

**BHARATHIAR UNIVERSITY**  
**COIMBATORE**

**A three-year Under-Graduate  
Programme in  
B. Sc. (Blended) Physics**

**Offered By  
Centre for International Affairs (CIA), Bharathiar  
University in collaboration with The University of  
Melbourne**

*(For the students admitted during the academic year 2025 – 26 onwards)*

**Syllabus for SEM I–VI  
(To Be Implemented from Academic Year 2025–2026)**

## **Overview of the B.Sc., (Blended) Course**

Bharathiar University is offering an innovative Bachelor's Degree known as B.Sc. (Blended) in collaboration with the University of Melbourne (UoM), Australia, to strengthen science education at the undergraduate level.

Bharathiar University is among the top universities in the country and has been at the forefront of initiating innovative programs. The UoM is ranked #1 in Australia and has been among the top 50 universities in the world.

The B.Sc. (Blended) course is a joint initiative of BU-UoM, offering a transparent and internationally recognized bachelor's degree that clearly outlines the teaching objectives and learning outcomes. In the first two years of the degree program, students will study all four basic sciences (Biology, Chemistry, Mathematics, and Physics), and in the third year, they will specialize in either Physics or Chemistry. The UoM will provide support in terms of special lectures, workshops, and quality assurance.

### **The B.Sc. (Blended) course aims to achieve the following objectives:**

- Introduce students to the fundamental concepts of science education.
- Enrich students' knowledge in all basic sciences, including Biology, Chemistry, Mathematics, and Physics.
- Help students develop an interdisciplinary approach to learning that integrates various scientific fields.
- Inculcate a sense of scientific responsibility, social awareness, and environmental consciousness in students.
- Assist students in building a successful and progressive career in academia and industry by providing them with the necessary skills and knowledge.

The B.Sc. (Blended) course will be jointly conducted by Bharathiar University and the University of Melbourne (UoM).

### **The following features are included in the course:**

- Special lectures will be delivered by expert faculty from UoM.
- The course will be quality assured by UoM, ensuring that it meets the highest standards of education.

- Upon completion, the degree will be considered equivalent to a degree from UoM, enabling students to pursue higher studies at UoM or any other Australian university.
- The collaboration with UoM ensures that students receive an internationally recognized education of the highest quality, opening up opportunities for further academic pursuits and careers in various fields. The students will be imparted solid training to enable them to pursue Masters and Integrated Ph.D. degrees in reputed institutes such as IITs, IISERs and Central Universities

### **Eligibility**

Higher Secondary School Certificate (10+2) or its equivalent Examination in Science stream with either PCM group (Physics, Chemistry & Mathematics) or PCMB group (Physics, Chemistry, Mathematics & Biology)

### **Course Structure**

- The B.Sc. (Blended) course follows a semester and credit system that spans over six semesters of 14-16 weeks each. The course curriculum is divided into two phases: the first two years and the third year.
- During the first two years, students will receive instruction in the four basic sciences, namely Biology, Chemistry, Mathematics, and Physics alongside language courses. In the third year, students will specialize in either Physics or Chemistry.
- The curriculum is designed to provide students with a well-rounded education in the sciences, preparing them for further academic pursuits or careers in various scientific fields.

### **Examination and Grading**

- The B.Sc. (Blended) course follows a credit-based system, and its examination process comprises two parts: continuous assessment (internal 50%) and end-semester examination (50%).
- The internal assessment will be based on various parameters, including classroom examinations (subjective/objective), fieldwork, viva-voce, assignments, lab work, tutorials, and group discussions. The grading will be carried out in accordance with the university norms applicable to the credit system.

- This examination process ensures that students are regularly assessed and evaluated based on their academic performance, facilitating a more comprehensive understanding of the subjects and enhancing the overall learning experience. The grading will be as per the university norms applicable to credit system.

### University Terms

- The commencement and conclusion dates for the odd and even semesters of the B.Sc. (Blended) course will adhere to the university regulations applicable to other departments.
- To be eligible for the term-end examination, students must fulfill the minimum attendance requirement of 75 percent for both theory and practical courses. Additionally, students must demonstrate satisfactory performance during the term.
- Adherence to these guidelines ensures that students attend classes regularly and maintain consistent academic performance throughout the term. This, in turn, promotes a positive and conducive learning environment for all students.

**Intake capacity of student:** B.Sc., Blended course:40 (20 for Physics and 20 for Chemistry)

**Duration:** The duration of **B.Sc., (Blended)** Degree Program shall be of three years.

**Medium of Instruction:** The medium of instruction for the course shall be English.

### Scheme of Examinations (CBCS Pattern)

- Number of weeks in a semester: 14-16
- Nomenclature: BIO: Biology. CHM: Chemistry. MTH: Mathematics PHY: Physics  
ENG: English; COMP –Computing; IDC: Interdisciplinary Course; FLX: Flexible timetabling
- 1 Credit =1 Contact hour per week both for theory and lab courses



| Course Code                                                                                                                                                                                                                                                         | Title of the Course                                                  | Credits | Hours  |           | Maximum Marks |     |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------|--------|-----------|---------------|-----|-------|
|                                                                                                                                                                                                                                                                     |                                                                      |         | Theory | Practical | CIA           | ESE | Total |
| FIRST SEMESTER                                                                                                                                                                                                                                                      |                                                                      |         |        |           |               |     |       |
| MTH101                                                                                                                                                                                                                                                              | Maths 1: Calculus                                                    | 4       | 4      | -         | 50            | 50  | 100   |
| PHY101                                                                                                                                                                                                                                                              | Physics 1: Introductory<br>Classical Physics                         | 4       | 4      | -         | 50            | 50  | 100   |
| CHM101                                                                                                                                                                                                                                                              | Chemistry 1: Introductory and<br>Organic Chemistry                   | 4       | 4      | -         | 50            | 50  | 100   |
| BIO101                                                                                                                                                                                                                                                              | Biology 1: The Diversity of Life                                     | 4       | 4      | -         | 50            | 50  | 100   |
| PHY102                                                                                                                                                                                                                                                              | Physics Practical                                                    | 2       | -      | 2         | 25            | 25  | 50    |
| CHM102                                                                                                                                                                                                                                                              | Chemistry Practical                                                  | 2       | -      | 2         | 25            | 25  | 50    |
| BIO102                                                                                                                                                                                                                                                              | Biology Practical                                                    | 2       | -      | 2         | 25            | 25  | 50    |
| FLX101*<br>(11T/11H/11M/<br>11K)                                                                                                                                                                                                                                    | Part I: Language Paper I-<br>Tamil/Malayalam/French/Hindi/<br>Kanada | 4       | 4      | -         | 50            | 50  | 100   |
| FLX102**<br>(12E)                                                                                                                                                                                                                                                   | Part II: English I                                                   | 4       | 4      | -         | 50            | 50  | 100   |
| 1FA#                                                                                                                                                                                                                                                                | Value Added 1/Foundation<br>course: Environmental Studies            | 2       | 2      | -         |               | 50  | 50    |
|                                                                                                                                                                                                                                                                     |                                                                      |         |        |           |               |     |       |
| <b>Total</b>                                                                                                                                                                                                                                                        |                                                                      | 32      | 26     | 6         | 375           | 425 | 800   |
| <p>* <b>and</b> ** indicates the mandatory language papers for all UG students as per the TN state government.<br/> # indicates the UGC mandatory course that all students must opt for. This course will be taught either in<br/> online mode or offline mode.</p> |                                                                      |         |        |           |               |     |       |

| SECOND SEMESTER              |                                                                                    |         |        |           |     |     |       |
|------------------------------|------------------------------------------------------------------------------------|---------|--------|-----------|-----|-----|-------|
| Course Code                  | Title of the Course                                                                | Credits | Theory | Practical | CIA | ESE | Total |
| MTH201                       | Maths 2: Algebra                                                                   | 4       | 4      | -         | 50  | 50  | 100   |
| PHY201                       | Physics 2: Modern Physics                                                          | 4       | 4      | -         | 50  | 50  | 100   |
| CHM201                       | Chemistry 2: Inorganic and Physical Chemistry                                      | 4       | 4      | -         | 50  | 50  | 100   |
| BIO201                       | Biology 2: Biology of Cells                                                        | 4       | 4      | -         | 50  | 50  | 100   |
| PHY202                       | Physics Practical                                                                  | 2       | -      | 2         | 25  | 25  | 50    |
| CHM202                       | Chemistry Practical                                                                | 2       | -      | 2         | 25  | 25  | 50    |
| BIO202                       | Biology Practical                                                                  | 2       | -      | 2         | 25  | 25  | 50    |
| IDC201                       | Scientific Computation and Modeling: Introduction to simple models and programming | 2       |        | 2         | 25  | 25  | 50    |
| FLX201*<br>(21T/21H/21M/21K) | Part I: Language Paper II- Tamil/Malayalam/French/Hindi/ Kanada                    | 4       | 4      | -         | 50  | 50  | 100   |
| FLX202**<br>(22E)            | Part II: English II                                                                | 4       | 4      | -         | 50  | 50  | 100   |
| 2FB#                         | Value Added 2/Foundation course: Human Rights                                      | 2       | 2      | -         |     | 50  | 50    |
|                              |                                                                                    |         |        |           |     |     |       |
| <b>Total</b>                 |                                                                                    | 34      | 26     | 8         | 400 | 450 | 850   |

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# indicates the UGC mandatory course that all students must opt for. This course will be taught either in online mode or offline mode.

| THIRD SEMESTER             |                                                                 |         |        |           |     |     |       |
|----------------------------|-----------------------------------------------------------------|---------|--------|-----------|-----|-----|-------|
| Course Code                | Title of the Course                                             | Credits | Theory | Practical | CIA | ESE | Total |
| MTH301                     | Maths 3: Vector Calculus, and Differential Equations            | 4       | 4      | -         | 50  | 50  | 100   |
| PHY301                     | Physics 3: Quantum mechanics and Thermodynamics                 | 4       | 4      | -         | 50  | 50  | 100   |
| CHM301                     | Chemistry 3: Reactions and Synthesis                            | 4       | 4      | -         | 50  | 50  | 100   |
| BIO301                     | Biology 3: Functional Biology of Organisms                      | 4       | 4      | -         | 50  | 50  | 100   |
| PHY302                     | Physics Practical                                               | 2       | -      | 2         | 25  | 25  | 50    |
| CHM302                     | Chemistry Practical                                             | 2       | -      | 2         | 25  | 25  | 50    |
| BIO302                     | Biology Practical                                               | 2       | -      | 2         | 25  | 25  | 50    |
| IDC301                     | Scientific Computation and Modeling: Projects                   | 2       | -      | 2         | 25  | 25  | 50    |
| FLX301*<br>31T/31H/31M/31K | Part I: Language Paper III- Tamil/Malayalam/French/Hindi/Kanada | 4       | 4      | -         | 50  | 50  | 100   |
| FLX302**<br>(32E)          | Part II: English III                                            | 4       | 4      | -         | 50  | 50  | 100   |
| 3FC#                       | Value added 3/Foundation course: Yoga for Human Excellence      | 2       | 2      |           |     | 50  | 50    |
| HW                         | Health & Wellness                                               | 1       | -      | 2         | 25  | -   | 25    |
|                            | <b>Total</b>                                                    | 36      | 26     | 10        | 425 | 450 | 875   |

\* **and** \*\* indicates the mandatory language papers for all UG students as per the TN state government.

# indicates the UGC mandatory course that all students must opt for. This course will be taught either in online mode or offline mode.

| FOURTH SEMESTER            |                                                                  |         |        |           |     |     |       |
|----------------------------|------------------------------------------------------------------|---------|--------|-----------|-----|-----|-------|
| Course Code                | Title of the Course                                              | Credits | Theory | Practical | CIA | ESE | Total |
| MTH401                     | Maths 4: Probability and Statistics                              | 4       | 4      | -         | 50  | 50  | 100   |
| PHY401                     | Physics 4: Electricity, magnetism, Special Relativity and Optics | 4       | 4      | -         | 50  | 50  | 100   |
| CHM401                     | Chemistry 4: Structure and properties                            | 4       | 4      | -         | 50  | 50  | 100   |
| BIO401                     | Biology 4: Genetics Evolution and Ecology                        | 4       | 4      | -         | 50  | 50  | 100   |
| PHY402                     | Physics Practical                                                | 2       | -      | 2         | 25  | 25  | 50    |
| CHM 402                    | Chemistry Practical                                              | 2       | -      | 2         | 25  | 25  | 50    |
| BIO402                     | Biology Practical                                                | 2       | -      | 2         | 25  | 25  | 50    |
| FLX401*<br>41T/41H/41M/41K | Part I: Language Paper IV- Tamil/Malayalam/French/Hindi/ Kanada  | 4       | 4      | -         | 50  | 50  | 100   |
| FLX402**<br>(42E)          | Part II: English IV                                              | 4       | 4      | -         | 50  | 50  | 100   |
| 4FD#                       | Value added 4/Foundation course: General Awareness               | 2       | 2      |           |     | 50  | 50    |
|                            | <b>Total</b>                                                     | 32      | 26     | 6         | 375 | 425 | 800   |

\* **and** \*\* indicates the mandatory language papers for all UG students as per the TN state government.  
# indicates the UGC mandatory course that all students must opt for. This course will be taught either in online mode or offline mode.

| FIFTH SEMESTER |                                                  |         |        |           |     |     |       |
|----------------|--------------------------------------------------|---------|--------|-----------|-----|-----|-------|
| Course Code    | Title of the Course                              | Credits | Theory | Practical | CIA | ESE | Total |
| PHY 501        | Classical Mechanics                              | 4       | 4      | -         | 50  | 50  | 100   |
| PHY 502        | Quantum Mechanics                                | 4       | 4      | -         | 50  | 50  | 100   |
| PHY 503        | Solid State Physics                              | 4       | 4      | -         | 50  | 50  | 100   |
| PHY 504        | Electrodynamics                                  | 4       | 4      | -         | 50  | 50  | 100   |
| PHY 505        | Elective – 1:<br>Introduction to<br>Astrophysics | 2       | 2      | -         | 25  | 25  | 50    |
| PHY 506        | Elective – 2:<br>Nanotechnology                  | 2       | 2      | -         | 25  | 25  | 50    |
| PHY 507        | Physics Lab I                                    | 2       | -      | 2         | 25  | 25  | 50    |
| PHY 508        | Physics Lab II (analog<br>and digital)           | 2       | -      | 2         | 25  | 25  | 50    |
| PHY 509        | Graduate Level Thesis                            | 2       | -      | 2         | 25  | 25  | 50    |
| <b>Total</b>   |                                                  | 26      | 20     | 6         | 325 | 325 | 650   |

| SIXTH SEMESTER     |                                                      |            |            |           |             |             |             |
|--------------------|------------------------------------------------------|------------|------------|-----------|-------------|-------------|-------------|
| Course Code        | Title of the Course                                  | Credits    | Theory     | Practical | CIA         | ESE         | Total       |
| PHY 601            | Statistical Mechanics                                | 4          | 4          | -         | 50          | 50          | 100         |
| PHY 602            | Subatomic Physics                                    | 4          | 4          | -         | 50          | 50          | 100         |
| PHY 603            | Atomic and Molecular Spectroscopy and Lasers         | 4          | 4          | -         | 50          | 50          | 100         |
| PHY 604            | Digital and analog electronics                       | 4          | 4          | -         | 50          | 50          | 100         |
| PHY 605            | Elective – 3: Renewable Energy and Energy Harvesting | 2          | 2          | -         | 25          | 25          | 50          |
| PHY 606            | Elective – 4: Introductory Biophysics                | 2          | 2          | -         | 25          | 25          | 50          |
| PHY 607            | Physics Lab I                                        | 2          | -          | 2         | 25          | 25          | 50          |
| PHY 608            | Physics Lab II (analog and digital)                  | 2          | -          | 2         | 25          | 25          | 50          |
| PHY 609            | Graduate Level Thesis                                | 2          | -          | 2         | 25          | 25          | 50          |
| <b>Total</b>       |                                                      | 26         | 20         | 6         | 325         | 325         | 650         |
|                    |                                                      |            |            |           |             |             |             |
| <b>Grand Total</b> |                                                      | <b>186</b> | <b>144</b> | <b>42</b> | <b>2225</b> | <b>2400</b> | <b>4625</b> |

# **SEMESTER I**

## SEMESTER I

|                                                                                                                            |                          |                  |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------|
| <b>Subject Code:</b> MTH101                                                                                                | <b>Maths 1:</b> Calculus | <b>4 Credits</b> |
| <b>Logic and Proof</b>                                                                                                     |                          |                  |
| <b>Basic Set Theory</b>                                                                                                    |                          | <b>1 Hour</b>    |
| Sets, Subsets, Power Sets                                                                                                  |                          |                  |
| <b>Operations:</b> Union, Intersection, Difference, Complement, Venn Diagrams.                                             |                          | <b>1</b>         |
| <b>Cardinality:</b> Finite and Infinite Sets, Countable and Uncountable Sets, Cartesian Products, Indexed Families of Sets |                          |                  |
| <b>Number System</b>                                                                                                       |                          | <b>3 Hours</b>   |
| Natural Numbers, Integers, Rational Numbers                                                                                |                          | <b>1</b>         |
| Real numbers                                                                                                               |                          | <b>1</b>         |
| Properties of Real Numbers and Completeness Property of Real Numbers                                                       |                          | <b>1</b>         |
| <b>Logic</b>                                                                                                               |                          | <b>4 Hours</b>   |
| Logical Connectives (Conjunction, Disjunction, Negation, Conditional, Biconditional) and Truth Tables                      |                          | <b>1</b>         |
| Propositional Logic, Logical Equivalence, Logical Laws                                                                     |                          | <b>1</b>         |
| Quantifiers, Predicate Calculus                                                                                            |                          | <b>1</b>         |
| Negation of Quantified Statements                                                                                          |                          | <b>1</b>         |
| <b>Methods of Proof</b>                                                                                                    |                          | <b>3 Hours</b>   |
| Direct Proof, Contrapositive                                                                                               |                          | <b>1</b>         |
| Contradiction, Proof by Cases                                                                                              |                          | <b>1</b>         |
| Induction                                                                                                                  |                          | <b>1</b>         |
| <b>Complex Numbers</b>                                                                                                     |                          |                  |
| <b>Review of Complex Numbers</b>                                                                                           |                          | <b>2 Hours</b>   |
| Definition of Complex Numbers, Algebra of Complex Numbers, Argand Plane, Cartesian and Polar Form                          |                          | <b>1</b>         |
| Exponential Form: $z = r(\cos \theta + i \sin \theta)$ Euler's Formula                                                     |                          | <b>1</b>         |
| <b>Roots of Complex Numbers</b>                                                                                            |                          | <b>2 Hours</b>   |
| Fundamental Theorem of Algebra                                                                                             |                          | <b>1</b>         |
| Finding nth Roots of Unity and De Moivre's Theorem; Roots of Complex Numbers                                               |                          | <b>1</b>         |
| <b>Differential Calculus</b>                                                                                               |                          |                  |
| <b>Limits, Continuity and Differentiation</b>                                                                              |                          | <b>5 Hours</b>   |
| Definitions Using $\varepsilon$ - $\delta$ (limit and continuity), One-sided Limits                                        |                          | <b>1</b>         |
| Limits at Infinity, Continuity and Types of Discontinuities                                                                |                          | <b>1</b>         |
| Rules: Product, Quotient, Chain Rule                                                                                       |                          | <b>1</b>         |
| Derivative of Functions (incl. Polynomials, Trigonometric, Exponential, Log Functions)                                     |                          | <b>1</b>         |
| Higher Order Derivatives                                                                                                   |                          | <b>1</b>         |



|                                                                                                                                                                                              |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Inverse Trigonometric Functions and Implicit Differentiation</b>                                                                                                                          | <b>4 Hours</b> |
| Inverse Trigonometric Function and Their Derivatives                                                                                                                                         | 2              |
| Implicit Differentiation                                                                                                                                                                     | 2              |
| <b>Integral Calculus</b>                                                                                                                                                                     |                |
| <b>Reimann Integration</b>                                                                                                                                                                   | <b>1 Hour</b>  |
| Definition of Reimann Integral, Partition, Norm of Partition, Upper and Lower Sums, Conditions for Integrability                                                                             | 1              |
| <b>Fundamental Theorem of Calculus; Review of Standard Antiderivatives</b>                                                                                                                   | <b>1 Hour</b>  |
| Statement and Explanation of Fundamental Theorem, Relationship Between Differentiation and Integration, Common Antiderivatives (Power, Exponential, Trigonometric and Logarithmic Functions) | 1              |
| <b>Techniques of Integration</b>                                                                                                                                                             | <b>4 Hours</b> |
| Derivative Present Substitution, Linear Substitution                                                                                                                                         | 1              |
| Integration of Trigonometric Functions Using Identities                                                                                                                                      | 1              |
| Integration of Rational Functions Including Partial Fractions, Integration Yielding Inverse Trigonometric Functions                                                                          | 1              |
| Trigonometric Substitutions; Integration By Parts                                                                                                                                            | 1              |
| <b>Definite Integral</b>                                                                                                                                                                     | <b>1 Hour</b>  |
| Definite Integral, Properties and Interpretation of Area, Fundamental Theorem of Calculus Improper Integrals                                                                                 | 1              |
| <b>Applications of Integration</b>                                                                                                                                                           | <b>2 Hours</b> |
| Areas Between Curves                                                                                                                                                                         | 1              |
| Volumes of Surfaces of Revolution                                                                                                                                                            | 1              |
| <b>Ordinary Differential Equations</b>                                                                                                                                                       |                |
| <b>Basic Concepts</b>                                                                                                                                                                        | <b>1 Hour</b>  |
| Definition of ODE, Order, General Solution, Initial Conditions; Separable ODEs                                                                                                               | 1              |
| <b>First Order ODEs</b>                                                                                                                                                                      | <b>1 Hour</b>  |
| Separable Equations, Homogeneous and Non-Homogeneous Equations, Linear First-Order Equations (Integrating Factor)                                                                            | 1              |
| <b>Applications of First Order ODEs</b>                                                                                                                                                      | <b>3 Hours</b> |
| Ecology Models                                                                                                                                                                               | 1              |
| Chemical Reaction Rates                                                                                                                                                                      | 1              |
| Newton's Law of Cooling                                                                                                                                                                      | 1              |
| <b>Second Order ODEs</b>                                                                                                                                                                     | <b>2 Hours</b> |
| Definitions of Homogeneous/Inhomogeneous, Linear/Non- Linear; Solution of Homogeneous Constant-Coefficient Linear ODEs                                                                       | 1              |
| Particular Solutions Of Inhomogeneous Constant Coefficient Linear ODEs Using Method of Undetermined Coefficients; Principle of Superposition                                                 | 1              |

|                                                                                                                                         |                |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Applications of Second Order ODEs</b>                                                                                                | <b>2 Hours</b> |
| Springs                                                                                                                                 | <b>1</b>       |
| LRC series electrical circuits                                                                                                          | <b>1</b>       |
| <b>Real World Application of ODEs</b>                                                                                                   | <b>3 Hours</b> |
| Real World Contextual Examples in Physics and Chemistry and the Application of ODEs (Selection of Examples Depending on Student Cohort) | <b>3</b>       |
|                                                                                                                                         |                |

### **Logics and Proof:**

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7<sup>th</sup> Edition, McGraw Hill, 2012.
2. Gary Chartrand, Albert D. Polimeni and Ping Zhang, Mathematical Proofs – A Transition to Advanced Mathematics, 3<sup>rd</sup> Edition, Pearson Education, Inc., 2012.

### **Complex Numbers:**

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, 8<sup>th</sup> Edition, McGraw Hill Higher Education, 2008.
2. L. V. Ahlfors, Complex Analysis, Third Edition, McGraw Hill Book Company, 2013.

### **Differential Calculus, Integral Calculus and Ordinary Differential Equations:**

1. James Stewart, Daniel Clegg and Saleem Watson, Calculus – Early Transcendentals, 9<sup>th</sup> Edition, Cengage, 2021.
2. Robert A. Adams and Christopher Essex, Calculus – A Complete Course, 7<sup>th</sup> Edition, Pearson Canada, 2009.
3. Robert T. Smith and Roland B. Minton, Calculus, 4<sup>th</sup> Edition, McGraw Hill, 2012.
4. Maurice D. Weir, Joel Hass, P. Sivaramakrishna Das and C. Vijaykumari, Calculus, Pearson, 2018.
5. Mukesh Kumar, A.P. Singh and Ashok Kumar, Integral Calculus, Medtech, 2008.
6. S.B. Gaikwad, K.C. Takale, V.S. Jadhav, P.G.Jadhav, S.M. Waingade, S.R. Patil, Calculus, Nirali Prakashan, 2019

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------|------------------|---------|
| Course code                                                                                                                                                                                                                                                                                                                                                                               | PHY101                       | Physics 1: Introductory Classical Physics | 4 Credits        |         |
| Core/Elective/SBS                                                                                                                                                                                                                                                                                                                                                                         |                              | CORE PAPER                                |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                           | Syllabus Version | 2023-24 |
|                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                           |                  |         |
| Unit:1                                                                                                                                                                                                                                                                                                                                                                                    | Classical Mechanics          |                                           |                  |         |
| Straight line motion – Vectors – Two and three dimensional motion – Force and Motion : Newton's Laws – Force and Motion : Drag and Friction – Kinetic energy, work, power – Potential energy, conservation of energy – Collisions and momentum – Rotational motion – Angular momentum-I – Angular momentum-II                                                                             |                              |                                           |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                           |                  |         |
| Unit:2                                                                                                                                                                                                                                                                                                                                                                                    | Gravitation                  |                                           |                  |         |
| Newton's law of gravity – superposition – Gravity at the earth's surface – far above the earth and within the earth – Work and gravitational potential energy - Kepler's laws : the planets and satellites – Orbital motion and energy                                                                                                                                                    |                              |                                           |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                           |                  |         |
| Unit:3                                                                                                                                                                                                                                                                                                                                                                                    | Thermal physics              |                                           |                  |         |
| Zeroth Law of Thermodynamics – Thermal expansion and absorption of heat – Heat transfer, conduction, emission, absorption                                                                                                                                                                                                                                                                 |                              |                                           |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                           |                  |         |
| Unit:4                                                                                                                                                                                                                                                                                                                                                                                    | Elasticity, fluids and gases |                                           |                  |         |
| Equilibrium and elasticity – Density and Pressure, Pascal's and Archimedes' Principles – Continuity and Bernoulli's Equation – Ideal gases (Kinetic theory of gases) – Mean free path, molecular speed distribution – Specific heat, adiabatic expansion – Real world examples – examples: wind power, hydro, blood circulation, water in plants, materials, osmosis, wind and atmosphere |                              |                                           |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                           |                  |         |
| Unit:5                                                                                                                                                                                                                                                                                                                                                                                    | ODEs                         |                                           |                  |         |
| Applications of 2 <sup>nd</sup> order ODEs: Springs – Applications of 2 <sup>nd</sup> order ODEs: LRC series electrical circuits – Real world contextual examples in physics and application of ODEs                                                                                                                                                                                      |                              |                                           |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                           |                  |         |

| <b>Text Book(s)</b>                                                  |                                                                                                                                                   |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                                                    | Properties of Matter, Brijlal and N.Subrahmanyam, 3 <sup>rd</sup> Edition, S. Chand & Co.(2005).                                                  |
| 2                                                                    | Heat & Thermodynamics, Brijlal & N.Subramaniam, S.Chand & Co(2007)                                                                                |
|                                                                      |                                                                                                                                                   |
| <b>Reference Books</b>                                               |                                                                                                                                                   |
| 1                                                                    | Elements of Properties of Matter, D.S. Mathur, 11 <sup>th</sup> Edition, S. Chand & Co.,(2010).                                                   |
| 2                                                                    | Heat and Thermodynamics–Zemansky and R.H.Dcltanann, TMH (2017)                                                                                    |
|                                                                      |                                                                                                                                                   |
| <b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.,]</b> |                                                                                                                                                   |
| 1                                                                    | <a href="https://www.physicstutoronline.co.uk/alevelphysicsnotes/">https://www.physicstutoronline.co.uk/alevelphysicsnotes/</a>                   |
| 2                                                                    | <a href="https://latestcontents.com/bsc-physics-mechanics-notes/">https://latestcontents.com/bsc-physics-mechanics-notes/</a>                     |
| 3                                                                    | <a href="https://www.askiitians.com/revision-notes/physics/thermodynamics/">https://www.askiitians.com/revision-notes/physics/thermodynamics/</a> |
| 4                                                                    | <a href="http://www.khanacademy.org/science/physics/elasticity/surfacetension">www.khanacademy.org/science/physics/elasticity/surfacetension</a>  |

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------|------------------|---------|
| Course Code                                                                                                                                                                                                                                                                                                                                                                              | CHM101               | GENERALCHEMISTRY–<br>CHEMISTRY OF LIFE | 4 Credits        |         |
| CORE                                                                                                                                                                                                                                                                                                                                                                                     |                      | Chemistry 1                            |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        | Syllabus Version | 2023-24 |
| UNIT I                                                                                                                                                                                                                                                                                                                                                                                   | General Chemistry    |                                        |                  |         |
| The Periodic Table - The Basis of the Periodic System, Classifications of Elements and Groups – Molecular Structure and Bonding - Chemical Bonding, Types of Chemical Bonds, Bond Characteristics – Acids and Bases - Theories of Acids and Bases, pH of Acids and Bases, Properties of Acids and Bases - Stoichiometry - Stoichiometric Coefficient, Balanced Reactions and Mole Ratios |                      |                                        |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                  |         |
| UNIT II                                                                                                                                                                                                                                                                                                                                                                                  | Organic Chemistry    |                                        |                  |         |
| Carbon- The Basis of Life – Structure and Bonding Alkanes- Alkanes Formula and its Condensed Structures, Branched Chain Alkane Formula, $sp^3$ Hybridisation – Structure and Bonding Alkenes- $sp^2$ Hybridisation – Benzene and its derivatives - Structure and Bonding of Alkynes - $sp$ hybridization                                                                                 |                      |                                        |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                  |         |
| UNIT III                                                                                                                                                                                                                                                                                                                                                                                 | Organic Chemistry    |                                        |                  |         |
| Functional Groups - Nomenclature of Common Functional Groups – Electrophiles and Nucleophiles – Nucleophilic Substitution Reactions – Elimination Reactions – Addition Reactions – Electrophilic Aromatic Substitution Reactions – Nucleophilic Addition Reactions – Organic Redox Reactions                                                                                             |                      |                                        |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                  |         |
| UNIT IV                                                                                                                                                                                                                                                                                                                                                                                  | Physical Chemistry   |                                        |                  |         |
| First Law of Thermodynamics- Adiabatic processes, Constant Volume Processes ,Enthalpy, Cyclical Processes, Free Expansions – Second Law of Thermodynamics – Irreversible Processes, Entropy, Free Energy, Real world Examples-Solar Energy, Geothermal ,Wind Power                                                                                                                       |                      |                                        |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                  |         |
| UNIT V                                                                                                                                                                                                                                                                                                                                                                                   | Applications of ODEs |                                        |                  |         |
| Applicationsof1 <sup>st</sup> Order ODEs: Ecology Models - Applicationsof1 <sup>st</sup> OrderODEs: Chemical Reaction Rates, Newton's Law of Cooling - Second-Order ODEs: Definitions of Homogeneous/Inhomogeneous, Linear/Non-linear ODEs –Solution of Homogeneous Constant-Coefficient Linear ODEs.                                                                                    |                      |                                        |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                  |         |

| <b>Textbook(s)</b>                                                 |                                                                                                               |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 1                                                                  | Principles of Physical Chemistry, B.R.Puri, L.R.Sharma, S.Chand & Co.                                         |
| 2                                                                  | Inorganic Chemistry, P. L. Soni, Sultan Chand & Sons.                                                         |
| 3                                                                  | A Textbook of Organic Chemistry, Arun Bahl, B.S. Bahl, S.Chand & Co.                                          |
| 4                                                                  | OrganicChemistry, Vol.1,2 & 3, S. M.Mughergee, S.P. Singh, R.P. Kapoor, Wiley Eastern.                        |
|                                                                    |                                                                                                               |
| <b>Reference Books</b>                                             |                                                                                                               |
| 1                                                                  | Advanced Organic Chemistry, B.S. Bahl, Arunbahl, S.Chand & Co.                                                |
| 2                                                                  | Essentials of Physical Chemistry, B.S. Bahl and G.D.Tuli, S.Chand & Co.                                       |
| 3                                                                  | Text book of Physical Chemistry ,P.L.Soni, D.B. Dharmarke, S. Chand & Co.                                     |
| 4                                                                  | Ordinary Differential Equations with Applications, Sze-Bi Hsu, World Scientific Publishing Co. Pte. Ltd       |
|                                                                    |                                                                                                               |
| <b>Related Online Contents [MOOC,SWAYAM, NPTEL, Websites etc.]</b> |                                                                                                               |
| 1                                                                  | <a href="https://chem.libretexts.org/">https://chem.libretexts.org/</a>                                       |
| 2                                                                  | <a href="https://byjus.com/chemistry/">https://byjus.com/chemistry/</a>                                       |
| 3                                                                  | <a href="https://openstax.org/details/books/chemistry-2e">https://openstax.org/details/books/chemistry-2e</a> |

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|                                                                                  |                                                                                                                                                                                                                                                   |
| <b>BIOLOGY - BIO101                      Evolution and the Diversity of Life</b> |                                                                                                                                                                                                                                                   |
| <b>38 h</b>                                                                      |                                                                                                                                                                                                                                                   |
| 1                                                                                | Theory of evolution: understanding life's diversity                                                                                                                                                                                               |
| 1                                                                                | Evolutionary relationships (phylogenies) are summarized in Classifications                                                                                                                                                                        |
| 1                                                                                | Chemical evolution of life – Molecules to cells                                                                                                                                                                                                   |
| 1                                                                                | Cell theory and the origin of life                                                                                                                                                                                                                |
| 2                                                                                | Prokaryotic Cells: Structure and diversity of Bacteria and Archaea (2 lectures)                                                                                                                                                                   |
| 1                                                                                | Evolution of the eukaryotic cell (Endosymbiotic theory and origin of organelles)                                                                                                                                                                  |
| 1                                                                                | Endosymbiosis                                                                                                                                                                                                                                     |
| 1                                                                                | Protists 1 - Red and Green algae (Features, life cycles, and evolutionary significance)                                                                                                                                                           |
| 1                                                                                | Protists 2 – Chromists (Diatoms, brown algae, and related groups)                                                                                                                                                                                 |
| 1                                                                                | Protists 3 - Protozoan Protist (Dinoflagellates and apicomplexans, flagellates, ciliates, amoebae)                                                                                                                                                |
| 1 + 1                                                                            | Evolution of sex (Origins and significance of sex in eukaryotes and Variations in sexual reproduction, i.e. haplontic, diplontic, haplodiplontic), life cycles (Comparative study of life cycle strategies in plants, Protists, fungi, and algae) |
| 1                                                                                | Origins of multicellularity (Evolutionary transitions from unicellular to multicellular life; Genetic and structural adaptations)                                                                                                                 |
| 1 + 1                                                                            | Slime moulds (Types - plasmodial and cellular and Life cycle and ecological role) and fungi (General characteristics and classification; Reproduction and life cycles, Ecological roles and economic importance)                                  |
| 1                                                                                | Fungi 2                                                                                                                                                                                                                                           |
| 1                                                                                | Introduction to Land Plants                                                                                                                                                                                                                       |
| 1                                                                                | Bryophytes (Characteristics and Significance)                                                                                                                                                                                                     |
| 1                                                                                | Evolution of vascular tissue, Lycophytes, fern allies, early fossil land plants (Diversity and ecological relevance)                                                                                                                              |
| 1                                                                                | Ferns                                                                                                                                                                                                                                             |
| 1                                                                                | Seed plants (Structure, function, and types), the seed and secondary growth, Cycads and Ginkgo                                                                                                                                                    |
| 1                                                                                | Conifer diversity and biology                                                                                                                                                                                                                     |
| 1                                                                                | Angiosperm structure, biology and diversity, the flower, double fertilization (Basic Flower structure and Reproductive strategies in angiosperms)                                                                                                 |
| 1                                                                                | Angiosperm phylogeny and evolution (Wood formation and vascular cambium)                                                                                                                                                                          |
| 1                                                                                | Introduction to animals (Metazoa)                                                                                                                                                                                                                 |
| 1                                                                                | Simple animals                                                                                                                                                                                                                                    |
| 1                                                                                | Protostomes-Flatworms and annelids                                                                                                                                                                                                                |
| 1                                                                                | Molluscs                                                                                                                                                                                                                                          |
| 1                                                                                | Arthropods                                                                                                                                                                                                                                        |
| 1                                                                                | Deuterostomes, Echinoderms-Chordates                                                                                                                                                                                                              |
| 1                                                                                | Fishes –sharks/rays, teleosts, coelacanth, lungfish                                                                                                                                                                                               |
| 1                                                                                | Amphibians                                                                                                                                                                                                                                        |
| 1                                                                                | Reptiles                                                                                                                                                                                                                                          |
| 1                                                                                | Birds                                                                                                                                                                                                                                             |
| 2                                                                                | Mammals                                                                                                                                                                                                                                           |
| 1                                                                                | The Primate story                                                                                                                                                                                                                                 |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <b>Text Book(s)</b>                                                                                                                                                                                                                 |        |
| Evolution, Strickberger. Fifth Edition, Jones and Bartlett Publishers, Inc (2013).                                                                                                                                                  |        |
| Biology, P.H. Raven, G.B. Johnson, K.A. Mason, L. Jonathan, T. Duncan, Twelfth Edition, McGraw Hill (2019)                                                                                                                          | McGraw |
|                                                                                                                                                                                                                                     |        |
| <b>Reference Books</b>                                                                                                                                                                                                              |        |
| Campbell Biology, L. Urry, M. Cain, <u>S. Wasserman</u> , <u>P. Minorsky</u> , J. Reece 11 <sup>th</sup> Edition, Pearson, (2017).                                                                                                  |        |
| Evolution, <u>Douglas Futuyma</u> , <u>Mark Kirkpatrick</u> , 4 <sup>th</sup> edition, Sinauer, 2017                                                                                                                                |        |
|                                                                                                                                                                                                                                     |        |
| <b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.,]</b>                                                                                                                                                                |        |
| <a href="https://www.easybiologyclass.com/chemical-evolution-theory-biochemical-origin-of-life-short-lecture-notes/">https://www.easybiologyclass.com/chemical-evolution-theory-biochemical-origin-of-life-short-lecture-notes/</a> | short- |
| <a href="https://bio.libretexts.org/Introductory_and_General_Biology/Diversity_of_Microbes_Fungi_and_Protists">https://bio.libretexts.org/Introductory_and_General_Biology/Diversity_of_Microbes_Fungi_and_Protists</a>             |        |
| <a href="https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/_Diversity_of_Plants">https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/_Diversity_of_Plants</a>                             |        |
| <a href="https://www.khanacademy.org/science/biology-india/animal-kingdom">https://www.khanacademy.org/science/biology-india/animal-kingdom</a>                                                                                     |        |
|                                                                                                                                                                                                                                     |        |



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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------|------------------|---------|
| Course code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | PHY102                                                                                                      | PHYSICS PRACTICAL 1 | 2 Credits        |         |
| Core/Elective/SBS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                             | CORE PRACTICAL      |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                             |                     | Syllabus Version | 2023-24 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                             |                     |                  |         |
| LIST OF EXPERIMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                             |                     |                  |         |
| <div>1. Simple Pendulum: To plot a <math>L-T^2</math> graph using a simple pendulum and find the effective length of the simple pendulum for a given time period using the graph.</div> <div>2. To calculate the acceleration due to gravity at a place.</div> <div>3. Torsional Pendulum: To find the moment of inertia of the disc and the rigidity modulus of the material of the suspension wire subjected to torsional oscillations.</div> <div>4. Young's Modulus: To determine the Young's modulus of elasticity of the material of a given wire using Searle's apparatus.</div> <div>5. Spring: To determine the restoring force per unit extension of a spiral spring by statistical and dynamical methods and also to determine the mass of the spring.</div> <div>6. Euler's Method: To determine the coefficient of friction by Euler's Method.</div> <div>7. Viscosity: To determine Coefficient of Viscosity by Stoke's Method.</div> |                                                                                                             |                     |                  |         |
| Reference Books                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                             |                     |                  |         |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | A textbook of practical Physics, M.N.Srinivasan, S.Balasubramanian,R.Ranganathan,Sultan Chand & Sons (2017) |                     |                  |         |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Practical Physics and Electronics, C.C. Ouseph,U.J.Rao,V.Vijayendran,S.Viswanathan Publishers (2007)        |                     |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                             |                     |                  |         |
| Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                             |                     |                  |         |
| <a href="https://nptel.ac.in/course.html/physics/experimentalphysicsI,IIandIII">https://nptel.ac.in/course.html/physics/experimentalphysicsI,IIandIII</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                             |                     |                  |         |
| <a href="https://nptel.ac.in/courses/115/105/115105110/">https://nptel.ac.in/courses/115/105/115105110/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                             |                     |                  |         |
| <a href="https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLoFRX7n8z4tHYK">https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLoFRX7n8z4tHYK</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                             |                     |                  |         |

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| Course Code                                                                                                                                                                                                                                            | CHM102              | CHEMISTRY PRACTICAL 1 | 2 Credits        |         |
| Core/Elective/SBS                                                                                                                                                                                                                                      |                     | CORE PRACTICAL        |                  |         |
|                                                                                                                                                                                                                                                        |                     |                       | Syllabus Version | 2023-24 |
|                                                                                                                                                                                                                                                        | List of Experiments |                       |                  |         |
| <b>List of Physical chemistry experiments (Any 2)</b>                                                                                                                                                                                                  |                     |                       |                  |         |
| 1. To determine the rate constant of the hydrolysis of Ethyl acetate using an acid catalyst.                                                                                                                                                           |                     |                       |                  |         |
| 2. Molar mass determination of some base metals, gases.                                                                                                                                                                                                |                     |                       |                  |         |
| 3. Determination of dissociation constant of a weak acid.                                                                                                                                                                                              |                     |                       |                  |         |
| 4. Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known substance.                                                                                                                           |                     |                       |                  |         |
| 5. Calculation of the enthalpy of ionization of ethanoic acid.                                                                                                                                                                                         |                     |                       |                  |         |
| <b>List of Inorganic chemistry experiments (Any 2)</b>                                                                                                                                                                                                 |                     |                       |                  |         |
| Basic Analytical Terms: Volumetric and Gravimetric analysis, Titration, Types of titration viz. acid base, redox, iodometric, iodometric and complexometric titrations, Types of indicators, Selection of indicator, Aquametry (Karl-Fisher titration) |                     |                       |                  |         |
| 1. Oxalate Complexes of Aluminum and Chromium.                                                                                                                                                                                                         |                     |                       |                  |         |
| 2. Estimation of Fe (II) with K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> using internal external (diphenylamine, anthranilic acid) and external indicator.                                                                                          |                     |                       |                  |         |
| 3. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.                                                                                                                                                                  |                     |                       |                  |         |
| 4. Estimation of Fe (II) and oxalic acid using standardized KMnO <sub>4</sub> solution.                                                                                                                                                                |                     |                       |                  |         |
| <b>List of Organic chemistry experiments (Any 3 in Each Group)</b>                                                                                                                                                                                     |                     |                       |                  |         |
| 1. Techniques:                                                                                                                                                                                                                                         |                     |                       |                  |         |
| Crystallization, Sublimation, Distillation, Steam Distillation, Vacuum Distillation, Column Chromatography, Thin Layer Chromatography. Record Melting Point & Boiling Point.                                                                           |                     |                       |                  |         |
| 2. Functional group tests following functional groups                                                                                                                                                                                                  |                     |                       |                  |         |
| Alcohols, Alkenes, Aldehydes and Ketones, Acids, Phenols, Amines, Amides, Esters, Aromatic compounds.                                                                                                                                                  |                     |                       |                  |         |
| 3. Preparations:                                                                                                                                                                                                                                       |                     |                       |                  |         |
| Preparation of 4, 4'-Dimethoxy-dibenzylideneacetone                                                                                                                                                                                                    |                     |                       |                  |         |
| Preparation of 4-tert-Butylphenol                                                                                                                                                                                                                      |                     |                       |                  |         |
| Reduction of p-nitro benzaldehyde by sodium borohydride                                                                                                                                                                                                |                     |                       |                  |         |
| Nitration of Salicylic acid by green approach (using ceric ammonium nitrate).                                                                                                                                                                          |                     |                       |                  |         |
| Bromination of cinnamic acid.                                                                                                                                                                                                                          |                     |                       |                  |         |

| <b>Text Book(s)</b> |                                                                                                                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                   | Basic Principles of Practical Chemistry, Kulandaivelu A.R., Veeraswamy R., Venkateswaran, Sultan Chand & Sons, 2017                                                                                             |
| 2                   | Practical Chemistry for B.Sc Chemistry, A.O. Thomas                                                                                                                                                             |
| 3                   | Practical Chemistry, Pandey D.N., Sultan Chand Publishers, 2018                                                                                                                                                 |
| 4                   | <a href="https://www.freebookcentre.net/chemistry-books-download/Chemistry-Laboratory-Manual-by-CSOS.html">https://www.freebookcentre.net/chemistry-books-download/Chemistry-Laboratory-Manual-by-CSOS.html</a> |
| <b>Reference</b>    |                                                                                                                                                                                                                 |
| 1                   | Vogel's Text book of Practical Organic Chemistry, Brian S. Furniss, Antony J. Hannaford, Peter W. G. Smith, Fifth Edition, Bath Press, Great Britan, 1989                                                       |
| 2                   | Vogel's Textbook of Quantitative Chemical Analysis, G H Jeffery, J Bassett, J Mendham, R C Denney, Fifth Edition, Bath Press, Great Britan, 1989                                                                |

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|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|---------|
| Course code                                                       | BIO102                                                                                                                                                                                                                                                                                                                                                                                                       | BIOLOGY PRACTICAL | 2 Credits        |         |
| Core/Elective/SBS                                                 |                                                                                                                                                                                                                                                                                                                                                                                                              | CORE PRACTICAL    |                  |         |
|                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                              |                   | Syllabus Version | 2023-24 |
|                                                                   | List of Experiments                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |         |
| 1. Basic instrumentation techniques – Principles and Operation    |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 2. Laboratory Sterilization Methods - Principles and Operation    |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 3. Estimation of proteins: Bradford Assay                         |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 4. Estimation of DNA: DPA(diphenylamine)method                    |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 5. Identification of sugars/carbohydrates.                        |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 6. Observation of zooplankton from pond samples under microscope. |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 7. Determination of dissolved oxygen in water sample.             |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
|                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| Text Book(s)                                                      |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 1                                                                 | Laboratory manual in biochemistry by J. Jayaraman, Wiley Eastern Publishers                                                                                                                                                                                                                                                                                                                                  |                   |                  |         |
| 2                                                                 | Biochemical Methods- Sadasivam and Manickam, 3rd Edition, New Age International Publishers                                                                                                                                                                                                                                                                                                                   |                   |                  |         |
| 3                                                                 | Zooplankton Methodology, Collection & Identification – - a field manual, S.C Goswami,                                                                                                                                                                                                                                                                                                                        |                   |                  |         |
|                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| Reference                                                         |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |
| 1                                                                 | Roy, K. Gupta, S., Nandi, S. K. (2016) Int. J. Res. Biol. Sci. 6 (1):1-6 2.                                                                                                                                                                                                                                                                                                                                  |                   |                  |         |
| 2                                                                 | Aneesh E. M., Fathibi, K. and Ambalaparambil, V. S. (2017) Int. J. Recent Sci. Res. 8 (10) : 20999-21015; available at <a href="https://www.researchgate.net/publication/321025466_Indian_Fresh_Water_Zooplankton_A_Review_Int_J_Recent_Sci_Res_810_pp_209_99-21015">https://www.researchgate.net/publication/321025466_Indian_Fresh_Water_Zooplankton_A_Review_Int_J_Recent_Sci_Res_810_pp_209_99-21015</a> |                   |                  |         |
|                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                  |         |

## VALUE ADDED 1: ENVIRONMENTAL STUDIES

| Course code                                                                                                                                                                           | VA-1                                                                                                        | Environmental Studies        | L                | T | P       | C |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------|------------------|---|---------|---|
| Value Added                                                                                                                                                                           |                                                                                                             | Value Added 1                | 2                | - | -       | 2 |
| Pre-requisite                                                                                                                                                                         |                                                                                                             | Understanding in Environment | Syllabus Version |   | 2023-24 |   |
| Course Objectives:                                                                                                                                                                    |                                                                                                             |                              |                  |   |         |   |
| The main objectives of this course are to:                                                                                                                                            |                                                                                                             |                              |                  |   |         |   |
| 1. Evolve into ecologically informed and socially responsible citizens who are empowered to protect the natural resources while ensuring sustainable lifestyle and developmental mode |                                                                                                             |                              |                  |   |         |   |
| Expected Course Outcomes:                                                                                                                                                             |                                                                                                             |                              |                  |   |         |   |
| On the successful completion of the course, student will be able to:                                                                                                                  |                                                                                                             |                              |                  |   |         |   |
| 1                                                                                                                                                                                     | Gaining in-depth knowledge on natural processes that sustain life                                           |                              |                  |   | K1, K2  |   |
| 2                                                                                                                                                                                     | Predicting the consequences of human actions on the web of life, global economy, and quality of human life. |                              |                  |   | K1, K2  |   |
| 3                                                                                                                                                                                     | Develop critical thinking for environmental protection and conservation                                     |                              |                  |   | K1, K2  |   |
| 4                                                                                                                                                                                     | Acquiring values and attitudes towards understanding environmental-economic-social challenges.              |                              |                  |   | K1, K2  |   |
| 5                                                                                                                                                                                     | Adopting sustainability as a practice in life, society, and industry.                                       |                              |                  |   | K1, K2  |   |
| K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyse; K5 - Evaluate; K6 - Create                                                                                                  |                                                                                                             |                              |                  |   |         |   |
| Unit:1 Multidisciplinary nature of environmental studies 3 Hours                                                                                                                      |                                                                                                             |                              |                  |   |         |   |
| Unit:2 Natural Resources 4 Hours                                                                                                                                                      |                                                                                                             |                              |                  |   |         |   |
| Unit:3 Ecosystems 3 Hours                                                                                                                                                             |                                                                                                             |                              |                  |   |         |   |
| Unit:4 Biodiversity and its conservation 3 Hours                                                                                                                                      |                                                                                                             |                              |                  |   |         |   |
| Unit:5 Environmental Pollution 3 Hours                                                                                                                                                |                                                                                                             |                              |                  |   |         |   |

|                                                              |                                                                                                                     |          |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------|
| Unit:6                                                       | Contemporary Issues                                                                                                 | 2 Hours  |
| Case Study, Expert Lectures, Online Seminars –Webinars       |                                                                                                                     |          |
|                                                              |                                                                                                                     |          |
| Total Lecture Hours                                          |                                                                                                                     | 18 Hours |
| Textbook(s)                                                  |                                                                                                                     |          |
| 1                                                            | Erach Barucha, Textbook for Environmental Studies, UGC                                                              |          |
| 2                                                            | Dr. Radha (2019), Environmental Studies, Revised Edition Prasanna Publishers                                        |          |
|                                                              |                                                                                                                     |          |
| Reference Books                                              |                                                                                                                     |          |
| 1                                                            | Dharmendra S. Sengar, (2007) ‘Environmental law’, Prentice hall of India                                            |          |
| 2                                                            | G. Tyler Miller and Scott E. Spoolman, (2014) “Environmental Science”, Cengage Learning India                       |          |
| 3                                                            | Rajagopalan, R, (2005) ‘Environmental Studies-From Crisis to Cure’, Oxford University Press,                        |          |
| 4                                                            | Benny Joseph, (2006) ‘Environmental Science and Engineering’, Tata McGraw-Hill, New Delhi,                          |          |
| 5                                                            | Gilbert M. Masters, (2004) ‘Introduction to Environmental Engineering and Science’, 2nd edition, Pearson Education, |          |
|                                                              |                                                                                                                     |          |
| Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] |                                                                                                                     |          |
| 1                                                            | Environmental Studies - By Dr. Tushar Banerjee   Devi Ahilya Viswavidyalaya, Indore - SWAYAM                        |          |
|                                                              |                                                                                                                     |          |
| Course Designed By: Bharathiar University                    |                                                                                                                     |          |

# **SEMESTER II**

## SEMESTER II

|                                                                                                                                                                                                         |                         |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------|
| <b>Subject Code:</b> MTH201                                                                                                                                                                             | <b>Maths 2: Algebra</b> | <b>4 Credits</b> |
| <b>Analysis</b>                                                                                                                                                                                         |                         |                  |
| <b>Limits</b>                                                                                                                                                                                           |                         | <b>2 Hours</b>   |
| Limits of Real-Valued Functions                                                                                                                                                                         |                         | <b>1</b>         |
| Proving Limits using the Definition                                                                                                                                                                     |                         | <b>1</b>         |
| <b>Continuity &amp; Differentiability</b>                                                                                                                                                               |                         |                  |
| Continuity and Differentiability                                                                                                                                                                        |                         | <b>1</b>         |
| Examples of Differentiable and Non-Differentiable Functions; Continuity and Differentiability of Standard Functions Including Polynomials, Trigonometric, Exponential, Log Functions and Their Inverses |                         | <b>1</b>         |
| <b>Applications of Differentiation</b>                                                                                                                                                                  |                         |                  |
| Techniques for Evaluating Limits Including L'Hopital's Rule, Sandwich Theorem                                                                                                                           |                         | <b>1</b>         |
| Mean Value Theorem and Applications                                                                                                                                                                     |                         | <b>1</b>         |
| Applications of Differential Calculus Eg. Related Rates                                                                                                                                                 |                         | <b>1</b>         |
| <b>Sequences and series</b>                                                                                                                                                                             |                         |                  |
| <b>Sequences and Limits</b>                                                                                                                                                                             |                         | <b>2 Hours</b>   |
| Sequences, Limits, Convergence and Divergence                                                                                                                                                           |                         | <b>1</b>         |
| Proving Limits using Definition                                                                                                                                                                         |                         | <b>1</b>         |
| <b>Methods for evaluating limits</b>                                                                                                                                                                    |                         |                  |
| Methods for Evaluating Limits: Standard Limits, Limit Theorems, Continuity Rule, Sandwich Theorem                                                                                                       |                         | <b>1 Hour</b>    |
| <b>Series and Its Types</b>                                                                                                                                                                             |                         |                  |
| Series, Convergence and Divergence of Series, Geometric Series, Harmonic P-Series                                                                                                                       |                         | <b>1</b>         |
| <b>Convergence Tests</b>                                                                                                                                                                                |                         |                  |
| Divergence Test, Comparison Test                                                                                                                                                                        |                         | <b>1</b>         |
| Ratio Test, Integral Test, Alternating Series Test                                                                                                                                                      |                         | <b>1</b>         |
| <b>Types of Series</b>                                                                                                                                                                                  |                         |                  |
| Power Series, Taylor Polynomials                                                                                                                                                                        |                         | <b>1</b>         |
| Taylor Series                                                                                                                                                                                           |                         | <b>1</b>         |
| Taylor's Theorem, Error in Taylor Polynomial Estimates                                                                                                                                                  |                         | <b>1</b>         |
| <b>Vectors</b>                                                                                                                                                                                          |                         |                  |
| <b>Algebra of Vectors</b>                                                                                                                                                                               |                         | <b>1 Hour</b>    |
| Vector Arithmetic, Vector Projections (Review)                                                                                                                                                          |                         | <b>1</b>         |
| <b>Product of Vectors</b>                                                                                                                                                                               |                         |                  |
|                                                                                                                                                                                                         |                         | <b>2 Hours</b>   |



|                                              |          |
|----------------------------------------------|----------|
| Vector Dot Product, Vector Cross Product     | <b>1</b> |
| Scalar Triple Product, Vector Triple Product | <b>1</b> |

|                                                                                    |                |
|------------------------------------------------------------------------------------|----------------|
|                                                                                    |                |
| <b>Parametric Form of Vector Equation</b>                                          | <b>1 Hour</b>  |
| Lines and Planes in $\mathbb{R}^3$                                                 | <b>1</b>       |
|                                                                                    |                |
| <b>Linear Algebra</b>                                                              |                |
| <b>Matrix Manipulations</b>                                                        | <b>3 Hours</b> |
| Matrices, Matrix Addition, Multiplication, Transpose and Properties (Review)       | <b>1</b>       |
| Matrix Inverse                                                                     | <b>1</b>       |
| Determinant                                                                        | <b>1</b>       |
|                                                                                    |                |
| <b>Systems of Linear Equations</b>                                                 | <b>3 Hours</b> |
| Solving Systems of Linear Equations with Gaussian Elimination                      | <b>1</b>       |
| Solutions of Systems of Linear Equations - Consistency, Uniqueness                 | <b>1</b>       |
| Geometric Interpretation of Solutions                                              | <b>1</b>       |
|                                                                                    |                |
| <b>Field</b>                                                                       | <b>1 Hour</b>  |
| Field                                                                              | <b>1</b>       |
|                                                                                    |                |
| <b>Vector Space</b>                                                                | <b>5 Hours</b> |
| $\mathbb{R}^n$ as a Vector Space, Linear Independence of Vectors in $\mathbb{R}^n$ | <b>1</b>       |
| Span of a Set of Vectors, Subspaces of $\mathbb{R}^n$                              | <b>1</b>       |
| Basis and Dimension in $\mathbb{R}^n$                                              | <b>1</b>       |
| Abstract Vector Space Axioms; Examples and Non-Examples of Vector Spaces           | <b>1</b>       |
| Bases, Dimension and Co-Ordinates in (Finite Dimensional) Abstract Vector Spaces   | <b>1</b>       |
|                                                                                    |                |
| <b>Linear Transformation</b>                                                       | <b>2 Hours</b> |
| Definition of Linear Transformation and Examples/Non-Examples                      | <b>1</b>       |
| Linear Transformations of the Plane                                                | <b>1</b>       |
|                                                                                    |                |
| <b>Linear Transformation in Matrix Form</b>                                        | <b>2 Hours</b> |
| Change of Basis and Linear Transformations                                         | <b>1</b>       |
| Matrix Representation of a Linear Transformation                                   | <b>1</b>       |
|                                                                                    |                |
| <b>Applications of Linear Transformation in Matrix Form</b>                        | <b>2 Hours</b> |
| Image and Kernel of a Linear Transformation                                        | <b>1</b>       |
| Rank and Nullity                                                                   | <b>1</b>       |

#### Analysis:

1. Edwin Jed Herman and Gilbert Strang, Calculus - Volume I, OpenStax, 2020.
2. James Stewart, Calculus – Early Transcendentals, 7<sup>th</sup> Edition, Brooks/Cole, Cengage Learning, 2012.

**Sequences and Series:**

1. James Stewart, Calculus – Early Transcendentals, 7<sup>th</sup> Edition, Brooks/Cole, Cengage Learning, 2012.
2. Robert A. Adams and Christopher Essex, Calculus – A Complete Course, 7<sup>th</sup> Edition, Pearson Canada, 2009.
3. Edwin Jed Herman and Gilbert Strang, Calculus - Volume I, OpenStax, 2020.

**Vector:**

1. Susan Jane Colley, Vector Calculus, 4<sup>th</sup> Edition, Pearson, 2011.

**Linear Algebra**

1. Jim Defranza and Daniel Gagliardi, Introduction to Linear Algebra and Applications, 3<sup>rd</sup> Edition, McGraw Hill Higher Education, 2017.
2. John W. Dettman, Introduction to Linear Algebra and Differential Equations, Dover Publications, Inc., 2008.
3. S. Arumugam and A.T. Isaac, Modern Algebra, Scitech Publications (India) Pvt. Ltd., 2003.

| PHYSICS 202                                                                                                                                                                                                                                                                                                  |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Electricity and Magnetism                                                                                                                                                                                                                                                                                    | No. of lectures |
| Electric charge, conductors and insulators                                                                                                                                                                                                                                                                   | 1               |
| Coulomb's Law, superposition principle                                                                                                                                                                                                                                                                       | 1               |
| Electric field, superposition principle                                                                                                                                                                                                                                                                      | 1               |
| Electric flux<br>Examples                                                                                                                                                                                                                                                                                    | 1               |
| Gauss's law, applications                                                                                                                                                                                                                                                                                    | 1               |
| Energy and electric field; electric potential                                                                                                                                                                                                                                                                | 1               |
| Calculating potential from the field, electric potential, potential energy surfaces.                                                                                                                                                                                                                         | 1               |
| Electric dipoles                                                                                                                                                                                                                                                                                             | 1               |
| Capacitance; parallel plate capacitors                                                                                                                                                                                                                                                                       | 1               |
| Energy storage in capacitors, dielectrics, series and parallel circuits                                                                                                                                                                                                                                      | 1               |
| Conductors, electric current, electric power, Ohm's law                                                                                                                                                                                                                                                      | 1               |
| Kirchoff's rules, resistors in series and parallel circuits                                                                                                                                                                                                                                                  | 1               |
| Magnetic field, magnetic force, Lorentz force, cyclotrons                                                                                                                                                                                                                                                    | 1               |
| Lorentz force, ion velocity filter, Hall effect                                                                                                                                                                                                                                                              | 1               |
| Bio-Savart Law, Ampere's Law, solenoids, earth's magnetic field                                                                                                                                                                                                                                              | 1               |
| Magnetic field due to a current, forces on current-carrying wires,<br>Electromagnetic induction, magnetic flux                                                                                                                                                                                               | 1               |
| Lenz' Law, Faraday's law, Maxwell's equations, applications                                                                                                                                                                                                                                                  | 1               |
| Magnetic materials                                                                                                                                                                                                                                                                                           | 1               |
|                                                                                                                                                                                                                                                                                                              |                 |
| Oscillations and Waves                                                                                                                                                                                                                                                                                       | No. of lectures |
| Simple harmonic motion, pendulum, diatomic molecules, Spring Mass System, Time period of Pendulum                                                                                                                                                                                                            | 2               |
| Damped harmonic motion, resonance - electronic circuits, evolution of populations                                                                                                                                                                                                                            | 2               |
| One dimensional waves, Interference and standing waves, Sound waves and the speed of sound, Intensity, sound level and the physics of music Wave on Strings, Wave equation, Separable solution of wave equation, Resonance, Physics of Music: Kinds of music Instruments and their modes of sound generation | 2               |
| Doppler effect and supersonic motion, shock waves                                                                                                                                                                                                                                                            | 1               |
| Optics                                                                                                                                                                                                                                                                                                       | No. of lectures |
| Images and mirrors<br>Images formed by plane mirrors, Spherical mirrors, Parabolic mirrors                                                                                                                                                                                                                   | 1               |
| Thin lenses and optical instruments                                                                                                                                                                                                                                                                          | 1(2)            |

|                                                                                                                                                                                 |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Image formation by lenses, Combination of lenses, Compound Microscope, Telescope                                                                                                |                        |
| Young's experiment, interference<br>Superposition of waves and interference                                                                                                     | 1                      |
| Thin films and the Michaelson interferometer<br>Thin film interference, Phase change, Michelson Interferometer                                                                  | 1                      |
| Diffraction by slits and apertures<br>Diffraction expression Derivation: Single Slit, Double Slit, N-slit                                                                       | 1                      |
| Diffraction by gratings and X-ray diffraction                                                                                                                                   | 1                      |
| Optical Microscopy<br>Microscope parts and types, Brightfield, Darkfield, Confocal microscope                                                                                   | 1                      |
| Spectroscopy<br>Inelastic scattering, Raman Spectroscopy, Fluorescence                                                                                                          | 1                      |
| <b>Modern Physics</b>                                                                                                                                                           | <b>No. of lectures</b> |
| Challenges to classical physics; special relativity<br>Michelson Morley Experiment, Compton Scattering, Einstein's Thought experiments, Special theory of Relativity-postulates | 1                      |
| Lorentz transformation, transformation of velocities, Doppler Effect<br>Length contraction, time dilation, Twin-Paradox                                                         | 1                      |
| Relativistic momentum and energy<br>$E=mc^2$                                                                                                                                    | 1                      |
| Photons and the photoelectric effect<br>Einstein's Photoelectric effect equation, Quantum of energy                                                                             | 1                      |
| Quantum physics, blackbody radiation, matter waves<br>De-Broglie waves, Schrodinger Equation, Uncertainty principle                                                             | 2                      |
| Trapped particles and tunneling particles<br>1-dimensional Potential well and barrier, Normalization and Boundary conditions                                                    | 1                      |
| Bohr and Schrodinger models of the hydrogen atom                                                                                                                                | 1                      |
| Complex atoms; Pauli Exclusion Principle, Periodic Table of Elements, selection rules and spectra                                                                               | 1                      |
| Nuclear Physics, nuclear physics, nuclear decay<br>Nucleons, Semi Empirical Mass Equation                                                                                       | 1                      |
| Nuclear fission and fusion                                                                                                                                                      | 1                      |
| Quarks, Leptons, The Big Bang<br>Fundamental forces and fundamental particles                                                                                                   | 1                      |

1. Serway and Jewett, Physics for Scientists and Engineers, 7th edn, Brooks/Cole Publishers (2008).
2. R. Shankar, Fundamentals of Physics I, Yale Press (2019)
3. A.P. French, Vibrations and Waves, CBS Publishers & Distributors Pvt Ltd, India ( 2003)
4. Stephen T. Thornton & Andrew Rex, Modern Physics For Scientists and Engineers F o u r t h E d i t i

on, Cengage Learning; 4th edition (2013)

5. A Beiser- Concepts of Modern Physics, McGraw Hill (India)(2020)
6. Hecht- Optics- 4<sup>th</sup> edn , Pearson India (2008)
7. Edward M. Purcell , David J. Morin, Electricity and Magnetism, Cambridge University Press; 3rd edition (2013)
8. Hugh D. Young , University Physics with Modern Physics Pearson Education; Fifteenth edition (2021)
9. I E Irodov, Basic Laws of Electromagnetism , Arihant Publication; Second edition (2023)

|                                                                                                                                                                                                                                                                                                                                                       |                                                                                           |                                  |                  |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------|------------------|---------|
| Course Code                                                                                                                                                                                                                                                                                                                                           | CHM201                                                                                    | PHYSICAL AND INORGANIC CHEMISTRY | 4 Credits        |         |
| CORE                                                                                                                                                                                                                                                                                                                                                  |                                                                                           | Chemistry 2                      |                  |         |
|                                                                                                                                                                                                                                                                                                                                                       |                                                                                           |                                  | Syllabus Version | 2023-24 |
| UNIT I                                                                                                                                                                                                                                                                                                                                                | Chemistry of Life                                                                         |                                  |                  |         |
| The Chemical Basis of Life - Bioenergetics - Examples of Major Bioenergetic Processes – Enzymes and Catalysed Reactions - The Chemistry Behind Enzyme Catalysis - Metabolism: Catabolism and Anabolism – Concatenation and Biopolymers – Stereochemistry and Biomolecular Chirality                                                                   |                                                                                           |                                  |                  |         |
| UNIT II                                                                                                                                                                                                                                                                                                                                               | Biochemistry & Inorganic Chemistry                                                        |                                  |                  |         |
| Biochemistry and Biomolecular Structure - Types of Biomolecules, Structure and Functions of Biomolecules - Small Inorganic Molecules of Biological Importance<br>Ionic Compounds and their Solutions - Formation, Bonding, Structure and Properties - Ionic Solutions - Structures of Solids - Classification of Solids - Types of Crystalline Solids |                                                                                           |                                  |                  |         |
| UNIT III                                                                                                                                                                                                                                                                                                                                              | Inorganic Chemistry & Electrochemistry                                                    |                                  |                  |         |
| Main Group Chemistry - General Trends in Main Group Chemistry - Chemistry of s- and p-block Elements, Structure, Chemical Reactivity and Bonding Concepts<br>Redox Reactions and Electrochemistry - the Basics of Redox Reactions - Electrochemical Cell - Electrochemical Series - Electrode and Cell potentials - Nernst equation                   |                                                                                           |                                  |                  |         |
| UNIT IV                                                                                                                                                                                                                                                                                                                                               | Inorganic Chemistry                                                                       |                                  |                  |         |
| The Transition Metals: A Survey – Coordination Chemistry - Important Terms Involving Coordination Compounds - Bonding in Complex ions - Types of Coordination Complexes – Transition Metals in Biological Systems – Simple Harmonic Motion, Pendulum, Diatomic Molecules                                                                              |                                                                                           |                                  |                  |         |
| UNIT V                                                                                                                                                                                                                                                                                                                                                | Quantum Chemistry                                                                         |                                  |                  |         |
| Schrödinger's Equation and Heisenberg's Uncertainty Principle – Bohr and Schrodinger Models of the Hydrogen Atom - Complex Atoms; Pauli Exclusion Principle, Periodic Table of Elements, Selection Rules and Spectra – Nuclear Fission and Fusion                                                                                                     |                                                                                           |                                  |                  |         |
|                                                                                                                                                                                                                                                                                                                                                       |                                                                                           |                                  |                  |         |
| Text Book(s)                                                                                                                                                                                                                                                                                                                                          |                                                                                           |                                  |                  |         |
| 1                                                                                                                                                                                                                                                                                                                                                     | Textbook of Biochemistry, Seema P. Upadhye, I.K. International Publishing House Pvt. Ltd. |                                  |                  |         |
| 2                                                                                                                                                                                                                                                                                                                                                     | Inorganic Chemistry,P. L. Soni,Sultan Chand & Sons.                                       |                                  |                  |         |
| 3                                                                                                                                                                                                                                                                                                                                                     | Principles of Physical Chemistry, B.R.Puri, L.R.Sharma ,S.Chand & Co.                     |                                  |                  |         |
| 4                                                                                                                                                                                                                                                                                                                                                     | Main Group Chemistry, 2nd Edition, A. G. Massey, Wiley Publication                        |                                  |                  |         |
|                                                                                                                                                                                                                                                                                                                                                       |                                                                                           |                                  |                  |         |

| <b>Reference Books</b>                                            |                                                                                                                   |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 1                                                                 | Bioenergetics: Molecular Biology, Biochemistry, and Pathology, Chong H. Kim, Takayuki Ozawa, Springer Publication |
| 2                                                                 | Essentials of Physical Chemistry, B.S.Bahl and G.D.Tuli, S.Chand &Co.                                             |
| 3                                                                 | Principles of Inorganic Chemistry, B.R. Puri L.R. Sharma, S.Chand & Co.                                           |
| 4                                                                 | Fundamentals of Biochemistry, J L Jain, Nitin Jain, Sunjay Jain, S.Chand&Co.                                      |
|                                                                   |                                                                                                                   |
| <b>Related Online Contents[MOOC,SWAYAM, NPTEL, Websites etc.]</b> |                                                                                                                   |
| 1                                                                 | <a href="https://chem.libretexts.org/">https://chem.libretexts.org/</a>                                           |
| 2                                                                 | <a href="https://byjus.com/chemistry/">https://byjus.com/chemistry/</a>                                           |
| 3                                                                 | <a href="https://openstax.org/details/books/chemistry-2e">https://openstax.org/details/books/chemistry-2e</a>     |

| BIOLOGY - BIO201                                                |  | The Biology of Cells                                                                                                                                                                         |
|-----------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                 |  |                                                                                                                                                                                              |
| 32 h                                                            |  |                                                                                                                                                                                              |
| 2                                                               |  | Introduction to Cell Biology                                                                                                                                                                 |
| <b>Theme: The cell contained</b>                                |  |                                                                                                                                                                                              |
| 2                                                               |  | The plasma membrane                                                                                                                                                                          |
| 2                                                               |  | Cell walls, extracellular matrix, cellulose synthesis, other cell wall components                                                                                                            |
| 1                                                               |  | Cytoplasm: content, chemistry and properties                                                                                                                                                 |
| 2                                                               |  | Cytoskeleton, actin filaments, microtubules                                                                                                                                                  |
| <b>Theme: Information flow in the cell</b>                      |  |                                                                                                                                                                                              |
| 2                                                               |  | Nucleus, chromosomes, DNA                                                                                                                                                                    |
| 2                                                               |  | Genes and the genetic code                                                                                                                                                                   |
| 2                                                               |  | Control of gene expression                                                                                                                                                                   |
| <b>Theme: Endomembrane system and intracellular Trafficking</b> |  |                                                                                                                                                                                              |
| 3                                                               |  | ER and ribosome, proteins and enzymes                                                                                                                                                        |
| 1                                                               |  | Golgi apparatus                                                                                                                                                                              |
| 2                                                               |  | Vesicles, transport and secretion, Lysosomes                                                                                                                                                 |
| <b>Theme: Harvesting energy</b>                                 |  |                                                                                                                                                                                              |
| 2                                                               |  | Mitochondria, ATP, energetic reactions, electron transport pathways, cellular respiration (ATP synthesis and energetic reactions, electron transport chain and oxidative phosphorylation)    |
| 2                                                               |  | Chloroplasts, photosynthesis, historical experiments (in photosynthesis research), pigments, photosystems (Structure and function of chloroplast, photosynthetic pigments, photosystem 1&2). |
| <b>Theme: Multicellularity and the Dividing Cell</b>            |  |                                                                                                                                                                                              |
| 2                                                               |  | Cell division, cell cycle, mitosis, cytokinesis, division and distribution of organelles                                                                                                     |
| 1                                                               |  | Meiosis, formation of haploid cells                                                                                                                                                          |
| 2                                                               |  | Communication and signaling, recognizing and responding                                                                                                                                      |
| 2                                                               |  | Cell differentiation and multicellularity                                                                                                                                                    |

| Text Book(s)    |                                                                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1               | Molecular cell biology, Harvey Lodish, 8 <sup>th</sup> edition, W.H. Freeman, (2016).                                                                                    |
| 2               | Cell and Molecular Biology concepts and Experiments, Gerald Karp, <a href="#">Janet Iwasa</a> , <a href="#">Wallace Marshall</a> , 9 <sup>th</sup> Edition, Wiley (2019) |
| 3               | Molecular Biology of the cell, Bruce Alberts, 6 <sup>th</sup> edition, Garland Science (2014)                                                                            |
|                 |                                                                                                                                                                          |
| Reference Books |                                                                                                                                                                          |
| 1               | The Cell: A molecular approach, Geoffrey M. Cooper, Robert E. Hausman, Sixth edition, Sinauer (2013)                                                                     |
| 2               | Essential Cell Biology, Bruce Alberts, 5 <sup>th</sup> edition, Garland Science (2019).                                                                                  |
| 3               | Lewin's Genes XII, 2017, Jocelyn E Krebs, Elliott S. Goldstein, and Stephen T. Kilpatrick                                                                                |



|                                                                      |                                                                                                                                                                                               |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | Jones, Bartlett Publishers, 12th revised edition                                                                                                                                              |
|                                                                      |                                                                                                                                                                                               |
| <b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.,]</b> |                                                                                                                                                                                               |
| 1                                                                    | <a href="https://microbenotes.com/category/cell-biology/">https://microbenotes.com/category/cell-biology/</a>                                                                                 |
| 2                                                                    | <a href="https://www.larberthigh.com/_documents/%5B1405%5DUnit_1-_Cell_biology_summary_notes.pdf">https://www.larberthigh.com/_documents/%5B1405%5DUnit_1-_Cell_biology_summary_notes.pdf</a> |
| 3                                                                    | <a href="https://nptel.ac.in/courses/102/103/102103012/">https://nptel.ac.in/courses/102/103/102103012/</a>                                                                                   |
| 4                                                                    | <a href="https://www.khanacademy.org/science/ap-biology/cell-structure-and-function">https://www.khanacademy.org/science/ap-biology/cell-structure-and-function</a>                           |
|                                                                      |                                                                                                                                                                                               |

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------|-------------------------|----------------|
| <b>Course code</b>                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>PHY202</b> | <b>PHYSICS PRACTICAL 2</b> | <b>2 Credits</b>        |                |
| <b>Core/Elective/SBS</b>                                                                                                                                                                                                                                                                                                                                                                                                                    |               | CORE PRACTICAL             |                         |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |                            | <b>Syllabus Version</b> | <b>2023-24</b> |
| <b>LIST OF EXPERIMENTS:</b>                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                            |                         |                |
| 1. Young's Modulus – Non-uniform bending methods                                                                                                                                                                                                                                                                                                                                                                                            |               |                            |                         |                |
| 2. Determination of the radius of a current carrying coil 2-Determination of magnetic field with the variation of distance along the axis of current carrying coil.                                                                                                                                                                                                                                                                         |               |                            |                         |                |
| 3. To determine the Wavelength of main spectral line of mercury light using plane transmission grating.                                                                                                                                                                                                                                                                                                                                     |               |                            |                         |                |
| 4. To determine the Refracting Angle, Refractive Index and Dispersive power of prism using spectrometer.                                                                                                                                                                                                                                                                                                                                    |               |                            |                         |                |
| 5. To determine the coefficient of thermal Conductivity of bad conductor by Lee's Disc.                                                                                                                                                                                                                                                                                                                                                     |               |                            |                         |                |
| 6. Charging and Discharging of Capacitor.                                                                                                                                                                                                                                                                                                                                                                                                   |               |                            |                         |                |
| 7. Verification of Kirchhoff's law.                                                                                                                                                                                                                                                                                                                                                                                                         |               |                            |                         |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |                            |                         |                |
| <b>Reference Books</b>                                                                                                                                                                                                                                                                                                                                                                                                                      |               |                            |                         |                |
| 1 A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand & Sons(2017).                                                                                                                                                                                                                                                                                                                            |               |                            |                         |                |
| 2 Practical Physics and Electronics, C.C. Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers(2007)                                                                                                                                                                                                                                                                                                                                    |               |                            |                         |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |                            |                         |                |
| <b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>                                                                                                                                                                                                                                                                                                                                                                         |               |                            |                         |                |
| <a href="https://nptel.ac.in/course.html/physics/experimentalphysicsI,IIandIII">https://nptel.ac.in/course.html/physics/experimentalphysicsI,IIandIII</a><br><a href="https://nptel.ac.in/courses/115/105/115105110/">https://nptel.ac.in/courses/115/105/115105110/</a><br><a href="https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLoFRX7n8z4tHYK">https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLoFRX7n8z4tHYK</a> |               |                            |                         |                |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------|------------------|---------|
| Course Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CHM202                                                                                                              | CHEMISTRY PRACTICAL 2 | 2 Credits        |         |
| Core/Elective/SBS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                     | CORE PRACTICAL        |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                     |                       | Syllabus Version | 2023-24 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | List of Experiments                                                                                                 |                       |                  |         |
| <b>List of Physical chemistry experiments (Any 2)</b><br>1. To determine the rate of chemical reaction by using hydrolysis of tert-Butyl chloride.<br>2. Effects of catalase enzyme obtained from potato in cleaving H <sub>2</sub> O <sub>2</sub> into H <sub>2</sub> O and O <sub>2</sub> .<br>3. To measure the vapour pressure of n-Pentane by using high vacuum line.<br>4. Heat of solution of KNO <sub>3</sub> / NH <sub>4</sub> Cl.<br>5. Glass electrode- Buffer solutions: To titrate a weak base (Na <sub>2</sub> CO <sub>3</sub> ) with a strong acid a) an acid-base indicator,(b) a glass electrode |                                                                                                                     |                       |                  |         |
| <b>List of Inorganic chemistry experiments (Any 2)</b><br>1. Synthesis of hexamine nickel (II) [Ni(NH <sub>3</sub> ) <sub>6</sub> ]I <sub>2</sub><br>2. Cuprous Chloride, Cu <sub>2</sub> Cl <sub>2</sub><br>3. The transition metals: a survey (Transition metals in biological systems and Bonding in complex ions).<br>4. Estimation of Cu (II) and K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> using sodium thiosulphate solution (Iodometrically).<br>5. Estimation of available chlorine in bleaching powder iodometrically.                                                                              |                                                                                                                     |                       |                  |         |
| <b>List of Organic chemistry experiments (Any 3 in Each Group)</b><br>1. Preparation of Derivatives:<br>Oxime, 2, 4-DNP, Acetyl, Benzoyl, Semicarbazone, Anilide, Amide, Aryloxyacetic acid.<br>2. Organic single stage preparation:<br>The preparation of paracetamol.<br>The synthesis of meso-1,2-Dihydroxy-1,2-Diphenylethane.<br>Preparation of α-phenyl Cinnamic acid from Benzaldehyde.<br>Preparation of benzyl alcohol from Benzaldehyde<br>Preparation glucose pentaacetate from Glucose.<br>Preparation of 2-iodobenzoic acid from Anthranilic acid.                                                   |                                                                                                                     |                       |                  |         |
| <b>Use of Computer (Chemistry Software)</b><br>Chem Draw-Sketch, ISI – Draw, Draw the structure of simple aliphatic, aromatic, heterocyclic organic compounds with substituent's. Get the correct IUPAC name.                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                     |                       |                  |         |
| <b>Text Book(s)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                     |                       |                  |         |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Basic Principles of Practical Chemistry, Kulandaivelu A.R., Veeraswamy R., Venkateswaran, Sultan Chand & Sons, 2017 |                       |                  |         |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Practical Chemistry for B.Sc Chemistry, A.O. Thomas                                                                 |                       |                  |         |

|                  |                                                                                                                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3                | Practical Chemistry, Pandey D.N., Sultan Chand Publishers, 2018                                                                                                                                                 |
| 4                | <a href="https://www.freebookcentre.net/chemistry-books-download/Chemistry-Laboratory-Manual-by-CSOS.html">https://www.freebookcentre.net/chemistry-books-download/Chemistry-Laboratory-Manual-by-CSOS.html</a> |
| <b>Reference</b> |                                                                                                                                                                                                                 |
| 1                | Vogel's Text book of Practical Organic Chemistry, Brian S. Furniss, Antony J. Hannaford, Peter W. G. Smith, Fifth Edition, Bath Press, Great Britain, 1989                                                      |
| 2                | Vogel's Textbook of Quantitative Chemical Analysis, G H Jeffery, J Bassett, J Mendham, R C Denney, Fifth Edition, Bath Press, Great Britain, 1989                                                               |
| 3                | ChemDraw 17.0 User Guide, PerkinElmer Informatics Inc, 1998-2017                                                                                                                                                |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                             |                     |                  |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------|---------|
| Course code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | BIO202                                                                                                                                      | BIOLOGY PRACTICAL 2 | 2 Credits        |         |
| Core/Elective/SBS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                             | CORE PRACTICAL      |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                             |                     | Syllabus Version | 2023-24 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | List of Experiments                                                                                                                         |                     |                  |         |
| <div>1. Microscopy and observation recording of representative organelle readymade specimens.</div> <div>2. Staining of cell for observations of-Flagella, cell wall, endospores, etc.<div>a. Plant cell, bacterial, fungi samples.</div><div>b. Malachite green, safranin, Leifson flagella stain/RYU flagella stain, nitric acid, crystals of potassium chlorate (any suitable stain)</div></div> <div>3. Introduction and visualization DNA-Proteins <i>insilico</i>.</div> <div>4. Demonstration of confocal/ fluorescence microscopy at the central instrumentation facility of Bharathiar University.</div> <div>5. Counting of cells using hemocytometer, observation of dead cells-Trypan blue staining.</div> <div>6. Isolation of DNA: gel electrophoresis.</div> <div>7. Mitosis in onion root tips – Microscopic observation</div> |                                                                                                                                             |                     |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                             |                     |                  |         |
| Text Book(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                             |                     |                  |         |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Cappuccino, James G., and Natalie Sherman. "Microbiology: a laboratory manual." (2005)                                                      |                     |                  |         |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Wilson, K. and Walker, J. (2010). Principles and techniques of Biochemistry and Molecular Biology. 7th Edition. Cambridge University Press. |                     |                  |         |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Tiwari, G. S. Hoondal, (2005). Laboratory Techniques In Microbiology & Biotechnology. Swastik publishers                                    |                     |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                             |                     |                  |         |
| Reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                             |                     |                  |         |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Sri Jayachamarajendra (2018)/ pdf. Cell Biology and Genetics Lab.                                                                           |                     |                  |         |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | K. R. Aneja; Laboratory Manual of Microbiology and Biotechnology, 2018. ED-TECH                                                             |                     |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                             |                     |                  |         |

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|---------------|--------------------------------------------------------------------------------------------------------------|
| <b>IDC201</b> | <b>Scientific Computation and Modeling: Introduction to simple models and programming – Total credits: 2</b> |
|---------------|--------------------------------------------------------------------------------------------------------------|

- Basics of Python Programming

## VALUE ADDED 2: HUMAN RIGHTS

| Course code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2FB                                                                   | Human Rights                   | L | T                | P | C       |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------|---|------------------|---|---------|---|
| Value Added                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                       | Value Added 2                  |   | 2                | - | -       | 2 |
| Pre-requisite                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                       | Awareness on Ethics and Values |   | Syllabus Version |   | 2023-24 |   |
| Course Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                       |                                |   |                  |   |         |   |
| The main objectives of this course are to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                       |                                |   |                  |   |         |   |
| 1. Create awareness, conviction and commitment to values for improving the quality of life through education, and for advancing social and human wellbeing                                                                                                                                                                                                                                                                                                                                                                                       |                                                                       |                                |   |                  |   |         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                       |                                |   |                  |   |         |   |
| Expected Course Outcomes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                       |                                |   |                  |   |         |   |
| On the successful completion of the course, student will be able to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                       |                                |   |                  |   |         |   |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Understand human values and value education                           |                                |   |                  |   | K1      |   |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Learn their role in national development                              |                                |   |                  |   | K1      |   |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Understand global development with ethics and values                  |                                |   |                  |   | K1      |   |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Learn various therapeutic methods                                     |                                |   |                  |   | K1      |   |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Learn and understand human rights                                     |                                |   |                  |   | K1      |   |
| K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyse; K5 - Evaluate; K6 - Create                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                       |                                |   |                  |   |         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                       |                                |   |                  |   |         |   |
| Unit:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Concept of Human Values, Value Education Towards Personal Development |                                |   |                  |   | 3 Hours |   |
| Aim of education and value education; Evolution of value-oriented education; Concept of Human values; types of values; Components of value education. Personal Development: Self-analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to - age, experience, maturity, family members, neighbors, co-workers. Character Formation Towards Positive Personality: Truthfulness, Constructivity, Sacrifice, Sincerity, Self-Control, Altruism, Tolerance, Scientific Vision. |                                                                       |                                |   |                  |   |         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                       |                                |   |                  |   |         |   |
| Unit:2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Value Education Towards National and Global Development               |                                |   |                  |   | 4 Hours |   |
| National and International Values: Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom, and fraternity. Social Values - Pity and probity, self-control, universal brotherhood. Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality, and faith. Religious Values - Tolerance, wisdom, character. Aesthetic values - Love and appreciation of literature and fine arts and respect for the same. National Integration and international understanding.  |                                                                       |                                |   |                  |   |         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                       |                                |   |                  |   |         |   |
| Unit:3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Impact of Global Development on Ethics and Values                     |                                |   |                  |   | 3 Hours |   |

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| Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges, and compromise. Modern Challenges of Adolescent Emotions and behaviour; Sex and spirituality: Comparison and competition; positive and negative thoughts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                               |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                               |          |
| Unit:4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Therapeutic Measures                                                                          | 3 Hours  |
| Control of the mind through a. Simplified physical exercise b. Meditation – Objectives, types, effect on body, mind and soul c. Yoga – Objectives, Types, Asanas d. Activities: (i)Moralisation of Desires (ii)Neutralisation of Anger (iii)Eradication of Worries (iv)Benefits of Blessings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                               |          |
| Unit:5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Human Rights                                                                                  | 3 Hours  |
| Concept of Human Rights – Indian and International Perspectives a. Evolution of Human Rights b. Definitions under Indian and International documents 2. Broad classification of Human Rights and Relevant Constitutional Provisions. a. Right to Life, Liberty and Dignity b. Right to Equality c. Right against Exploitation d. Cultural and Educational Rights e. Economic Rights f. Political Rights g. Social Rights 3.Human Rights of Women and Children a. Social Practice and Constitutional Safeguards (i) Female Foeticide and Infanticide (ii) Physical assault and harassment (iii) Domestic violence (iv) Conditions of Working Women 4.Institutions for Implementation a. Human Rights Commission b. Judiciary 5.Violations and Redressal a. Violation by State b. Violation by Individuals c. Nuclear Weapons and terrorism d. Safeguards. |                                                                                               |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                               |          |
| Unit:6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Contemporary Issues                                                                           | 2 Hours  |
| Case Study, Expert Lectures, Online Seminars - Webinars                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                               |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                               |          |
| Total Lecture Hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                               | 18 Hours |
| Textbook(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                               |          |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Value Education – Human Rights, Bharathiar University                                         |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                               |          |
| Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                               |          |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Human Rights in India - By Prof. (Dr.) Y.S.R. Murthy   O.P. Jindal Global University - SWAYAM |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                               |          |
| Course Designed By: Bharathiar University                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                               |          |

# **SEMESTER III**



### SEMESTER III

|                                                                                             |                                                             |                  |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------|
| <b>Subject Code:</b> MTH301                                                                 | <b>Maths 3:</b> Vector Calculus, and Differential Equations | <b>4 Credits</b> |
| <b>Linear Algebra</b>                                                                       |                                                             |                  |
| <b>Characteristic Equation</b>                                                              |                                                             | <b>2 Hours</b>   |
| Characteristic And Minimal Polynomial                                                       |                                                             | <b>1</b>         |
| Cayley-Hamilton Theorem                                                                     |                                                             | <b>1</b>         |
| <b>Eigenvectors, Eigenvalues and Diagonalisation</b>                                        |                                                             |                  |
| Definition of Eigenvectors and Eigenvalues                                                  |                                                             | <b>1</b>         |
| Calculating Eigenvalues and Eigenvectors                                                    |                                                             | <b>1</b>         |
| Diagonalisation of Matrices; Matrix Powers                                                  |                                                             | <b>1</b>         |
| Orthogonal Matrices, Real Symmetric Matrices                                                |                                                             | <b>1</b>         |
| Applications of Eigenvectors/Diagonalisation Eg Markov Chains                               |                                                             | <b>1</b>         |
| <b>Inner Product Space</b>                                                                  |                                                             |                  |
| Inner Product Axioms; Examples/Non-Examples of Inner Products                               |                                                             | <b>1</b>         |
| Length, Angle, Cauchy-Schwarz Inequality in-terms of Inner Product                          |                                                             | <b>1</b>         |
| Orthogonality, Projections in-terms of Inner Product                                        |                                                             | <b>1</b>         |
| Gram-Schmidt Algorithm                                                                      |                                                             | <b>1</b>         |
| <b>Vector Calculus</b>                                                                      |                                                             |                  |
| <b>Differentiation in Several Variables</b>                                                 |                                                             | <b>8 Hours</b>   |
| Functions of Several Variables; Level Curves and Cross Sections of Surfaces                 |                                                             | <b>1</b>         |
| Common Surfaces Including Paraboloid, Ellipsoid, Hyperboloid                                |                                                             | <b>1</b>         |
| Domains and Ranges of Functions of Several Variables                                        |                                                             | <b>1</b>         |
| Limits and Continuity of Functions of Several Variables; Definition Of $C^N$                |                                                             | <b>1</b>         |
| Partial Derivatives, Tangent Plane                                                          |                                                             | <b>1</b>         |
| Differentiability of Functions of Several Variables                                         |                                                             | <b>1</b>         |
| Chain Rule and Total Derivative                                                             |                                                             | <b>1</b>         |
| Directional Derivative, Gradient                                                            |                                                             | <b>1</b>         |
| <b>Vector-Valued Functions</b>                                                              |                                                             |                  |
| Parameterization of Paths                                                                   |                                                             | <b>1</b>         |
| Vector Fields, Div and Curl Operators                                                       |                                                             | <b>1</b>         |
| <b>Maxima and Minima in Several Variables</b>                                               |                                                             |                  |
| Stationary Points of Surfaces, Classification of Stationary Points using Second Derivatives |                                                             | <b>1</b>         |
| Optimization Applications                                                                   |                                                             | <b>1</b>         |
| Constrained Extrema using Lagrange Multiplier Method                                        |                                                             | <b>1</b>         |
| <b>Multiple Integration</b>                                                                 |                                                             |                  |
| Double Integrals, Changing Order of Integration                                             |                                                             | <b>1</b>         |
| Polar Co-Ordinates, Change of Variables for Double Integrals                                |                                                             | <b>1</b>         |
| Triple Integrals                                                                            |                                                             | <b>1</b>         |

|                                                                    |          |
|--------------------------------------------------------------------|----------|
| Change of Variables For Triple Integrals; Cylindrical Co-Ordinates | <b>1</b> |
| Spherical Co-Ordinates                                             | <b>1</b> |

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| <b>Line Integrals</b>                                                                                    | <b>5 Hours</b> |
| Line Integrals of Scalar Functions                                                                       | <b>1</b>       |
| Line Integrals of Vector Functions                                                                       | <b>1</b>       |
| Integrals of Scalar Functions Over Surfaces, Applications of Surface Integrals<br>Eg. Surface Area, Mass | <b>1</b>       |
| Integrals of Vector Functions Over Surfaces, Flux                                                        | <b>1</b>       |
| Green's Theorem                                                                                          | <b>1</b>       |
|                                                                                                          |                |
| <b>Surface Integrals and Its Applications</b>                                                            | <b>3 Hours</b> |
| Gauss Divergence Theorem                                                                                 | <b>1</b>       |
| Stokes' Theorem                                                                                          | <b>1</b>       |
| Applications of Integral Theorems Eg. Maxwell's Equations                                                | <b>1</b>       |
|                                                                                                          |                |
| <b>Partial Differential Equations</b>                                                                    |                |
| <b>Fourier Series</b>                                                                                    | <b>4 Hours</b> |
| Fourier Series                                                                                           | <b>1</b>       |
| Fourier Series: Dirichlet's, Discontinuities and Differentiation                                         | <b>1</b>       |
| Fourier Series: Weak Convergence and Series Summation                                                    | <b>1</b>       |
| Linearity and Superposition                                                                              | <b>1</b>       |
|                                                                                                          |                |
| <b>Applications of Partial Differential Equations</b>                                                    | <b>3 Hours</b> |
| Wave Equation                                                                                            | <b>1</b>       |
| Heat and Diffusion Equation                                                                              | <b>1</b>       |
| Laplace Equation and Harmonic Functions                                                                  | <b>1</b>       |
|                                                                                                          |                |
| <b>Fourier Transform</b>                                                                                 | <b>2 Hours</b> |
| Fourier Transform                                                                                        | <b>1</b>       |
| Fourier Transform: Properties                                                                            | <b>1</b>       |

### Linear Algebra:

1. Seymour Lipschitz and Marc Lipson, Linear Algebra, 3<sup>rd</sup> Edition, McGraw Hill Higher Education, 2017.
2. Thomas S. Shores, Applied Linear Algebra and Matrix Analysis, Springer International Publishing AG, 2018.
3. S.G. Venkatachalapathy, Modern Algebra, Margham Publications, 2011.
4. Kenneth Hoffman and Ray Kunze, Linear Algebra, Second Edition, Prentice-Hall of India Pvt. Ltd, 2013.
5. S.R. Patil, M.D. Bhagat, R.S. Bhamare, S.M. Waingade, N.M. Phatangare, K.D. Masalkar, Linear Algebra, Nirali Prakashan, 2018.

**Vector:**

1. Susan Jane Colley, Vector Calculus, 4<sup>th</sup> Edition, Pearson, 2011.
2. Gerald B. Folland, Advanced Calculus, Upper Saddle River, NJ : Prentice Hall, 2002.
3. Edwin Jed Herman and Gilbert Strang, Calculus - Volume II, OpenStax, 2016.

**Partial Differential Equations:**

1. T. Veerarajan, Transforms and Partial Differential Equations, 3<sup>rd</sup> Edition, McGraw Hill Education, 2016.
2. P. Sivaramakrishna Das and C. Vijaykumari, Transforms and Partial Differential Equations, 6<sup>th</sup> Edition, Pearson India, 2018.
3. G. Balaji, Transforms and Partial Differential Equations, 12<sup>th</sup> Edition, G. Balaji Publishers, 2016.

| <b>PHYSICS 302</b>                                                                                                                                                                                                                                                                                                                          |                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Quantum Mechanics</b>                                                                                                                                                                                                                                                                                                                    | <b>No. of Lectures-<br/>18</b> |
| The Breakdown of Classical Physics: Failure to explain blackbody radiation. Planck's idea of quantization, Photoelectric effect                                                                                                                                                                                                             | <b>18</b>                      |
| Matter Waves and Quantum Interpretation: de Broglie Waves and experimental confirmation of de Broglie's hypothesis. Electron double slit experiment. Wave-particle duality                                                                                                                                                                  |                                |
| Quantum Mechanics in One Dimension: Basic Postulates of Quantum Mechanics, Time-dependent and independent Schrodinger equation, Stationary states, and probabilistic interpretation of quantum mechanics, One-dimensional infinite square well, Harmonic oscillator: Solving using algebraic method, Eigenfunctions, and energy eigenvalues |                                |
| Expectation values, Observables and Operators: Hermitian operators, commutator algebra, a connection of classical and quantum mechanics                                                                                                                                                                                                     |                                |
| Tunneling Phenomena: Free particle, one-step potential and concept of tunneling                                                                                                                                                                                                                                                             |                                |
| Quantum Mechanics in 3-dimensions: 3d Cubic potential and degeneracy                                                                                                                                                                                                                                                                        |                                |
| Hydrogen atom, hydrogenic ions, helium atoms: Qualitative solution and idea of eigenvalue and wavefunction                                                                                                                                                                                                                                  |                                |
| Hydrogen molecule ion, hydrogen molecule: Qualitative discussion                                                                                                                                                                                                                                                                            |                                |
| <b>Thermodynamics</b>                                                                                                                                                                                                                                                                                                                       | <b>No. of Lectures-<br/>17</b> |
| Temperature and the Zeroth Law of Thermodynamics. Thermal equilibrium. Ideal gases, the kinetic theory of gases, equipartition theory, Boltzmann distribution                                                                                                                                                                               | 3                              |
| Heat, work, internal energy. First law of thermodynamics. Heat capacity and enthalpy. Compression of an ideal gas under various conditions. Latent heats                                                                                                                                                                                    | 2                              |
| Transport, conduction, conductivity, diffusion in gases- from mechanistic point of view                                                                                                                                                                                                                                                     | 1                              |
| Multiplicity and ideal gases. Entropy, spontaneous change and the Second Law of Thermodynamics. Interacting ideal gases and the entropy of mixing.                                                                                                                                                                                          | 2                              |
| Heat engines, Carnot Cycle, Otto Cycle, Stirling Cycle.                                                                                                                                                                                                                                                                                     | 3                              |
| Gibbs Free energy and spontaneity, Helmholtz Free energy, standard free energies, free energy as a function of pressure and temperature The Fundamental equation, properties of internal energy and Maxwell's relations                                                                                                                     | 2                              |
| Thermodynamics criteria for chemical and phase equilibria, chemical potential and partial molar quantities, the Gibbs Free Energy minimum                                                                                                                                                                                                   | 2                              |

|                                                                                                                                                                                                                                                                                                                                       |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| and equilibrium, extent of reaction and equilibrium constant, molecular description of equilibrium, response of equilibria to temperature                                                                                                                                                                                             |   |
| Thermodynamics of liquids and liquid mixtures, chemical potentials of liquids, ideal liquid mixtures and Raoult's Law, Henry's Law, vapor pressure diagrams, liquid-liquid phase diagrams Free energy and entropy of mixing, excess functions and real solutions, solute and solvent activity, activity coefficient, osmotic pressure | 2 |
| The two-state paramagnet and the Einstein model of a solid; quantum deviations from classical equipartition. Partition function. Interacting systems, large systems, Stirling's approximation                                                                                                                                         | 3 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                            |                                     |                  |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------------|------------------|---------|
| Course code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | CHM303                                     | Chemistry-3 Reactions and Synthesis | 4 Credits        |         |
| Core/Elective/SBS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                            | CORE PAPER                          |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                            |                                     | Syllabus Version | 2023-24 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                            |                                     |                  |         |
| Unit:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Organic Synthesis                          |                                     | 08 L             |         |
| <ul style="list-style-type: none"><li><b>C-C bond Forming Reactions:</b> Grignard Reagents and Organolithiums. Formation and reaction with Carbonyl compounds.</li><li><b>Organometallic Reagents in Synthesis:</b> Applications of Organocerium and Organocuprate reagents.</li><li><b>Carbonyl Compounds and Reactions:</b> Carbonyl compounds, Tautomerism as a general phenomenon, keto-enol tautomerism of carbonyl compounds, mechanism of keto-enol tautomerism - Generating enolate anions, suitable base catalysts for enolising aldehydes, ketones, and ester and <math>\beta</math>-dicarbonyl compounds, general <math>\alpha</math>- Substitution reaction. Reactions of enols and enolates, <math>\alpha</math>-substitution with H/D<sup>+</sup> Stereochemical consequences and deuterium incorporation, Halogenation of carbonyl compounds. The haloform reaction, Halogenation of carbonyls, Hell-Volhard-Zelinsky reaction, Synthetic applications of <math>\alpha</math>-halocarbonyl compounds. Alkylation of enolates, LDA, scope and limitations. Aldol reaction, mechanism and retro synthesis, inter-and-intra- Molecular variants, mixed Aldol reaction. Claisen reaction, mechanism and retro synthesis, mixed Claisen and Dieckman reaction. Malonate Diester Chemistry, Acetoacetate chemistry, Synthesis of Substituted acetic acid and acetone derivatives, Scope, Mechanism and Retro synthesis. Michael addition Chemistry, reaction of enolates with various Michael electrophiles.<br/>Kinetic and Thermo dynamic enolates, Enamines and silylenol ethers</li></ul> |                                            |                                     |                  |         |
| Unit:2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Redox (and important acid-base) Reactions: |                                     | 08 L             |         |
| <ul style="list-style-type: none"><li>Oxidation of elements by halogens and dioxygen. Metal and main group halides and oxides. Discussion of selected syntheses, chemistry and structures of halides and oxides including amphoteric behaviour and hydroxide/aqua ion formation.</li><li>Thermodynamic vs. kinetic control of reactions. Thermodynamic aspects of halide and oxide formation. Thermodynamic parameters, their estimation and uses of tabulations. Born-Haber cycle and construction and uses of Ellingham diagrams for these systems. (Electrides and sodides).</li><li>Oxidation of metals by protons etc. and generation of aqua ions. Comparison of TM and main group systems and hydrolysis in TM aqua ions (acid-base chemistry of coordinated water-hydroxide-oxo ligands). Connection between electrochemical and thermo dynamic parameters. Construction and uses of Latimer and Frost diagrams. Interpretations of Frost diagrams exemplified by the more complex chemistry of main group elements, such as nitrogen.</li><li>Thermodynamic content of plots (free energy of formation vs. oxidation state) and</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                            |                                     |                  |         |

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------|
| <p>predictive power. Nernst equation revisited and construction and uses of Pourbaix diagrams combining redox and acid base reactions. Comparison of chemistry of representative elements as reflected in Pourbaix diagrams.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                               |             |
| <b>Unit:3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Exchange reactions</b>     | <b>06 L</b> |
| <ul style="list-style-type: none"> <li>• Solid/gas phase systems exemplified by transport reactions and preparation of solid-state materials, in volcanology, halogen lamps etc. Solution examples of doubled composition (metathesis). Solubility trends, Common ion effect.</li> <li>• Hard/soft acid/base theory. Thermodynamic basis for HSAB theory. Usefulness in predicting direction of equilibrium and solubility.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                               |             |
| <b>Unit:4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Substitution Reactions</b> | <b>06 L</b> |
| <ul style="list-style-type: none"> <li>• Typical reactions and synthetic applications and examples. Inert and labile complexes. Stability (<math>K_f</math>) and factors affecting stability (metals, ligands). Irving-Williams series, Chelate effect. Applications of chelate effect. Siderophores. Antioxidants, garden products, chelation therapy in medicine.</li> <li>• Mechanism of substitution reactions. Square planar Pt complexes and applications. Trans effect, Pt chemistry, Applications in synthesis of action of chemotherapeutic agents.</li> <li>• Dissociative, interchange and associative mechanisms in substitution, racemization <i>etc</i> in octahedral complexes.</li> <li>• Combination of substitution and redox chemistry in TM systems.</li> <li>• Co(III) syntheses, Cr(II) catalysed substitution. Electron transfer, inner-and outer-sphere reactions.</li> <li>• <b>Metal centered reactions:</b> Template reactions and reactions of coordinated ligands. Atom transfer reactions (redox reactions). Metal directed ligand syntheses</li> </ul>                                                                                                                                                                                                                                                  |                               |             |
| <b>Unit:5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Thermodynamics</b>         | <b>08 L</b> |
| <ul style="list-style-type: none"> <li>• Ideal gases, the kinetic theory of gases, equipartition theory, Boltzmann distribution, Heat, work, internal energy. First law of thermo dynamics. Heat Capacity and enthalpy. Compression of an ideal gas under various conditions. Latent heats, Multiplicity and ideal gases. Entropy, spontaneous change and the Second Law of Thermodynamics. Interacting ideal gases and the entropy of mixing. Gibbs Free energy and spontaneity, Helmholtz Free energy, standard free energies, free energy as a function of pressure and temperature.</li> <li>• The Fundamental equation, properties of internal energy and Maxwell's relations. Thermodynamics criteria for chemical and phase equilibria, chemical potential and partial molar quantities, the Gibbs Free Energy, minimum and equilibrium, extent of reaction and equilibrium constant, molecular description of equilibrium, response of equilibria to temperature.</li> <li>• Thermodynamics of liquids and liquid mixtures, chemical potentials of liquids, ideal liquid mixtures and Raoult's Law, Henry's Law, vapor pressure diagrams, liquid-liquid phase diagrams, Free energy and entropy of mixing, excess functions and real solutions, solute and Solvent activity, activity coefficient, osmotic pressure</li> </ul> |                               |             |

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>Student Work</b>                                                                                                                                           |                                                                                                                                 | <b>09 L</b>                                                                                                   |
| <ul style="list-style-type: none"><li>• Assignments, Tutorials</li><li>• Reviews of various research papers, reports, books</li><li>• Presentations</li></ul> |                                                                                                                                 |                                                                                                               |
| <b>Recommended Books/references</b>                                                                                                                           |                                                                                                                                 |                                                                                                               |
| 1                                                                                                                                                             | OrganicChemistryby J. McMurray, 7th Ed., Thomson, 2008.                                                                         |                                                                                                               |
| 2                                                                                                                                                             | Carey, F. A. and Sundberg, R. J., “Advanced Organic Chemistry, Part B: Reactions and Synthesis”, 5 <sup>th</sup> Ed., Springer. |                                                                                                               |
| 3                                                                                                                                                             | PrinciplesofOrganicSynthesisby R. Norman and J.M. Coxon, 3rd Ed., Chapman and Hall, 1993.                                       |                                                                                                               |
| 4                                                                                                                                                             | Organic Chemistry by Clayden, J., Greeves, N. and Warren, S., “Organic Chemistry”, Oxford University Press.                     |                                                                                                               |
| 5                                                                                                                                                             | Smith, M.B., “Organic Synthesis”, 3 <sup>rd</sup> Ed., Academic Press.                                                          |                                                                                                               |
|                                                                                                                                                               |                                                                                                                                 |                                                                                                               |
| <b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>                                                                                           |                                                                                                                                 |                                                                                                               |
|                                                                                                                                                               | 1                                                                                                                               | <a href="https://chem.libretexts.org/">https://chem.libretexts.org/</a>                                       |
|                                                                                                                                                               | 2                                                                                                                               | <a href="https://byjus.com/chemistry/">https://byjus.com/chemistry/</a>                                       |
|                                                                                                                                                               | 3                                                                                                                               | <a href="https://openstax.org/details/books/chemistry-2e">https://openstax.org/details/books/chemistry-2e</a> |
|                                                                                                                                                               |                                                                                                                                 |                                                                                                               |



| <b>BIOLOGY – BIO301</b> |  | <b>Functional Biology of Organisms</b>                                                |
|-------------------------|--|---------------------------------------------------------------------------------------|
| <b>36</b>               |  |                                                                                       |
| 1                       |  | Introduction to Functional Biology                                                    |
|                         |  | Animal biology (Humans as an example) (18 lectures)                                   |
| 1                       |  | Anatomy and Function 1: Tissues, Organs and Viscera                                   |
| 1                       |  | Anatomy and Function 2: Skeletal & Muscular system                                    |
| 1                       |  | Nervous system 1: The central nervous system (CNS) and nervous tissues                |
| 1                       |  | Nervous system 2: Autonomic nervous system and motor responses                        |
| 1                       |  | Endocrine system 1: Endocrine and Exocrine glands                                     |
| 1                       |  | Endocrine system 2: HPA axis introduction                                             |
| 1                       |  | Respiration and Metabolism 1: Breathing in air and water                              |
| 1                       |  | Respiration and Metabolism 2: Regulation of metabolism                                |
| 1                       |  | Cardiovascular and circulatory system 1: Regulation of the circulatory system         |
| 1                       |  | Cardiovascular and circulatory system 2: Peripheral circulation                       |
| 1                       |  | Digestive system                                                                      |
| 1                       |  | Urinary and Excretion systems 1: Anatomy and function                                 |
| 1                       |  | Urinary and Excretion systems 2: Osmoregulation in terrestrial & aquatic environments |
| 1                       |  | Thermal dynamics                                                                      |
| 1                       |  | Immunology 1: Innate immune system                                                    |
| 1                       |  | Immunology 2: Adaptive/Humoral immune system                                          |
| 1                       |  | Reproduction and Development 1: Gonads and the Reproductive tract                     |
| 1                       |  | Reproduction and Development 2: Gametes, Fertilization and conception                 |
|                         |  | Plant biology (15 lectures)                                                           |
| 2                       |  | Growth and Development                                                                |
| 2                       |  | Photosynthesis                                                                        |
| 2                       |  | Water Balance Water Relations and Transport (Xylem & Phloem)                          |
| 1                       |  | Phloem and translocation                                                              |
| 2                       |  | Mineral nutrition and nutrient assimilation                                           |
| 2                       |  | Respiration and lipid metabolism                                                      |
| 1                       |  | Reproduction                                                                          |
| 1                       |  | Signaling; hormones, light responses, control of flowering                            |
| 1                       |  | Abiotic stress                                                                        |
| 1                       |  | Secondary metabolism and defence                                                      |
| 2                       |  | Microbial physiology                                                                  |

| <b>Text Book(s)</b>                                                  |                                                                                                                                                                                               |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                                                    | Molecular cell biology, Harvey Lodish, 8 <sup>th</sup> edition, W.H. Freeman, (2016).                                                                                                         |
| 2                                                                    | Cell and Molecular Biology concepts and Experiments, Gerald Karp, <a href="#">Janet Iwasa</a> , <a href="#">Wallace Marshall</a> , 9th Edition, Wiley (2019)                                  |
| 3                                                                    | Molecular Biology of the cell, Bruce Alberts, 6 <sup>th</sup> edition, Garland Science (2014)                                                                                                 |
|                                                                      |                                                                                                                                                                                               |
| <b>Reference Books</b>                                               |                                                                                                                                                                                               |
| 1                                                                    | The Cell: A molecular approach, Geoffrey M. Cooper, Robert E. Hausman, Sixth edition, Sinauer (2013)                                                                                          |
| 2                                                                    | Essential Cell Biology, Bruce Alberts, 5 <sup>th</sup> edition, Garland Science (2019).                                                                                                       |
| 3                                                                    | Lewin's Genes XII, 2017, Jocelyn E Krebs, Elliott S. Goldstein, and Stephen T. Kilpatrick Jones, Bartlett Publishers, 12th revised edition                                                    |
|                                                                      |                                                                                                                                                                                               |
| <b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.,]</b> |                                                                                                                                                                                               |
| 1                                                                    | <a href="https://microbenotes.com/category/cell-biology/">https://microbenotes.com/category/cell-biology/</a>                                                                                 |
| 2                                                                    | <a href="https://www.larberthigh.com/_documents/%5B1405%5DUnit_1-_Cell_biology_summary_notes.pdf">https://www.larberthigh.com/_documents/%5B1405%5DUnit_1-_Cell_biology_summary_notes.pdf</a> |
| 3                                                                    | <a href="https://nptel.ac.in/courses/102/103/102103012/">https://nptel.ac.in/courses/102/103/102103012/</a>                                                                                   |
| 4                                                                    | <a href="https://www.khanacademy.org/science/ap-biology/cell-structure-and-function">https://www.khanacademy.org/science/ap-biology/cell-structure-and-function</a>                           |

### **PHY302 - Physics Practical - 2 Credits**

1. Michelson's interferometer: To find the wavelength of given laser beam.
2. Specific charge of the electron( $e/m$ ): To find the specific charge of the electron from the path of an electron beam in crossed electric and magnetic fields of variable strength.
3. Rydberg's constant: To find Rydberg's constant using diffraction grating.
4. Photoelectric effect: To estimate Planck's constant and work function of the photoelectrons by measuring the variation of stopping potential with the frequency of light. To see the graph of current Vs voltage for different intensity and frequency of light.
5. Electron diffraction: To measure diameter of smallest diffraction rings at different anode voltages.
6. Millikan oil drop experiment: To measure the charge of the electron.

## **CHM302 - Chemistry Practical - 2 Credits**

### **List of Physical chemistry experiments**

1. Thermodynamic data of electrochemical cell by e.m.f. measurements.
2. Determination of the equilibrium constant of tri-iodide ion formation
3. Determination of dipole moment of liquid at various temperatures
4. Dissociation constant of an acid-base indicator by spectrophotometry
5. Flame Photometric determination of Na, K, Li and Ca (Working curve method, standard addition method and Internal standard method)
6. A photometric titration of a mixture of Bi and Cu with EDTA(-745nm)
7. The reaction between potassium persulphate and potassium iodide by colorimetry.
8. Hydrolysis constant of aniline hydrochloride by distribution coefficient method.
9. Thermodynamic data of electrochemical cell by e.m.f. measurements.
10. Determination of the equilibrium constant of tri-iodide ion formation
11. Determination of dipole moment of liquid at various temperatures
12. Determination of concentration of sulfuric acid, acetic acid and copper sulphate by conductometric titration with sodium hydroxide.
13. Determine the formula and stability constant of a metal ion complex (Lead Oxalate) by polarography.

### **List of Inorganic chemistry experiments**

#### **1. Analysis of ore(Any one)**

- i) Pyrolusite ore –Estimation of silica gravimetrically and Manganese volumetrically.
- ii) Chromite ore–Estimation of Iron gravimetrically and Chromium volumetrically

## **2. Analysis of Alloy**

Solder alloy– Estimation of Tin gravimetrically and Lead volumetrically

## **3. Column Chromatography: Ion exchange capacity of resins by Co and Ni.**

## **4. Characterization of soil and water.**

### **List of Organic chemistry experiments**

#### **1. Separation of Binary Mixture (8-10 samples)**

#### **2. Preparations: Single Stage**

- a. Ethyl benzene from acetophenone
- b. P-Nitrobenzylcyanide from Benzyl cyanide.
- c. 2,4-dinitroanisole from anisole
- d. Azo dye from Anthranilic acid
- e. Osazone from Glucose
- f. Cinnamic acid dibromide from Cinnamic acid
- g. Chalcone from P-chloro Benzaldehyde.
- h. Hippuric acid from Glycine
- i. 4-formyl resorcinol from Resorcinol.
- j. Adipic acid from Cyclohexanone
- k. 4,6 dimethyl coumarin from p-cresol.
- l. Cannizzaro reaction of aromatic aldehyde.

## **BIO302 - Biology Practical - 2 Credits**

### Any 5 Experiments

1. Preparation of media, autoclaving and culturing of bacteria
2. Plating techniques
  - a) Pour plate b) Streaking c) Spread plate technique
3. Dilution and colony counting
4. Bacterial Growth curve
5. Enzyme kinetics (effect of pH, temperature, substrate and enzyme concentration)
6. Estimation of glucose
7. Antibiotic sensitivity test: zone of inhibition

### **VALUEADDED 3: YOGA FOR HUMAN EXCELLENCE (2 CREDITS)**

**Course code: 3FC**

#### **Yoga and Physical Health**

Physical Structure- Three bodies –Five limitations

Simplified physical Exercises-Hand Exercises-Leg Exercises–Breathing Exercises-Eye Exercises – Kapalapathi

Matrarasanas-Massages -Acupuncture- Relaxational

Yogasanas-Padmasana-Vajrasanas–Chakrasanas (Side)-Viruchasanas-Yogamuthra- Patchimothasanas - Ustrasanas -Vakkarasanas – Salabasanas

#### **Art of Nurturing the life force and Mind**

Maintaining the youthfulness-Postponing the ageing process

Sex and Spirituality-Significance of sexual vital fluid-Married life -Chastity

Ten stages of Mind

Mental frequency-Methods for concentration

#### **Sublimation**

Purpose and Philosophy of life

Introspection-Analysis of Thought

Moralization of Desires

Neutralization of Anger

#### **Human Resources development**

Eradication of worries

Benefits of Blessings

Greatness of Friendship

Individual Peace and World Peace

#### **Law of Nature**

Unified force-Cause and Effect system

Purity of Thought and Deed and Genetic centre

Love and Compassion

Cultural Education- Five-fold Culture

#### **Textbook(s)**

1. Manavalakalai Yoga, Vedathiri Publications
2. Simplified Physical Exercises–Vethathiri Maharishi, Vethathiri Publication.  
Yogasanas–Vethathiri Publication

3. Yoga for Modern Age–Vethathiri Maharishi, Vethathiri Publications
4. The World Order of Holistic Unity –Vethathiri Maharishi, Vethathiri - Publications
5. Sound health through yoga–Dr. K. Chandrasekaran.

**Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]**

1. Yoga Practices 1 –By Dr Vikas|Swami Vivekananda Yoga Anusandhana Samsthan-SWAYAM

Course Designed By: **Bharathiar University**



---- 23 - 886\*

**AUDIT**

**HEALTH & WELLNESS**

| L | T | P | C** |
|---|---|---|-----|
| 0 | 0 | 2 | 1   |

\*(First four digits in the subject code is branch code and Seventh digit is Semester)

\*\* Health & Wellness has one credit for the third semester only and it has no credits for other semesters.

### **Skill Areas:**

Physical Fitness, Nutrition, Mental Health, Awareness on Drug addiction and its effects

### **Purpose:**

The Health & Wellness course focuses on teaching the elements of physical, mental, emotional, social, intellectual, environmental well-being which are essential for overall development of an individual. The course also addresses the dangers of substance abuse and online risks to promote emotional and mental health.

### **Learning Outcomes:**

Upon completion of the Health & Wellness course, students will be able to:

1. Demonstrate proficiency in sports training and physical fitness practices.
2. Improve their mental and emotional well-being, fostering a positive outlook on health and life.
3. Develop competence and commitment as professionals in the field of health and wellness.
4. Awareness on drug addiction and its ill effects

### **Focus:**

During the conduct of the Health & Wellness course, the students will benefit from the following focus areas:

1. Stress Management.
2. Breaking Bad Habits.
3. Improving Interpersonal Relationships.
4. Building Physical Strength & Inner Strength.

### **Role of the Facilitator:**

The faculty plays a crucial role in effectively engaging with students and guiding them towards achieving learning outcomes. Faculty participation involves the following areas:

1. **Mentorship & Motivation:** The Facilitator mentors students in wellness and self-discipline while inspiring a positive outlook on health. Faculty teach stress management, fitness, and daily well-being.
2. **Promoting a Safe and Inclusive Environment:** The facilitator ensures a safe, inclusive, and respectful learning environment for active student participation and benefit.
3. **Individualised Support and Monitoring Progress:** The facilitator plays a crucial role in providing personalized support, monitoring and guidance to students.

#### **Guided Activities:**

In this course, several general guided activities have been suggested to facilitate the achievement of desired learning outcomes. They are as follows:

1. Introduction to Holistic Well-being.
2. Holistic Wellness Program- Nurturing Body and Mind
3. Breaking Bad Habits Workshop.
4. Improving the elements of physical, emotional, social, intellectual, environmental and mental well-being.
5. Creating situational awareness, digital awareness.
6. Understanding substance abuse, consequences and the way out.

#### **Period Distribution**

The following are the guided activities suggested for this Audit course.

The Physical Director should plan the activities by the students.

Arrange the suitable Mentor / Guide for the wellness activities.

Additional activities and programs can be planned for Health and Wellness.

| <b>S.No</b> | <b>Guided Activities</b>                                                                                                                                                                                                                                                                                                                              | <b>Period</b> |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1           | <b>Introduction to Holistic Well-being</b> <ol style="list-style-type: none"> <li>1. Introduce the core components of Health &amp; Well-being namely Physical, mental and emotional well-being</li> <li>2. Provide worksheets on all the four components individually and explain the interconnectedness to give an overall understanding.</li> </ol> |               |
| 2           | <b>Wellness Wheel Exercise (Overall Analysis)</b>                                                                                                                                                                                                                                                                                                     |               |

Guide students to assess their well-being in various life dimensions through exercises on various aspects of well-being, and explain the benefits of applying wellness wheel.

- Introduce Tech Tools:
- Explore the use of technology to support well-being.
- Introduce students to apps for meditation, sleep tracking, or healthy recipe inspiration.

### **3 Breaking Bad Habits (Overall Analysis)**

- Open a discussion on bad habits and their harmful effects.
- Provide a worksheet to the students to identify their personal bad habits.
- Discuss the trigger, cause, consequence and solution with examples.
- Guide them to replace the bad habits with good ones through worksheets.

### **4 Physical Well-being**

#### **1. Fitness**

Introduce the different types of fitness activities such as basic exercises, cardiovascular exercises, strength training exercises, flexibility exercises, so on and so forth.

(Include theoretical explanations and outdoor activity).

#### **2. Nutrition**

Facilitate students to reflect on their eating habits, their body type, and to test their knowledge on nutrition, its sources and the benefits.

#### **3. Yoga & Meditation**

Discuss the benefits of Yoga and Meditation for one's overall health.

Demonstrate different yoga postures and their benefits on the body through visuals (pictures or videos)

#### **4. Brain Health**

Discuss the importance of brain health for daily life.

Habits that affect brain health (irregular sleep, eating, screen time).

Habits that help for healthy brains (reading, proper sleep, exercises).

Benefits of breathing exercises and meditation for healthy lungs.

#### **5. Healthy Lungs**

Discuss the importance of lung health for daily life.

Habits that affect lung health (smoking, lack of exercises).

Benefits of breathing exercises for healthy lungs.

#### **6. Hygiene and Grooming**

Discuss the importance of hygienic habits for good oral, vision, hearing and skin health.

Discuss the positive effects of grooming on one's confidence level and professional growth.

#### **Nutrition:**

Invite a nutritionist to talk among the students on the importance of nutrition to the body or show similar videos shared by experts on social media. Organize a 'Stove less/fireless cooking competition' for students where they are expected to prepare a nutritious dish and explain the nutritive values in parallel.

### **5 Emotional Well-being**

#### **1. Stress Management**

Trigger a conversation or provide self-reflective worksheets to identify the stress factors in daily life and their impact on students' performance.

Introduce different relaxation techniques like deep breathing, progressive muscle relaxation, or guided imagery.

(use audio recordings or visuals to guide them through these techniques).

After practicing the techniques, have them reflect on how these methods can help manage stress in daily life.

#### **2. Importance of saying 'NO'.**

Explain the students that saying 'NO' is important for their Physical and mental well-being, Academic Performance, Growth and Future, Confidence, Self-respect, Strong and Healthy Relationships, building reputation for self and their family (avoid earning a bad name).

Factors that prevent them from saying 'NO'.

How to practice saying 'NO'.

### **3. Body Positivity and self-acceptance**

Discuss the following with the students.

- What is body positivity and self-acceptance?
- Why is it important?
- Be kind to yourself.
- Understand that everyone's unique.

(Importance of saying 'NO')

Provide worksheets to self-reflect on...

...how they feel when others say 'no' to them

...the situations where they should say 'no'

Challenge students to write a song or rap about the importance of saying no and how to do it effectively.

Students can perform their creations for the class.

## **6 Social Well-Being**

### **1. Practicing Gratitude**

Discuss the importance of practicing gratitude for building relationships with family, friends, relatives, mentors and colleagues

Discuss how one can show gratitude through words and deeds.

Explain how practicing gratitude can create 'ripple effect'.

### **2. Cultivating Kindness and Compassion**

Define and differentiate between kindness and compassion.

Explore practices that cultivate these positive emotions.

Self-Compassion as the Foundation.

The power of small gestures.  
Understanding another's perspective.  
The fruits of compassion.

### **3. Practising Forgiveness**

Discuss the concept of forgiveness and its benefits.  
Forgiveness: What is it? and What it isn't?  
Benefits of forgiveness.  
Finding forgiveness practices.

### **4. Celebrating Differences**

Appreciate the value of individual differences and foster inclusivity.  
The World: A Tapestry of Differences (cultures, backgrounds, beliefs, abilities, and appearances).  
Finding strength in differences (diverse perspectives and experiences lead to better problem-solving and innovation).  
Celebrating differences, not ignoring them (respecting and appreciating the unique qualities).  
Activities for celebrating differences (share culture, learn about others, embrace new experiences).

### **5. Digital Detox**

**Introduce the students to:**

The concept of a digital detox and its benefits for social well-being.  
How to disconnect from devices more often to strengthen real-world connections.

:

(Practicing Gratitude)

Provide worksheets to choose the right ways to express gratitude.  
Celebrate 'gratitude day' in the college and encourage the students to honour the house keeping staff in some way to express gratitude for their service.

## **7 Intellectual Well-being**

### **1. Being a lifelong Learner**

**Give students an understanding on:**

The relevance of intellectual well-being in this 21<sup>st</sup> century to meet

the expectations in personal and professional well-being

The Importance of enhancing problem-solving skills

Cultivating habits to enhance the intellectual well-being (using the library extensively, participating in extra-curricular activities, reading newspaper etc.)

## **2. Digital Literacy**

### **Discuss:**

The key aspects of digital literacy and its importance in today's world.

It is more than just liking and sharing on social media.

The four major components of digital literacy (critical thinking, communication, problem-solving, digital citizenship).

Why is digital literacy important?

Boosting one's digital skills.

## **3. Transfer of Learning**

Connections between different subjects – How knowledge gained in one area can be applied to others.

Intellectual Well-being.

Provide worksheets to students for teaching them how to boost intellectual well-being.

Ask the students to identify a long-standing problem in their locality, and come up with a solution and present it in the classroom. Also organize an event like 'Idea Expo' to display the designs, ideas, and suggestions, to motivate the students to improve their intellectual well-being.

## **8 Environmental Well-being**

1.The Importance of initiating a change in the environment.

### **The session could be around:**

Defining Environmental well-being (physical, chemical, biological, social, and psychosocial factors) – People's behaviour, crime, pollution, political activities, infra-structure, family situation etc.

Suggesting different ways of initiating changes in the environment (taking responsibility, creating awareness, volunteering,



approaching administration).

Providing worksheets to self-reflect on how the environment affects their life, and the ways to initiate a change.

Dedicate a bulletin board or wall space (or chart work) in the classroom for students to share their ideas for improving environmental well-being.

Creating a volunteers' club in the college and carrying out monthly activities like campus cleaning, awareness campaigns against noise pollution, (loud speakers in public places), addressing anti-social behaviour on the campus or in their locality.

## **9 Mental Well-being**

### **1. Importance of self-reflection**

#### **Discuss:**

Steps involved in achieving mental well-being (self-reflection, self-awareness, applying actions, achieving mental well-being).

Different ways to achieve mental well-being (finding purpose, coping with stress, moral compass, connecting for a common cause).

The role of journaling in mental well-being.

### **2. Mindfulness and Meditation Practices**

Benefits of practicing mindful habits and meditation for overall well-being.

#### **1. Connecting with nature**

Practising to be in the present moment – Nature walk, feeling the sun, listening to the natural sounds.

Exploring with intention – Hiking, gardening to observe the nature.

Reflecting on the emotions, and feeling kindled by nature.

#### **2. Serving people**

Identifying the needs of others.

Helping others.

Volunteering your time, skills and listening ear.

Finding joy in giving.

#### **3. Creative Expressions**



Indulging in writing poems, stories, music making/listening, creating visual arts to connect with inner selves.

(Mindfulness and Meditation) – Conducting guided meditation every day for 10 minutes and directing the students to record the changes they observe.

## **10 Situational Awareness (Developing Life skills)**

### **1. Being street smart**

#### **Discuss:**

Who are street smarts?

Why is it important to be street smart?

Characteristics of a street smart person: Importance of acquiring life skills to become street smart – (General First-aid procedure, CPR Procedure, Handling emergency situations like fire, flood etc).

### **2. Digital Awareness**

#### **Discuss:**

Cyber Security

Information Literacy

Digital Privacy

Fraud Detection

(sample):

(Street Smart) Inviting professionals to demonstrate the CPR Procedure

Conducting a quiz on Emergency Numbers

## **11 Understanding Addiction**

### **Plan this session around:**

Identifying the environmental cues, triggers that lead to picking up this habit.

Knowing the impact of substance abuse – Adverse health conditions, social isolation, ruined future, hidden financial loss and damaging the family reputation.

Seeking help to get out of this addiction.

:

Provide Worksheets to check the students' level of understanding about substance addiction and their impacts.

Share case studies with students from real-life.

Play/share awareness videos on addiction/de-addiction, experts talk.

\*Conduct awareness programmes on Drugs and its ill effects. (Arrange Experts from the concerned government departments and NGOs working in drug addiction issues) and maintain the documents of the program.

#### **Closure:**

Each student should submit a Handwritten Summary of their Learnings & Action Plan for the future.

#### **Assessments:**

Use Self-reflective worksheets to assess their understanding.

- Submit the worksheets to internal audit/external audit.
- Every student's activities report should be documented and the same have to be assessed by the Physical Director with the mentor. The evaluation should be for 100 marks. No examination is required.

#### **Scheme of Evaluation**

| <b>Part</b>  | <b>Description</b>                       | <b>Marks</b> |
|--------------|------------------------------------------|--------------|
| A            | Report                                   | 40           |
| B            | Attendance                               | 20           |
| C            | Activities (Observation During Practice) | 40           |
| <b>Total</b> |                                          | <b>100</b>   |

## **References/Resource Materials:**

The course acknowledges that individual needs for references and resources may vary. However, here are some general reference materials and resources that may be helpful:

### **1. The Well-Being Wheel:**

**2. Facilities & Spaces:** Some activities may require access to specific facilities, resources or spaces. Students may need to coordinate with the college administration to reserve these as required.

### **3. Online Resources:**

1. United Nations Sustainable Development Goals - Goal 3 - Good Health & Well-Being: <https://www.un.org/sustainabledevelopment/health/>
2. Mindfulness and Meditation: Stanford Health Library offers mindfulness and meditation resources:  
<https://healthlibrary.stanford.edu/books-resources/mindfulness-meditation.html>

3. Breaking Bad Habits: James Clear provides a guide on how to build good habits and break bad ones: <https://jamesclear.com/habits>
4. 6 Ways to Keep Your Brain Sharp  
<https://www.lorman.com/blog/post/how-to-keep-your-brain-sharp>
5. What Is Social Wellbeing? 12+ Activities for Social Wellness  
<https://positivepsychology.com/social-wellbeing/>
6. How Does Your Environment Affect Your Mental Health?  
<https://www.verywellmind.com/how-your-environment-affects-your-mental-health-5093687>
7. How to say no to others (and why you shouldn't feel guilty)  
<https://www.betterup.com/blog/how-to-say-no>

# **SEMESTER IV**

## SEMESTER IV

|                                                                                                                                                            |                                            |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------|
| <b>Subject Code:</b> MTH401                                                                                                                                | <b>Maths 4:</b> Probability and Statistics | <b>4 Credits</b> |
| <b>Probability</b>                                                                                                                                         |                                            |                  |
| <b>Probability and Random Variables</b>                                                                                                                    |                                            | <b>4 Hours</b>   |
| Review of Probability, Events, Laws of Probability                                                                                                         |                                            | <b>1</b>         |
| Conditional Probability, Independent Events                                                                                                                |                                            | <b>1</b>         |
| Random Variables; Discrete Random Variables and Distributions; Mean, Variance and Standard Deviation of Discrete Random Variable                           |                                            | <b>1</b>         |
| Bernoulli Trials                                                                                                                                           |                                            | <b>1</b>         |
| <b>Distribution</b>                                                                                                                                        |                                            |                  |
| <b>Distribution</b>                                                                                                                                        |                                            | <b>10 Hours</b>  |
| Binomial Distribution, Poisson Distribution and Poisson Process                                                                                            |                                            | <b>1</b>         |
| Continuous Random Variables and Distributions, Probability Density Functions, Cumulative Distribution Function                                             |                                            | <b>1</b>         |
| Mean, Variance, Standard Deviation, Median and Percentiles of a Continuous Distribution                                                                    |                                            | <b>1</b>         |
| Normal Distribution                                                                                                                                        |                                            | <b>1</b>         |
| Uniform and Exponential Distribution                                                                                                                       |                                            | <b>1</b>         |
| Distributions of Functions of a Random Variable                                                                                                            |                                            | <b>1</b>         |
| Sums/Differences/Scalar Multiples of Random Variables, Independent Random Variables, Distributions of Sums/Differences of Independent Random Variables     |                                            | <b>1</b>         |
| Central Limit Theorem                                                                                                                                      |                                            | <b>1</b>         |
| Normal Approximation to The Binomial Distribution, Distribution of The Sample Mean                                                                         |                                            | <b>1</b>         |
| Distribution of Sample Proportion                                                                                                                          |                                            | <b>1</b>         |
| <b>Stochastic processes and Markov chains</b>                                                                                                              |                                            |                  |
| <b>Stochastic processes and Markov chains</b>                                                                                                              |                                            | <b>2 Hours</b>   |
| Stochastic Processes, Markov Chains                                                                                                                        |                                            | <b>1</b>         |
| Limiting Behavior of Markov Chains                                                                                                                         |                                            | <b>1</b>         |
| <b>Statistics</b>                                                                                                                                          |                                            |                  |
| <b>Statistics</b>                                                                                                                                          |                                            |                  |
| <b>Study design</b>                                                                                                                                        |                                            | <b>2 Hours</b>   |
| Bias, Confounding, Precision, Comparison, Control                                                                                                          |                                            | <b>1</b>         |
| Observational Studies Vs Designed Experiments                                                                                                              |                                            | <b>1</b>         |
| <b>Exploratory data analysis</b>                                                                                                                           |                                            |                  |
| <b>Exploratory data analysis</b>                                                                                                                           |                                            | <b>4 Hours</b>   |
| Describing and Displaying Categorical Data (Tables, Frequencies, Bar Chart)                                                                                |                                            | <b>1</b>         |
| Describing and Displaying Univariate Numeric Data (Dotplots, Boxplots, Histograms, Mean, Median, Quartiles/Percentiles, Standard Deviation, Variance, IQR) |                                            | <b>1</b>         |
| Describing and Displaying Bivariate Numeric Data (Scatterplot, Correlation)                                                                                |                                            | <b>1</b>         |
| Statistical Modeling (Single Mean Model, Multiple Means Model, Regression Model)                                                                           |                                            | <b>1</b>         |
| <b>Sampling distributions</b>                                                                                                                              |                                            |                  |
| <b>Sampling distributions</b>                                                                                                                              |                                            | <b>1 Hour</b>    |
| Sampling Distributions: Population Vs Sample, Parameter Vs Statistic; Distribution of Sample Mean, Proportion; Standard Error                              |                                            | <b>1</b>         |

**Probability:**

|                                                                                                    |                |
|----------------------------------------------------------------------------------------------------|----------------|
| <b>Estimation</b>                                                                                  | <b>4 Hours</b> |
| Confidence Intervals, Confidence Interval for Mean (using z), Confidence Interval for Mean using t | <b>1</b>       |
| Confidence Interval for Difference in Mean, Confidence Intervals for Proportion                    | <b>1</b>       |
| Required Sample Size, Confidence Interval Vs Prediction Interval                                   | <b>1</b>       |
| Theory of estimation: Unbiased Estimators, Maximum Likelihood Estimators                           | <b>1</b>       |
| <b>Hypothesis Testing</b>                                                                          | <b>3 Hours</b> |
| Concepts and Terminology, Testing a Single Mean (z and t)                                          | <b>1</b>       |
| Errors, Power, 2-Sample Test, Paired Test, Testing Proportion                                      | <b>1</b>       |
| Non-Parametric Tests for 2 Samples                                                                 | <b>1</b>       |
| <b>ANOVA</b>                                                                                       | <b>2 Hours</b> |
| One-Way ANOVA                                                                                      | <b>1</b>       |
| Theory of ANOVA                                                                                    | <b>1</b>       |
| <b>Regression</b>                                                                                  | <b>2 Hours</b> |
| Least Squares Method                                                                               | <b>1</b>       |
| Partitioning of Variability in Regression, Significance Testing in Regression                      | <b>1</b>       |
| <b>Chi-squared Test</b>                                                                            | <b>2 Hours</b> |
| Chi-Squared Test for Independence                                                                  | <b>1</b>       |
| Chi-Squared Goodness-of-Fit                                                                        | <b>1</b>       |

1. Seymour Lipschutz and Marc Lars Lipson, Probability, 2<sup>nd</sup> Edition, McGraw Hill Higher Education, 2010.
2. T. Veerarajan, Probability, Statistics and Random Process, 3<sup>rd</sup> Edition, McGraw Hill Education, 2017.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11<sup>th</sup> Edition, Sultan Chand and Sons, 2014.

**Statistics:**

1. S.P. Gupta, Statistical Methods, Sultan Chand & Sons, 2021.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11<sup>th</sup> Edition, Sultan Chand and Sons, 2014.
3. B.L. Agarwal, Programmed Statistics (Question-Answers), 4<sup>th</sup> Edition, New Age International Private Limited, 2021.

| PHYSICS 402                                                                                                                                                                                                                                                                     |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Electricity and Magnetism                                                                                                                                                                                                                                                       | No. of Lectures<br>-18 |
| Coulomb's Law - (Introduction to spherical polar coordinate, Spherical symmetry in Coulomb's law)                                                                                                                                                                               |                        |
| Gauss's Law - (Electric field lines/Flux, Introduction to divergence and Curl, Differential and integral form of Gauss law)                                                                                                                                                     |                        |
| Electric Field, Potential - (Defining electric field, Electric field for a dipole and charged spherical shell, Boundary conditions of Electric field across a charged surface, Divergence and curl of electric field, Defining electrostatic potential from the Electric field) |                        |
| Conductors, Insulators - Equipotential surfaces, Properties of conductor in an electrostatic field, Electric field in presence of charged Conducting shells, Induced charges, shielding effect of conductor, Brief introduction to insulators                                   |                        |
| Laplace equation, Poisson equation                                                                                                                                                                                                                                              |                        |
| Curl and Stoke's theorem, Divergence Theorem- Use of divergence theorem to derive Differential form of Gauss law from integral form                                                                                                                                             |                        |
| Capacitors, capacitance and energy stored in E field- Capacitor introduction, Parallel plate capacitor, Capacitance of concentric charged shells, Energy stored in capacitor, Energy stored in an electrostatic field/ due to a charge configuration                            |                        |
| Current and continuity equation- Ohm's law, Continuity equation- Kirchoff's law                                                                                                                                                                                                 |                        |
| Magnetic field and Moving Charges- Lorentz force on a moving charged particle, cyclotron motion, Biosavart law for magnetic fields, Divergence and curl of magnetic field, Magnetic force does no work                                                                          |                        |
| Force on Moving charges- Lorentz force                                                                                                                                                                                                                                          |                        |
| Magnetic Field and vector potential- Ampere's law and its differential form                                                                                                                                                                                                     |                        |
| Special relativity and E and B fields                                                                                                                                                                                                                                           |                        |
| Induction- Lenz law, Examples of Changing magnetic fields produce current                                                                                                                                                                                                       |                        |
| Inductance and energy stored in B field- Self and mutual inductance, Energy stored in an Inductor                                                                                                                                                                               |                        |
| RC circuits- Equation of motion, Time constant, instantaneous Current and charge, Charging and discharging of capacitor                                                                                                                                                         |                        |
| CL and RLC circuits- Equation of motion, Time constant, Harmonic oscillations, damped Harmonic oscillations, Forced harmonic oscillations in RLC circuit connected to a battery                                                                                                 |                        |



|                                                                                                                                                                                                                                                 |                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Displacement current- Inconsistency in Ampere's law, Deriving displacement current vector from the Continuity equation, Maxwell's equations                                                                                                     |                                |
| Complete Maxwell's Equations                                                                                                                                                                                                                    |                                |
| Electromagnetic Waves- Deriving wave equations from source free Maxwell equation, Monochromatic EM waves and their property, Energy stored in EM waves, transverse E and B fields                                                               |                                |
| Dielectrics and Electric Dipoles- Brief introduction, Electric dipole moment, atomic polarizability, polarizability tensor, Polarization vector, bound and free charges, Displacement vector, Gauss law in Dielectrics                          |                                |
| Dielectrics                                                                                                                                                                                                                                     |                                |
| Magnetic Dipoles- Brief Introduction                                                                                                                                                                                                            |                                |
| Magnetism in Matter                                                                                                                                                                                                                             |                                |
| <b>Special relativity</b>                                                                                                                                                                                                                       | <b>No. of Lectures<br/>-7</b>  |
| Galilean Transformation, Qualitative idea of Michelson Morley experiment, Space-time and simultaneity. Einstein axioms for special relativity. The Lorentz transformation.                                                                      | 2/1                            |
| Relativistic kinematics; length contraction, time dilation. Doppler effect. Twin paradox.                                                                                                                                                       | 2                              |
| Idea of space-time and Lorentz transformations, Relativistic energy and momentum, Relativistic dynamics (scattering and decay). Mass-energy equivalence. Conservation of four-momentum. Centre of momentum frame. De Broglie waves and photons. | 2                              |
| Einstein, the equivalence principle, gravity, gravitational lenses, gravitational waves (qualitative)                                                                                                                                           | 1                              |
| Nuclear reactions and thermonuclear power.                                                                                                                                                                                                      | 1                              |
| <b>Optics- Applications and microscopy</b>                                                                                                                                                                                                      | <b>No. of Lectures<br/>-10</b> |
| Classical optics: Fermat's Principle                                                                                                                                                                                                            | 1                              |
| Fourier Optics: Huygens-Fresnel Principle                                                                                                                                                                                                       | 1                              |
| Fourier Optics: Fresnel diffraction integral                                                                                                                                                                                                    | 1                              |
| Fourier Optics: Paraxial approximation                                                                                                                                                                                                          | 1                              |
| Fourier Optics: Fraunhofer diffraction                                                                                                                                                                                                          | 1                              |
| Fourier Optics: Apertures and imaging                                                                                                                                                                                                           | 1                              |
| Fourier Optics: phase contrast imaging                                                                                                                                                                                                          | 1                              |
| Microscopy applications                                                                                                                                                                                                                         | 4/3                            |
|                                                                                                                                                                                                                                                 |                                |

|                                                                                                                                        |                        |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Relativistic dynamics. Mass-energy equivalence. Conservation of four-momentum. Centre of momentum frame. De Broglie waves and photons. | 2                      |
| Einstein, the equivalence principle, gravity, gravitational lenses, gravitational waves (qualitative)                                  | 1                      |
| Nuclear reactions and thermonuclear power.                                                                                             | 1                      |
| <b>Optics- Applications and microscopy</b>                                                                                             | <b>No. of Lectures</b> |
| Classical optics: Fermat's Principle                                                                                                   | 1                      |
| Fourier Optics: Huygens-Fresnel Principle                                                                                              | 1                      |
| Fourier Optics: Fresnel diffraction integral                                                                                           | 1                      |
| Fourier Optics: Paraxial approximation                                                                                                 | 1                      |
| Fourier Optics: Fraunhofer diffraction                                                                                                 | 1                      |
| Fourier Optics: Apertures and imaging                                                                                                  | 1                      |
| Fourier Optics: phase contrast imaging                                                                                                 | 1                      |
| Microscopy applications                                                                                                                | 4                      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |                                      |                  |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------|------------------|---------|
| Course code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CHM401                            | Chemistry-4 Structure and Properties | 4 Credits        |         |
| Core/Elective/SBS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                   | CORE PAPER                           |                  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |                                      | Syllabus Version | 2023-24 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |                                      |                  |         |
| Unit:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Stereochemistry & Group Theory    |                                      | 08 L             |         |
| <ul style="list-style-type: none"><li>Molecular shape and simple electronic structure, Isomerism: Orbitals, hybridization and shapes of molecules, stereochemical consequences of tetrahedral carbon (isomers, enantiomers, R/S, D/L, optical rotation).</li><li>Stereochemistry – optical activity: Molecules with more than one chiral centre (diastereomers, meso compounds, separation of racemic mixtures).</li><li>Stereochemistry and Reactions: Prochirality, chirality in Nature, Stereochemistry on atoms other than carbon, Retrosynthetic analysis. Stereochemistry and Mechanism (nucleophilic substitution, elimination from non-cyclic compounds).</li><li>Alkene addition reactions – Hydrogenation, halogenation, HX addition. Elimination Reactions epoxide ring forming reactions.</li><li>Zeeman effect: Effect on the energies of a system by application of a magnetic field; Magneto chemistry, spin and orbital contribution to the magnetic moment.</li><li>Symmetry operations and elements, Group theory: Definition of reducible and irreducible representations, Use of group theory to determine the irreducible representation, Assignment of point groups, Leading to definition of components of character tables (irreducible representations, characters – at least the interpretation of the sign of the character)</li><li>Simple applications, Label molecular shapes, isomers, Identify chiral molecules, Physical properties – <i>e.g.</i> dipole moment, possible optical isomers, Orbital symmetry labels (<i>e.g.</i> s, p &amp; d orbitals in Td, Oh, D4h).</li></ul> |                                   |                                      |                  |         |
| Unit:2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Magnetic resonance spectroscopy's |                                      | 08 L             |         |
| <ul style="list-style-type: none"><li>EPR spectroscopy, hyperfine coupling application to organic radicals and to transition metal complexes.</li><li>Nuclear Magnetic Resonance (NMR), energies of nuclei in magnetic fields. Chemical shift and the <math>\delta</math> scale, resonance of different nuclei, shielding, spin-orbit coupling and coupling constants, molecular symmetry. <math>^{13}\text{C}</math> NMR, <math>^1\text{H}</math> NMR, integration, multiplicity, chemical shift typical ranges - Introduction to molecular spectroscopy and spectroscopic transitions, absorbance, transmittance, the Beer-Lambert Law, intensities of spectroscopic transitions.</li><li>Quantised vibration and simply harmonic oscillator model, wave functions, Molecular vibrational modes, vibrational spectroscopy infrared and Raman spectroscopy 3N-5, 3N-6 vibrational degrees of freedom.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |                                      |                  |         |
| Unit:3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Vibrational spectroscopy          |                                      | 06 L             |         |
| <ul style="list-style-type: none"><li>Vibrational symmetry and IR/Raman activity: Symmetry properties of the vibrational</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |                                      |                  |         |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------|
| <p>degrees of freedom and to deduce IR, Raman activity. Use of internal coordinates to get symmetry properties of a subset of bands.</p> <ul style="list-style-type: none"> <li>Vibrational spectroscopy: Local mode approximation. Characteristic infrared absorptions (alkyl CH, alcohol, amine RN H<sub>2</sub> and R<sub>2</sub>NH, carboxylic acid, amide, ester, ketone, aldehyde, nitrile RCN, alkyne, alkene, aromatic), fingerprint regions, interpretation of IR spectra.</li> <li>Molecular orbital theory: Electronic spectroscopy requires understanding of electronic structure leading to Molecular orbital theory – HOMO. LUMO. Diatomic molecules, LCAO-MO, Symmetry of MO's.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                   |             |
| <b>Unit:4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Photoelectron spectroscopy</b> | <b>08 L</b> |
| <ul style="list-style-type: none"> <li>Generalisation of the application of MO approaches to polyatomic molecules. Hückel Theory-Aromatic and Heterocyclic Chemistry of compounds with delocalised p orbitals: Benzene and Aromaticity/Antiaromaticity, Reactions of Aromatic Compounds Electrophilic aromatic substitution. Reactions of Polycyclic and Heteroaromatic Compounds. Reactions via Aromatic Transition States Electrophilic aromatic substitution on naphthalene. Electrophilic aromatic substitution on heteroaromatics (<i>e.g.</i> pyridine and pyrrol). Non C- based aromatic systems.</li> <li>Electronic spectroscopy: Chromophores and excited electronic states, electronic transitions, UV-Vis spectroscopy, Franck-Condon Principle, Franck-Condon factors - Fates of electronic excited states – fluorescence and phosphorescence, non- radiative transitions, internal conversion and intersystem crossing, fluorescence spectra.</li> <li>Applications – light emitting polymers</li> </ul>                                                                                                                                            |                                   |             |
| <b>Unit:5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Organometallic chemistry</b>   | <b>06 L</b> |
| <ul style="list-style-type: none"> <li>Types and broad applications of organometallic complexes and catalysts. Ligand types and examples. Group 1 (LiR) and group 2 (Grignard) and p-block chemistries. EPR spectroscopy as a tool to probe electron distribution in carbocyclic and organometallic species. Covalent interactions in coordination compounds – rationalisation of spectrochemical series in terms of bonding interactions Binary metal carbonyl complexes Synergistic bonding and the 18-electron rule. IR and NMR spectroscopy. Substitution at metal carbonyl. Other organometallic ligand types and complexes thereof. Alkyne and alkene complexes <i>etc.</i> Redox reaction in organometallic chemistry. Hydrogen complexes and oxidative addition reactions. Reductive elimination reactions. Activation and reactions of organometallic ligands. Insertions, migrations.</li> <li><b>Catalysis involving transition metals:</b> Catalytic systems. Water gas shift reaction, hydrogenations, acetic acid process <i>etc.</i> Metallocene complexes and their chemistry leading to advanced polymerization catalysts <i>etc.</i></li> </ul> |                                   |             |
| <p><b>Student Work</b></p> <ul style="list-style-type: none"> <li>Assignments, Tutorials</li> <li>Reviews of various research papers, reports, books</li> <li>Presentations</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   | <b>09 L</b> |

| Recommended Books/references                                 |                                                                                                                             |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 1                                                            | Organic Chemistry by J.McMurray, 7thEd., Thomson, 2008.                                                                     |
| 2                                                            | Carey, F.A. and Sundberg, R.J.,“Advanced Organic Chemistry, Part B: Reactions and Synthesis”,5 <sup>th</sup> Ed., Springer. |
| 3                                                            | Principles of Organic Synthesis by R.Normanand J.M. Coxon, 3rd Ed., Chapman and Hall, 1993.                                 |
| 4                                                            | Organic Chemistry by Clayden, J.,Greeves, N.and Warren,S.,“Organic Chemistry”,Oxford University Press.                      |
| 5                                                            | Smith, M.B.,“OrganicSynthesis”,3 <sup>rd</sup> Ed.,AcademicPress.                                                           |
| Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] |                                                                                                                             |
| 1                                                            | <a href="https://chem.libretexts.org/">https://chem.libretexts.org/</a>                                                     |
| 2                                                            | <a href="https://byjus.com/chemistry/">https://byjus.com/chemistry/</a>                                                     |
| 3                                                            | <a href="https://openstax.org/details/books/chemistry-2e">https://openstax.org/details/books/chemistry-2e</a>               |

| <b>BIOLOGY – BIO401</b> |  | <b>Transmission Genetics (Mendelian Genetics)</b>                                                                                                                                 |
|-------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>17</b>               |  |                                                                                                                                                                                   |
| 3                       |  | Genetic variation and behaviour of genes                                                                                                                                          |
| 2                       |  | Linkage and recombination; Mapping genes<br>(Chromosomal Basis of Inheritance, Pedigree Analysis and Human Genetics)                                                              |
| 1                       |  | Chromosome maps and genetic markers                                                                                                                                               |
| 2                       |  | Sex linkage and sex determination                                                                                                                                                 |
| 2                       |  | Complementation                                                                                                                                                                   |
| 2                       |  | Chromosomal mutations                                                                                                                                                             |
| 1                       |  | Non-Mendelian inheritance                                                                                                                                                         |
| 2                       |  | Extrachromosomal DNA                                                                                                                                                              |
| 2                       |  | Quantitative genetics                                                                                                                                                             |
| <b>7</b>                |  | <b>Population Genetics</b>                                                                                                                                                        |
| 2                       |  | Genetic variation in populations                                                                                                                                                  |
| 1                       |  | Mutation and Genetic drift                                                                                                                                                        |
| 1                       |  | Natural selection                                                                                                                                                                 |
| 1                       |  | Mutation/Selection balance                                                                                                                                                        |
| 1                       |  | Balanced polymorphism                                                                                                                                                             |
| 1                       |  | Gene flow & inbreeding (Migration & random mating)                                                                                                                                |
| <b>5</b>                |  | <b>Population Biology</b>                                                                                                                                                         |
| 1                       |  | Nature of populations; numbers, mixing (dispersal), structure in age/stage                                                                                                        |
| 2                       |  | Density independent, density dependent growth (exponential and logistic growth equations)                                                                                         |
| 1                       |  | R & K selection, life-histories and links to population growth parameters, (annual vs perennial life-histories, clonality)                                                        |
| 1                       |  | Demography, Life tables, matrix models (requires simple matrix mathematics) and Epidemiology (simple functions)                                                                   |
| <b>4</b>                |  | <b>Communities</b>                                                                                                                                                                |
| 1                       |  | Nature of communities; Community structure: how it is described, measured; what drives it; species composition, diversity (alpha, beta, gamma)                                    |
| 1                       |  | Intracommunity (interspecific) interactions (bi-partite networks); Symbiosis, Predation, Competition, Host-parasite interactions                                                  |
| 1                       |  | Dynamics of communities (perturbation and succession)                                                                                                                             |
| 1                       |  | Biomes (communities on a global scale)                                                                                                                                            |
| <b>4</b>                |  | <b>Ecosystems</b>                                                                                                                                                                 |
| 1                       |  | Pond ecosystem (or other integrated example)                                                                                                                                      |
| 1                       |  | Food chains and webs                                                                                                                                                              |
| 1                       |  | Pyramids (numbers, biomass, energy), abstraction, defining trophic levels, the problem of omnivory (stable isotope tracers)                                                       |
| 1                       |  | Biogeochemical cycles (water, C, N, P) pools and fluxes, mass budget models. Rates of processes: productivity, decomposition, trophic transfer, turnover and Mean Residence Time. |

|                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">Anthony J. F. Griffiths</a> , <a href="#">John Doebley</a> , <a href="#">Catherine Peichel</a> , <a href="#">David A. Wassarman</a> – Introduction to Genetic Analysis. Edited by W.H. Freeman, [ISBN: 9781319114772]; 796 pages |
| Benjamin A. Pierce. Genetics: A Conceptual Approach; Edited by W H Freeman & Co; 6th edition; 978-1319050962: 976 pages                                                                                                                      |
| Daniel L. Hartl, Andrew G. Clark. Principles of Population Genetics. Sinauer Associates, USA; ISBN-13 978-0-87893-308-2: 672 pages                                                                                                           |
|                                                                                                                                                                                                                                              |
| <b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.,]</b>                                                                                                                                                                         |
| <a href="https://dth.ac.in/medical/course.php">https://dth.ac.in/medical/course.php</a>                                                                                                                                                      |
| <a href="https://onlinecourses.nptel.ac.in/noc22_bt07/preview">https://onlinecourses.nptel.ac.in/noc22_bt07/preview</a>                                                                                                                      |
| <a href="https://www.youtube.com/watch?v=NR3779ef9yQ">https://www.youtube.com/watch?v=NR3779ef9yQ</a>                                                                                                                                        |
| <a href="https://www.youtube.com/watch?v=IRBLEV8QR4A">https://www.youtube.com/watch?v=IRBLEV8QR4A</a>                                                                                                                                        |

## **PHY402: Physics Practical - 2 Credits**

### **List of experiments**

1. Verification of Stefan's Law by Electrical method.
2. Study of LR circuit.
3. Study of LCR circuit
4. To determine the self-inductance of the coil using Anderson's bridge and calculate the Value of inductive reactance ( $X_L$ ) of the coil at a particular frequency.
5. Measurement of wavelength of Laser by Diffraction Grating.
6. To determine the Wavelength of main spectral line of mercury light using plane transmission grating.



## **CHM402: Chemistry Practical - 2 Credits**

### **List of Physical chemistry experiments (Any 3)**

1. Determination of the stability constant of a complex by spectrophotometry.
2. The reaction between potassium persulphate and potassium iodide by colorimetry.
3. Determine the formula and stability constant of a metal ion complex (Lead Oxalate) by polarography.
4. Analysis of copper oxide and copper dioxide to determine law of multiple proportions.
5. Behaviour of water at different temperatures

### **List of Inorganic chemistry experiments (Any 3)**

1. Photometric Analysis - To study complex formation between Fe (III) and salicylic acid and find the formula and stability constant of the complex.
2. Simultaneous determination of  $\text{Cr}^{+2}$  and  $\text{Cu}^{+2}$
3. To determine the strength of given mixture of carbonate and bicarbonate in the given mixture by pH metric method.
4. Determination of chemical oxygen demand (COD)
5. Determination of Biological oxygen demand (COD)

### **List of Organic chemistry experiments (Any 3)**

#### **Organic Preparations: Double Stage**

1. Glycine – Hydantoic acid – Hydantoin
2. Benzoin – Benzil - Benzilicacid
3. P-cresol – 4,6-Dimethylcoumarin – 3-Bromo-4,6 Dimethyl Coumarin
4. Benzophenone – Oxime –Benzanilide
5. Acetanilide – p-Bromoacetanilide –p-Bromoaniline
6. Hydroquinone – Quinoline – 1,2,4 –Triacetoxybenzene.

## **BIO402: Biology Practical - 2 Credits**

### **List of Experiments (Any 6)**

1. Create an artificial mesocosm (tub/tank of defined area), and inoculate with Lemna./Azolla sp. (brought from nearby habitats). Monitor growth, density and biomass over time.
2. a) Visit different types of water bodies (one river/stream and one quarry/pond/lake) and conduct sampling. Sampling methods (point count/line transect/quadrat) in field. Learn methods for estimating plant biomass (using GBH). (Field session)
3. Determination of population density in a natural community by quadrat method
4. Solving Genetic problems which obey Mendelian laws
5. Determination of linkage and cross-over analysis – Problem solving
6. Sex linked Inheritance in drosophila – problem solving
7. Analyze the Human karyotype chart for different genetic disorders
8. Use of ABO blood group data to calculate allele frequencies. (Data can be gathered both by interviews and by actual blood group determination)

## **VALUE ADDED 04: GENERAL AWARENESS (2 CREDITS)**

**Course code - 4FE**

**Following are the areas which cover the various test items prescribed in the syllabus:**

1. Verbal Aptitude
2. Numerical Aptitude
3. Abstract Reasoning
4. Tamil and Other Literature
5. General Science and Technology and Education
6. Computer
7. Economics and Commerce
8. Social Studies
9. Sports
10. Current Affairs

### **Textbook(s)**

1. General Awareness, Bharathiar University

### **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]**

1. <https://www.careerpower.in/gk-general-knowledge.html>

Course Designed By: **Bharathiar University**

# **SEMESTER V**

## SEMESTER V

### **PHY501: Classical Mechanics**

This course extends knowledge of fundamental thermal physics principles and introduces the powerful and elegant Lagrangian and Hamiltonian formulations of classical mechanics

| <b>PHY501: Classical Mechanics – 4 Credits</b>                                                                                                     |                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Central force Problem</b>                                                                                                                       | <b>No. of Lectures</b> |
| Nature of orbits in an attractive inverse square field                                                                                             | 3                      |
| Kepler's laws of planetary motion. Rutherford scattering as an example of repulsive potential.                                                     | 3                      |
| <b>Mechanics of Ideal Fluids</b>                                                                                                                   | <b>No. of Lectures</b> |
| Streamlines and flow lines; Equation of continuity; Euler's equation of motion;                                                                    | 3                      |
| Streamline motion - Bernoulli's equation and its applications. Definition of Newtonian and non-Newtonian fluids                                    | 3                      |
| Lagrangian and Hamiltonian formulation of Classical Mechanics                                                                                      | 10                     |
| Generalized coordinates, constraints and degrees of freedom; D'Alembert's principle;                                                               | 2                      |
| Lagrange's equation for conservative systems (from D'Alembert's principle; variational principle not required) and its application to simple cases | 4                      |
| Generalized momentum; Idea of cyclic coordinates, its relation with conservation principles;                                                       | 4                      |
| Definition of Hamiltonian, Hamilton's equation (derivation by Legendre transformation) and its application to simple cases.                        | 4                      |

#### **REFERENCE BOOKS:**

- Mechanics: C. Kittel, W.D. Knight, M.A. Ruderman, C.A. Helmholz and B.J.Moyer (2008) Berkeley Physics Vol 1, Tata McGraw-HillLtd
- Classical Mechanics: N. Rana and P. Joag (2001) Tata McGraw-HillEducation
- Classical Mechanics: J.R. Taylor (2005) University ScienceBooks
- Feynman Lectures in Physics, Vol I, Addison-Wesley.
- Classical Mechanics: H. Goldstein, C. Poole and J. Safko (2002) 3<sup>rd</sup> edition, Pearson
- Classical Dynamics of Particles and Systems: Thornton and Marion (2003)Thomson Learning EMEA Ltd

### **PHY502: Quantum Mechanics**

Quantum mechanics plays a central role in our understanding of fundamental phenomena, primarily in the microscopic domain. It lays the foundation for an understanding of atomic, molecular, condensed matter, nuclear and particle physics.

| <b>PHY502: Quantum Mechanics – 4 Credits</b>                                                                                                |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Time dependent and time independent Schrodinger equation</b>                                                                             | <b>No. of Lectures</b> |
| Eigenstates, normalization and orthonormality.                                                                                              | 6                      |
| <b>Simple applications of Quantum Mechanics</b>                                                                                             | <b>No. of Lectures</b> |
| One dimensional potential well and barrier, boundary conditions, bound and unbound states.                                                  | 2                      |
| Reflection and transmission coefficients for a rectangular barrier in one dimension – explanation of alpha decay.                           | 4                      |
| Free particle in one dimensional box, box normalization, momentum eigen functions of a free particle                                        | 4                      |
| Linear harmonic oscillator, energy eigenvalues from Hermite differential equation, wave function for ground state, parity of wave function. | 2                      |
| <b>Schrodinger equation in spherical polar coordinates</b>                                                                                  | <b>No. of Lectures</b> |
| Angular momentum operators and their commutation relations;                                                                                 | 2                      |
| eigenvalues and eigen functions of $L^2$ and $L_z$ ; theorem of addition of angular momenta [statement with examples].                      | 6                      |
| The hydrogen atom problem – stationary state wave functions as simultaneous eigen functions of $H$ , $L^2$ , and $L_z$ ;                    | 5                      |
| radial Schrodinger equation and energy eigenvalues [Laguerre polynomial solutions to be assumed]; degeneracy of the energy eigenvalues.     | 5                      |

#### **REFERENCE BOOKS:**

- Quantum Physics: S. Gasiorowicz (2003) 3rd edition, Wiley India Edition
- Quantum Physics: E.H. Wichman (2008) Berkeley Physics Course, Vol 4, Tata McGraw-Hill Ltd
- Introduction to Quantum Mechanics, David J. Griffiths, Pearson Education
- Introductory Quantum Mechanics, Richard Liboff, Addison-Wesley; 4th edition
- A Modern Approach to Quantum Mechanics, John Townsend, Viva Books
- Principles of Quantum Mechanics: R. Shankar (2010) 2nd edition, Springer

### **PHY503: Solid State Physics**

Solid State Physics explains how the macroscopic properties of solids result from atomic scale properties. Solid State Physics forms the theoretical basis of Materials Science

| <b>PHY503: Solid State Physics – 4 Credits</b>                                                                                                                                                                                                                                                                         |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Crystal Structure</b>                                                                                                                                                                                                                                                                                               | <b>No. of lectures</b> |
| Crystalline and amorphous solids, translational symmetry                                                                                                                                                                                                                                                               | 2                      |
| Elementary ideas about crystal structure, lattice and bases, unit cell, reciprocal lattice                                                                                                                                                                                                                             | 3                      |
| fundamental types of lattices, Miller indices, lattice planes, simple cubic, f.c.c. and b.c.c. lattices                                                                                                                                                                                                                | 5                      |
| Laue and Bragg equations. Determination of crystal structure with X-rays.                                                                                                                                                                                                                                              | 2                      |
| <b>Elementary band theory</b>                                                                                                                                                                                                                                                                                          | <b>No. of lectures</b> |
| Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. Effect of concentration and temperature on fermi level.                                                   | 6                      |
| <b>Dielectric properties of materials</b>                                                                                                                                                                                                                                                                              | <b>No. of lectures</b> |
| Electronic, ionic and dipolar polarizability, local fields, induced and oriented polarization – molecular field in a dielectric; Clausius-Mosotti relation.                                                                                                                                                            | 4                      |
| <b>Magnetic properties of materials</b>                                                                                                                                                                                                                                                                                | <b>No. of lectures</b> |
| Dia, para and ferro-magnetic properties of solids. Langevin's theory of diamagnetism and paramagnetism. Quantum theory of paramagnetism, Curie's law. Ferromagnetism: spontaneous magnetization and domain structure; temperature dependence of spontaneous magnetisation; Curie-Weiss law, explanation of hysteresis. | 8                      |
| <b>Superconductivity</b>                                                                                                                                                                                                                                                                                               | <b>No. of lectures</b> |
| Introduction (Kamerlingh-Onnes experiment), effect of magnetic field, Type-I and type-II superconductors, Isotope effect. Meissner effect. Heat capacity. Energy gap. Ideas about High-Tc superconductors                                                                                                              | 5                      |

#### **REFERENCE BOOKS:**

- Solid State Physics: N.W. Ashcroft and N.D. Mermin (1976) College edition, Harcourt College Publishers
- Introduction to Solid State Physics: C. Kittel (2004) 8th edition, John Wiley and Sons
- Atomic and Electronic Structure of Solids, E. Kaxiras; Cambridge University Press.

### **PHY504: Electrodynamics**

Introduction to electrodynamics and a wide range of applications including communications, superconductors, plasmas, novel materials, photonics and astrophysics

| <b>PHY504: Electrodynamics – 4 Credits</b>                                                                                                                                          |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Generalization of Ampere's Law</b>                                                                                                                                               | <b>No. of lectures</b> |
| Displacement Current, Maxwell's Field Equations, Wave equation for electromagnetic (EM) field and its solution                                                                      | 4                      |
| plane wave and spherical wave solutions, transverse nature of field, relation between E and B; energy density of field, Poynting vector and Poynting's theorem, boundary conditions | 4                      |
| <b>EM Waves in an isotropic dielectric</b>                                                                                                                                          | <b>No. of lectures</b> |
| Wave equation, reflection and refraction at plane boundary, reflection and transmission coefficients                                                                                | 4                      |
| Fresnel's formula, change of phase on reflection, polarization on reflection and Brewster's law, total internal reflection.                                                         | 4                      |
| <b>EM waves in conducting medium</b>                                                                                                                                                | <b>No. of lectures</b> |
| Wave equation in conducting medium, reflection and transmission at metallic surface – skin effect and skin depth,                                                                   | 3                      |
| propagation of E-M waves between parallel and conducting plates – wave guides (rectangular only)                                                                                    | 5                      |
| <b>Dispersion</b>                                                                                                                                                                   | <b>No. of lectures</b> |
| Equation of motion of an electron in a radiation field : Lorentz theory of dispersion – normal and anomalous                                                                        | 2                      |
| Sellmeier's and Cauchy's formulae, absorptive and dispersive mode, half power frequency, band width.                                                                                | 6                      |
| <b>Scattering</b>                                                                                                                                                                   | <b>No. of lectures</b> |
| Scattering of radiation by a bound charge, Rayleigh's scattering (qualitative ideas), blue of the sky, absorption.                                                                  | 4                      |



**REFERENCE BOOKS:**

- Electricity and Magnetism: E.M. Purcell (2008) Berkeley Physics Course, Vol2, Tata McGraw-Hill Ltd
- Feynman Lectures on Physics: R.P. Feynman, R.B. Leighton and M. Sands (2011) The Millenium edition, Vol 2, Basic Books
- Introduction to Electrodynamics: D.J. Griffths (2012) Pearson Education
- Modern Electrodynamics: A. Zangwill (2013) Cambridge University Press

### **PHY- 505: ELECTIVE 1-Introduction to Astrophysics**

The course defines and analyzes the basic concepts in astronomy. Describes the working principle of the telescope. Identifies important constellations – orient in space. Describes the planets of the solar system and their properties. Interprets the phenomena in the Universe. Describes and understand the physical processes in the Sun and other stars.

| <b>PHY505: Introduction to Astrophysics – 2 Credits</b>                                                                                                                                                                                                                                                                                                                                                                                                              |                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Astronomical Scales</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>No. of lectures</b> |
| Astronomical Distance, Mass and Time, Scales, Brightness, Radiant Flux and Luminosity, Measurement of Astronomical Quantities Astronomical Distances, Stellar Radii, Masses of Stars, Stellar Temperature.<br><br>Astronomical techniques: Basic Optical Definitions for Astronomy (Magnification Light Gathering Power, Resolving Power and Diffraction Limit, Atmospheric Windows), Optical Telescopes (Types of Reflecting Telescopes, Telescope Mountings, Space | 4                      |
| <b>Telescopes, Detectors and Their Use with Telescopes</b>                                                                                                                                                                                                                                                                                                                                                                                                           | <b>No. of lectures</b> |
| (Types of Detectors, detection Limits with Telescopes).<br><br>The sun (Solar Parameters, Solar Photosphere, Solar Atmosphere, Chromosphere. Corona, Solar Activity, Basics of Solar Magneto-hydrodynamics. Helioseismology). The solar family (Solar System: Facts and Figures, Origin of the Solar System: The Nebular Model, Tidal Forces and Planetary Rings, Extra-Solar Planets.                                                                               | 6                      |
| <b>Stellar spectra and classification Structure</b>                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>No. of lectures</b> |
| (Atomic Spectra Revisited, Stellar Spectra, Spectral Types and Their Temperature Dependence, Black Body Approximation, H R Diagram, Luminosity Classification)                                                                                                                                                                                                                                                                                                       | 2                      |
| <b>The milky way</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>No. of lectures</b> |
| Basic Structure and Properties of the Milky Way, Nature of Rotation of the Milky Way(Differential Rotation of the Galaxy and Oort Constant, Rotation Curve of the UGC Document on LOCF Physics 189 Galaxy and the Dark Matter, Nature of the Spiral Arms), Stars and Star Clusters of the Milky Way, Properties of and around the Galactic Nucleus.                                                                                                                  | 6                      |
| <b>Galaxies</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>No. of lectures</b> |
| Galaxy Morphology, Hubble's Classification of Galaxies, Elliptical Galaxies (The Intrinsic Shapes of Elliptical, de Vaucouleurs Law, Stars and Gas). Spiral and Lenticular Galaxies (Bulges, Disks, Galactic Halo) The Milky Way Galaxy, Gas and Dust in the Galaxy, Spiral Arms                                                                                                                                                                                     | 6                      |

## **REFERENCE BOOKS**

- Galaxies in the Universe: An Introduction: L.S. Sparke and J.S. Gallagher III(2000) Cambridge University Press
- Galactic and Extragalactic Radio Astronomy: G.L. Verschuur and K.I. Kellermann (1988) Springer-Verlag
- The Physics of Stars (Manchester Physics Series): A.C. Phillips (1999) John Wiley & Sons

### **PHY-506: ELECTIVE 2- Nanotechnology**

This course will enable students to have the knowledge of syntheses and characterization of nanomaterials. It also highlights the applications and significance of nanotechnology in terms of their properties.

| <b>PHY506: Nanotechnology – 2 Credits</b>                                                                                                                                                                                                                                                                                                                                                                                                          |                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Nanoscale systems</b>                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>No. of lectures</b> |
| Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale, Size Effects in nano systems, Quantum confinement: Applications of Schrodinger equation- Infinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructures and its consequences                             | 4                      |
| <b>Synthesis and Characterization of nanostructure materials</b>                                                                                                                                                                                                                                                                                                                                                                                   | <b>No. of lectures</b> |
| Top down and Bottom up approach, Photolithography. Ball milling. Vacuum deposition. Physical vapor deposition (PVD): Thermal evaporation, E-beam evaporation, Pulsed Laser deposition.<br><br>Chemical vapor deposition (CVD). Sol-Gel. X-Ray Diffraction. Optical Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Scanning Tunnelling Microscopy.                                            | 4                      |
| <b>Optical properties</b>                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>No. of lectures</b> |
| Coulomb interaction in nanostructures. Concept of dielectric constant for nanostructures and charging of nanostructure. Quasi- particles and excitons. Excitons in direct and indirect band gap semiconductor nanocrystals. Quantitative treatment of quasiparticles and excitons, charging effects. Radiative processes: General formalization- absorption, emission and luminescence. Optical properties of heterostructures and nanostructures. | 8                      |
| <b>Applications</b>                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>No. of lectures</b> |
| Applications of nanoparticles. Nanomaterial Devices: Quantum dots heterostructure lasers, optical switching and optical data storage.<br><br>Magnetic quantum well; magnetic dots - magnetic data storage. Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems (NEMS).                                                                                                                                                          | 8                      |

## **REFERENCE BOOKS:**

- C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.).
- S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publishing Company)
- K.K. Chattopadhyay and A. N. Banerjee, Introduction to Nanoscience and Technology (PHI Learning Private Limited).
- Richard Booker, Earl Boysen, Nanotechnology (John Wiley and Sons).
- M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama, Nanoparticle Technology Handbook (Elsevier, 2007).
- Introduction to Nanoelectronics, V.V. Mitin, V.A. Kochelap and M.A. Stroscio, 2011, Cambridge University Press.
- Bharat Bhushan, Springer Handbook of Nanotechnology (Springer-Verlag, Berlin, 2004).

**PHY507: Physics Lab I - 2 Credits**

1. Verification of Hall Effect.
2. Hysteresis Loop, coercivity, saturation magnetization.
3. Susceptibility of Paramagnetic Materials by Quincke's Tube method.
4. Michelson Interferometer with He-Ne Laser.

**PHY508: Physics Lab II (Analog and digital) - 2 Credits**

1. Characteristics of p-n Junction diode
2. Characteristics of transistor in forward and reverse bias.
3. Characteristics of Zener diode.

**PHY509: Research Project work - - 2 Credits**

Combination of experimental and theoretical aspects of a problem. Perform experiment, collect data, analyze with various tools and software. Derive conclusion (positive or negative) from the work and summarize the report in form of dissertation in the VI semester

# **SEMESTER VI**

## SEMESTER VI

### **PHY601: Statistical Physics**

*Statistical mechanics, the microscopic basis of classical thermodynamics, is developed in this subject. It is one of the core areas of physics, finding wide application in solid state physics, astrophysics, plasma physics and cosmology. Using fundamental ideas from quantum physics, a systematic treatment of statistical mechanics is developed for systems in equilibrium*

| <b>PHY601: Statistical Physics- 4 Credits</b>                                                                                                                                                                                                                                               |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Microstates and macrostates</b>                                                                                                                                                                                                                                                          | <b>No. of lectures</b> |
| Classical description in terms of phase space and quantum description in terms of wave functions.                                                                                                                                                                                           | 1                      |
| Hypothesis of equal a priori probability for microstates of an isolated system in equilibrium. Interactions between two systems – thermal, mechanical and diffusive.                                                                                                                        | 3                      |
| Statistical definition of temperature, pressure, entropy and chemical potential. Partition function of a system in thermal equilibrium with a heat bath                                                                                                                                     | 3                      |
| <b>Classical statistical mechanics</b>                                                                                                                                                                                                                                                      | <b>No. of lectures</b> |
| Maxwell-Boltzmann distribution law. Calculation of thermodynamic quantities for ideal monoatomic gases. Ergodic hypothesis and Liouville theorem and Ideal gases (monoatomic and diatomic): Translational, rotational, vibrational, electronic partition functions, thermodynamic functions | 10                     |
| <b>Motivations for quantum statistics</b>                                                                                                                                                                                                                                                   | <b>No. of lectures</b> |
| Gibbs' paradox. Identical particle and symmetry requirement. Derivation of MB, FD and BE statistics as the most probable distributions (micro-canonical ensemble). Classical limit of quantum statistics.                                                                                   | 6                      |
| <b>Quantum statistical mechanics</b>                                                                                                                                                                                                                                                        | <b>No. of lectures</b> |
| Bose-Einstein statistics: Application to radiation – Planck's law. Rayleigh Jeans and Wien laws as limiting cases, Stefan's law.                                                                                                                                                            | 8                      |
| Fermi-Dirac statistics: Fermi distribution at zero and non-zero temperatures                                                                                                                                                                                                                | 7                      |



**REFERENCE BOOKS:**

- Statistical Mechanics: K. Huang (1987) 2nd edition, Wiley
- Fundamental of Statistical and Thermal Physics: F. Reif (2008) Waveland PrInc
- Statistical Physics of Particles: Mehran Kardar (2007) Cambridge University Press
- Statistical Physics- Reif-(2008) ) Berkeley Physics Course, Vol 5, Tata McGraw-Hill Ltd

### **PHY602: Subatomic Physics**

This course intends to develop familiarity with the vast areas of nuclear and particle physics as well as develop an interest in these subjects. It also helps students acquire knowledge in the content areas of nuclear and particle physics, focusing on concepts that are commonly used in this area

| <b>PHY602: Subatomic Physics -4 Credits</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Bulk properties of nuclei and Nuclear structure</b>                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>No. of lectures</b> |
| Nuclear mass, charge, size, binding energy, spin and magnetic moment. Isobars, isotopes and isotones; mass spectrometer. Nature of forces between nucleons, nuclear stability and nuclear binding, the liquid drop model (descriptive) and the Bethe-Weizsacker mass formula, application to stability considerations, extreme single particle shell model (qualitative discussion with examples)                                                                                                 | 2                      |
| <b>Unstable nuclei and Nuclear Reactions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>No. of lectures</b> |
| Alpha decay : alpha particle spectra – velocity and energy of alpha particles. Geiger-Nuttal law. Beta decay : nature of beta ray spectra, the neutrino, energy levels and decay schemes, positron emission and electron capture, selection rules, beta absorption and range of beta particles, Kurie plot. Gamma decay : gamma ray spectra and nuclear energy levels, isomeric states. Gamma absorption in matter – photoelectric process, Compton scattering, pair production (qualitative)     | 2                      |
| Conservation principles in nuclear reactions. Q-values and thresholds, nuclear reaction cross-sections, examples of different types of reactions and their characteristics. Bohr's postulate of compound nuclear reaction, Ghoshal's experiment.                                                                                                                                                                                                                                                  | 2                      |
| <b>Nuclear fission and fusion</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>No. of lectures</b> |
| Discovery and characteristics, explanation in terms of liquid drop model, fission products and energy release, spontaneous and induced fission, transuranic elements. Chain reaction and basic principle of nuclear reactors. Nuclear fusion: energetics in terms of liquid drop model.                                                                                                                                                                                                           | 6                      |
| <b>Elementary particles</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>No. of lectures</b> |
| Four basic interactions in nature and their relative strengths, examples of different types of interactions. Quantum numbers -mass, charge, spin, isotopic spin, intrinsic parity, hypercharge. Charge conjugation. Conservation laws. Classifications of elementary particles – hadrons and leptons, baryons and mesons, elementary ideas about quark structure of hadrons – octet and decuplet families. Particle Accelerator and Detector<br>Cyclotron – basic theory, synchrotron, GM counter | 18                     |

**REFERENCE BOOKS:**

- Nuclear Physics – Cottingham and Greenwood (Cambridge University Press).
- Concepts of Nuclear Physics – R. Cohen (Tata-Mc Graw Hill).
- Paramanu o Kendrak Gathan Parichay – S. N. Ghoshal (WBSBB).
- Atomic and Nuclear Physics – S. N. Ghoshal (S. Chand).
- Nuclear Physics – S. B. Patel (New Age).
- Nuclei and Particles – E. Segre (Benjamin).
- Nuclear Physics: Principles and applications – J.S. Lilley (Wiley Eastern).
- Fundamentals in Nuclear Physics: from Nuclear Structure to Cosmology – J. Basdevant, J. Rich and M. Spiro (Springer).
- Particle Physics – Seiden (Persian Education)

### **PHY603: Atomic and Molecular Spectroscopy and Lasers**

This course intends to throw light on the phenomenon of the interaction of light with matter in terms of the relationship with the molecular structure. The course will enable students to select molecular spectroscopy methods suitable for solving given scientific problem.

| <b>PHY603: Atomic and Molecular Spectroscopy and Lasers - 4 Credits</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Atomic Spectroscopy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>No. of lectures</b> |
| LS and JJ coupling schemes. Terms for equivalent and non-equivalent electron atom. Spectra of one and two electron systems. Electron spin, spin orbit interaction, fine structure, relativistic correction and radiation correction (Lamb Shift). Electric dipole selection rules. Intensity rules. Alkali type spectra. Zeeman effect. Paschen-Back effect. Stark effect. Hyperfine structure and isotopic shifts. Complex Spectra: Vector model for three or more valence electrons. Inverted terms. Compound doublet. Inner-Shell Excitation and Auto ionization, Line intensities, Transition probabilities, oscillator strength. Forbidden transitions.            | 15                     |
| <b>Molecular Spectroscopy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>No. of lectures</b> |
| Rotational spectra of diatomic molecules. Vibrational spectra of diatomic molecules. Rotation- Vibration spectra of diatomic molecules. Classification of electronic states. Electronic spectra of diatomic molecules. Franck-Condon principle. Rotational spectra of linear polyatomic molecules: Coriolis interaction and effect of l-type doubling in linear molecules. Nuclear spin statistical weights and their effect on intensities. Rotational spectra of symmetric (prolate and oblate) molecules. Vibration-rotation spectra of polyatomic molecules: Parallel and perpendicular bands of linear molecules and symmetric top (prolate and oblate) molecules. | 15                     |
| <b>Spectroscopy (elementary and qualitative)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>No. of lectures</b> |
| Experimental techniques in spectroscopy: FTIR Raman, Stoke's antiStoke's.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3                      |
| <b>Laser Physics Spectroscopy(elementary and qualitative)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3                      |

#### **REFERENCE BOOKS:**

- Eisberg, R. and Resnick, R., Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, II Edition, John Wiley,1985
- Banwell, C.N., Fundamentals of Molecular Spectroscopy, III Edition, Tata-McGraw Hill,1972
- Wilson, J. and Hawkes, J. F. B., Optoelectronics- An Introduction, Prentice Hall,1983

### **PHY604: Digital and Analog Electronics**

This course is designed for students to know the operation and the structure of switching circuits, use and working of diodes and transistors as a switching circuits, logic families, TTL, ECL, and MOSFET and amplifiers etc

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| PHY604: Digital and Analog Electronics -4 Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |
| <b>Digital Circuits</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>No. of lectures</b> |
| Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and transistors)                                                                                                                                                                                                                                                                                                                                                                     | 4                      |
| De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and                                                                                                                                                                                                                                                                                                                                                                                                                            | 5                      |
| Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |
| Binary Addition. Binary Subtraction using 2's Complement Method). Half Adders and Full Adders and Subtractors, 4-bit binary Adder-Subtractor.                                                                                                                                                                                                                                                                                                                                                                                                            | 4                      |
| <b>Semiconductor Devices and Amplifiers:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>No. of lectures</b> |
| Semiconductor Diodes: P and N type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell.                                                                                                                                                                                                                                      | 5                      |
| Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff & Saturation regions Current gains $\alpha$ and $\beta$ . Relations between $\alpha$ and $\beta$ . Load Line analysis of Transistors. DC Load line & Q-point. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of single-stage CE amplifier using UGC Document on LOCF Physics 233 hybrid Model. Input & output Impedance. Current, Voltage and Power gains. Class A, B & C Amplifiers | 12                     |
| <b>Operational Amplifiers (Black Box approach):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>No. of lectures</b> |
| Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop and closed-loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Zero crossing detector.                                                                                                                                                                                                                                                              | 6                      |

**REFERENCEBOOKS:**

- Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
- Electronic devices & circuits, S. Salivahanan & N.S. Kumar, 2012, Tata Mc-Graw Hill
- Microelectronic Circuits, M.H. Rashid, 2nd Edn., 2011, Cengage Learning.
- Modern Electronic Instrumentation and Measurement Tech., Helfrick and Cooper, 1990, PHI Learning
- Digital Principles and Applications, A.P. Malvino, D.P. Leach and Saha, 7th Ed., 2011, Tata McGraw Hill
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6<sup>th</sup> Edn., Oxford University Press.

### **PHY605: ELECTIVE 3- Renewable Energy and Energy Harvesting**

This course enables the students to outline the principles of energy harvesting systems as well as methods of electro-mechanical conversion, principle of photovoltaic cells and thermoelectric generators. They will be able to describe the physical principles of energy harvesting methods mainly electro-mechanical conversion and simulation modeling of such mechatronic systems.

| PHY605: Renewable Energy and Energy Harvesting - 2 Credits                                                                                                                                                                                                                                                                                                                          |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Fossil fuels and Alternate Sources of energy</b>                                                                                                                                                                                                                                                                                                                                 | <b>No. of lectures</b> |
| Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity                           | 3                      |
| <b>Solar energy</b>                                                                                                                                                                                                                                                                                                                                                                 | <b>No. of lectures</b> |
| Its importance, storage of solar energy, solar pond, no convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption                                                                                                                                  | 3                      |
| <b>Ocean Energy, Hydro Energy and Geothermal Energy</b>                                                                                                                                                                                                                                                                                                                             | <b>No. of lectures</b> |
| Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices. (3 Lectures) Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass. (2 Lectures) Geothermal Resources, Geothermal Technologies. Hydropower resources, hydropower technologies, environmental impact of hydro power sources | 6                      |
| <b>Piezoelectric Energy harvesting</b>                                                                                                                                                                                                                                                                                                                                              | <b>No. of lectures</b> |
| Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric Energy harvesting applications, Human power                                                                                                                            | 4                      |
| <b>Electromagnetic Energy Harvesting</b>                                                                                                                                                                                                                                                                                                                                            | <b>No. of lectures</b> |
| Electromagnetic Energy Harvesting                                                                                                                                                                                                                                                                                                                                                   | 2                      |
| Linear generators, physics mathematical models, recent applications                                                                                                                                                                                                                                                                                                                 | 2                      |
| Environmental issues and Renewable sources of energy, sustainability.                                                                                                                                                                                                                                                                                                               | 2                      |

**REFERENCE BOOKS:**

- Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
- Solar energy - M P Agarwal - S Chand and Co. Ltd.
- Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
- Godfrey Boyle, “Renewable Energy, Power for a sustainable future”,  
2004, Oxford  
University Press, in association with The Open University.
- Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
- J.Balfour, M.Shaw and S. Jarosek, Photo voltaics, Lawrence J Goodrich (USA).
- [http://en.wikipedia.org/wiki/Renewable\\_energy](http://en.wikipedia.org/wiki/Renewable_energy)



### **PHY606: ELECTIVE 4 -Introductory Biophysics**

This course will enable students to define the fundamental concepts of biophysics. The course explains the integration of physical theory into biological processes

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| PHY606: Introductory Biophysics - 2 Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |
| <b>Thermodynamics of living systems</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>No. of lectures</b> |
| Conservation of energy in living systems, Entropy and Life, Gibbs and Standard free energy, Equilibrium constant, Coupled reactions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2                      |
| <b>Dynamics of biomolecules</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>No. of lectures</b> |
| Diffusion, Laws of diffusion, Active transport, facilitated diffusion, Osmosis, Osmotic pressure, Osmoregulation, Viscosity and biological importance, Surface tension, Factors influencing surface tension, Biological importance.                                                                                                                                                                                                                                                                                                                                                                 | 4                      |
| <b>Atomic &amp; Molecular structure</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>No. of lectures</b> |
| Structure of atom-Models & theories, Periodic table, Concept of bonding; valence of carbon; hybridizations of carbon; hybridizations of nitrogen & oxygen; molecular orbital theories, polar & non polar molecules; inductive effect; Secondary bonding: weak interactions, hydrogen bonding; dipole-dipole & dipole induced dipole interactions; London dispersion forces. Bonds within molecules-Ionic, covalent, Hydrogen, Electrostatic, Disulphide& peptide bonds, Van-der Waals forces Bond lengths & Bond energies, Bond angles, Structural isomerism; optical isomerism & optical activity. | 8                      |
| <b>Physico-chemical Foundations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>No. of lectures</b> |
| Biophysics of Water: Physicochemical properties of water, Molecular structure, Nature of hydrophobic interactions, Water Structure. Small-Molecule Solutes: Hydrophiles, Hydrophobes, Large Hydrophobic Solutes and Surfaces, Aqueous Environment of the Cell, State of water in bio- structures & its significance, Protein Hydration-Nonspecific Effects, The Hydration Shell. Acid                                                                                                                                                                                                               | 12                     |
| & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, Ampholyte, concept of pH, measurements of pH , Henderson–Hasselbatch equation , Titration curve & pK values, Buffers & Stability of their pH , numerical problems. Redox potential : Oxidation –Reduction, examples of redox potential in biological system                                                                                                                                                                                                                                                              |                        |

**REFERENCES BOOKS:**

- Biochemistry by Voet and Voet
- Biological Thermodynamics by Donald T.Haynie
- Introductory Biophysics by J. R. Claycomb and J.Q.P.Tran
- Molecular and Cellular Biophysics by Meyer B.Jackson

**PHY607- Physics Lab I - 2 Credits**

1. Determine Planck's constant using Photo Vacuum Tube.
2. Refractive index of transparent material.
3. Study of Zeeman Effect.
4. G M counting set up for radioactive experiments.

**PHY608- Physics Lab II (Analog and digital) - 2 Credits**

1. Verification of Logic Gates.
2. Charging and Discharging of Capacitor.
3. Verification of Kirchhoff's law.
4. Solar Power Lab

**PHY609- Research Project work - 2 Credits**

Combination of experimental and theoretical aspects of a problem. Perform experiment, collect data, analyze with various tools and software. Derive conclusion (positive or negative) from the work and summarize the report in form of dissertation in the VI semester.

## PART -1 Tamil

## பொதுத்தமிழ்

அனைத்து இளங்கலை பட்டப்படிப்பு ( சிறப்புத் தமிழ் அல்லாத ) மாணவர்களுக்கானது  
( தமிழ்நாடு மாநில உயர்கல்வி மன்றப் பாடத்திட்டம் 2022 - யை அடியொற்றியது )

## Syllabus

### AFFILIATED COLLEGES

Program Code: \*\*\*

2025 – 2026onwards



## BHARATHIAR UNIVERSITY

(A State University, Accredited with "A++" Grade by NAAC,  
Ranked 21<sup>st</sup> among Indian Universities by MHRD-NIRF)  
Coimbatore - 641 046, Tamil Nadu, India

**Instruction : PEOs are:**

**Program Educational Objectives (PEOs)  
PART –I TAMIL program**

|       |                                                                                           |
|-------|-------------------------------------------------------------------------------------------|
| PEO1  | இலக்கியப் பார்வை பெறுதல்.                                                                 |
| PEO2  | காலந்தோறுமான இலக்கிய வகைகளை அறிதல்.                                                       |
| PEO3  | இலக்கியச் சுவை உணர்வுவழி மனநல மேம்பாடு பெறுதல்.                                           |
| PEO4  | மொழிப் பயிற்சி வழி மொழியாளுமையைப் பெறுதல்.                                                |
| PEO5  | சமூகக் கண்ணோட்டத்தைப் பெறுதல்                                                             |
| PEO6  | படைப்பாளுமையை மேம்படுத்துதல்.                                                             |
| PEO7  | வாழ்வியல் கோட்பாடுகளை உணர்தல்.                                                            |
| PEO8  | இலக்கிய வரலாறு வழி பண்பாடுகளை அறிதல்.                                                     |
| PEO9  | நிறை மனத்தினராதல்.                                                                        |
| PEO10 | நூல்களைத் தேர்ந்து படிக்கும் பழக்கம் பெறுதலும் போட்டித் தேர்வுகளுக்குத் திறனுடையோராதலும். |

## Program Specific Outcomes (PSOs)

After the successful completion of PART-1 program, the students are expected to

|       |                                                       |
|-------|-------------------------------------------------------|
| PSO1  | இலக்கியம் இன்னதென்பதை அறிதல். .                       |
| PSO2  | இலக்கிய வடிவங்களை அறிதல்                              |
| PSO3  | மொழிப் பயன்பாட்டு அறிவு பெறுதல்.                      |
| PSO4  | சமூகச் சிந்தனை அறிவு பெறுதல்.                         |
| PSO5  | படைப்பாளர்களாய் உருவாதல்.                             |
| PSO6  | வாழ்வியல் மதிப்புகளைப் பெறுதல்                        |
| PSO7  | பாரம்பரிய பண்பாட்டு உணர்வடைதல்                        |
| PSO8  | மனநல மேம்பாட்டுடன் மிளிர்ந்தல்                        |
| PSO9  | நிறைவாழ்வு நடாத்துதல்.                                |
| PSO10 | நூலின்பம் பெறுதலும்.பணிவாய்ப்பிற்கான தகுதி பெறுதலும். |

### Program Outcomes (Pos)

#### On successful completion of the PART-I Tamil Program

|     |                                                                     |
|-----|---------------------------------------------------------------------|
| PO1 | பாடப்பகுதியிலக்கியங்கள் வழி மானுட மதிப்புகளைப் பெறுதல்.             |
| PO2 | சமூகத்தின் பாற்பட்ட நல்லுணர்வு பெறுதல்.                             |
| PO3 | மொழியாளுமைத் திறன் உடையோராதல்.                                      |
| PO4 | படைப்பாக்கத் திறன் பெற்றோராதல்.                                     |
| PO5 | இலக்கிய வரலாறு வழி போட்டித் தேர்வுகளை எதிர் கொள்ளும் திறன் பெறுதல். |

**BHARATHIAR UNIVERSITY: COIMBATORE 641 046****PART- 1 TAMIL CURRICULUM OTHER THEN TAMIL MAJOR (AFFILIATED COLLEGES)****FOLLOWED BY TANSCHS SYLLABUS- AUGUST-2022****(For the students admitted during the academic year 2025-2026 onwards)**

| SEMESTER | SUBJECT CODE | TITLE OF THE PAPER                                                                                                         | INSTRUCTION HOURS | DURATION ON THE HOURS (EXAM) | MAXIMUM MARKS |     |       | CREDIT |
|----------|--------------|----------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------|---------------|-----|-------|--------|
|          |              |                                                                                                                            |                   |                              | CIA           | ESE | TOTAL |        |
| I        | 11T          | PART1 – TAMIL PAPER1I<br>(Poetry, Short Story, Grammar, Translation and Communicative Skills, History of Tamil Literature) | 6                 | 3                            | 50            | 50  | 100   | 4      |
| II       | 21T          | PART1 – TAMIL PAPER1I<br>(Poetry, Prose, Grammar, Communicative Skills, History of Tamil Literature)                       | 6                 | 3                            | 50            | 50  | 100   | 4      |
| III      | 31T          | PART1 – TAMIL PAPER1III<br>(Poetry, Novel, Communicative Skills, History of Tamil Literature)                              | 6                 | 3                            | 50            | 50  | 100   | 4      |
| IV       | 41T          | PART1 – TAMIL PAPER1IV<br>(Poetry, Drama, Communicative Skills, History of Tamil Literature)                               | 6                 | 3                            | 50            | 50  | 100   | 4      |



# தாள்-1

| COURSE CODE                                                                                                                                                                                                                                                                                                                                               | COURSE NAME                                                                                                           | CATEGORY                                                          | L          | T | P | S | INSTRUCTION HOURS | CREDITS | MARKS |          |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------|---|---|---|-------------------|---------|-------|----------|-------|
|                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                       |                                                                   |            |   |   |   |                   |         | CIA   | EXTERNAL | TOTAL |
| 11T                                                                                                                                                                                                                                                                                                                                                       | PART-1<br>TAMIL<br>PAPER-1                                                                                            |                                                                   | Y          | - | - | - | 6                 | 4       | 50    | 50       | 100   |
| CORE/ELECTIVE/SUPPORTIVE                                                                                                                                                                                                                                                                                                                                  |                                                                                                                       |                                                                   | SUPPORTIVE |   |   |   |                   |         |       |          |       |
| PRE-REQUISITE                                                                                                                                                                                                                                                                                                                                             |                                                                                                                       | பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும். |            |   |   |   |                   |         |       |          |       |
| LEARNING OBJECTIVES                                                                                                                                                                                                                                                                                                                                       |                                                                                                                       |                                                                   |            |   |   |   |                   |         |       |          |       |
| THE MAIN OBJECTIVES OF THIS COURSE ARE TO :                                                                                                                                                                                                                                                                                                               |                                                                                                                       |                                                                   |            |   |   |   |                   |         |       |          |       |
| <ul style="list-style-type: none"><li>முதலாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ்மொழி இலக்கியங்களை அறிமுகம் செய்தல்.</li><li>தற்கால இலக்கியப் போக்குகளையும் இலக்கண வளங்களையும் மாணவர் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்.</li><li>தமிழ் இலக்கியம் சார்ந்த போட்டித்தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.</li></ul> |                                                                                                                       |                                                                   |            |   |   |   |                   |         |       |          |       |
| EXPECTED COURSE OUTCOMES                                                                                                                                                                                                                                                                                                                                  |                                                                                                                       |                                                                   |            |   |   |   |                   |         |       |          |       |
| ON THE SUCCESSFUL COMPLETION OF THE COURSE, STUDENTS WILL BE ABLE TO                                                                                                                                                                                                                                                                                      |                                                                                                                       |                                                                   |            |   |   |   |                   |         |       |          |       |
| இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.                                                                                                                                                                                                                                                                                                    |                                                                                                                       |                                                                   |            |   |   |   |                   |         |       |          |       |
| CO 1                                                                                                                                                                                                                                                                                                                                                      | பாரதியார் காலந்தொட்டு தற்காலப் புதுக்கவிதைகள் வரை கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன்பெறுதல். |                                                                   |            |   |   |   |                   |         | K1,K2 |          |       |
| CO 2                                                                                                                                                                                                                                                                                                                                                      | புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்.                                                                               |                                                                   |            |   |   |   |                   |         | K2    |          |       |
| CO 3                                                                                                                                                                                                                                                                                                                                                      | சிறுகதை இலக்கியவகையினைக் கற்பதன் மூலம் படைப்பாக்கத் திறனைப் பெறுவர்.                                                  |                                                                   |            |   |   |   |                   |         | K3,K6 |          |       |
| CO 4                                                                                                                                                                                                                                                                                                                                                      | மொழியறிவோடு சிந்தனைத்திறன் அதிகரித்தல்.                                                                               |                                                                   |            |   |   |   |                   |         | K3,K5 |          |       |
| CO 5                                                                                                                                                                                                                                                                                                                                                      | தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்கவும் அறிந்து கொள்ளுதல்.                                 |                                                                   |            |   |   |   |                   |         | K2,K6 |          |       |
| K1 - REMEMBER; K2 - UNDERSTAND; K3 - APPLY; K4 - ANALYZE; K5 - EVALUATE; K6 - CREATE                                                                                                                                                                                                                                                                      |                                                                                                                       |                                                                   |            |   |   |   |                   |         |       |          |       |

|           |                                                                                                                                                                                                                                   |                        |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
|           | <b>மரபுக்கவிதை</b>                                                                                                                                                                                                                |                        |
| UNIT -I   | 1.பெ. சுந்தரனார் – தமிழ்த் தெய்வ வணக்கம்<br>(நீராரும்.....வாழ்த்துதுமே)                                                                                                                                                           | 18<br>CONTACT<br>HOURS |
|           | 2.பாரதியார் – நாட்டு வணக்கம்                                                                                                                                                                                                      |                        |
|           | 3.பாரதிதாசன் – சிறுத்தையே வெளியில் வா                                                                                                                                                                                             |                        |
|           | 4.கவிமணி – புத்தரும் சிறுவனும்                                                                                                                                                                                                    |                        |
|           | 5.முடியரசன்- மொழியுணர்ச்சி(1,2,3)                                                                                                                                                                                                 |                        |
|           | 6.பட்டுக்கோட்டை கல்யாணசுந்தரம்- விடுதலை                                                                                                                                                                                           |                        |
|           | 7.தமிழ்ஒளி- நெய்வேலி நாம் பெற்ற பேறு                                                                                                                                                                                              |                        |
|           | 8.சுரதா- இயற்கை                                                                                                                                                                                                                   |                        |
|           | <b>புதுக்கவிதை</b>                                                                                                                                                                                                                |                        |
| UNIT -II  | .1அப்துல்ரகுமான் – ஒப்பிலாத சமுதாயம்                                                                                                                                                                                              | 18<br>CONTACT<br>HOURS |
|           | .2ஈரோடுதமிழன்பன்-<br>நகைத்துளிப்பா(சென்ரியூ)*<br>பா எண்29,41,53,65,89,92,94,118,139,168<br>இயைபுத் துளிப்பா (லிமரைக்கூ)**<br>பா எண்1,20,59,91,110,112,118,124,129,135<br>*ஒரு வண்டி சென்ரியூ<br>**சென்னிமலைக் கிளியோப்பாத்ராக்கள் |                        |
|           | 3.சிற்பி பாலசுப்பிரமணியம்.- நழுவும் பருவம்                                                                                                                                                                                        |                        |
|           | .4தேனரசன் – கதறுகிறேன்                                                                                                                                                                                                            |                        |
|           | 5.புவியரசு -தந்தை மகற்காற்றும் உதவி                                                                                                                                                                                               |                        |
|           | .6வைரமுத்து – மழைக்காலப் பூக்கள்                                                                                                                                                                                                  |                        |
|           | 7.இளம்பிறை – அம்மா                                                                                                                                                                                                                |                        |
|           | 8.தாமரை ஒரு -கதவும் கொஞ்சம் கள்ளிப்பாலும்                                                                                                                                                                                         |                        |
|           | <b>சிறுகதைகள்</b>                                                                                                                                                                                                                 |                        |
| UNIT -III | .1ஆற்றங்கரைப் பிள்ளையார்- புதுமைப்பித்தன்                                                                                                                                                                                         | 18<br>CONTACT<br>HOURS |
|           | 2.முள்முடி – தி.ஜானகிராமன்                                                                                                                                                                                                        |                        |
|           | 3.காகிதஉறவு – சு.சமுத்திரம்                                                                                                                                                                                                       |                        |
|           | 4. கரு – உமாமகேஸ்வரி                                                                                                                                                                                                              |                        |
|           | 5.வீட்டின் மூலையில் ஒரு சமையல் அறை – அம்பை                                                                                                                                                                                        |                        |
|           | 6.மாப்பளே இரயிலுப் பாக்கப் போலாமா...? -<br>பட்சி<br>(கொங்கு வட்டாரச் சிறுகதை)                                                                                                                                                     |                        |

|  |                                                                                 |  |
|--|---------------------------------------------------------------------------------|--|
|  | 7.ஒரு ஸ்கூல் கோயிலாகிறது-மாத்தளை சோழ                                            |  |
|  | 8.நூலகத்தில் ஒரு தளபதி-இடாலோ கால்வினா<br>(மொழிபெயர்ப்புக்கதை, தமிழில்- மாதவன் ) |  |

|          |                                                                                                                                                                                                                                                                            |                        |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
|          | சிறுகதைக் கொத்து<br>வெளியீடு<br>அறிவுப் பதிப்பகம்(பி)லிட் சென்னை-14                                                                                                                                                                                                        |                        |
| UNIT -IV | பாடம் சார்ந்த இலக்கிய வரலாறு<br>.1இருபதாம் நூற்றாண்டு மரபுக்கவிதைகள்<br>.2புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்<br>.3சிறுகதையின் தோற்றமும் வளர்ச்சியும்.;<br>பாட நூல்<br>தமிழ் இலக்கிய வரலாறு<br>முனைவர் ப.இப்ராஹிம்<br>வெளியீடு: நியூசெஞ்சுரிபுக்ஹவுஸ் (பி) லிட், சென்னை | 18<br>CONTACT<br>HOURS |
| UNIT -V  | இலக்கணம் /மொழித்திறன்<br>• பொருள் பொதிந்த சொற்றொடர் அமைத்தல்<br>• ஓர் எழுத்து ஒரு மொழி<br>• வேற்றுமை உருபுகள்<br>• திணை, பால், எண், இடம்<br>2.மொழி பெயர்ப்பு-ஆங்கிலத்திலிருந்து தமிழ்<br>அபொது நிலை.<br>ஆஅலுவலக நிலை.                                                      | 18<br>CONTACT<br>HOURS |
|          | <b>TOTAL LECTURE HOURS</b>                                                                                                                                                                                                                                                 | <b>90</b>              |
|          | <b>REFERENCE BOOKS</b>                                                                                                                                                                                                                                                     |                        |
|          | தமிழ் இலக்கிய வரலாறு – சி.பாலசுப்பிரமணியன்<br>புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு-தமிழண்ணல்<br>வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு- எஃப்.பாக்கியமேரி                                                                                                                       |                        |

| WEB SOURCES                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• <a href="http://www.tamilvu.org/">Tamil virtual University Library- www.tamilvu.org/</a></li> </ul>                                   |
| <ul style="list-style-type: none"> <li>• <a href="http://www.projectmadurai.org">Project Madurai - www.projectmadurai.org.</a></li> </ul>                                      |
| <ul style="list-style-type: none"> <li>• <a href="http://www.chennailibrary.com">Chennai Library- www.chennailibrary.com &lt;http://www.chennailibrary.com&gt;.</a></li> </ul> |
| <ul style="list-style-type: none"> <li>• <a href="http://www.ulib.prg">Tamil Universal Digital Library- www.ulib.prg &lt;http://www.ulib.prg&gt;.</a></li> </ul>               |
| <ul style="list-style-type: none"> <li>• <a href="http://tamilebooksdownloads.blogspot.com">Tamil E-Books Downloads- tamilebooksdownloads. blogspot.com</a></li> </ul>         |
| <ul style="list-style-type: none"> <li>• <a href="http://books.tamilcube.com">Tamil Books on line- books.tamil cube.com</a></li> </ul>                                         |
| <ul style="list-style-type: none"> <li>• <a href="http://archive.org">Catalogue of the Tamil books in the Library of British Congress archive.org</a></li> <li>•</li> </ul>    |
| <ul style="list-style-type: none"> <li>• <a href="http://books.tamilcube.com">Tamil novels on line - books.tamilcube.com</a></li> </ul>                                        |

### Mapping with Programme Outcomes

| COs | Po1 | Po2 | Po3 | Po4 | Po5 |
|-----|-----|-----|-----|-----|-----|
| Co1 | S   | S   | S   | S   | M   |
| Co2 | M   | S   | S   | S   | S   |
| Co3 | S   | S   | S   | S   | M   |
| Co4 | S   | S   | S   | S   | S   |
| Co5 | M   | M   | S   | S   | S   |

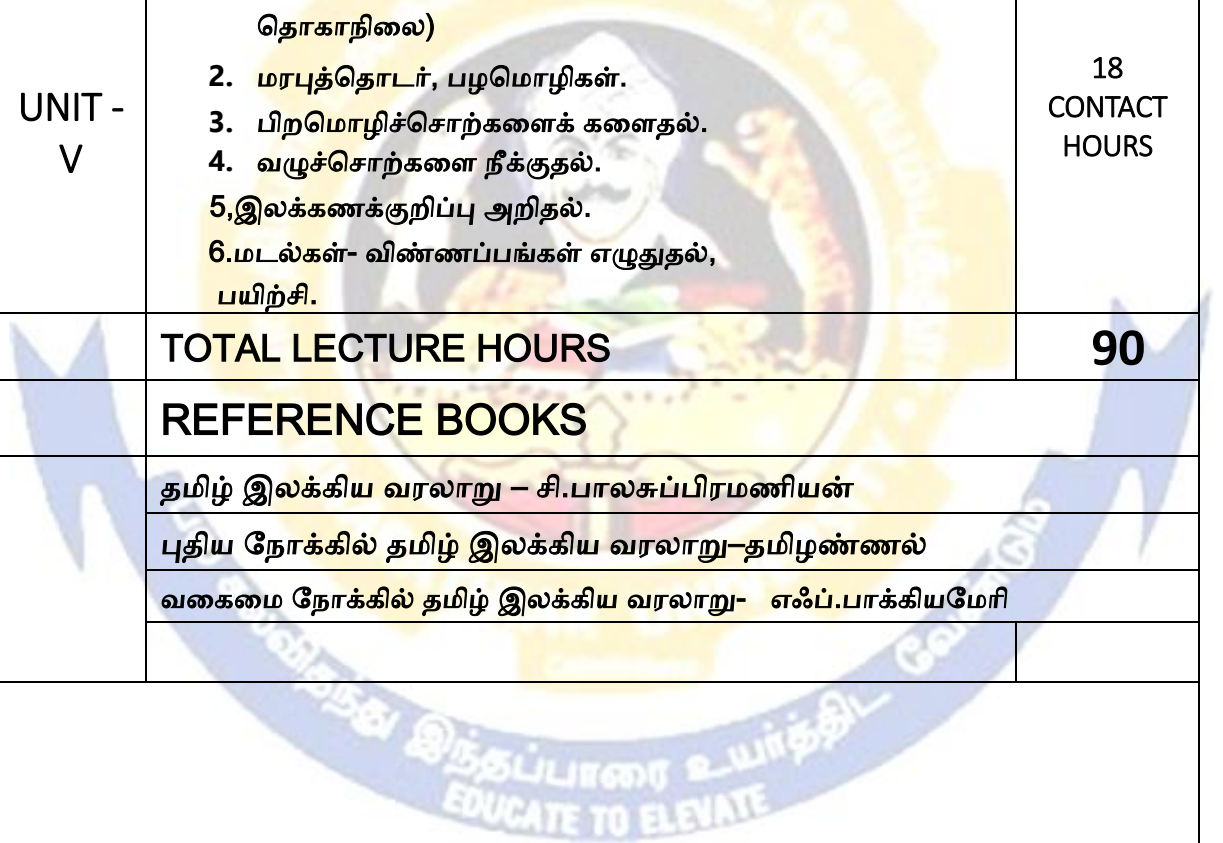
**S-Strong; M-Medium; L-Low**



## தாள்-2

| COURSE CODE                                                                                                                                                                                                                                                          | COURSE NAME                                                                                                                                                        | CATEGORY                                                          | L          | T | P | S | INSTRUCTION HOURS | CREDITS | MARKS  |          |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------|---|---|---|-------------------|---------|--------|----------|-------|
|                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         | CIA    | EXTERNAL | TOTAL |
| 21T                                                                                                                                                                                                                                                                  | PART-1<br>TAMIL<br>PAPER-11                                                                                                                                        |                                                                   | Y          | - | - | - | 6                 | 4       | 50     | 50       | 100   |
| CORE/ELECTIVE/SUPPORTIVE                                                                                                                                                                                                                                             |                                                                                                                                                                    |                                                                   | SUPPORTIVE |   |   |   |                   |         |        |          |       |
| PRE-REQUISITE                                                                                                                                                                                                                                                        |                                                                                                                                                                    | பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும். |            |   |   |   |                   |         |        |          |       |
| LEARNING OBJECTIVES                                                                                                                                                                                                                                                  |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         |        |          |       |
| THE MAIN OBJECTIVES OF THIS COURSE ARE TO :                                                                                                                                                                                                                          |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         |        |          |       |
| <ul style="list-style-type: none"><li>வாழ்வியல் அறஉணர்வை மேம்படுத்துதல்.</li><li>சமய இலக்கியங்களையும் சிற்றிலக்கியங்களையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.</li><li>மொழித்திறனையும்,உரைநடை இலக்கிய வடிவம் வழியாக சமூகம் சார் சிந்தனை உணர்வையும் பெறுவர்.</li></ul> |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         |        |          |       |
| EXPECTED COURSE OUTCOMES                                                                                                                                                                                                                                             |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         |        |          |       |
| ON THE SUCCESSFUL COMPLETION OF THE COURSE, STUDENTS WILL BE ABLE TO                                                                                                                                                                                                 |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         |        |          |       |
| இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.                                                                                                                                                                                                               |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         |        |          |       |
| CO 1                                                                                                                                                                                                                                                                 | அற உணர்வின் பாற்பட்டு தமது வாழ்வை நடத்தும் திறம் பெறுவர்.                                                                                                          |                                                                   |            |   |   |   |                   |         | k2,K3  |          |       |
| CO 2                                                                                                                                                                                                                                                                 | சிற்றிலக்கியங்களின் வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர். பக்தி இலக்கியம் வழி பக்குவ மனப்பாங்கும் சித்தர் இலக்கியவழி சிந்தனை தெளிவும் பெறுவர். |                                                                   |            |   |   |   |                   |         | K1,K2, |          |       |
| CO 3                                                                                                                                                                                                                                                                 | உரைநடை இலக்கியங்கள் வழி சமூக உணர்வு, வாழ்வியல் அற விழிப்புணர்வு மற்றும் மொழிசார் கருத்துக்களைப் பெறுவர்.                                                           |                                                                   |            |   |   |   |                   |         | K2,k4  |          |       |
| CO 4                                                                                                                                                                                                                                                                 | தமிழ்ச் சமூகப்பண்பாட்டு வரலாற்றினை இலக்கியங்கள் வாயிலாக அறிவர்.                                                                                                    |                                                                   |            |   |   |   |                   |         | K5.k4  |          |       |
| CO 5                                                                                                                                                                                                                                                                 | போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்கு ஏற்ப தமிழ்ப் பாடத்தினைப் பயன் கொள்ளும் வகையில் பயிற்சி பெறுவர்.விண்ணப்பங்கள் எழுதும் திறன் பெறுவர்.                         |                                                                   |            |   |   |   |                   |         | K5,k6  |          |       |
| K1 - REMEMBER; K2 - UNDERSTAND; K3 - APPLY; K4 - ANALYZE; K5 - EVALUATE; K6 – CREATE                                                                                                                                                                                 |                                                                                                                                                                    |                                                                   |            |   |   |   |                   |         |        |          |       |

|           |                                                                                                                            |                        |
|-----------|----------------------------------------------------------------------------------------------------------------------------|------------------------|
|           | <b>அற இலக்கியம்- பக்தி இலக்கியம்</b>                                                                                       |                        |
| UNIT -I   | 1.திருக்குறள் - அறன் வலியுறுத்தல்                                                                                          | 18<br>CONTACT<br>HOURS |
|           | 2.நாலடியார் - மெய்ம்மை                                                                                                     |                        |
|           | 3.தேவாரம்-திருநாவுக்கரசர் -நின்ற திருத்தாண்டகம் முதல் 5 பாடல்கள்                                                           |                        |
|           | 4.பராபரக்கண்ணி- குணங்குடி மஸ்தான் சாகிபு பாடல்கள் 20 கண்ணிகள்                                                              |                        |
|           | 5. பிள்ளைச் சிறு விண்ணப்பம்- வள்ளலார் 1-5பாடல்கள்                                                                          |                        |
|           | <b>சிற்றிலக்கியம்- சித்தர்பாடல்கள்- சிலேடைப் பாடல்கள்</b>                                                                  |                        |
| UNIT -II  | 1.திருக்குற்றாலக் குறவஞ்சி - குறத்தி மலைவளம் கூறுதல்.                                                                      | 18<br>CONTACT<br>HOURS |
|           | 2.முக்கூடற்பள்ளு - நகர் வளம்                                                                                               |                        |
|           | 3. திருமந்திரம் - அன்புடைமை- (முதல் (பாடல்கள் 5.                                                                           |                        |
|           | 4.பட்டினத்தார் பாடல்கள்)-திருவேகம்பமாலை -பாடல் எண்11முதல்15வரை )                                                           |                        |
|           | 5.கவி வீரராகவர் -<br>1வைக்கோலுக்கும் யானைக்கும்....<br>2முகுந்தனுக்கும் முறத்திற்கும்....<br>3சந்திரனுக்கும் மலைக்கும்.... |                        |
|           | <b>உரைநடை</b>                                                                                                              |                        |
| UNIT -III | 1.தமிழ்நாடு-திரு.வி.க.                                                                                                     | 18<br>CONTACT<br>HOURS |
|           | 2. வீரக்கல்-ரா.பி .சேதுப்பிள்ளை.                                                                                           |                        |
|           | 3.எளிமை ஓர் அறம் - மு.வ.                                                                                                   |                        |
|           | 4.தமிழில் அறிவியல் - மணவை முஸ்தபா                                                                                          |                        |
|           | 5. தமிழ்வழிக் கல்வி குறித்த ஒரு விளக்கக் கருத்துரை - மூலம் தமிழண்ணல் மொழியாக்கம் -முனைவர் க. முத்தையா                      |                        |
|           | 6. தமிழ் கற்றல் கற்பித்தல்:சமுதாய மொழியியல் நோக்கில் - டாக்டர் கி.கருணாகரன்.                                               |                        |
|           | 7. குழந்தைகளும் இலக்கியமும் - டாக்டர் பூவண்ணன்                                                                             |                        |
|           | 8. ஓதுவது ஒழியேல் - முனைவர் சி.பாலசுப்ரமணியன்                                                                              |                        |
|           | <b>உரைநடைத் திரட்டு வெளியீடு:தாமரை பப்ளிகேஷன்ஸ் சென்னை-50</b>                                                              |                        |

|                                                                                     |                                                                                                                                                                                                                                                                      |                        |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| UNIT - IV                                                                           | <b>பாடம் சார்ந்த இலக்கிய வரலாறு</b>                                                                                                                                                                                                                                  | 18<br>CONTACT<br>HOURS |
|                                                                                     | 1.பதினெண்கீழ்க்கணக்கு நூல்கள்.                                                                                                                                                                                                                                       |                        |
|                                                                                     | 2.பக்தி இலக்கியத்தின் தோற்றமும் வளர்ச்சியும்.                                                                                                                                                                                                                        |                        |
|                                                                                     | 3.சிறநிலக்கிய வகைகள்.                                                                                                                                                                                                                                                |                        |
|                                                                                     | 4.உரைநடையின் தோற்றமும் வளர்ச்சியும்.                                                                                                                                                                                                                                 |                        |
|                                                                                     | <b>பாட நூல்</b><br>தமிழ் இலக்கிய வரலாறு<br>முனைவர் ப.இப்ராஹிம்<br>வெளியீடு: நியூசெஞ்சுரிபுக்ஹவுஸ் (பி) லிட், சென்னை                                                                                                                                                  |                        |
| UNIT - V                                                                            | <b>இலக்கணம் /மொழித்திறன்</b>                                                                                                                                                                                                                                         | 18<br>CONTACT<br>HOURS |
|                                                                                     | இலக்கணம்/மொழித்திறன்/போட்டித்தேர்வுத்திறன்<br>1. தொடர்வகைகள் – (தொகைநிலை ,<br>தொகாநிலை)<br>2. மரபுத்தொடர், பழமொழிகள்.<br>3. பிறமொழிச்சொற்களைக் களைதல்.<br>4. வழுச்சொற்களை நீக்குதல்.<br>5.இலக்கணக்குறிப்பு அறிதல்.<br>6.மடல்கள்- விண்ணப்பங்கள் எழுதுதல்,<br>பயிற்சி. |                        |
|                                                                                     | <b>TOTAL LECTURE HOURS</b>                                                                                                                                                                                                                                           | <b>90</b>              |
|                                                                                     | <b>REFERENCE BOOKS</b>                                                                                                                                                                                                                                               |                        |
|                                                                                     | தமிழ் இலக்கிய வரலாறு – சி.பாலசுப்பிரமணியன்                                                                                                                                                                                                                           |                        |
|                                                                                     | புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு-தமிழண்ணல்                                                                                                                                                                                                                        |                        |
|                                                                                     | வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு- எஃப்.பாக்கியமேரி                                                                                                                                                                                                                |                        |
|  |                                                                                                                                                                                                                                                                      |                        |

### தாள்-3

| COURSE CODE                                                                                                                                                                                                                                                                                                                                                                                                                    | COURSE NAME                                                                                                        | CATEGORY                                                          | L          | T | P | S | INSTRUCTION HOURS | CREDITS | MARKS |          |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------|---|---|---|-------------------|---------|-------|----------|-------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                    |                                                                   |            |   |   |   |                   |         | CIA   | EXTERNAL | TOTAL |
| 31T                                                                                                                                                                                                                                                                                                                                                                                                                            | PART-1<br>TAMIL<br>PAPER-111                                                                                       |                                                                   | Y          | - | - | - | 6                 | 4       | 50    | 50       | 100   |
| CORE/ELECTIVE/SUPPORTIVE                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                    |                                                                   | SUPPORTIVE |   |   |   |                   |         |       |          |       |
| PRE-REQUISITE                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                    | பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும். |            |   |   |   |                   |         |       |          |       |
| LEARNING OBJECTIVES                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                    |                                                                   |            |   |   |   |                   |         |       |          |       |
| THE MAIN OBJECTIVES OF THIS COURSE ARE TO :                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                    |                                                                   |            |   |   |   |                   |         |       |          |       |
| <ul style="list-style-type: none"><li>இரண்டாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ்மொழி இலக்கியங்களை அறிமுகம் செய்தல்.இலக்கியங்களின்சிறப்பினைஉணர்த்துதல்.</li><li>காலந்தோறும் எழுந்த காப்பியங்களின் போக்கையும், புதினத்தின் இலக்கிய வடிவத்தையும், யாப்பு, அணி போன்ற இலக்கியவகைகளையும் மாணவர்கள் உணருமாறு செய்தல்.</li><li>தமிழ் இலக்கியம் சார்ந்த போட்டித்தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்</li></ul> |                                                                                                                    |                                                                   |            |   |   |   |                   |         |       |          |       |
| EXPECTED COURSE OUTCOMES                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                    |                                                                   |            |   |   |   |                   |         |       |          |       |
| ON THE SUCCESSFUL COMPLETION OF THE COURSE, STUDENTS WILL BE ABLE TO                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                    |                                                                   |            |   |   |   |                   |         |       |          |       |
| இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                    |                                                                   |            |   |   |   |                   |         |       |          |       |
| CO 1                                                                                                                                                                                                                                                                                                                                                                                                                           | காப்பியங்கள் அறிமுகப்படுத்தப்படுவதால் தமிழ்மொழியின் உயர்வையும் சிறப்பையும் உணர்தல்.                                |                                                                   |            |   |   |   |                   |         | K1,K2 |          |       |
| CO 2                                                                                                                                                                                                                                                                                                                                                                                                                           | சமயக் காப்பியங்களின் வழி சமூக நல்லுணர்வுச் சிந்தனையைப் பெறுவர்.                                                    |                                                                   |            |   |   |   |                   |         | K2,K4 |          |       |
| CO 3                                                                                                                                                                                                                                                                                                                                                                                                                           | தமிழ்ப் புதினங்களின் சமகாலப்படைப்புகள் காட்டும் வாழ்வியலை அறிந்து கொள்வர்.                                         |                                                                   |            |   |   |   |                   |         | K3,K6 |          |       |
| CO 4                                                                                                                                                                                                                                                                                                                                                                                                                           | நாவல் இலக்கியம் அறிமுகப்படுத்தப்படுவதால் சிந்தனைஆற்றல், படைப்பாற்றல்,கற்பனைத்திறன்வளர்தல்.                         |                                                                   |            |   |   |   |                   |         | K3,K5 |          |       |
| CO 5                                                                                                                                                                                                                                                                                                                                                                                                                           | யாப்பு, அணிஇலக்கணங்கள், கட்டுரை எழுதுதல் ஆகியவற்றைக் கற்பதன் மூலம் போட்டித்தேர்வுகளை எதிர் கொள்ளும் திறன் பெறுவர். |                                                                   |            |   |   |   |                   |         | K2,K6 |          |       |
| K1 - REMEMBER; K2 - UNDERSTAND; K3 - APPLY; K4 - ANALYZE; K5 - EVALUATE; K6 - CREATE                                                                                                                                                                                                                                                                                                                                           |                                                                                                                    |                                                                   |            |   |   |   |                   |         |       |          |       |



|           |                                                                                                                     |                        |
|-----------|---------------------------------------------------------------------------------------------------------------------|------------------------|
|           | <b>பெருங்காப்பியங்கள்</b>                                                                                           |                        |
| UNIT -I   | சிலப்பதிகாரம்-மங்கலவாழ்த்துப்பாடல்-இளங்கோவடிகள்                                                                     | 18<br>CONTACT<br>HOURS |
|           | மணிமேகலை -சிறைக் கோட்டம் அறக் கோட்டமாக்கிய<br>காதை - சீத்தலைச்சாத்தனார்                                             |                        |
|           | சீவகசிந்தாமணி - நாமகள்இலம்பகம்-<br>( பாடல் எண் -30 70 )திருத்தக்கதேவர்                                              |                        |
|           | <b>சமய இலக்கியங்கள்</b>                                                                                             |                        |
| UNIT -II  | பெரியபுராணம்-திருநீலகண்டநாயனார்புராணம்- சேக்கிழார்                                                                  | 18<br>CONTACT<br>HOURS |
|           | கம்பராமாயணம் -கங்கைப் படலம் (1-27)-கம்பர்                                                                           |                        |
|           | தேம்பாவணி - நாட்டுப்படலம்-வீரமாமுனிவர்<br>( பாடல் எண் 14-45 )                                                       |                        |
| Unit -III | <b>புதினம்</b>                                                                                                      | 18<br>CONTACT<br>HOURS |
|           | ஆத்மாவின் ராகங்கள்- நா. பார்த்தசாரதி<br>சமூகப் புதினம்<br>பாவை பப்ளிகேஷன்ஸ் சென்னை-14                               |                        |
|           | <b>பாடம் சார்ந்த இலக்கிய வரலாறு</b>                                                                                 |                        |
| UNIT -IV  | 1.ஐம்பெருங்காப்பியங்கள்                                                                                             | 18<br>CONTACT<br>HOURS |
|           | 2.ஐஞ்சிறுங்காப்பியங்கள்                                                                                             |                        |
|           | .3புதினத்தின்தோற்றமும்வளர்ச்சியும்                                                                                  |                        |
|           | <b>பாட நூல்</b><br>தமிழ் இலக்கிய வரலாறு<br>முனைவர் ப.இப்ராஹிம்<br>வெளியீடு: நியூசெஞ்சுரிபுக்ஹவுஸ் (பி) லிட், சென்னை |                        |
| UNIT -V   | <b>இலக்கணம் /மொழித்திறன்</b>                                                                                        | 18<br>CONTACT<br>HOURS |
|           | 1.பாவகைகள் - வெண்பா, ஆசிரியப்பா                                                                                     |                        |
|           | 2.அணிகள் - உவமை, உருவகம்                                                                                            |                        |
|           | .3கட்டுரை எழுதுதல்<br>அஇலக்கியக். கட்டுரைகள்<br>ஆஅறிவியல் கட்டுரைகள்.                                               |                        |
|           | <b>TOTAL LECTURE HOURS</b>                                                                                          | <b>90</b>              |
|           |                                                                                                                     |                        |

|  | REFERENCE BOOKS                                       |  |
|--|-------------------------------------------------------|--|
|  | தமிழ் இலக்கிய வரலாறு – சி.பாலசுப்பிரமணியன்            |  |
|  | புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு-தமிழண்ணல்         |  |
|  | வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு- எஃப்.பாக்கியமேரி |  |

## WEB SOURCES

- [Tamil virtual University Library- www.tamilvu.org/](http://www.tamilvu.org/)
- [Project Madurai - www.projectmadurai.org.](http://www.projectmadurai.org)
- [Chennai Library- www.chennailibrary.com <http://www.chennailibrary.com>.](http://www.chennailibrary.com)
- [Tamil Universal Digital Library- www.ulib.prg <http://www.ulib.prg>.](http://www.ulib.prg)
- [Tamil E-Books Downloads- tamilebooksdownloads. blogspot.com](http://tamilebooksdownloads.blogspot.com)
- [Tamil Books on line- books.tamil cube.com](http://books.tamilcube.com)
- [Catalogue of the Tamil books in the Library of British Congress archive.org](http://archive.org)
- [Tamil novels on line - books.tamilcube.com](http://books.tamilcube.com)

## Mapping with Programme Outcomes

| COs | Po1 | Po2 | Po3 | Po4 | Po5 |
|-----|-----|-----|-----|-----|-----|
| Co1 | S   | S   | S   | M   | S   |
| Co2 | S   | S   | S   | M   | S   |
| Co3 | S   | S   | S   | S   | S   |
| Co4 | M   | S   | S   | S   | S   |
| Co5 | M   | S   | S   | S   | S   |

**S-Strong; M-Medium; L-Low**

## தாள்-4

| COURSE CODE                                                                                                                                                                                                                                                                                                                                                             | COURSE NAME                                                                           | CATEGORY                                                          | L          | T | P | S | INSTRUCTION HOURS | CREDITS | MARKS  |          |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------|---|---|---|-------------------|---------|--------|----------|-------|
|                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |                                                                   |            |   |   |   |                   |         | CIA    | EXTERNAL | TOTAL |
| 41 T                                                                                                                                                                                                                                                                                                                                                                    | PART-1<br>TAMIL<br>PAPER-1V                                                           |                                                                   | Y          | - | - | - | 6                 | 4       | 50     | 50       | 100   |
| CORE/ELECTIVE/SUPPORTIVE                                                                                                                                                                                                                                                                                                                                                |                                                                                       |                                                                   | SUPPORTIVE |   |   |   |                   |         |        |          |       |
| PRE-REQUISITE                                                                                                                                                                                                                                                                                                                                                           |                                                                                       | பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும். |            |   |   |   |                   |         |        |          |       |
| LEARNING OBJECTIVES                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |                                                                   |            |   |   |   |                   |         |        |          |       |
| THE MAIN OBJECTIVES OF THIS COURSE ARE TO :                                                                                                                                                                                                                                                                                                                             |                                                                                       |                                                                   |            |   |   |   |                   |         |        |          |       |
| <ul style="list-style-type: none"><li>செவ்வியல் இலக்கியமாம் சங்க இலக்கியங்களின் சிறப்பினை உணர்த்துதல்.</li><li>சங்க இலக்கியத்தின் சிறப்பையும், நாடகம் என்னும் இலக்கியவகையின் தன்மையையும் அகத்திணை, புறத்திணை இலக்கணங்களையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.</li><li>தமிழ்இலக்கியம் சார்ந்த போட்டித்தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.</li></ul> |                                                                                       |                                                                   |            |   |   |   |                   |         |        |          |       |
| EXPECTED COURSE OUTCOMES                                                                                                                                                                                                                                                                                                                                                |                                                                                       |                                                                   |            |   |   |   |                   |         |        |          |       |
| ON THE SUCCESSFUL COMPLETION OF THE COURSE, STUDENTS WILL BE ABLE TO                                                                                                                                                                                                                                                                                                    |                                                                                       |                                                                   |            |   |   |   |                   |         |        |          |       |
| இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.                                                                                                                                                                                                                                                                                                                  |                                                                                       |                                                                   |            |   |   |   |                   |         |        |          |       |
| CO 1                                                                                                                                                                                                                                                                                                                                                                    | சங்க இலக்கியத்தில் காணப்பெறும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.                  |                                                                   |            |   |   |   |                   |         | k2,K3  |          |       |
| CO 2                                                                                                                                                                                                                                                                                                                                                                    | தமிழின் தொன்மையையும், செம்மொழித் தகுதியையும் அறிந்து கொள்ளுதல்.                       |                                                                   |            |   |   |   |                   |         | K1,K2, |          |       |
| CO 3                                                                                                                                                                                                                                                                                                                                                                    | நாடக இலக்கியம் மூலம் நடிப்பாற்றலையும், கலைத் தன்மையையும், படைப்பாற்றலையும் வளர்த்தல். |                                                                   |            |   |   |   |                   |         | K2,k4  |          |       |
| CO 4                                                                                                                                                                                                                                                                                                                                                                    | மானுட விழுமியங்களை உணர்த்துதல்.                                                       |                                                                   |            |   |   |   |                   |         | K5.k4  |          |       |
| CO 5                                                                                                                                                                                                                                                                                                                                                                    | மொழியறிவோடு வேலை வாய்ப்பினைப் பெறுதல்.                                                |                                                                   |            |   |   |   |                   |         | K5,k6  |          |       |
| K1 - REMEMBER; K2 - UNDERSTAND; K3 - APPLY; K4 - ANALYZE; K5 - EVALUATE; K6 - CREATE                                                                                                                                                                                                                                                                                    |                                                                                       |                                                                   |            |   |   |   |                   |         |        |          |       |

|           |                                                                                                                     |                        |
|-----------|---------------------------------------------------------------------------------------------------------------------|------------------------|
|           | <b>எட்டுத்தொகை</b>                                                                                                  |                        |
| UNIT -I   | நற்றிணை (பாடல்எண் :9, 14, 18)                                                                                       | 18<br>CONTACT<br>HOURS |
|           | குறுந்தொகை (பாடல்எண் :16, 17, 19, 20, 25, 29, 38, 341)                                                              |                        |
|           | கலித்தொகை (பாடல்எண் :38, 51)                                                                                        |                        |
|           | அகநானூறு(பாடல்எண்)14, 33, 55)                                                                                       |                        |
|           | புறநானூறு (பாடல்எண் :(37, 86, 112,)                                                                                 |                        |
|           | பரிபாடல் - செவ்வேள் (5)                                                                                             |                        |
| UNIT -II  | <b>பத்துப்பாட்டு</b>                                                                                                | 18<br>CONTACT<br>HOURS |
|           | நெடுநல்வாடை-நக்கீரர்<br>(முழுமையும்)                                                                                |                        |
|           | <b>நாடகம்</b>                                                                                                       |                        |
| UNIT -III | <b>ஆதி அத்தி</b><br>ஆசிரியர்-ம.ப.பெரியசாமித் தூரன்<br>(வரலாற்று நாடகம் )                                            | 18<br>CONTACT<br>HOURS |
|           | வெளியீடு: நியூசெஞ்சுரிபுக்ஹவுஸ் (பி) லிட், சென்னை-50                                                                |                        |
| UNIT -IV  | <b>பாடம் சார்ந்த இலக்கிய வரலாறு</b>                                                                                 | 18<br>CONTACT<br>HOURS |
|           | .1எட்டுத்தொகைநூல்கள்                                                                                                |                        |
|           | 2.பத்துப்பாட்டுநூல்கள்                                                                                              |                        |
|           | .3நாடகத்தின்தோற்றமும்வளர்ச்சியும்                                                                                   |                        |
|           | <b>பாட நூல்</b><br>தமிழ் இலக்கிய வரலாறு<br>முனைவர் ப.இப்ராஹிம்<br>வெளியீடு: நியூசெஞ்சுரிபுக்ஹவுஸ் (பி) லிட், சென்னை |                        |

|         |                                                       |                        |
|---------|-------------------------------------------------------|------------------------|
|         | இலக்கணம் /மொழித்திறன்                                 |                        |
| UNIT -V | 1. அகப்பொருள் (திணைகள்மட்டும்)                        | 18<br>CONTACT<br>HOURS |
|         | .2புறப்பொருள் (திணைகள்மட்டும்)                        |                        |
|         | .3படைப்பாக்கப் பயிற்சி<br>(கவிதை,சிறுகதை )            |                        |
|         | TOTAL LECTURE HOURS                                   | 90                     |
|         | REFERENCE BOOKS                                       |                        |
|         | தமிழ் இலக்கிய வரலாறு – சி.பாலசுப்பிரமணியன்            |                        |
|         | புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு-தமிழண்ணல்         |                        |
|         | வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு- எஃப்.பாக்கியமேரி |                        |
|         |                                                       |                        |



| WEB SOURCES                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------|
| • <a href="http://www.tamilvu.org/">Tamil virtual University Library- www.tamilvu.org/</a>                                                       |
| • <a href="http://www.projectmadurai.org">Project Madurai - www.projectmadurai.org.</a>                                                          |
| • <a href="http://www.chennailibrary.com">Chennai Library- www.chennailibrary.com &lt;http://www.chennailibrary.com&gt;.</a>                     |
| • <a href="http://www.ulib.prg">Tamil Universal Digital Library- www.ulib.prg &lt;http://www.ulib.prg&gt;.</a>                                   |
| • <a href="http://tamilbooksdownloads.blogspot.com">Tamil E-Books Downloads- tamilbooksdownloads. blogspot.com</a>                               |
| • <a href="http://books.tamilcube.com">Tamil Books on line- books.tamil cube.com</a>                                                             |
| • <a href="http://catalogue.libraryofbritishcongressarchive.org">Catalogue of the Tamil books in the Library of British Congress archive.org</a> |
| • <a href="http://books.tamilcube.com">Tamil novels on line - books.tamilcube.com</a>                                                            |

### Mapping with Programme Outcomes

| COs | Po1 | Po2 | Po3 | Po4 | Po5 |
|-----|-----|-----|-----|-----|-----|
| Co1 | S   | S   | S   | S   | M   |
| Co2 | M   | S   | S   | S   | S   |
| Co3 | S   | S   | S   | S   | M   |
| Co4 | S   | S   | S   | S   | S   |
| Co5 | M   | M   | S   | S   | S   |

**S-Strong; M-Medium; L-Low**

**BHARATHIAR UNIVERSITY:: COIMBATORE-641 02**  
**BOARD OF STUDIES IN TAMIL (UG) - PART-1 TAMIL**

2025-2027

|   |                                                                                                                                                                                             |    |                                                                                                                                              |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Dr.R.P.Kannaki- Chairperson<br>Associate Professor& Head<br>Deaprtment of Tamil<br>Tiruppur Kumaran College for Women<br>SR NagarManglam Road<br>Tirupur-641687<br>MOBILE NUMBER 9443728260 | 7  | 8 Mr.M.Velayutham-Member<br>Industrialist<br>No 20, Raja Street Town Hall (Near<br>Clock Tower. Opposite Olympic Cards)<br>Coimbatore-641001 |
| 2 | Dr.G Suresh-Member<br>Associate Professor of Tamil & Head<br>VLB Janakianmal College of Arts and<br>Science<br>Kovaipudur 641042                                                            | 8  | Mrs K Murugeswari-Member<br>Stu. Alumnus<br>DO. Karuppusamy<br>39/88. Kommaran Street Kumarylga<br>Post<br>Madathukulam (TK)<br>Tirupur Dit  |
| 3 | Dr.T Sukumaran-Member<br>Associate Professor of Tamil Govt Arts and<br>Science College<br>Thalavadi- 638461                                                                                 | 9  | 10 Dr. A Senthamarai-Member-ACTA<br>Assistant Professor of Tamil & Head<br>Erode Arts and Science College<br>Erode- 63800                    |
| 4 | Mrs. N Karunmambiga Member<br>Assistant Professor of Tamil<br>United College of Arts & Science<br>Periyannackalpalasam<br>Coimbatore 641020                                                 | 10 | Dr.R Gokul Member- AUT<br>Associate Proffesor of Tamil<br>SRMV College of Art and Science<br>Coimbatore-641020                               |
| 5 | Dr. Thyagarajan- Member- Other- Univ<br>Professor of Tamil& Head<br>Department of Scientific Tamil&Tamil<br>Tamil University Thanjavur-613010                                               | 11 | Dr Kumarasamy Ex-CP \Spl.Invitee<br>Associate Professor of Tamil<br>Government Arts College<br>Kangayam-638108                               |
| 6 | Dr.Umamakheswari-Member-Other -State<br>Assistant Professor Of Tamil<br>Research Centre,Government college<br>Chittur<br>Pallakad-678104                                                    |    |                                                                                                                                              |

# BHARATHIAR UNIVERSITY, COIMBATORE – 641046. BOARD OF STUDIES PART II ENGLISH – MAY 2025

## NAME OF THE BOARD: PART – II - ENGLISH

**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025**

| Program Educational Objectives (PEOs)                   |                                                                                                                           |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| The Part II English program will enable the students to |                                                                                                                           |
| PEO1                                                    | To develop the language skills of students by offering adequate practice in professional contexts                         |
| PEO2                                                    | Enhance the lexical, grammatical, socio-linguistic and communicative competence of students                               |
| PEO3                                                    | Develop strategic competence that will help to efficient communication                                                    |
| PEO4                                                    | Provide the most pedagogical inputs for the students                                                                      |
| PEO5                                                    | Instill a comprehensive understanding through the study of various analytical skills and advances the level of writing.   |
| PEO6                                                    | Inculcate effective use of English in creative expression and day to day life                                             |
| PEO7                                                    | Enhance the ability to think and write critically and clearly.                                                            |
| PEO8                                                    | Prepare the students to use English proficiency in everyday life and to lay foundation for compete in respective careers. |



**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025**

| Program Specific Outcomes (PSOs)                                                      |                                                                                   |
|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| After the successful completion of Part II English program, the students are expected |                                                                                   |
| PSO1                                                                                  | To create a life-long interest to improve their language and communicative skills |
| PSO2                                                                                  | To develop the language skills through LSRW                                       |
| PSO3                                                                                  | To improve the effectiveness in day to day communication                          |
| PSO4                                                                                  | To analyse various oral and written communication and proper responses            |
| PSO5                                                                                  | To present their ideas in a suitable way for the given situation                  |
| PSO6                                                                                  | To assess and improve their communicative competency                              |
| PSO7                                                                                  | To apply knowledge in analyzing the text and context                              |
| PSO8                                                                                  | To prove their knowledge and skills in language proficiency                       |
| PSO9                                                                                  | To imbibe self-confidence through their language proficiency                      |
| PSO10                                                                                 | To enhance their communicative skills in their career                             |





**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025**

| Program Out comes (POs)                                                             |                                                                                         |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| On successful completion of the Part II English programme, students will be able to |                                                                                         |
| PO1                                                                                 | Prove their knowledge and skills in Language proficiency                                |
| PO2                                                                                 | Prove his proficiency in Listening Speaking Reading Writing.                            |
| PO3                                                                                 | Apply the knowledge in analyzing the text.                                              |
| PO4                                                                                 | Develop good communicative skills                                                       |
| PO5                                                                                 | Demonstrate the competency in the domain area                                           |
| PO6                                                                                 | Assess the communicative ideas                                                          |
| PO7                                                                                 | Establish a communicative competence in personal and social circumstances               |
| PO8                                                                                 | Imbibe better understanding in various texts                                            |
| PO9                                                                                 | Express thoughts, ideas and feelings appropriately in formal and informal communication |
| PO10                                                                                | Evaluate every text and improve knowledge in various fields.                            |



**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025**

**PART-II ENGLISH**  
**Scheme of Examination (CBCS & OBE Pattern)**  
**(Applicable to the students admitted from 2025- 2026 onwards)**

| Semester | Subject code       | Title of the paper  | Instruction   | Duration of Exam (Hrs) | Max Marks |     |       | Credit |
|----------|--------------------|---------------------|---------------|------------------------|-----------|-----|-------|--------|
|          | Question paper cod |                     | hours / cycle |                        | CIA       | ESE | TOTAL |        |
| I        | 12 E               | ENGLISH Paper - I   | 6             | 3                      | 50        | 50  | 100   | 4      |
| II       | 22E                | ENGLISH Paper -II   | 4 + 2         | 3                      | 50        | 50  | 100   | 4      |
| III      | 33 E               | ENGLISH Paper - III | 6             | 3                      | 50        | 50  | 100   | 4      |
| IV       | 43E                | ENGLISH Paper - IV  | 6             | 3                      | 50        | 50  | 100   | 4      |

**QUESTION PAPER PATTERN FOR THE STUDENTS ADMITTED FROM 2025-26 ONWARDS**

| Maximum - 75 marks |                                             |             |                                 |
|--------------------|---------------------------------------------|-------------|---------------------------------|
| SECTION A          | Multiple choice questions with four options | 10 x 1 = 10 | 10 Questions - 2 from each unit |
| SECTION A          | Short answer questions of either / or type  | 5x5= 25     | 5 Questions - 1 from each unit  |
| SECTION A          | Essay-type questions of either /or type     | 5x8=40      | 5 Questions - 1 from each unit  |



**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025**

**BHARATHIAR UNIVERSITY, COIMBATORE – 641046.**

**BOARD OF STUDIES Part II English– MAY 2025**

**NAME OF THE BOARD: Part –II ENGLISH**

**DATE: 09.07.2025**

**FIRST YEAR - SEMESTER ENGLISH- I**

| Course code                                                                                    | 12E                                                               | PART II - ENGLISH - I | L                | T | P          | C |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------|------------------|---|------------|---|
| PART II ENGLISH                                                                                |                                                                   |                       | 4                | 0 | 0          | 4 |
| Pre-requisite                                                                                  | Basic knowledge of English language                               |                       | Syllabus Version |   | 2025- 2026 |   |
| Course Objectives:                                                                             |                                                                   |                       |                  |   |            |   |
| The main objective of this course is to:                                                       |                                                                   |                       |                  |   |            |   |
| 1. Enable the students to communicate effectively and appropriate in day-to day conversations. |                                                                   |                       |                  |   |            |   |
| Expected Course Outcomes:                                                                      |                                                                   |                       |                  |   |            |   |
| On the successful completion of the course, student will be able to:                           |                                                                   |                       |                  |   |            |   |
| 1                                                                                              | To understand basic language skills through listening and reading |                       |                  |   | K1         |   |
| 2                                                                                              | To understand basic English grammar and use effectively           |                       |                  |   | K2, K3     |   |
| 3                                                                                              | To enhance word power to speak and write effectively              |                       |                  |   | K3         |   |
| 4                                                                                              | To improve flawless writing and speaking in day-to-day situations |                       |                  |   | K4         |   |
| 5                                                                                              | To communicate effectively                                        |                       |                  |   | K5         |   |
| K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create                       |                                                                   |                       |                  |   |            |   |

| Unit No. | Unit Title & Text                                                                                                                                                                                                                                                                                   | No. of Periods for the Unit |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>I</b> | <b>SELF-AWARENESS(WHO)&amp;POSITIVE THINKING(UNICEF)</b><br><b>Life Story</b><br>Chapter 1 from Malala Yousafzai, I am Malala<br><br>An Autobiography or The Story of My Experiments with Truth (Chapters 1, 2 & 3)<br>M.K.Gandhi<br><b>Poem</b><br>Where the Mind is Without Fear – Gitanjali 35 – | 20                          |

|            |                                                                                                                                                                                                                                                                                                                                         |    |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|            | Rabindranath Tagore                                                                                                                                                                                                                                                                                                                     |    |
|            | Love Cycle – Chinua Achebe                                                                                                                                                                                                                                                                                                              |    |
| <b>II</b>  | <b>EMPATHY</b><br><b>Poem</b><br>Nine Gold Medals – David Roth<br>Alice Fell or poverty – William Wordsworth<br><b>Short Story</b><br>The School for Sympathy – E.V. Lucas<br>Barn Burning – William Faulkner                                                                                                                           | 20 |
| <b>III</b> | <b>CRITICAL &amp; CREATIVE THINKING</b><br><b>Poem</b><br>The Things That Haven't Been Done Before –Edgar Guest<br>Stopping by Woods on a Snowy Evening –Robert Frost<br><b>Readers Theatre</b><br>The Magic Brocade – A Tale of China<br>Stories on Stage – Aaron Shepard (Three Sideway Stories from Wayside School” by Louis Sachar) | 20 |
| <b>IV</b>  | <b>Part of Speech</b><br>Articles Noun Pronoun Verb Adverb Adjective<br>Preposition                                                                                                                                                                                                                                                     | 15 |
| <b>V</b>   | <b>Paragraph and Essay Writing</b><br>Descriptive<br>Expository<br>Persuasive<br>Narrative<br><b>Reading Comprehension</b>                                                                                                                                                                                                              | 15 |

**Total Number of Hours: 90 Hours**

**Book Prescribed: IMPACT – 1 - GENERAL ENGLISH – 1 (SEMESTER - I)**

**Publisher Name: Cambridge University Press and Assessment, New Delhi. Year of Publication 2024.**

| <b>Course Outcomes</b> |                                                                                  |                |
|------------------------|----------------------------------------------------------------------------------|----------------|
| <b>Course Outcomes</b> | On completion of this course, students will:                                     |                |
| <b>CO1</b>             | Acquire self-awareness and positive thinking required in various life situations | PO1, PO7       |
| <b>CO2</b>             | Acquire the attribute of empathy.                                                | PO1, PO2, PO10 |
| <b>CO3</b>             | Acquire creative and critical thinking abilities.                                | PO4, PO6, PO9  |
| <b>CO4</b>             | Learn basic grammar                                                              | PO4, PO5, PO6  |

|                                                   |                                                                                                                                                                        |          |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>CO5</b>                                        | Development and integrate the use of four language skills i.e., listening, speaking, reading and writing.                                                              | PO3, PO8 |
| <b>Text books for Reference (Latest Editions)</b> |                                                                                                                                                                        |          |
| <b>1.</b>                                         | MalalaYousafzai. I am Malala, Little, Brown and Company, 2013.                                                                                                         |          |
| <b>2.</b>                                         | M.K. Gandhi. An Autobiography or The Story of My Experiments with Truth (Chapter – I), Rupa Publications, 2011.                                                        |          |
| <b>3.</b>                                         | Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings): A Collection of Prose Translations Made by the Author from the Original Bengali. MacMillan, 1913. |          |
| <b>4.</b>                                         | N.Krishnasamy. Modern English: A Book of Grammar, Usage and Composition Macmillan, 1975.                                                                               |          |
| <b>5.</b>                                         | Aaron Shepard. Stories on Stage, ShepardPublications, 2017.                                                                                                            |          |
| <b>6.</b>                                         | J.C. Nesfield. English Grammar Composition and Usage, Macmillan, 2019.                                                                                                 |          |

| <b>Web Resources</b> |                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b>             | MalalaYousafzai. I am Malala (Chapter 1) <a href="https://archive.org/details/i-am-malala">https://archive.org/details/i-am-malala</a>                                                                                                                                                                                                                                                |
| <b>2</b>             | M.K Gandhi. An Autobiography or The Story of My Experiments with Truth(Chapter-1)- Rupa Publication, 2011 <a href="https://www.indiastudychannel.com/resources/146521-Book-Review-An-Autobiography-or-The-story-of-my-experiments-with-Truth.aspx">https://www.indiastudychannel.com/resources/146521-Book-Review-An-Autobiography-or-The-story-of-my-experiments-with-Truth.aspx</a> |
| <b>3</b>             | Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings) <a href="https://www.poetryfoundation.org/poems/45668/gita-njali-35">https://www.poetryfoundation.org/poems/45668/gita njali-35</a>                                                                                                                                                                               |
| <b>4</b>             | Aaron Shepard.Stories on Stage, Shepard Publications, 2017 <a href="https://amzn.eu/d/9rVzlNv">https://amzn.eu/d/9rVzlNv</a>                                                                                                                                                                                                                                                          |
| <b>5</b>             | J C Nesfield. Manual of English Grammar and Composition. <a href="https://archive.org/details/in.ernet.dli.2015.44179">https://archive.org/details/in.ernet.dli.2015.44179</a>                                                                                                                                                                                                        |

| COS | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CO1 | S   | S   | L   | M   | M   | L   | L   | M   | S   | M    |
| CO2 | L   | S   | S   | S   | M   | M   | M   | M   | L   | M    |
| CO3 | M   | S   | S   | M   | S   | S   | M   | L   | M   | M    |
| CO4 | M   | M   | S   | S   | S   | S   | S   | L   | M   | S    |
| CO5 | S   | S   | M   | S   | S   | S   | S   | L   | S   | M    |

\* S - Strong; M - Medium; L - Low

**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025**

**FIRST YEAR – SEMESTER – II - ENGLISH- II**

|                                                                                            |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------|---|-----------|---|
| Course code                                                                                | 22E                                                                                                                                                                                                                                                                                                                                                  | PART II - ENGLISH - II | L                | T | P         | C |
| PART II - ENGLISH II                                                                       |                                                                                                                                                                                                                                                                                                                                                      |                        | 4                | 0 | 0         | 4 |
| Pre-requisite                                                                              | BASIC INTELLIGENCE ON WRITING                                                                                                                                                                                                                                                                                                                        |                        | Syllabus Version |   | 2025-2026 |   |
| Course Objectives:                                                                         |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |
| The main objective of this course is to:                                                   |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |
| 1.To train the students to develop the communication skills and inculcate language skills. |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |
|                                                                                            |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |
| Expected Course Outcomes:                                                                  |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |
| On the successful completion of the course, student will be able to:                       |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |
| 1                                                                                          | Understand basic grammar and enrich word power and language skill<br>Enhance the writing skill of the students to write flawlessly<br>Write paragraphs, emails, letters, opinion pieces and dramatic scripts<br>Enhance understanding various formal and in formal, written and oral communications and respond to them<br>Generate the own writing. |                        |                  |   | K1, K2    |   |
| 2                                                                                          |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   | K3        |   |
| 3                                                                                          |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   | K4        |   |
| 4                                                                                          |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   | K5        |   |
| 5                                                                                          |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   | K6        |   |
| K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create                   |                                                                                                                                                                                                                                                                                                                                                      |                        |                  |   |           |   |

**FIRST YEAR - SEMESTER II - English-II**

| Unit No.  | Unit Title & Text                      | No. of Periods for the Unit |
|-----------|----------------------------------------|-----------------------------|
| <b>I</b>  | <b>RESILIENCE</b>                      | 20                          |
|           | Poem                                   |                             |
|           | Don't Quit – Edgar A. Guest            |                             |
|           | Still Here – Langston Hughes           |                             |
|           | Short Story                            |                             |
|           | Engine Trouble – R.K. Narayan          |                             |
| <b>II</b> | <b>DECISION MAKING</b>                 | 20                          |
|           | Short Story                            |                             |
|           | The Scribe – Kristin Hunter            |                             |
|           | The Lady or the Tiger - Frank Stockton |                             |
|           | Poem                                   |                             |
|           | The Road not Taken – Robert Frost      |                             |



|                            |                                                     |           |
|----------------------------|-----------------------------------------------------|-----------|
| III                        | <b>PROBLEM SOLVING</b>                              | 20        |
|                            | <b>Prose life Story</b>                             |           |
|                            | How I taught My Grandmother to Read – Sudha Murthy  |           |
|                            | <b>Autobiography</b>                                |           |
|                            | How frog Went to Heaven – A Tale of Angolo          |           |
|                            | Wings of Fire (Chapter- 1) by A.P.J Abdul Kalam     |           |
| IV                         | <b>Tenses</b>                                       | 15        |
|                            | Present                                             |           |
|                            | Past                                                |           |
|                            | Future                                              |           |
|                            | Concord                                             |           |
| V                          | <b>English in the Workplace</b>                     | 15        |
|                            | E-mail – Invitation, Enquiry, Seeking Clarification |           |
|                            | Circular                                            |           |
|                            | Minutes of the Meeting                              |           |
| <b>Total Lecture Hours</b> |                                                     | <b>90</b> |

**Book Prescribed: IMPACT – 2 - GENERAL ENGLISH – 2 (SEMESTER - II)**

**Publisher Name: Cambridge University Press and Assessment, New Delhi. Year of Publication 2024.**

| <b>Course Outcomes</b> |                                              |                |
|------------------------|----------------------------------------------|----------------|
| <b>Course Outcomes</b> | On completion of this course, students will; |                |
| <b>CO1</b>             | Realize the importarice of resilience        | PO1, PO7       |
| <b>CO2</b>             | Become good decision-makers                  | PO1, PO2, PO10 |
| <b>CO3</b>             | Imbibe problem-solving skills                | PO4, PO6, PO9  |
| <b>CO4</b>             | Use tenses appropriately                     | PO4, PO5, PO6  |
| <b>CO5</b>             | Use English effectively at the work place.   | PO3, PO8       |

| <b>Textbooks for References (Latest Editions)</b> |                                                                                        |
|---------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>Reference Books</b>                            |                                                                                        |
| 1                                                 | Martin Hewings. Advanced English Grammar. Cambridge University Press, 2000             |
| 2                                                 | SP Bakshi, Richa Sharma. Descriptive English. Arihant Publications (India) Ltd., 2019. |



|    |                                                                                                                  |
|----|------------------------------------------------------------------------------------------------------------------|
| 3. | Sheena Cameron, Louise Dempsey. The Reading Book: A Complete Guide to Teaching Reading. S & L. Publishing, 2019. |
| 4  | Barbara Sherman. Skimming and Scanning Techniques, Liberty University Press, 2014.                               |
| 5. | Phil Chambers. Brilliant Speed Reading: Whatever you need to read, however. Pearson, 2013.                       |
| 6. | Communication Skills: Practical Approach Ed. Shaikh Moula                                                        |
|    | Ramendra Kumar. Stories of Resilience, Blue Rose Publications, 2020.                                             |

#### Web Sources

|   |                                                                                                                                                                          |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Langston Hughes. Still Here<br><a href="https://poetryace.com/im-still-here">https://poetryace.com/im-still-here</a>                                                     |
| 2 | R. K. Narayan. Engine Trouble<br><a href="http://www.sbioaschooltrichy.org/work/Work/images/new/8e.pdf">http://www.sbioaschooltrichy.org/work/Work/images/new/8e.pdf</a> |
| 3 | Washington Irving. Rip Van Winkle<br><a href="https://www.gutenberg.org/files/60976/60976-h/60976-h.htm">https://www.gutenberg.org/files/60976/60976-h/60976-h.htm</a>   |
| 4 | Frank Stockton. The Lady or the Tiger<br><a href="https://www.gutenberg.org/ebooks/396">https://www.gutenberg.org/ebooks/396</a>                                         |

#### Mapping with Programme Outcomes:

| COS | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CO1 | S   | S   | L   | M   | M   | L   | L   | M   | S   | M    |
| CO2 | L   | S   | S   | S   | M   | M   | M   | M   | L   | M    |
| CO3 | M   | S   | S   | M   | S   | S   | M   | L   | M   | M    |
| CO4 | M   | M   | S   | S   | S   | S   | S   | L   | M   | S    |
| CO5 | S   | S   | M   | S   | S   | S   | S   | L   | S   | M    |

\* S - Strong; M - Medium; L - Low



**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025**

**SECOND YEAR- SEMESTER III-ENGLISH - III**

|                                                                          |                                                            |                         |                  |   |            |   |
|--------------------------------------------------------------------------|------------------------------------------------------------|-------------------------|------------------|---|------------|---|
| Course code                                                              | 32E                                                        | PART II - ENGLISH - III | L                | T | P          | C |
| PART II ENGLISH - III                                                    |                                                            |                         | 4                | 0 | 0          | 4 |
| Pre-requisite                                                            | Express Ideas in Simple English                            |                         | Syllabus Version |   | 2025- 2026 |   |
| Course Objectives:                                                       |                                                            |                         |                  |   |            |   |
| The main objective of this course is to:                                 |                                                            |                         |                  |   |            |   |
| 1. To evolve students intellectual, personal and professional abilities  |                                                            |                         |                  |   |            |   |
| 2. To develop interest in reading.                                       |                                                            |                         |                  |   |            |   |
| Expected Course Outcomes:                                                |                                                            |                         |                  |   |            |   |
| On the successful completion of the course, student will be able to:     |                                                            |                         |                  |   |            |   |
| 1                                                                        | Enhance the reading skill of the students                  |                         |                  |   | K1         |   |
| 2                                                                        | Understand the essence of literature.                      |                         |                  |   | K2         |   |
| 3                                                                        | Improve the writing skills and present ideas appropriately |                         |                  |   | K3         |   |
| 4                                                                        | Comprehend and interpret the text.                         |                         |                  |   | K4         |   |
| 5                                                                        | Comment on the literary works efficiently                  |                         |                  |   | K5         |   |
| K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create |                                                            |                         |                  |   |            |   |

**SECOND YEAR - SEMESTER III - English - III**

| <b>Unit No.</b> | <b>Unit Title &amp; Text</b>                                                                                                                                                                                                                                   | <b>No. of Periods for the Unit</b> |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <b>I</b>        | <b>ACTIVE LISTENING</b><br><b>Short Story</b><br>In a Grove – Akutagawa Ryunosuke Translated from Japanese by Takashi Kojima<br>The Gift of the Magi – O’ Henry<br><b>Prose</b><br>Listening – Robin Sharma<br>Nobel Prize Acceptance Speech – Wangari Maathai | 20                                 |

|            |                                                                                                                                                                                                                                               |    |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>II</b>  | <b>INTERPERSONAL RELATIONSHIPS</b><br><b>Prose</b><br>Telephone Conversation – Wole Soyinka<br>Of Friendship – Francis Bacon<br><b>Song on (Motivational/ Narrative)</b><br>Ulysses – Alfred Lord Tennyson<br>And Still I Rise – Maya Angelou | 20 |
| <b>III</b> | <b>COPING WITH STRESS</b><br><b>Poem</b><br>Leisure – W.H. Davies<br>Anxiety Monster – RhonaMcFerran<br><b>Readers Theatre</b><br>The Forty Fortunes: A Tale of Iran<br>Where there is a Will – Mahesh Dattani                                | 20 |
| <b>IV</b>  | <b>Grammar</b><br>Phrasal Verbs & Idioms<br>Modals and Auxiliaries<br>Verb Phrases – Gerund, Participle, Infinitive                                                                                                                           | 15 |
| <b>V</b>   | <b>Composition / Writing Skills</b><br>Official Correspondence – Leave Letter, Letter of Application, Permission Letter<br>Drafting Invitations<br>Brochures for Programmes and Events                                                        | 15 |

**Total Lecture Hours: 90 Hours**

**Book Prescribed: IMPACT – III GENERAL ENGLISH – 3 (SEMESTER - III)**

**Publisher Name: Cambridge University Press and Assessment, New Delhi. Year of Publication 2024.**

| <b>Course Outcomes</b> |                                              |              |
|------------------------|----------------------------------------------|--------------|
| <b>Course Outcomes</b> | On completion of this course, students will; |              |
| <b>CO1</b>             | Listen actively                              | PO1,PO7      |
| <b>CO2</b>             | Develop interpersonal relationship skills    | PO1,PO2,PO10 |
| <b>CO3</b>             | Acquire self-confidence to cope with stress  | PO4,PO6,PO9  |
| <b>CO4</b>             | Master grammar skills                        | PO4,PO5,PO6  |
| <b>CO5</b>             | Carry out business communication effectively | PO3,PO8      |

**Text Books for Reference (Latest Editions)**

|          |                                                                          |
|----------|--------------------------------------------------------------------------|
| <b>1</b> | Wangari Maathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Jul 2023. |
| <b>2</b> | Mahesh Dattani, Where there is a Will. Penguin, 2013.                    |

|   |                                                                            |
|---|----------------------------------------------------------------------------|
| 3 | Martin Hewings, Advanced English Grammar, Cambridge University Press, 2000 |
| 4 | Essential English Grammar by Raymond Murphy                                |

**Web Resources**

|   |                                                                                                                                                                                                                           |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | WangariMaathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Mon. 17 Jul 2023. <a href="https://www.nobelprize.org/prizes/peace/2004/maathai/lecture/">https://www.nobelprize.org/prizes/peace/2004/maathai/lecture/</a> |
| 2 | Telephone Conversation - Wole Soyinka<br><a href="https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html">https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html</a>                                    |
| 3 | Anxiety Monster- RhonaMcFerran-<br><a href="http://www.poetrysoup.com">www.poetrysoup.com</a>                                                                                                                             |

| COS                               | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CO1                               | S   | M   | M   | S   | S   | S   | S   | S   | S   | L    |
| CO2                               | L   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO3                               | M   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO4                               | M   | M   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO5                               | S   | S   | S   | S   | M   | S   | S   | S   | S   | S    |
| * S - Strong; M - Medium; L - Low |     |     |     |     |     |     |     |     |     |      |



**Part II English 2025-26 onwards - Affiliated Colleges - Annexure No.5 SCAA DATED: 09.07.2025****SECOND YEAR - SEMESTER IV – ENGLISH IV**

|                                                                                                                                |                                                                       |                        |                  |   |            |   |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------|------------------|---|------------|---|
| Course code                                                                                                                    | 42E                                                                   | PART II - ENGLISH - IV | L                | T | P          | C |
| PART II ENGLISH - IV                                                                                                           |                                                                       |                        | 4                | 0 | 0          | 4 |
| Pre-requisite                                                                                                                  | Knowledge on Basic English Skills                                     |                        | Syllabus Version |   | 2025- 2026 |   |
| Course Objectives:                                                                                                             |                                                                       |                        |                  |   |            |   |
| The main objective of this course is to:                                                                                       |                                                                       |                        |                  |   |            |   |
| 1. Enable the students to incorporate the language skills (Listening, speaking, reading & writing) in day today conversations. |                                                                       |                        |                  |   |            |   |
| Expected Course Outcomes:                                                                                                      |                                                                       |                        |                  |   |            |   |
| On the successful completion of the course, student will be able to:                                                           |                                                                       |                        |                  |   |            |   |
| 1                                                                                                                              | Understand the literary texts through listening and reading           |                        |                  |   | K1, K2     |   |
| 2                                                                                                                              | Enhance the language skills of the students.                          |                        |                  |   | K3         |   |
| 3                                                                                                                              | Develop the verbal ability & reasoning or influence of language.      |                        |                  |   | K3         |   |
| 4                                                                                                                              | Analyse the texts and appreciate literature with literary competence. |                        |                  |   | K4         |   |
| 5                                                                                                                              | To assess the view of the authors                                     |                        |                  |   | K5         |   |
| K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create                                                       |                                                                       |                        |                  |   |            |   |

| <b>Unit No.</b> | <b>Unit Title &amp; Text</b>                                                                                                                                                                                                           | <b>No. of Periods for the Unit</b> |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <b>I</b>        | <b>GOAL SETTING (UNICEF)</b><br><b>Life Story</b><br>From Chinese Cinderella – Adeline Yen Mah<br>Why I Write - George Orwell<br><br><b>Short Essay</b><br>On Personal Mastery – Robin Sharma<br>On the Love of Life – William Hazlitt | 20                                 |

|            |                                                                                                                                                                                                                                                                    |    |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>II</b>  | <b>INTEGRITY</b><br><b>Short Story</b><br>The Taxi Driver – K.S. Duggal<br>Kabuliwala - Rabindranath Tagore<br>A Retrieved Reformation – O Henry<br><b>Extract from a play</b><br><br>The Quality of Mercy (Trial Scene from the Merchant of Venice - Shakespeare) | 20 |
| <b>III</b> | <b>COPING WITH EMOTIONS</b><br><b>Poem</b><br>Pride – Dahlia Ravikovitch<br>Phenomenal Woman – Maya Angelou<br><b>Reader's Theatre</b><br>The Giant's Wife: A Tall Tale of Ireland – William Carleton<br>The Princess and the God: A Tale of Ancient India         | 20 |
| <b>IV</b>  | <b>Grammar</b><br>Simple Sentences<br>Compound Sentences<br>Complex Sentences<br><br><b>Direct and Indirect Speech</b>                                                                                                                                             | 15 |
| <b>V</b>   | <b>Report Writing</b><br>Narrative Report<br>Newspaper Report<br><br><b>Drafting Speeches</b><br>Welcome Address<br>Vote of Thanks                                                                                                                                 | 15 |

**Total Hours: 90 Hours**

**Book Prescribed: IMPACT – 4 - GENERAL ENGLISH – 4 (SEMESTER - IV)**

**Publisher Name: Cambridge University Press and Assessment, New Delhi.**

**Year of Publication 2025.**

#### **Course Outcomes**

| <b>Course Outcomes</b> | On completion of this course, students will |                |
|------------------------|---------------------------------------------|----------------|
| <b>CO1</b>             | Determine their goals                       | PO1, PO7       |
| <b>CO2</b>             | Identify the value of integrity.            | PO1, PO2, PO10 |
| <b>CO3</b>             | Deal with emotions.                         | PO4, PO6, PO9  |

|            |                                       |               |
|------------|---------------------------------------|---------------|
| <b>CO4</b> | Frame grammatically correct sentences | PO4, PO5, PO6 |
| <b>CO5</b> | Write cohesive reports.               | PO3, PO8      |
|            |                                       |               |

**Text Books for Reference (Latest Editions)**

|           |                                                                   |
|-----------|-------------------------------------------------------------------|
| <b>1</b>  | Oxford Practice Grammar, John Eastwood, Oxford University Press   |
| <b>2</b>  | Cambridge Grammar of English, Ronald Carter and Michael Mc Carthy |
| <b>3.</b> | George Orwell Essays, Penguin Classics                            |

**Web Resources**

|   |                                                                                                                                                                                                                                                                         |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <a href="http://www.gradesaver.com/George-orwell-essays/study/summary">http://www.gradesaver.com/George-orwell-essays/study/summary</a>                                                                                                                                 |
| 2 | O' Henry. A Retrieved Reformation.<br><a href="https://americanenglish.state.gov/files/ae/resource_files/a-retrieved-reformation.pdf">https://americanenglish.state.gov/files/ae/resource_files/a-retrieved-reformation.pdf</a>                                         |
|   | Maya Angelou. Phenomenal Woman.<br><a href="https://www.poetryfoundation.org/poems/48985/phenomenal-woman">https://www.poetryfoundation.org/poems/48985/phenomenal-woman</a>                                                                                            |
| 3 | The Quality of Mercy, <a href="https://poemanalysis.com">https://poemanalysis.com</a>                                                                                                                                                                                   |
| 4 | <a href="https://www.oxfordscholarlyeditions.com/display/10.1093/actrade/9780199235742.book.1/actrade-9780199235742-div1-106">https://www.oxfordscholarlyeditions.com/display/10.1093/actrade/9780199235742.book.1/actrade-9780199235742-div1-106</a> - William Hazlitt |

| COS | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CO1 | L   | M   | M   | S   | S   | S   | S   | S   | S   | L    |
| CO2 | L   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO3 | M   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO4 | M   | M   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO5 | S   | S   | S   | S   | S   | S   | S   | S   | S   | S    |

\* S - Strong; M - Medium; L - Low



## First Semester– Paper I

**Course: French I Course**

Code: Credits: 4

Hours: 72

### Course Objectives:

- Understand and use familiar everyday expressions and basic phrases aimed at the satisfaction of concrete needs.
- Recognize key aspects of Francophone cultures such as greetings, etiquette, daily life, and basic geography of French-speaking countries.
- Write short, simple texts such as postcards, emails, or short descriptions about themselves and their immediate environment.
- Construct simple sentences using correct word order and basic vocabulary.
- Develop sensitivity to cross-cultural differences in communication and social practices.
- Read and understand short, simple texts such as personal messages, advertisements, menus, and schedules.

### Course Outcomes:

On the successful completion of the course, student will be able to

| S.No | CourseOutcome                                                                                                     | BloomsLevel |
|------|-------------------------------------------------------------------------------------------------------------------|-------------|
| CO1  | improve all the four French language skills (speaking, listening, reading, and writing) (Effective communicators) | K1          |
| CO2  | comprehend French and other Francophone nations' cultures and civilizations.                                      | K2          |
| CO3  | comprehend the fundamentals of language structure, vocabulary, grammar, and phonetics (language skill).           | K3          |
| CO4  | The French DELF-A1 Certification is appreciated.                                                                  | K4          |



**Syllabus:**

| <b>Part1-French I</b>                                                                                                         |                                                          |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| <b>Unit No.</b>                                                                                                               | <b>Topics</b>                                            |
| 1                                                                                                                             | BIENVENUE (pg 10-17)<br>Grammaire: pg(122-124)           |
| 2                                                                                                                             | CONTACTS(pg 18-28)<br>Grammaire: pg(125-128)             |
| 3                                                                                                                             | COMMUNICATION pg(29-33)<br>Grammaire: pg(129-130)        |
| 4                                                                                                                             | QU'EST-CE QU'IL FONT pg(34-44)<br>Grammaire: pg(131-136) |
| 5                                                                                                                             | COMMUNICATION pg( 45-49)<br>Grammaire: pg(137-139)       |
| Semester I Portions from Textbook « Nouvelle Génération A1» :<br>UNITÉ 1, UNITÉ 2(Pg 10-49)<br>Cahier d'exercices (Pg122-139) |                                                          |

**Text Book prescribed**

| S.No | Authors                                                    | Title                     | Publishers | Year & Edition |
|------|------------------------------------------------------------|---------------------------|------------|----------------|
| 1    | Luca Giachino,<br>Carla Baracco,<br>Romain Chrétien(DELFL) | Nouvelle Génération<br>A1 | Didier FLE | 2022<br>1 Ed.  |

Book Available at: GOYAL Publishers and Distributors Pvt Ltd, New Delhi (9810322459)

**Books for Reference**

| S.No | Authors                               | Title       | Publishers | Year & Edition |
|------|---------------------------------------|-------------|------------|----------------|
| 1.   | Nathalie Hirschsprung,<br>Tony Tricot | COSMOPOLITE | Hachette   | 2017<br>1 Ed.  |

**Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.,)**

| S.No | Related Online Contents                                                                                                                                                                                                                |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | FUN MOOC Online course VIVRE EN France A1 Cours de français Alliance de français de Paris<br><br>SWAYAM ONLINE COURSE BFLI -001- PARLER DE SOI/ BFLI-002 : FRENCH Échanger / Interactions (French) BY DR. DEEPANWITA SRIVATSAVA, IGNOU |

## Second Semester–Paper II

### Course: French II

Course Code: Credits: 4

Hours: 72

#### Course Objectives:

- Understand and use familiar everyday expressions and basic phrases aimed at the satisfaction of concrete needs.
- Recognize key aspects of Francophone cultures such as greetings, etiquette, daily life, and basic geography of French-speaking countries.
- Write short, simple texts such as postcards, emails, or short descriptions about themselves and their immediate environment.
- Construct simple sentences using correct word order and basic vocabulary.
- Develop sensitivity to cross-cultural differences in communication and social practices.
- Read and understand short, simple texts such as personal messages, advertisements, menus, and schedules.

#### Course Outcomes:

On the successful completion of the course, student will be able to

| S.No | Course Outcome                                                                                                    | Knowledge Level |
|------|-------------------------------------------------------------------------------------------------------------------|-----------------|
| CO1  | improve all the four French language skills (speaking, listening, reading, and writing) (Effective communicators) | K1              |
| CO2  | comprehend French and other Francophone nations' cultures and civilizations.                                      | K2              |
| CO3  | comprehend the fundamentals of language structure, vocabulary, grammar, and phonetics (language skill).           | K3              |
| CO4  | The French DELF-A1 Certification is appreciated.                                                                  | K4              |

**Syllabus:**

| <b>Part I-French II</b>                                                                                                        |                                                          |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| <b>Unit No.</b>                                                                                                                | <b>Topics</b>                                            |
| 1                                                                                                                              | PORTRAITS(pg 50-60)<br>Grammaire: pg(140-144)            |
| 2                                                                                                                              | COMMUNICATION(pg 61-65)<br>Grammaire: pg(145-146)        |
| 3                                                                                                                              | TEMPS LIBRE(pg 66-68)<br>Grammaire: pg(147)              |
| 4                                                                                                                              | MOTS ET EXPRESSIONS((pg 69-76)<br>Grammaire: pg(148-151) |
| 5                                                                                                                              | COMMUNICATION(pg 77-81)<br>Grammaire: pg(152-155)        |
| Semester II Portions from Textbook « Nouvelle Génération A1» :<br>UNITÉ 3, UNITÉ 4(Pg 50-81)<br>Cahier d'exercices (Pg140-155) |                                                          |

**Text Book prescribed**

| S.No | Authors                                                    | Title                     | Publishers | Year & Edition |
|------|------------------------------------------------------------|---------------------------|------------|----------------|
| 1    | Luca Giachino,<br>Carla Baracco,<br>Romain Chrétien(DELFL) | Nouvelle Génération<br>A1 | Didier FLE | 2022<br>1 Ed.  |

Book Available at: GOYAL Publishers and Distributors Pvt Ltd, New Delhi (9810322459)

**Books for Reference**

| S.No | Authors                               | Title       | Publishers | Year & Edition |
|------|---------------------------------------|-------------|------------|----------------|
| 1.   | Nathalie Hirschsprung,<br>Tony Tricot | COSMOPOLITE | Hachette   | 2017<br>1 Ed.  |

**Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.,)**

| S.No | Related Online Contents                                                                                                                                                                                                                |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | FUN MOOC Online course VIVRE EN France A1 Cours de français Alliance de français de Paris<br><br>SWAYAM ONLINE COURSE BFLI -001- PARLER DE SOI/ BFLI-002 : FRENCH Échanger / Interactions (French) BY DR. DEEPANWITA SRIVATSAVA, IGNOU |

## Third Semester–Paper III

### Course: French III

Course Code:

Credits: 4

Hours: 72

### Course Objectives:

- Understand and use familiar everyday expressions and basic phrases aimed at the satisfaction of concrete needs.
- Recognize key aspects of Francophone cultures such as greetings, etiquette, daily life, and basic geography of French-speaking countries.
- Write short, simple texts such as postcards, emails, or short descriptions about themselves and their immediate environment.
- Construct simple sentences using correct word order and basic vocabulary.
- Develop sensitivity to cross-cultural differences in communication and social practices.
- Read and understand short, simple texts such as personal messages, advertisements, menus, and schedules.

### Course Outcomes:

On the successful completion of the course, student will be able to

| S.No | Course Outcome                                                                                                    | Knowledge Level |
|------|-------------------------------------------------------------------------------------------------------------------|-----------------|
| CO1  | improve all the four French language skills (speaking, listening, reading, and writing) (Effective communicators) | K1              |
| CO2  | comprehend French and other Francophone nations' cultures and civilizations.                                      | K2              |
| CO3  | comprehend the fundamentals of language structure, vocabulary, grammar, and phonetics (language skill).           | K3              |
| CO4  | The French DELF-A1 Certification is appreciated.                                                                  | K4              |

**Syllabus:**

| <b>Part I-French III</b>                                                                                                         |                                                           |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| <b>Unit No.</b>                                                                                                                  | <b>Topics</b>                                             |
| 1                                                                                                                                | VENDRE ET ACHETER(pg 82-92)<br>Grammaire: pg(156-160)     |
| 2                                                                                                                                | COMMUNICATION(pg 93-97)<br>Grammaire: pg(161-162)         |
| 3                                                                                                                                | TOUT LE MONDE S'AMUSE(pg 98-100)<br>Grammaire: pg(163)    |
| 4                                                                                                                                | MOTS ET EXPRESSIONS(pg 101-107)<br>Grammaire: pg(164-167) |
| 5                                                                                                                                | COMMUNICATION(pg 108-120)<br>Grammaire: pg(168-171)       |
| Semester III Portions from Textbook « Nouvelle Génération A1» :<br>UNITÉ 5, UNITÉ 6(Pg 82-120)<br>Cahier d'exercices (Pg156-171) |                                                           |

### Text Book prescribed

| S.No | Authors                                                   | Title                     | Publishers | Year & Edition |
|------|-----------------------------------------------------------|---------------------------|------------|----------------|
| 1    | Luca Giachino,<br>Carla Baracco,<br>Romain Chrétien(DELF) | Nouvelle Génération<br>A1 | Didier FLE | 2022<br>1 Ed.  |

Book Available at: GOYAL Publishers and Distributors Pvt Ltd, New Delhi (9810322459)

### Books for Reference

| S.No | Authors                               | Title       | Publishers | Year & Edition |
|------|---------------------------------------|-------------|------------|----------------|
| 1.   | Nathalie Hirschsprung,<br>Tony Tricot | COSMOPOLITE | Hachette   | 2017<br>1 Ed.  |

### Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.,)

| S.No | Related Online Contents                                                                                                                                                                                                                |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | FUN MOOC Online course VIVRE EN France A1 Cours de français Alliance de français de Paris<br><br>SWAYAM ONLINE COURSE BFLI -001- PARLER DE SOI/ BFLI-002 : FRENCH Échanger / Interactions (French) BY DR. DEEPANWITA SRIVATSAVA, IGNOU |



## Fourth Semester–Paper IV

### Course: French IV

Course Code:

Credits: 4

Hours: 72

### Course Objectives:

- Understand and use familiar everyday expressions and basic phrases aimed at the satisfaction of concrete needs.
- Introduce themselves and others, and ask and answer questions about personal details such as name, age, nationality, family, and daily routines.
- Recognize key aspects of Francophone cultures such as greetings, etiquette, daily life, and basic geography of French-speaking countries.
- Write short, simple texts such as postcards, emails, or short descriptions about themselves and their immediate environment.
- Construct simple sentences using correct word order and basic vocabulary.
- Develop sensitivity to cross-cultural differences in communication and social practices.
- Read and understand short, simple texts such as personal messages, advertisements, menus, and schedules.

### Course Outcomes:

On the successful completion of the course, student will be able to

| S.No | Course Outcome                                                                                                    | Knowledge Level |
|------|-------------------------------------------------------------------------------------------------------------------|-----------------|
| CO1  | improve all the four French language skills (speaking, listening, reading, and writing) (Effective communicators) | K1              |
| CO2  | comprehend French and other Francophone nations' cultures and civilizations.                                      | K2              |
| CO3  | comprehend the fundamentals of language structure, vocabulary, grammar, and phonetics (language skill).           | K3              |
| CO4  | The French DELF-A1 Certification is appreciated.                                                                  | K4              |

**Syllabus:**

| <b>Part I-French IV</b>                                                                                                          |                                                   |
|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| <b>Unit No.</b>                                                                                                                  | <b>Topics</b>                                     |
| 1                                                                                                                                | BIEN VENUE (pg 11-14)<br>Grammaire: pg(121-122)   |
| 2                                                                                                                                | EN VILLE (pg 15-25)<br>Grammaire: pg(123-127)     |
| 3                                                                                                                                | COMMUNICATION(pg 26-29)<br>Grammaire: pg(128)     |
| 4                                                                                                                                | EN VOYAGE (pg 31-40)<br>Grammaire: pg(129-133)    |
| 5                                                                                                                                | COMMUNICATION(pg 41-46)<br>Grammaire: pg(134-137) |
| Semester IV Portions from Textbook « Nouvelle Génération A2» :<br>UNITÉ 1, UNITÉ 2 (Pg 11- 46)<br>Cahier d'exercices (Pg121-137) |                                                   |

### Text Book prescribed

| S.No | Authors                                                   | Title                     | Publishers | Year & Edition |
|------|-----------------------------------------------------------|---------------------------|------------|----------------|
| 1    | Luca Giachino,<br>Carla Baracco,<br>Romain Chrétien(DELF) | Nouvelle Génération<br>A2 | Didier FLE | 2022<br>1 Ed.  |

Book Available at: GOYAL Publishers and Distributors Pvt Ltd, New Delhi (9810322459)

### Books for Reference

| S.No | Authors                               | Title       | Publishers | Year & Edition |
|------|---------------------------------------|-------------|------------|----------------|
| 1.   | Nathalie Hirschsprung,<br>Tony Tricot | COSMOPOLITE | Hachette   | 2017<br>1 Ed.  |

### Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.,)

| S.No | Related Online Contents                                                                                                                                                                                                                |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | FUN MOOC Online course VIVRE EN France A1 Cours de français Alliance de français de Paris<br><br>SWAYAM ONLINE COURSE BFLI -001- PARLER DE SOI/ BFLI-002 : FRENCH Échanger / Interactions (French) BY DR. DEEPANWITA SRIVATSAVA, IGNOU |

**BHARATHIAR UNIVERSITY: COIMBATORE – 641 046**  
**Part I – Hindi**  
**For Under-graduate Degree Programme**  
**(For the students admitted during 2025-2026 onwards)**

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**Programme Educational Objectives (PEO)**  
**Undergraduate Programme of Part I Hindi will be**

**PROGRAMME OUTCOME (PEO) :**

- **PO1:** Basic knowledge of Hindi language will be improved.
- **PO2:** Knowledge of glossaries will increase.
- **PO3:** Hindi language expression will rise.
- **PO4:** Learners will enrich their grammar in Hindi.
- **PO5:** The desire to read literature, such as a story or a poem, develops.
- **PO6:** Knowledge such as reading, understanding and critique of literature will improve
- **PO7:** The knowledge of expressing one's opinion in Hindi will improve.
- **PO8:** Communication knowledge will increase.
- **PO9:** Develop a skill in translation.
- **PO10:** They will learn more about our Indian Culture and the values of Human being.

**PROGRAM SPECIFIC OUTCOME (PSO):**

**PSO1:** Develop an interest in the appreciation of literature.

**PSO2:** Discuss and respond to content of a reading passage.

**PSO3:** Learning the literary knowledge of Hindi specially reading and writing .

**PSO4:** Learning the literary knowledge specially reading and understanding of Hindi short Stories

**PSO5:** Learning the history of Hindi literature.

**PSO6:** The ability to translate from Hindi to English and from English to Hindi will be improved.

**PSO7:** Develop a skill in spoken Hindi.

|                      |            |                             |                         |          |          |                |
|----------------------|------------|-----------------------------|-------------------------|----------|----------|----------------|
| <b>Course code</b>   | <b>HD1</b> | <b>PART I HINDI PAPER I</b> | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b>       |
| <b>PART - I</b>      |            | <b>PART I</b>               | <b>3</b>                | <b>-</b> | <b>-</b> | <b>3</b>       |
| <b>Pre-requisite</b> |            |                             | <b>Syllabus Version</b> |          |          | <b>2025-26</b> |

- **COURSE OBJECTIVE:**

- Improves grammatical knowledge
- Will continue to read and learn about articles and think about them
- It is possible to read and understand short stories and understand the thoughts and life of the people of this country
- Translation knowledge and the ability to read and analyze a message are also gained

| <b>Unit</b> | <b>PART I HINDI PAPER I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Hrs</b> |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>I</b>    | <b>PROSE : BHARTHI GADYA SANGRAH</b><br><br>1.Sanskurthi hai kya? (Lalith nibandh)- Ramdhari singh Dinkar<br>2. Voh cheeni Bhayi (Rekha chitra) – Mahadevi varma<br>3. Badthe shor ka gahratha sankat (pradoshan)<br>- Rajendrakumr ray & Ravindra Varma<br>4. Ghar Loutthe huye – (Athma katha) – Harivamshraai Bacchan<br>5. Paramanu urja evam khadya padarth samrakshan (vaigyanik lek)-<br>Parmaanuu urja vibhag ( Bharth sarkar)<br>6. Cinema (film) – Manmohan Chdda | <b>18</b>  |
| <b>II</b>   | <b>NON DETAILED TEXT SHORT STORIES: AAT KAHANIYAN</b><br><br>1. Vrath-bang                                 – Jayashankar Prasad<br>2. Sath gathi                                 - Premchand<br>3. parda                                         - Yespal<br>4. Apna apna bhagya                     - Jaynendrakumar<br>5. Bhammarakshas ka shishya         - Mukthibhodh<br>6. Dana-bhusa                              - Markandeya                                       | <b>18</b>  |
| <b>III</b>  | <b>GRAMMAR : SHABDHA VICHAR ONLY</b><br>(NOUN, PRONOUN, ADJECTIVE, VERB, TENSE, CASE ENDINGS)<br>Theoretical & Applied.                                                                                                                                                                                                                                                                                                                                                     | <b>14</b>  |
| <b>IV</b>   | <b>TRANSLATION : English – Hindi only.</b><br>ANUVADH ABHYAS – III (1-15 lessons only)                                                                                                                                                                                                                                                                                                                                                                                      | <b>12</b>  |
| <b>V</b>    | <b>COMPREHENSION:</b><br>1 Passage from ANUVADH ABHYAS–III (16-30)                                                                                                                                                                                                                                                                                                                                                                                                          | <b>10</b>  |
|             | <b>TOTAL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>72</b>  |

**Teaching methods:**

Lecturing, Assignment, Group Discussion, Quiz, Group Activity. PowerPoint Projection through LCD

**Text Book:**

Bharathi gadya sangrah, editor : Madhudhavan, publisher : Vani prakashan,  
4697/5, Daryaganj, New Delhi – 110002.

Aatt Kahaniyan, Editor : Dr. H.R. Mihir, Publisher : Jaya bharthi prakashan, 267 B, Maya  
press Road, Allahabad–211 003

**Reference Books:**

NAVEENHINDI Vyakaran, 2002, Dakshin Bharat Hindi Prachar Sabha, Chennai–600017

**Web Link:**

<https://hi.wikipedia.org/wiki/https://en.wikipedia.org/wiki/Premchandhttp://hindigrammar.in/>

| S.No | COURSE OUTCOME                                                            |
|------|---------------------------------------------------------------------------|
| CO1  | Understand the text styles and grammatical elements                       |
| CO2  | Discuss the content of a reading passage                                  |
| CO3  | Develop an interest in the appreciation of short stories                  |
| CO4  | Comprehend the grammatical structures and sentence making                 |
| CO5  | Understand the language and developing English to Hindi translation skill |

| Mapping with Programme Outcomes |     |     |     |     |     |     |     |     |     |      |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| COs                             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1                             | S   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO3                             | M   | S   | S   | M   | S   | M   | S   | S   | M   | S    |
| CO3                             | S   | M   | M   | M   | M   | S   | S   | M   | S   | M    |
| CO4                             | L   | S   | L   | S   | L   | S   | L   | M   | M   | M    |
| CO5                             | S   | S   | M   | M   | S   | M   | L   | L   | L   | L    |

|                 |                                    |
|-----------------|------------------------------------|
| COURSE PREPARED | Dr.S.S.Resmi resmivijay6@gmail.com |
|-----------------|------------------------------------|

**SECOND SEMESTER – HINDI - PAPER II**

| Course code          | HD2 | HINDI PAPER II | L                       | T | P              | C        |
|----------------------|-----|----------------|-------------------------|---|----------------|----------|
| <b>PART - I</b>      |     | PART I         | <b>3</b>                | - | -              | <b>3</b> |
| <b>Pre-requisite</b> |     |                | <b>Syllabus Version</b> |   | <b>2025-26</b> |          |

● **COURSE OBJECTIVE:**

- A basic understanding of contemporary poetry can be gained and the nature of modern poetry can be realized.
- Realizing the nature of drama and its nature and improving the knowledge of reading and understanding the nature of contemporary plays.
- Understands the benefits of correspondence and can enhance the correspondence you need.
- Translation is especially useful for translating from Hindi to English

| Unit No    | PART I - HINDI II                                                                                                                                                                                                                                                    | Hours     |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>I</b>   | <b>MODERN POETRY : KAVYA PARASAR</b><br>1. Niyam – Kedarnath Singh<br>2. Ladki aur andha aadhmi – Manglesh Dablar<br>3. Daily Passenger – Arun kamal<br>4. Thodi si jagah – Rajesh joshi<br>5. Haddy Khopdi Khatra nishan – Veeren Dangvala<br>6. Bejghah – Anaamika | <b>18</b> |
| <b>II</b>  | <b>ONE ACT PLAY: SONE KI VARSHA</b><br>1. Sitha – Dvijendarlal rai<br>2. Parivartan - Ke Aiyanaar<br>3. Apoorva Thyag - Balashaur reddy<br>4. Sone ki varsha - Dayavathi Bhardhvaj<br>5. Sachcha Insaf - Avadh Nandan                                                | <b>18</b> |
| <b>III</b> | <b>LETTER WRITING</b><br>(Leave Letter, Job Application, Ordering Books, Letter to Publisher, Personal Letter)                                                                                                                                                       | <b>10</b> |
| <b>IV</b>  | <b>CONVERSATION:</b><br>(Doctor & Patient, Teacher & Student, Storekeeper & Buyer, Two Friends, Booking Clerk & Passenger at Railway Station, Auto rickshaw driver and Passenger)Ref : Bolchal Ki Hindi Aur Sanchar by Dr. Madhu Dhavan Vani Prakashan, New Delhi.   | <b>12</b> |
| <b>V</b>   | <b>TRANSLATION: HINDI-ENGLISH ONLY</b> Lessons – 1-15 only<br><b>ANUVADH ABYAS-III</b>                                                                                                                                                                               | <b>14</b> |
|            | <b>TOTAL</b>                                                                                                                                                                                                                                                         | <b>72</b> |

**Teaching methods:**

Lecturing,Assignment,GroupDiscussion,Quiz,GroupActivity.PowerPointProjection through LCD

**Text Book:**

Kavya Parasar, Dr.Bolanath, Jawahar Pusthakalay, Sadar Bazaar,Mathura-U.P.281001.

Sone ki Varsha- Dakshin Bharat Hindi Prachar Sabha, Chennai – 600 017

**Reference Books:**

BolchalKiHindiAurSanchar,2015,Dr.MadhuDhavanVaniPrakashan, NewDelhi.

**Web Link:**

<https://hi.wikipedia.org/wiki/https://en.wikipedia.org/wiki/Premchandhttp://hindigrammar.in/>

| S.No | PROGRAMME OUTCOME                                                       |
|------|-------------------------------------------------------------------------|
| CO1  | Get a basic understanding of renewal poetry and the essence of the poem |
| CO2  | It is possible to understand the genre of Drama                         |
| CO3  | Translating skill improved specially from English to Hindi              |
| CO4  | Knowledge is gained by using phrases and idioms                         |
| CO5  | Learners can express opinion in small sentences                         |

| Mapping with Programme Outcomes |     |     |     |     |     |     |     |     |     |      |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| COs                             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1                             | S   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO3                             | M   | S   | S   | M   | S   | S   | S   | S   | M   | S    |
| CO3                             | S   | M   | M   | M   | M   | S   | S   | M   | S   | M    |
| CO4                             | L   | S   | L   | S   | L   | S   | L   | M   | M   | M    |
| CO5                             | S   | S   | M   | S   | L   | S   | S   | S   | S   | S    |

|                 |                                    |
|-----------------|------------------------------------|
| COURSE PREPARED | Dr.S.S.Resmi resmivijay6@gmail.com |
|-----------------|------------------------------------|



**THIRD SEMESTER - HINDI - PAPER III**

| Course code          | HD3 | HINDI - PAPER III | L                       | T        | P        | C              |
|----------------------|-----|-------------------|-------------------------|----------|----------|----------------|
| <b>PART - I</b>      |     | PART I            | <b>3</b>                | <b>-</b> | <b>-</b> | <b>3</b>       |
| <b>Pre-requisite</b> |     |                   | <b>Syllabus Version</b> |          |          | <b>2025-26</b> |

● **COURSE OBJECTIVE:**

- May have knowledge of the contents of primitive poetry
- Learn about contemporary poetry and its techniques.
- Interest in reading poetry and the ability to express social thoughts will improve
- This will help you to understand the basics of Hindi literature and to understand Hindi literature properly
- Knowledge of the elements of poetry and the knowledge of subtle translation will improve.

| Unit No    | PART I - HINDI III                                                                                                                                                                                                                                                                                                                                                                                     | Hours     |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>I</b>   | <b>POETRY:KAVYA THARANG – by Dr. NIRANJAN PRACHEEN KAVITHA</b><br>1. MAHATMA KABEER – Sakhi & Padh (2)<br>2. GOSWAMY TULSIDAS – Pad(4)<br>3. MAHATMA SOORDAS- Pad(3)<br>4. KAVIVAR RAHIM – DOHE(6)                                                                                                                                                                                                     | <b>18</b> |
| <b>II</b>  | <b>MODERN POETRY : KAVYA THARANG- by Dr. NIRANJAN</b><br>1. Nirjar – Mythili sharan gupth<br>2. Parichay – Ramdhari singh Dinkar<br>3. Prethibimb – Sumithra nandan Panth<br>4. Kavi kaha ththa – Sooryakanth Tripathi Nirala<br>5. Kah de mam Kya ab dekhoon – Mahadevi varma<br>6. Kanu ke prathi – Darmveer Bharathi<br>7. Loha ka swad – Dhumil<br>8. Bhanth Kidikkiyon ki Takrahat – Gorakh pande | <b>18</b> |
| <b>III</b> | <b>HISTORY OF HINDI LITERATURE :(TIPPANIYAN)</b><br>1.Bhakthi kal ka samanya parichaya<br>(Kabeer, Jaysi, Soor, Thulsi, Meera, Raskhan, Rahim)                                                                                                                                                                                                                                                         | <b>10</b> |
| <b>IV</b>  | <b>Ras Chad &amp; ALANKAR:</b><br>1.Srungar & veer Ras<br>2. ANUPRAS & Upama<br>3. Dhoha & Rola                                                                                                                                                                                                                                                                                                        | <b>12</b> |
| <b>V</b>   | <b>TRANSLATION : ENGLISH-HINDI only</b><br><b>ANUVADH ABHYAS – III</b><br>(16-30 Lessons only)                                                                                                                                                                                                                                                                                                         | <b>14</b> |
|            | <b>TOTAL</b>                                                                                                                                                                                                                                                                                                                                                                                           | <b>72</b> |

**Teaching methods:**

Lecturing,Assignment,GroupDiscussion,Quiz,GroupActivity.PowerPointProjection through LCD

**Text Book:**

Kavya Tharang – by Dr. NIRANJAN, Jawahar Pusthakalay, Sadar Bazaar, Mathura-  
U.P.281001.

Anuvadh abyas-III, Dakshin Bharath Hindi Prachar Sabha Chennai – 17.

**Reference Books:**

Hindi sahithya ka saral ithihaas, by Rajnath sharma, vinod pustak mandir, agra-282

Kavya Pradeep Rambadri Shukla, Hindi Bhavan, 36, Tagore Town, Allahabad – 211 002.

**Web Link:**

<https://hi.wikipedia.org/wiki/https://en.wikipedia.org/wiki/Premchand>

| S.No | COURSE OUTCOME                                              |
|------|-------------------------------------------------------------|
| CO1  | Get a basic knowledge of the history of Hindi literature.   |
| CO2  | Enhances the art and taste of Hindi literary works          |
| CO3  | Literary genres can be learned                              |
| CO4  | Create an interest to read and enjoy Hindi poetry           |
| CO5  | Get the basic Knowledge of poetry techniques like Anlankar. |

| Mapping with Programme Outcomes |     |     |     |     |     |     |     |     |     |      |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| COs                             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1                             | S   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO2                             | M   | S   | S   | M   | S   | S   | S   | S   | M   | S    |
| CO3                             | S   | S   | M   | S   | L   | S   | S   | S   | S   | S    |
| CO4                             | M   | S   | S   | M   | S   | S   | S   | S   | M   | S    |
| CO5                             | S   | M   | M   | M   | M   | S   | S   | L   | S   | L    |

|                 |                                    |
|-----------------|------------------------------------|
| COURSE PREPARED | Dr.S.S.Resmi resmivijay6@gmail.com |
|-----------------|------------------------------------|

**FOURTH SEMESTER-HINDI –PAPER-IV**

| Course code          | HD4 | HINDI PAPER IV | L                       | T        | P        | C              |
|----------------------|-----|----------------|-------------------------|----------|----------|----------------|
| <b>PART - I</b>      |     | PART I         | <b>3</b>                | <b>-</b> | <b>-</b> | <b>3</b>       |
| <b>Pre-requisite</b> |     |                | <b>Syllabus Version</b> |          |          | <b>2025-26</b> |

- **COURSE OBJECTIVE:**
- Knowledge of contemporary drama contents of Hindi literature
- Learn novels and its techniques. The ability to read novels and express criticism about it and the ability to express social thoughts will improve
- There will also be litigation messages in Hindi and news on speech techniques
- Able to write articles on their own and improve their translation skills.

| Unit No.   | PART I - HINDI IV                                                                                | Hours     |
|------------|--------------------------------------------------------------------------------------------------|-----------|
| <b>I</b>   | <b>DRAMA: Aashad ka ek din By Mohan Rakesh</b>                                                   | <b>18</b> |
| <b>II</b>  | <b>NOVEL : GABAN – Premchand</b>                                                                 | <b>18</b> |
| <b>III</b> | <b>LOKKOTHI &amp; MUHAVARE - NAVEEN HINDI VYAKARAN</b><br>(Selected Lokkokthi -10 & Muhavare-10) | <b>10</b> |
| <b>IV</b>  | <b>GENERAL ESSAY : AADARSH NIBANDH</b>                                                           | <b>12</b> |
| <b>V</b>   | <b>TRANSLATION : HINDI-ENGLISH only</b><br><b>ANUVADH ABHYAS – III</b><br>(16-30 Lessons only)   | <b>14</b> |
|            | <b>TOTAL</b>                                                                                     | <b>72</b> |

**Teaching methods:**

Lecturing, Assignment, Group Discussion, Quiz, Group Activity. Power Point Projection through LCD

**Text Book:**

Aashad ka ek din –Drama- Mohan Rakesh, Publisher : Rajpal & sons Kashmeeri gate Delhi– 110006.

Gaban –Novel- Premchand, 2015, Rajkamal Prakashan, 1B Nethaji Subash Marg, New Delhi.

**Reference Books:**

|                                                                                    |
|------------------------------------------------------------------------------------|
| Hindi sahithya ka saral ithihaas,by rajnath sharma, vinod pustak mandir,Agra-282   |
| Kavya Pradeep Rambadri Shukla, Hindi Bhavan, 36, Tagore Town, Allahabad – 211 002. |

**Web Link:**

|                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="https://hi.wikipedia.org/wiki/https://en.wikipedia.org/wiki/Premchand">https://hi.wikipedia.org/wiki/https://en.wikipedia.org/wiki/Premchand</a><br><a href="http://www.hindisamay.com/content/259">http://www.hindisamay.com/content/259</a><br><a href="https://www.hindisamay.com/content/1050/2">https://www.hindisamay.com/content/1050/2</a> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| S.No | COURSE OUTCOME                                                    |
|------|-------------------------------------------------------------------|
| CO1  | Get a basic knowledge of drama                                    |
| CO2  | Can read and critique novels                                      |
| CO3  | Creat the interested in art literature courses                    |
| CO4  | The hope of writing an essay in genaral topic                     |
| CO5  | The idea of creating new works and critique knoledge will improve |

| Mapping with Programme Outcomes |     |     |     |     |     |     |     |     |     |      |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| COs                             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1                             | S   | S   | S   | S   | S   | S   | S   | S   | S   | S    |
| CO2                             | M   | S   | S   | M   | S   | S   | S   | S   | M   | S    |
| CO3                             | S   | S   | M   | S   | L   | S   | S   | S   | S   | S    |
| CO4                             | M   | S   | S   | M   | S   | S   | S   | S   | M   | S    |
| CO5                             | S   | M   | M   | M   | M   | S   | S   | L   | S   | L    |

|                    |                                       |
|--------------------|---------------------------------------|
| COURSE<br>PREPARED | Dr.S.S.RESMI<br>resmivijay6@gmail.com |
|--------------------|---------------------------------------|

**BHARATHIAR UNIVERSITY : COIMBATORE – 641 046**  
**(For the students admitted during 2020-2021 onwards)**  
**QUESTION PAPER PATTERN**  
**FIRST SEMESTER HINDI -PAPER-I**  
**(Maximum Marks 75)**

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**SECTION – A (10 x 1 = 10)**  
**Multiple Choice Questions**

**Multiple Choice Questions :**

5 Questions from Prose Text

5 Questions from non-detailed text (Multiple Choice Questions)

**SECTION – B (5 x 5 = 25)**  
**(either / or pattern)**

Two annotations from Prose text only. (Either / or Pattern)

Two Short note from non-detailed (Either / or Pattern)

Applied Grammar – 5 Questions (Sentences)

(Gender, Number, Tense, Verb, Error Corrections)

**SECTION – C (5 x 8 = 40)**  
**(Either or pattern)**

1. One Essay from Prose

2. One Essay from non-detailed text.

3. One Essay from Grammar (Theoretical)

4. Comprehension passage with 4 Questions

5. One passage – English to Hindi Translation

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**SECOND SEMESTER - HINDI-PAPER-II**  
**(Maximum Marks 75)**

---

**SECTION – A (10 x 1 = 10)**  
**Multiple Choice Questions**

5 Questions from Modern Poetry

5 Questions from One Act Play

**SECTION – B**  
**(5 x 5 = 25)**  
**(either / or**  
**pattern)**

Two annotations from Poetry

Three Short answers from One Act Play

**SECTION – C (5 x 8 = 40)**  
**(Either or pattern)**

One Essay from Poetry

One Essay from One Act Play

One Letter writing

One Conversation

One passage – Hindi to English Translation

**QUESTION PAPER PATTERN**  
**THIRD SEMESTER - HINDI-PAPER-III**  
**(Maximum Marks 75)**

---

**SECTION – A (10 x 1 = 10)**  
**Multiple Choice Questions**

- 5 Questions from Old Poetry
- 5 Questions from History of Hindi Literature

**SECTION – B (5 x 5 = 25)**  
**(either / or pattern)**

- 1 Annotation from Ancient Poetry.
- 1 Annotation from Modern & Contemporary Poetry
- 1 Short note from Ras
- 1 Short note from Chand
- 1 Short note from Alankar

**SECTION – C (5 x 8 = 40)**  
**(Either or pattern)**

- One essay from Ancient Poetry
  - One Essay from Modern Poetry
  - One Essay from History of Hindi Literature
  - One short note (poet and literature)
  - One passage – English to Hindi Translation
- 

**FORTH SEMESTER PAPER-IV**  
**(Maximum Marks 75)**

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**SECTION – A (10 x 1 = 10)**  
**Multiple Choice Questions**

- 5 Questions from Drama
- 5 Questions from Novel

**SECTION – B (5 x 5 = 25)**  
**(either / or pattern)**

- TWO Short Notes from Drama.
- ONE short notes from Novel.
- ONE short notes Lokokthi
- ONE short notes Muhavre

**SECTION – C (5 x 8 = 40)**  
**(Either or pattern)**

- One essay from drama.
- Two essays from novel
- One General essay.
- One passage – Hindi to English Translation

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Programme:</b>          | <b>B.A./B.Sc./B.COMM/BBA, Degree Courses</b>                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Duration:</b>           | <b>Only in Four Semesters</b>                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Programme Outcomes:</b> | <ol style="list-style-type: none"><li>1. To produce competent students, academicians, and writers in the field of Kannada Language and Literature.</li><li>2. To provide the brief vision of the historical development and the evolution of the sensibility in Kannada</li><li>3. To understand the compositional analysis in Kannada writings.</li><li>4. To attract more students in Kannada Literature study.</li></ol> |



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>5. To enable them to write for media</p> <p><b>PSO 1 (PSE =PROGRAMME SPECIFIC OUTCOMES)</b><br/>The students are to ensure the up-to-date level of understanding the concepts of basics in Kannada Language and Literature.</p> <p><b>PSO 2</b><br/>The Students are to ensure the competence and performance in Kannada Language.</p> <p><b>PSO 3</b><br/>The Students are to ensure the style variations and new trends in Kannada Literature.</p> <p><b>PSO 4</b><br/>An overview of world Literature from the perceptive of Kannada Literature.</p> <p><b>PSO 5</b><br/>To generalize social mobility in terms of literary sensibility.</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|





### KANNADA – UG - Syllabus

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Programme Specific Outcomes:</b> | <p>After the successful completion of the course the students are expected to do the following:</p> <ul style="list-style-type: none"><li>• To implement the grammatical and linguistic competence in accordance with the context and text.</li><li>• To be more curious about study the further development in Kannada Language and Literature.</li><li>• To do higher studies in Kannada Language and Literature.</li><li>• To enrich the students in the various field of the literary as well as the linguistic level in Kannada.</li><li>• To bring out reference books and other materials for future generation.</li></ul> |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



| Semester | Course Code | Title of the Course                       | Core/<br>Elective/<br>Soft Skill | Credits |
|----------|-------------|-------------------------------------------|----------------------------------|---------|
| I        | KAN         | Paper-I, Ancient and Medieval Poetry      |                                  | 3       |
| II       | KAN         | Paper-II, Modern poetry and General Essay |                                  | 3       |
| III      | KAN         | Paper-III, Modern Kannada Prose           |                                  | 3       |
| IV       | KAN         | Paper-IV, Kannada Drama and Translation   |                                  | 3       |

| Course Objectives                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Recall (K1)</b> - List, Identify, Enumerate, Define</p> <p><b>Understand/Comprehend (K2)</b> - Describe, Explain, Outline, Briefly Summarise</p> <p><b>Apply Knowledge (K3)</b> - Interpret, Calculate, Select, Employ, Generalise</p> <p><b>Analyze and Evaluate (K4 and K5)</b> - Compare and Contrast, Differentiate, Evaluate, Critically Assess, Review an Idea</p> <p><b>Create(K6)</b> - Conceive, Theorise, Conceptualiseetc</p> | <ol style="list-style-type: none"> <li>1. Students are capable of evaluating different literary sensibilities.</li> <li>2. Enable them to understand the history of Literature in Kannada</li> <li>3. Enable them to differentiate new trends in literary genres.</li> <li>4. Enable them to identify the nature of development of Kannada Literature.</li> <li>5. Enable them to translate Kannada Literature into another Language.</li> </ol> |



## Semester - I

| Course I                                                                                                                                                                                                                                                                                                                                                         | Core/Elective/Soft Skill                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Title of the Course:</b>                                                                                                                                                                                                                                                                                                                                      | <b>Paper-I, Ancient and Medieval Poetry</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Credits:</b>                                                                                                                                                                                                                                                                                                                                                  | <b>3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Pre-requisites, if any:</b>                                                                                                                                                                                                                                                                                                                                   | To expose students to the Ancient and Medieval Kannada Literature. They learn about the Literary Heritage, Culture, Religic developments etc. Also to make them to understand and appreciate Old Literature a representative collection of Ancient and Medieval poetry of about 100 pages is prescribed. General understanding, appreciation of poetry, poetical beauty, the language of the poetry etc., are to be taught.                                                                                                                                                       |
| <b>Course Outcomes</b><br>(Use verbs like interpret, calculate,employ,generalise, evaluate, differentiate, critically assess, review, enumerate, identify, state, describe, explain, outline, select, recall, understand, compare and contrast, evaluate, critique, revise, summarise, demonstrate, draft, report, explain, obtain, recognise, respond, display) | <ol style="list-style-type: none"> <li>1. To understand ancient literary text &amp; Medieval Poetry in Kannada</li> <li>2. To describe text and context of ancient literature and Medieval Texts in Kannada</li> <li>3. To evaluate the difference between the ancient style of writing.</li> <li>4. To describe about the style of the authors.</li> <li>5. To narrate the poetry and improve in understanding the poetry</li> </ol>                                                                                                                                             |
| <b>UNITS</b>                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>I</b>                                                                                                                                                                                                                                                                                                                                                         | Introduction to Ancient Kannada Literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>II</b>                                                                                                                                                                                                                                                                                                                                                        | Prescribed text Lessons 1,2,3,4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>III</b>                                                                                                                                                                                                                                                                                                                                                       | Prescribed text Lessons 5,6,7,8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>IV</b>                                                                                                                                                                                                                                                                                                                                                        | Prescribed text Lessons 9,10,11 and 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>V</b>                                                                                                                                                                                                                                                                                                                                                         | Critical appreciation of Ancient and Medieval Poetry-their contents and expression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Reading List<br/>(Print and Online)</b>                                                                                                                                                                                                                                                                                                                       | <ol style="list-style-type: none"> <li>1. Parakrama dhalavana Parakramam –Pampa</li> <li>2. Bheema Dhuryodhaniyam-Ranna</li> <li>3. Vachanagalu</li> <li>4. Bedara Kannappana ragale-Harihara</li> <li>5. Sudugadu Hageyayte-Raghavankha</li> <li>6. Haydudu tale nabha stalake-Kumaravyasa</li> <li>7. Maaniniyariche-Kumaravyasa</li> <li>8. Maye meredalu baala leeleyali-Chamarasa.</li> <li>9. Ragi vreehi samvada-Kanakadaasa</li> <li>10.Karubariddoorinde kaadollithu-Lakshmisha</li> <li>11.Garathiya Haadugalu-Jaanapad geethegalu</li> <li>12. Govina haadu</li> </ol> |

|                          |                                                                                                                    |
|--------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Recommended Texts</b> | <b>Pracheena Kavya Marga-3</b> , H. Nagarajaih & Others (Ed), 1995, Prasaranga, Bangalore University, Bangalore-56 |
|--------------------------|--------------------------------------------------------------------------------------------------------------------|

**Mapping with Programme Outcomes:**

|      | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 |
|------|------|------|------|------|------|------|------|------|
| CO 1 | 2    | 3    | 2    | 3    | 2    | 3    | 1    | 2    |
| CO 2 | 3    | 3    | 1    | 3    | 3    | 2    | 3    | 2    |
| CO 3 | 3    | 2    | 3    | 3    | 3    | 2    | 1    | 3    |
| CO 4 | 3    | 3    | 3    | 3    | 3    | 3    | 2    | 3    |
| CO 5 | 3    | 3    | 3    | 2    | 2    | 1    | 3    | 1    |

**Level of Correlation between PSO's and CLO's**

|                                                           | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|-----------------------------------------------------------|-------|-------|-------|-------|-------|
| CLO 1                                                     | 3     | 3     | 3     | 3     | 2     |
| CLO 2                                                     | 3     | 3     | 3     | 3     | 2     |
| CLO 3                                                     | 3     | 2     | 3     | 2     | 3     |
| CLO 4                                                     | 3     | 3     | 3     | 2     | 3     |
| CLO 5                                                     | 2     | 2     | 2     | 3     | 3     |
| <b>Weightage</b>                                          | 14    | 13    | 14    | 13    | 13    |
| <b>Weighted percentage of Course Contribution to PSOs</b> | 2.8   | 2.6   | 2.8   | 2.6   | 2.6   |

**Strong- 3      Medium – 2      Low - 1**

## Semester – II

| Course - 2                             | Core/Elective/Soft Skill                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Title of the Course :</b>           | <b>Paper-II, Modern poetry and General Essay</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Credits :</b>                       | <b>03</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Pre- requisites, if any:</b>        | To expose the students to the Modern Kannada poetry and train them to write essays. For this an anthology of about 100 pages of Modern Poems covering different general trends, forms and contents is prescribed. Essay on given topics relating to Literature, Culture, Art, Education, Communication, Sports, Environment, Current Affairs etc., are to be given.                                                                                                                                                                                                                                                                          |
| <b>Course Outcomes</b>                 | <ol style="list-style-type: none"> <li>1. To understand the Contemporary literary text in Kannada</li> <li>2. To Explain the Contemporary author style of writings</li> <li>3. To evaluate the difference between the ancient and Contemporary Literature.</li> <li>4. To brief the content of the techniques of General Essay Writing</li> <li>5. To use grammatical styles in writing.</li> </ol>                                                                                                                                                                                                                                          |
| <b>Units</b>                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>I</b>                               | Beginning of modern Kannada Poetry-trends-themes-contents-Poetry-in a birds eye view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>II</b>                              | Text Poems from Part I -1,2,9, Part II - 2,4,6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>III</b>                             | Text Poems from Part III - 1,3, 14, 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>IV</b>                              | Text Poems from Part IV - 6,8,11, Part V - 2,6,8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>V</b>                               | Poems reading-appreciation-general-acquaintance of the writers of the prescribed poems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Reading List (Print and Online)</b> | <p>Part -I :1. Belagu-Bendre</p> <p>2. Devaru ruju maadidanu-Kuvempu</p> <p>9. Sharade-G.S.Shivarudrappa</p> <p>Part-II :2.Mane tumbisuvudu-V.Seetaramaiah</p> <p>4. Nalli taav nam malli-G.P.Rajaratnam</p> <p>6.Tungabhadre - K.S.Narasimhaswamy</p> <p>Part-III :1.Kurudu kanchaana-Bendre</p> <p>3. O! Nanna Janave!-GopalaKrishna adiga</p> <p>14.Samadhaana-G.P.Rajaratnam</p> <p>16.Amma Aachara Naanu-K.S.Nisar Ahmad.</p> <p>Part-IV :6.Mabbininda Mabbige-G.S.Shivarudrappa</p> <p>8. Kaala Nilluvudilla-Channaveera Kanavi</p> <p>11.Maneyinda manege- K.S.Narasimhaswamy</p> <p>Part-V :2.Vishva kutumbiya kashta-Pu.thi.na.</p> |

|                          |                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------|
|                          | 6.Atithigalu- GopalaKrishna adiga<br>8.Angula Huluvina parakaaya pravesha-A.K. <b>Ramanujam</b>                           |
| <b>Recommended Texts</b> | <b>Samakaaleena Kannada Kavithe-I</b> , Ed. G.S. Shivarudrappa, 2000, Prasaranga, Bangalore University, Bangalore-560 001 |

**Mapping with Programme Outcomes:**

|             | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 |
|-------------|------|------|------|------|------|------|------|------|
| <b>CO 1</b> | 2    | 3    | 2    | 3    | 2    | 3    | 1    | 2    |
| <b>CO 2</b> | 3    | 3    | 1    | 3    | 3    | 2    | 3    | 2    |
| <b>CO 3</b> | 3    | 2    | 3    | 3    | 3    | 2    | 1    | 3    |
| <b>CO 4</b> | 3    | 3    | 3    | 3    | 3    | 3    | 2    | 3    |
| <b>CO 5</b> | 3    | 3    | 3    | 2    | 2    | 1    | 3    | 1    |

**Level of Correlation between PSO's and CLO's**

|                                                           | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|-----------------------------------------------------------|-------|-------|-------|-------|-------|
| <b>CLO 1</b>                                              | 3     | 3     | 3     | 3     | 2     |
| <b>CLO 2</b>                                              | 3     | 3     | 3     | 3     | 2     |
| <b>CLO 3</b>                                              | 3     | 2     | 3     | 2     | 3     |
| <b>CLO 4</b>                                              | 3     | 3     | 3     | 2     | 3     |
| <b>CLO 5</b>                                              | 2     | 2     | 2     | 3     | 3     |
| <b>Weightage</b>                                          | 14    | 13    | 14    | 13    | 13    |
| <b>Weighted percentage of Course Contribution to PSOs</b> | 2.8   | 2.6   | 2.8   | 2.6   | 2.6   |

**Strong- 3      Medium – 2      Low - 1**

### Semester - III

|                                        |                                                                                                                                                                                                                                                                                               |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course - 3</b>                      |                                                                                                                                                                                                                                                                                               |
| <b>Title of the Course</b>             | Paper-III, Modern Kannada Prose                                                                                                                                                                                                                                                               |
| <b>Credits :</b>                       | <b>03</b>                                                                                                                                                                                                                                                                                     |
| <b>Pre- requisites, if any:</b>        | To expose the students for Modern Kannada Prosatic Literature and teach them to understand the literature and enjoy. A novel of about 200 pages are prescribed. The general appreciation and evaluation of the theme, development and the techniques of the prescribed text are to be learnt. |
| <b>Course Outcomes</b>                 | 1. To understand the significance of the current phase of Prose<br>2. To Explain the nature of modern Novels in Kannada<br>3. To evaluate the culture of the society through Novels<br>4. Understand the Critical outlook of the Texts<br>5. To interpret the various styles of Novels.       |
| <b>Units</b>                           |                                                                                                                                                                                                                                                                                               |
| <b>I</b>                               | Development of Modernism in Kannada Literature - the trends-Fiction prose writers-introduction about the author and texts.                                                                                                                                                                    |
| <b>II</b>                              | The Novel - Alida mele (Novel Story and Theme)                                                                                                                                                                                                                                                |
| <b>III</b>                             | The Novel-Alida mele (First half)                                                                                                                                                                                                                                                             |
| <b>IV</b>                              | The Novel- Alida mele (Second half)                                                                                                                                                                                                                                                           |
| <b>V</b>                               | The critical appreciation of the texts                                                                                                                                                                                                                                                        |
| <b>Reading List (Print and Online)</b> | L.S. Sheshagiri Rao, Hosagannada Sahitya charitre, Ankita Pustaka, No.53, Shamsingh Complex, Gandhi bazaar Road, Bagsavanagudi, Bangalore-560 004                                                                                                                                             |
| <b>Recommended Texts</b>               | <b>Dr. Shivarama Karanatha</b> , 1996, Alida Mele, SBS Publishers & Distributers, Bangalore-01                                                                                                                                                                                                |

#### Mapping with Programme Outcomes:

|             | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 |
|-------------|------|------|------|------|------|------|------|------|
| <b>CO 1</b> | 2    | 3    | 2    | 3    | 2    | 3    | 1    | 2    |
| <b>CO 2</b> | 3    | 3    | 1    | 3    | 3    | 2    | 3    | 2    |
| <b>CO 3</b> | 3    | 2    | 3    | 3    | 3    | 2    | 1    | 3    |
| <b>CO 4</b> | 3    | 3    | 3    | 3    | 3    | 3    | 2    | 3    |
| <b>CO 5</b> | 3    | 3    | 3    | 2    | 2    | 1    | 3    | 1    |

**Level of Correlation between PSO's and CLO's**

|                                                    | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|----------------------------------------------------|-------|-------|-------|-------|-------|
| CLO 1                                              | 3     | 3     | 3     | 3     | 2     |
| CLO 2                                              | 3     | 3     | 3     | 3     | 2     |
| CLO 3                                              | 3     | 2     | 3     | 2     | 3     |
| CLO 4                                              | 3     | 3     | 3     | 2     | 3     |
| CLO 5                                              | 2     | 2     | 2     | 3     | 3     |
| Weightage                                          | 14    | 13    | 14    | 13    | 13    |
| Weighted percentage of Course Contribution to PSOs | 2.8   | 2.6   | 2.8   | 2.6   | 2.6   |

**Strong- 3      Medium – 2      Low - 1**





### Semester - IV

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course - 4</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Title of the Course :</b>           | <b>Paper-IV, Kannada Drama and Translation</b>                                                                                                                                                                                                                                                                                                                                                          |
| <b>Credits :</b>                       | <b>03</b>                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Pre- requisites, if any:</b>        | Kannada Drama Literature is to be studied and enjoy. Learn to understand and appreciate the theme, characters, techniques and style of the Kannada Drama. A traditional or Modern drama either original or translation of about 100 pages to be learnt. A passage of about 100 words from English to be given for translation in to Kannada thus translation skill of the student also to be developed. |
| <b>Course Outcomes</b>                 | <ol style="list-style-type: none"> <li>1. To understand the rich tradion of Kannada Drama</li> <li>2. To Explain nature of Drama of Kannada</li> <li>3. To describe the nature of understandings the Drama</li> <li>4. To evaluate the culture of the society through Drama.</li> <li>5. To know the techniques of the Translation in Kannada</li> </ol>                                                |
| <b>Units</b>                           |                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>I</b>                               | Drama Literature in Kannada-Translation Dramas from Sanskrit and English-Development of Kannada Drama through many trends of 20 <sup>th</sup> Century. Elements of Drama-theme-characters-techniques and style etc., are to be described.                                                                                                                                                               |
| <b>II</b>                              | Prescribed Drama-Abhijnana Shakuntalam Act-1                                                                                                                                                                                                                                                                                                                                                            |
| <b>III</b>                             | Prescribed Drama-Abhijnana Shakuntalam Act-2                                                                                                                                                                                                                                                                                                                                                            |
| <b>IV</b>                              | Prescribed Drama-Abhijnana Shakuntalam Act-3                                                                                                                                                                                                                                                                                                                                                            |
| <b>V</b>                               | Techniques of Translation for Translation English to Kannada and Kannada to English.                                                                                                                                                                                                                                                                                                                    |
| <b>Reading List (Print and Online)</b> | <b>Avalokana</b> , Ed. Basavappa Sahstri virachita shakuntala naatakam, HM. Shankaranarayana Rao, Sharada mandir, Mysore.                                                                                                                                                                                                                                                                               |
| <b>Recommended Texts</b>               | <b>Karnataka Abhijnana shakuntala Natakam</b> , by Basavappa shastry, Sharada Mandira, 1973, Mysore-04.                                                                                                                                                                                                                                                                                                 |

## Method of Evaluation:

| Internal Assessment | End Semester Examination | Total | Grade |
|---------------------|--------------------------|-------|-------|
| 25                  | 75                       | 100   |       |

### Methods of Assessment:

**Recall (K1)** - Simple definitions, MCQ, Recall steps, Concept definitions

**Understand/ Comprehend (K2)** - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

**Application (K3)** - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

**Analyse (K4)** - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

**Evaluate (K5)** - Longer essay/ Evaluation essay, Critique or justify with pros and cons

**Create (K6)** - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

**\*\*[Follow the same pattern for all Courses/Papers]- \*\*Course means Paper**

### Mapping with Programme Outcomes:

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of 1, 2, 3 (Strong, Medium and Low)

#### Mapping with Programme Outcomes:

|      | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 |
|------|------|------|------|------|------|------|------|------|
| CO 1 | 2    | 3    | 2    | 3    | 2    | 3    | 1    | 2    |
| CO 2 | 3    | 3    | 1    | 3    | 3    | 2    | 3    | 2    |
| CO 3 | 3    | 2    | 3    | 3    | 3    | 2    | 1    | 3    |
| CO 4 | 3    | 3    | 3    | 3    | 3    | 3    | 2    | 3    |
| CO 5 | 3    | 3    | 3    | 2    | 2    | 1    | 3    | 1    |