# B.Sc.ELECTRONICS

## Syllabus

AFFILIATED COLLEGES

Program Code :
22M

2025-2026

# BHARATHIAR UNIVERSITY

A State University, Accredited with "A" Grade by
NAAC, Ranked 13th among Indian Universities
by MHRD-NIRF,

| **Program Educational Objectives (PEOs)** | |
|---|---|
| The **B. Sc. Electronics** program describe accomplishments that graduates are expected to attain within five to seven years after graduation | |
| **PEO1** | Provide graduates with a strong foundation in Electronics domain and to enable them to devise and deliver efficient solutions to challenging problems in Electronics, Communications and allied disciplines. |
| **PEO2** | Impart analytic and thinking skills to develop initiatives and innovative ideas for R&D, Industry and societal requirements. |
| **PEO3** | Provide sound theoretical and practical knowledge of Electronics, managerial and entrepreneurial skills to enable students to contribute to the wellbeing of society with a global outlook. |
| **PEO4** | Inculcate qualities of teamwork as well as social, interpersonal and leadership skills and an ability to adapt to evolving professional environments in the domains of engineering and technology. |
| **PEO5** | Motivate graduates to become good human beings and responsible citizens for the overall welfare of the society. |
| **PEO6** | Develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves. |
| **PEO7** | To prepare graduates who will have knowledge, ability and courage to pursue higher studies and research. |

| **Program Specific Outcomes (PSOs)** | |
|---|---|
| After the successful completion of B.Sc. Electronics program, the students are expected to | |
| **PSO1** | Demonstrate proficiency in use of software and hardware required to practice electronics and communication profession. |
| **PSO2** | Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems |
| **PSO3** | Apprehend and Analyzes specific engineering problems of communication, electronic circuits, computer programming, embedded systems, VLSI design and semiconductor technology by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals. |
| **PSO4** | Ability to communicate effectively with excellent interpersonal skills and demonstrate the practice of professional ethics for societal benefit |
| **PSO5** | Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems. |
| **PSO6** | Use embedded system concepts for developing IoT applications |

| **Program Outcomes (POs)** | |
|---|---|
| On successful completion of the B. Sc. Electronics program | |
| **PO1** | **Engineering knowledge**: Apply the knowledge of mathematics, Science, Engineering fundamentals and an engineering specialization to the solution of complex engineering problems |
| **PO2** | **Problem analysis:** Identify, formulate, review research literature and Analyzes complex engineering problems reaching substantiated conclusion using principles of mathematics and Engineering sciences |
| **PO3** | **Design/Development of solutions:** Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental conditions. |
| **PO4** | **Conduct investigation of complex problems**: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO5** | **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations |
| **PO6** | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| **PO7** | **Environment and Sustainability:** Understand the impact of the professional engineering solution in societal and environmental contexts, and demonstrate the knowledge of and need fir sustainable development |
| **PO8** | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO9** | **Individual and team work:** Function effectively as an individual, an as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO10** | **Life-Long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

# BHARATHIAR UNIVERSITY: COIMBATORE 641 046

B. Sc. Electronics Curriculum (University Affiliated Colleges)

Scheme of Examination (CBCS PATTERN)

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

| Course Code | Title of the Course | Credits | Hours | | Maximum Marks | | |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | CIA | ESE | TOTAL |
| **FIRST SEMESTER** | | | | | | | |
| 11T | Language –I | 4 | 6 | - | 25 | 75 | 100 |
| 12E | English – I | 4 | 4 | - | 25 | 75 | 100 |
| 13A | **Core Paper I :** Basic Electronics | 4 | 6 | - | 25 | 75 | 100 |
| -- | **Core Practical I:** Basic Electronics Lab | - | - | 3 | - | - | - |
| -- | **Core Practical II** : Semiconductor Devices Lab | - | - | 3 | - | - | - |
| 1AA | **Allied I:** Mathematics–I | 4 | 6 | - | 25 | 75 | 100 |
| 1FA | Environmental Studies * | 2 | 2 | - | - | 50 | 50 |
| **Total** | | 18 | T 24 | L 06 | 100 | 350 | 450 |
| **SECOND SEMESTER** | | | | | | | |
| 21T | Language – II | 4 | 6 | - | 25 | 75 | 100 |
| 22E | English – II | 2 | 4 | - | 25 | 25 | 50 **@** |
| 23A | **Core Paper II :** Semiconductor Devices | 4 | 5 | - | 25 | 75 | 100 |
| 23P | **Core Practical I:** Basic Electronics Lab | 4 | - | 3 | 25 | 75 | 100 |
| 23Q | **Core Practical II:** Semiconductor Devices Lab | 4 | - | 3 | 25 | 75 | 100 |
| 2AA | **Allied : II** Mathematics–II | 4 | 5 | - | 25 | 75 | 100 |
| 2FB | **Value Education-** Human Rights * | 2 | 2 | - | - | 50 | 50 |
| 2NM | Naan Mudhalvan – Skill Course | 2 | 2 | - | 25 | 25 | 50 # |
| **Swatch Bharat- Summer internship $** | | | | | | | |
| **Total** | | 26 | T 24 | L 06 | 175 | 475 | 650 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **THIRD SEMESTER** | | | | | | | |
| 31T | Language – III | 4 | 6 | - | 25 | 75 | 100 |
| 32E | English – III | 4 | 4 | - | 25 | 75 | 100 |
| 33A | **Core Paper III :** Digital Principles and Applications | 4 | 3 | - | 25 | 75 | 100 |
| 33B | **Core Paper IV:** Electronic Circuits | 4 | 3 | - | 25 | 75 | 100 |
| 3AD | **Allied : III** Object Oriented Programming using C++ | 2 | 2 | - | 20 | 30 | 50 |
| 3ZA | **Skill Based Subject : I** Bio Medical Instrumentation | 3 | 3 | - | 20 | 55 | 75 |
| -- | **Core Practical : III** Digital Electronics and Linear IC's Lab - III | - | - | 2 | - | - | - |
| -- | **Core Practical : IV** Electronics Circuits and Communication Lab -IV | - | - | 2 | - | - | - |
| 3FB / 3FC | Tamil **/ Advanced Tamil* (OR) **Non-major elective - I** (Yoga for Human excellence * Women's Rights*) | 2 | 2 | - | - | 50 | 50 |
| 3NM | Naan Mudhalvan –Skill Course | 2 | 2 | - | 25 | 25 | 50# |
| 3HW | Health and Wellness** | 1 | 1 | - | 25 | - | 25 |
| | **Total** | 26 | T 26 | L 04 | 190 | 460 | 650 |
| **FOURTH SEMESTER** | | | | | | | |
| 41T | Language – IV | 4 | 6 | - | 25 | 75 | 100 |
| 42E | English – IV | 4 | 4 | - | 25 | 75 | 100 |
| 43A | **Core Paper V:** IC's and Instrumentation | 4 | 5 | - | 25 | 75 | 100 |
| 4AD | **Allied : IV** Python Programming | 4 | 5 | | 25 | 75 | 100 |
| 43P | **Core Practical: III** Digital Electronics and Linear IC's Lab | 3 | - | 2 | 30 | 45 | 75 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 43Q | **Core Practical: IV** Electronics Circuits and Communication Lab -IV | 3 | - | 2 | 30 | 45 | 75 |
| 43R | **Allied Practical: V** C++ Programming Lab | 2 | - | 2 | 20 | 30 | 50 |
| 4FB/ 4FE | Tamil**/ Advanced Tamil * (OR) **Non Major Elective-II** (General Awareness *) | 2 | 2 | - | - | 50 | 50 |
| 4NM | **Skill Based Subject :II** Naan Mudhalvan –Skill Course | 2 | 2 | - | 25 | *25* | 50# |
| **Total** | | 28 | T 24 | L 06 | 205 | 495 | 700 |
| **FIFTH SEMESTER** | | | | | | | |
| 53A | **Core Paper VI**: 8051Microcontroller and its Applications | 4 | 4 | - | 25 | 75 | 100 |
| 53B | **Core Paper VII:** Internet of Things | 4 | 4 | - | 25 | 75 | 100 |
| 5EA/ 5EB/ 5EC/ 5ED | **Elective I** | 3 | 4 | | 20 | 55 | 75 |
| 5EE/ 5EF/ 5EG/ 5EH | **Elective II** | 3 | 4 | | 20 | 55 | 75 |
| -- | **Core Practical VI**: 8051 Microcontroller Lab | - | - | 3 | - | - | |
| -- | **Core Practical VII:** Internet of Things System Design Lab | - | - | 3 | - | - | - |
| -- | **Core Practical VIII**: Industrial and Power Electronics Lab | - | - | 3 | - | - | - |
| 5NM | Naan Mudhalvan – Skill Course | 2 | 2 | - | 25 | 25 | 50# |
| 5ZC | **Skill based subject – III** Visual Programming | 3 | 3 | | 20 | 55 | 75 |
| **Total** | | 19 | T 21 | L 09 | 135 | 340 | 475 |

| SIXTH SEMESTER | | | | | | | |
|---|---|---|---|---|---|---|---|
| 63A | **Core Paper VIII:** Design with PIC Microcontroller | 4 | 6 | | 25 | 75 | 100 |
| 6EI/ 6EJ/ 6EK/ 6EL | **Elective III** | 3 | 6 | | 20 | 55 | 75 |
| 63P | **Core Practical VI**: 8051 Microcontroller Lab | 4 | - | 3 | 25 | 75 | 100 |
| 63Q | **Core Practical VII:** Internet of Things System Design Lab | 4 | - | 3 | 25 | 75 | 100 |
| 63R | **Core Practical VIII**: Industrial and Power Electronics Lab | 4 | - | 3 | 25 | 75 | 100 |
| 67V | **PROJECT** | 2 | 2 | - | 20 | 30 | 50 |
| 6ZP | **Skill based Subject – IV** Practical Visual Programming | 2 | - | 3 | 20 | 30 | 50 |
| 67A | Extension Activities** | 2 | 2 | - | - | 50 | 50 |
| 6NM | Naan Mudhalvan – Skill Course | 2 | 2 | - | 25 | 25 | 50# |
| | **Total** | 27 | T 18 | L 12 | 185 | 490 | 675 |
| | **Grand Total** | **144** | | | | | **3600** |

* No Continuous Internal Assessment (CIA). Only University Examinations

** No University Examinations. Only Continuous Internal Assessment (CIA).

$ Swachh Bharat – Summer Internship. Extra 2 Credits would be given. It is mandatory.

@ University semester examination will be conducted for 50 marks (As per the existing pattern of examination) and the marks will be converted to 25 marks

# Naan Mudhalvan Course :CEE will be assessed by Industry for 25 marks and CIA will be done by the course teacher

For Project report *30 marks and viva-voce *20 marks

*@ English II- University semester examination will be conducted for 50 marks (As per existing pattern of Examination) and it will be converted for 25 marks.*

| List of Elective papers (Colleges can choose any one of the paper as electives) | | |
|---|---|---|
| **Elective – I** | **A** | PCB Design and Fabrication |
| | **B** | Advanced Communication Systems |
| | **C** | Artificial Intelligence |
| | **D** | Advanced Computer Architecture |
| **Elective – II** | **E** | Arduino with Sensors |
| | **F** | Microwave and Fiber Optic Communication |
| | **G** | Automotive Electronics |
| | **H** | Satellite Communications |

| | | |
|---|---|---|
| **Elective – III** | **I** | Industrial and Power Electronics |
| | **J** | Robotics |
| | **K** | Programmable Logic Controllers |
| | **L** | VLSI Design |

# First Semester

| Course code | 13A | BASIC ELECTRONICS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Core Paper I | 5 | T | | 4 |
| Pre-requisite | | Higher secondary physics | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To become familiar with fundamentals of electronic components
- ❖ To learn to use common electronic components
- ❖ To design electronic circuits to perform realistic tasks

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Understand the basic electronic components | K2 |
| 2 | Understand the basic electronic components | K2 |
| 3 | Differentiate and demonstrate the voltage and current source. | K3 |
| 4 | Apply the electronic components in network theorems. | K3 |
| 5 | Put into practice and use the electronic components | K4 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | RESISTORS & INDUCTORS | 15hours |
|---|---|---|

Types of Resistors: Fixed, Variable - Brief mention of their Construction and Characteristics - Color Coding of Resistors - Connecting Resistors in Series and Parallel
Types of Inductors: Fixed, Variable- Self and Mutual Inductance-Faraday's Law and Lenz's Law Of Electromagnetic Induction-Energy Stored In An Inductor-Inductance In Series And Parallel-Testing of Resistance and Inductance using Multimeter.

| Unit:2 | CAPACITORS | 15hours |
|---|---|---|

Principles of Capacitance-Parallel Plate Capacitor- -Energy Stored in a Capacitor-Types of Capacitors: Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic: Construction and Application- Connecting Capacitors in Series and Parallel - Factors Governing the Value of Capacitors- Testing of Capacitors Using
Millimeters.

| Unit:3 | ELECTRICAL ELEMENTS AND CIRCUITS | 15hours |
|---|---|---|

Potential Difference- Electric Current-Electromotive Force - Ohms Law- Kirchoff's Law - Kirchoff'sCurrent Law-Analysis of Resistance in Series Circuits, Parallel Circuits and Series Parallel Circuits-Concept of Voltage Source and Current Source-Voltage Source in Series and Current Source in Parallel-Simple Problems in DC Circuits.

| Unit:4 | NETWORK THEOREMS | 15 hours |
|---|---|---|

Superposition Theorem - Thevenin Theorem- - Norton's Theorem - Thevenin to Norton Conversion - Conversion of Voltage and Current Sources - Millman's Theorem - Star and Delta Conversion-Maximum Power Transfer Theorem - Simple Problems in DC Circuits.

| Unit:5 | AC CIRCUITS | 15hours |
|---|---|---|

IntroductionToSinusoidalWave-RMSValue-AverageValue-ACCircuitswithResistance-
Circuits with XL Alone – Circuits with XC Alone - Series Reactance And Resistance - Parallel Reactance and Resistance - Series Parallel Reactance and Resistance – Real Power -Series

| | | |
|---|---|---|
| Resonant Circuit – Parallel Resonant Circuit - Passive Filters: Low Pass Filters, High Pass Filters, Band Pass Filters, Band Rejection Filters | | |
| | | |
| | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | |
| 1 | S.Salivahanan, N.Suresh Kumar, A.Vallavaraj **"ELECTRONIC DEVICES AND CIRCUITS"**- | |
| 2 | B.V.Narayana Rao**—PRINCIPLES OFELECTRONICS**‖, Wiley Eastern Limited, 1992 | |
| | | |
| **Reference Books** | | |
| 1 | B.L.Theraja, **"BASIC ELECTRONICS-SOLID STATE DEVICES",**S.Chand Company | |
| 2 | BernardGrob **"BASIC ELECTRONICS"**-Tata McGraw-Hill Publishing Company Limited, 9thEdition. | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | |
| 1 | https://nptel.ac.in/courses/108/104/108104139/ | |
| 2 | https://nptel.ac.in/courses/108/101/108101091/ | |
| 3 | https://www.youtube.com/playlist?list=PLFF553CED56CDE25D | |
| 4 | https://www.youtube.com/watch?v=w8Dq8blTmSA | |
| Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. | | |

**Mapping with Programme Outcomes**

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

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

# Second Semester

| Course code | 23A | SEMICONDUCTOR DEVICES | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Core Paper II: | 5 | T | | 4 |
| Pre-requisite | | Higher secondary physics | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To enable the students to understand and gain the knowledge on semiconductor devices.
- ❖ To acquaint the students with construction, theory and characteristics of the electronic

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Explain the structure of the basic electronic devices | K1 |
| 2 | Understand the characteristics and operations of special diodes | K2 |
| 3 | Understand the characteristics and operations of transistors | K2 |
| 4 | Understand the characteristics and operations of FET and UJT | K2 |
| 5 | Use the special diodes for various applications | K3 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

| Unit:1 | PN JUNCTION DIODE | 15hours |
|---|---|---|

Energy Band Structure and Conduction in Insulator - Semiconductor, Conductor - Intrinsic and Extrinsic Semiconductor – Doping – P Type – N Type Semiconductor - Formation of PN Junction Diode - Forward Bias - Reverse Bias Condition – Characteristics - Clipping and Clamping.

| Unit:2 | SPECIAL DIODES | 15hours |
|---|---|---|

Zener Diode - VI Characteristics – Breakdown - Backward Diode – Varactor Diode - Step RecoveryDiode-PointContactDiode-ShcottkeyDiode-TunnelDiode-GunnDiode-ImpattDiode - PIN Diode - PNPN Diode

| Unit:3 | BJT | 15hours |
|---|---|---|

Introduction To Bipolar Junction Transistor – Construction - Transistor Biasing - Operation of NPN and PNP Transistor - CB, CE &CC Configuration - Bias Stability - Load Line - Method of Biasing: Fixed Bias - Collector to Base Bias - Voltage Divider Bias – Bias Compensation -Thermal Runaway - HeatSink

| Unit:4 | FET AND UJT | 15hours |
|---|---|---|

Introduction to FET - Construction and Operation of N-Channel JFET - Drain Characteristics-Comparison of JFET &BJT - Introduction to MOSFET - Enhancement MOSFET – Depletion MOSFET - FET as a Voltage Variable Resistor(VVR) - Introduction to UJT – Characteristics – UJT as Relaxation Oscillator – SCR – TRIAC-DIAC

| Unit:5 | OPTOELECTROIC DEVICES | 15hours |
|---|---|---|

Principles, Operation And Characteristics Of Opto Electronic Devices: LDR – Photo Diode - Photo Transistor – Photo Voltaic Cell – Solar Cell – Photo Emissive Sensors – Vacuum Photo Tube– Gap Filled Photo Tube – Photo Multiplexer – LED – IR Emitter – LCD –Optocouplers

| | Total Lecture hours | 75 hours |
|---|---|---|

| | |
|---|---|
| **Text Book(s)** | |
| 1 | S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, **"ELECTRONICS DEVICES AND CIRCUITS",** Tata McGraw Hill Publishing Company Limited, New Delhi, 8th edition. |
| 2 | B. L. Theraja, **"BASIC ELECTRONICS – SOLID STATE DEVICES"**, S.Chand&Company Ltd. 2000 |
| **Reference Books** | |
| 1 | S.L. Kakani,K. C. BhanDai**—ATEXTBOOKOFELECTRONICS** |
| 2 | BernardGrob**"BASIC ELECTRONICS"**-Tata McGraw-Hill Publishing Company Limited, |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https://nptel.ac.in/courses/108/108/108108122/ |
| 2 | https://nptel.ac.in/courses/108/108/108108112/ |
| 3 | https://nptel.ac.in/courses/115/102/115102103/ |

Course Designed By:

Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

**Mapping with Programme Outcomes**

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

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

| Course code | 23P | BASIC ELECTRONICS LAB | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Core Practical I | 3 | | P | 4 |
| Pre-requisite | | Basic Electronics theory | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To understand the fundamental principles of circuit theory
- ❖ To make use of circuit laws and theorems and measuring the circuit parameters.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Apply the concept of basic circuit and theorems | K3 |
| 2 | Simplify the circuits using series and parallel equivalents and using Thevenin's and Norton's equivalent circuits. | K3 |
| 3 | Design resonance circuits. | K4 |
| 4 | Use the oscilloscope for the display and measurements of signals. | K2 |
| 5 | Analyze Various Theorems with different resistance values | K4 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

| | BASIC ELECTRONICS LAB | 90 Hours |
|---|---|---|

(Any 12 Experiments)

1. Study of Multimeter – Checking of Components
2. Measurement of Amplitude, Frequency & Phase Difference using CRO
3. Verification of Ohm's Law
4. Voltage sources in Series, Parallel and Series–Parallel
5. Resistance in Series, Parallel and Series–Parallel
6. Voltage and Current Dividers
7. Verification of Kirchhoff's Law
8. Wheatstone Bridge
9. Verification of Norton's Theorem
10. Verification of Thevenin's Theorem
11. Verification of Millman's Theorem
12. Verification of Superposition Theorem
13. LCR Bridge
14. Series Resonance Circuit
15. Parallel Resonance Circuit
16. Transient Response of RC Circuit
17. Transient Response of RL Circuit
18. Capacitors & Inductors in Series &Parallel
19. Frequency Response of R, L&C
20. Low Pass Filter & High Pass Filter
21. Band pass and Band Rejection Filter
22. Verification of Maximum Power Transfer Theorem
23. Measurement of resistance and capacitance in series and parallel

| Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] | |
|---|---|
| 1 | https://nptel.ac.in/courses/122/106/122106025/ |
| 2 | https://nptel.ac.in/courses/122/106/122106026/ |

Course Designed By: K.Manikantan, Assistant Professor, Government Arts College, Ooty.&
Dr.N.Om Muruga , Assistant Professor, Government Arts College ,Ooty.

**Mapping with Programme Outcomes**

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

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

| Course code | 23Q | SEMICONDUCTOR DEVICES LAB | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Core Practical II | 3 | | P | 4 |
| Pre-requisite: | | Higher secondary physics | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To understand and experiment the basic parameters of electronic devices.
- ❖ To construct few applications using semiconductor devices.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Experiment the fundamental operations of the main semiconductor electronic devices. | K3 |
| 2 | Design and construct electronic circuits using semiconductor devices. | K3 |
| 3 | Understand the transistor characteristics | K2 |
| 4 | Understand the characteristics of LDR and solar cell | K2 |
| 5 | Apply Various transistor characteristics in applications. | K3 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

| UNIT I | SEMICONDUCTOR DEVICES LAB | 90 Hours |
|---|---|---|

(Any 12 Experiments)

1. Band Gap Energy of Silicon /Germanium Diode
2. V-I Characteristics of Junction Diode
3. V-I Characteristics of Zener Diode
4. Transistor Characteristics of CE Configuration
5. Transistor Characteristics of CB Configuration
6. Transistor Characteristics of CC Configuration
7. Clipping Circuits
8. Clamping Circuits
9. Measurement of Stability Factor of Fixed Bias
10. Measurement of Stability Factor of Self Bias
11. V-I Characteristics of JFET
12. V-I Characteristics of UJT
13. UJT as Oscillator
14. Characteristics of Solar Cell
15. Study of IR(Tx&Rx)
16. Study of LED and 7Segment display
17. Temperature Co-efficient of Junction Diode
18. Zener as a Voltage regulator
19. ON / OFF control of relay using Opto–Couplers
20. Characteristics of SCR
21. TRIAC Characteristics

Course Designed By: K.Manikantan, Assistant Professor, Government Arts College, Ooty.&
Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.

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

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

# Third Semester

| Course code | 33A | DIGITAL PRINCIPLES AND APPLICATIONS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Core Paper III | 3 | T | | 4 |
| Pre-requisite: | | Basic Physics | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To acquire the basic knowledge of Number system, Digital logic circuits and its application
- ❖ To outline the formal procedures for the analysis and design of combinational and sequential circuits
- ❖ To learn the concepts of A/D, D/A conversions and their types

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Understand the basics of Number system and gates | K2 |
| 2 | Realize the operation of various logic gates and analyzing the outputs | K1 |
| 3 | Analyze and design the combinational logic circuits | K4 |
| 4 | Analyze and design the Sequential logic circuits | K4 |
| 5 | Design various synchronous and asynchronous sequential circuits | K6 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | NUMBER SYSTEMANDCODES | 12hours |
|---|---|---|

Decimal, Binary, Octal and Hexa Decimal Numbers – Conversion — Binary Addition, Subtraction and Multiplication – 1's and 2's Compliments - Binary Coded Decimal (BCD) – Weighted Codes and Non-weighted Codes – Excess Three – Grey Code .

| Unit:2 | BOOLEAN ALGEBRA AND LOGIC GATES | 12hours |
|---|---|---|

Boolean logic operations – Boolean functions – Truth Tables – Basic Laws – DeMorgans Theorem – Sum of Products and Products of Sums – Karnaugh map –Universal Gates- Logic Gates – OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR Gates .

| Unit:3 | COMBINATIONALLOGICCIRCUITS | 12hours |
|---|---|---|

Half Adder – Full Adder – Half Sub tractor – Full Sub tractor – 4 bit Binary Adder / Subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders – Parity Generators / Checkers .

| Unit:4 | SEQUENTIALLOGICCIRCUITS | 12hours |
|---|---|---|

Flip Flops – RS, Clocked RS, JK, JK Master Slave, D and T Flip Flops – Shift Registers and its Types – Ring Counters – Ripple Counters – Synchronous Counter – Up Down counter – Decade Counter – Applications

| Unit:5 | D/A AND A/D CONVERTERS | 12 hours |
|---|---|---|
| Digital to Analog Converters: Resistive Divider Type - Ladder Type – Accuracy and Resolution - Analog to Digital Converters: Counter– simultaneous Conversion – Dual Slope Type – Accuracy and Resolution. | | |
| | **Total Lecture hours** | **60 hours** |
| **Text Book(s)** | | |
| 1 | Malvino & Leech, **—Digital Principles and Applications"**, Tata McGraw Hill Edition V, 2002. | |
| 2 | M.Morris Mano ,‖**Digital Logic and Computer Design"**, PHI 2005. | |
| **Reference Books** | | |
| 1 | Floyd and Jain, **Digital Fundamentals,** Prentice Hall2010 | |
| 2 | M. Morris Mano Charles Kime, **Digital Logic and Computer Design Fundamentals**, Pearson Education Limited, 2014 | |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | | |
| 1 | https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&%20MALVINO.pdfE book, Malvino & Leech, —**DIGITALPRINCIPLESANDAPPLICATIONS**, TataMcGrawHillEditionXI,2011 | |
| 2 | https://nptel.ac.in/courses/117/106/117106086/Introduction to digital circuits | |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. | | |

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

| Course Code | 33B | ELECTRONIC CIRCUITS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | Core paper IV | | 3 | T | | 4 |
| Pre-Requisite: | Basic Physics | | Syllabus Version | 2025-26 | | |

**Course Objectives:**

**The Main Objectives of this course are to:**

- ❖ To enable the students to understand and gain the knowledge on power supplies, amplifiers and oscillators.
- ❖ To acquaint the students with construction, theory and characteristics of the electronic amplifier circuits and types of multivibrators.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Understand the concepts of Rectifiers and regulators | K2 |
| 2 | Study about Small signal amplifiers | K1 |
| 3 | Analyze the functions of power amplifiers | K4 |
| 4 | Analyze the performance of negative as well as positive feedback circuits | K4 |
| 5 | design oscillators and Multivibrators | K6 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

| Unit:1 | RECTIFIERS AND REGULATORS | 12 hours |
|---|---|---|

Half wave, Full waves and bridge Rectifiers – Calculation of RMS Value – Average Value – Ripple Factor – Efficiency – Transformer Utility Factor – Peak Inverse Voltage – Inductor Filter – Capacitor Filter – LC Filter - Voltage Doubler – Voltage Regulator – Construction of DC Power Supply.

| Unit:2 | SMALL SIGNAL AMPLIFIERS | 12 hours |
|---|---|---|

CE, CB, CC amplifiers– Current Gain - Voltage Gain – Power Gain – Single Stage Transistor Amplifier – DC and AC load line – RC Coupled Amplifier –Transformer Coupled Amplifier.

| Unit:3 | POWER AMPLIFIERS | 12 hours |
|---|---|---|

Operation and Graphical Representation of Class A, Class B, Class C and Class AB Amplifiers – Maximum Collector Efficiency of Class A Power Amplifier– Harmonic Distortion – Class B Push Pull Amplifier .

| Unit:4 | FEEDBACK AMPLIFIERS | 12 hours |
|---|---|---|

Basic concepts of feedback – Positive Feedback – Negative Feedback – Effects of Negative Feedback on Gain, Bandwidth and Distortion – Noise – Voltage Series Feedback - Voltage Shunt Feedback – Current Series Feedback – Current Shunt Feedback.

| Unit:5 | OSCILLATORS AND MULTIVIBRATORS | 12 hours |
|---|---|---|
| Barkhausen Criterion – Hartley Oscillator – Colpitts Oscillator – Phase Shift Oscillator – Wein Bridge Oscillators - Astable Multivibrator – Monostable multivibrator – Schmitt Trigger | | |
| | **Total Lecture hours** | **60 hours** |

| **Text Book(s)** | |
|---|---|
| 1 | S.K.Sahdev,‖**ElectronicPrinciples"**,DhanpatRai&Co(P)Ltd,2ndEdition, 1998 |
| 2 | B.L.Theraja, **"Basic Electronics"**, Chand Company Ltd, 2000. |
| **Reference Books** | |
| 1 | V.K.Metha, Rohit Metha, **—Principles ofElectronics"** S Chand, 2006 . |
| 2 | B.Sasikala, C.Poornachandra,‖**Electronic Devices and Circuits"**, Scitech 2003. |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | |
| 1 | http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.htmlLecture Notes |
| 2 | https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuits NPTEL. |
| 3 | https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL. |

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

| Course Code | 3AD | OBJECT ORIENTED PROGRAMMING USING C++ | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | ALLIED PAPER III | | 3 | T | | 3 |
| Pre-Requisite: | Computer Fundamentals | | Syllabus Version | | 2025-26 | |

**Course Objectives:**

**The Main Objectives of this course are to;**

- This subject deals with the programming concepts of Object Oriented Programming using C++.
- To develop a skills on using MS word, MS Excel, Power Point and MS Access

**Expected Course Outcomes:**

On successful completion of this subject the students should have :Writing programming ability on OOPS concepts like Encapsulation, Data abstraction, Inheritance, Polymorphism and Exception handling etc.,

| | | |
|---|---|---|
| 1 | Recognize and understand Basic of Computer | K2 |
| 2 | Use and Practice of Word Processing | K3 |
| 3 | Use and Practice of MS Excel | K3 |
| 4 | Knowledge to Make Small Presentation | K6 |
| 5 | Use and Practice of MS Access | K3 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

| Unit:1 | INTRODUCTION TO C++ | 9 hours |
|---|---|---|

Basic Concepts of OOPs – Advantages OOPs– I/O in C++ - C++ Declarations - Control Structures – Decision Making Statements – If…Else – Jump – GOTO – Break – Continue – Switch Case Statements – Loops in C++ - For – While – Do…While loops – Array –Types of array.

| Unit:2 | CLASSES AND OBJECTS | 9 hours |
|---|---|---|

Functions in C++, Inline Functions – Function Overloading-Declaring objects – Defining member functions – Static member variables and functions – Array of objects – Friend functions – Overloading member functions – Constructor and Destructors. – String Functions.

| Unit:3 | OPERATOR OVERLOADING & INHERITANCE | 9 hours |
|---|---|---|

Overloading unary, Binary operators – Overloading friend functions – Type conversion - Inheritance: Types of inheritance: Single, Multilevel, Multiple, Hierarchical, Hybrid and Multi path inheritance – Virtual Base classes – Abstract Classes.

| Unit:4 | POINTERS | 9 hours |
|---|---|---|

Declaration – Pointer to class, object – THIS pointer – Pointer to derived classes and base classes – Memory models – New and delete operators – Dynamic objects – Binding, Polymorphisms and Virtual functions.

| Unit:5 | EXCEPTION HANDLING & FILES | 9 hours |
|---|---|---|
| Exception handling -File stream classes – File Modes – Sequential read/write operations – Binary and ASCII files –Random Access File. | | |
| | **Total Lecture hours** | **45 hours** |
| **Text Book(s)** | | |
| 1 | Ashok N Kamthane: Object Oriented Programming with ANSI and Turbo C++, Pearson Education Publ., 2003. | |
| **Reference Books** | | |
| 1 | E. Balagurusamy: Object Oriented Programming with C++, TMH Pub., 1998. | |
| 2 | Maria Litvin and Gary Litvin: C++ for you++, Vikas Publ, 2002 | |
| 3 | John R Hubbard: Programming with C++, TMH Publ. II Edition, 2002 | |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. | | |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

| Course code | 3ZA | BIOMEDICAL INSTRUMENTATION | L | T | P | C |
|---|---|---|---|---|---|---|

| Core /Elective / Supportive: | Skill Based Subject: I | 3 | T | | 3 |
|---|---|---|---|---|---|
| Pre-requisite | Higher secondary biology | Syllabus Version | 2025-26 | | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To presents various bio-potentials and working principles of medical instruments
- ❖ To enable the students to learn about bio-potentials and medical instruments

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Understand the Concept of bio-potential | K2 |
| 2 | Understand the concept of medical instruments | K2 |
| 3 | Develop the troubleshooting Skills of medical instruments | K3 |
| 4 | Understand the concepts of signal conditioners & diagnostic equipment | K2 |
| 5 | Analyze physiological assist devices | K4 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | BASIC PHYSIOLOGY | 9 hours |
|---|---|---|

Cells and their Structures - Transport of Ions through Cell Membrane - Resting and Excited State Transmembrane Potential - Nervous System - Physiology of Muscles - Heart and Blood Circulation

| Unit:2 | ELECTRODES AND TRANSDUCERS | 9 hours |
|---|---|---|

Basic Electrode Theory - Micro Electrodes - Skin Surface Electrodes - Needle Electrodes - Equivalent Circuit - Electrode Materials - Chemical Electrodes - Reference Electrodes - The pH Electrode - Blood Gas Electrode – Thermistor

| Unit:3 | SIGNAL CONDITIONERS & DIAGNOSTIC EQUIPMENTS | 9 hours |
|---|---|---|

Instrumentation Amplifiers - Current Amplifiers - Isolation Amplifier - Need for Filters - Low Pass, High Pass and Band Pass Active Filters - Notch Filters - Heated Stylus and Ink Pen Recorders. DIAGNOSTIC EQUIPMENTS: Typical Electrocardiogram (ECG)-Electrocardiograph - Electroencephalogram (EEG) .

| Unit:4 | DIAGNOSTIC EQUIPMENTS & BIOTELEMETRY | 9 hours |
|---|---|---|

X-ray Imaging - Radio Fluoroscopy - Image Intensifiers - Angiography - Endoscopy – Diathermy. BIOTELEMETRY AND PATIENT SAFETY: Need for Biotelemetry - Elements of Telemetry System - Radio Telemetry System - Physiological Signals used in Telemetry .

| Unit:5 | PHYSIOLOGICAL ASSIST DEVICES | 9 hours |
|---|---|---|
| Need for Pacemakers - Pacemaker Parameters and Circuits - Different Modes of Operation - DC Defibrillator - Heart Lung Machines - Nerve and Muscle Stimulator. COMPUTER APPLICATIONS: Analysis of ECG signals . | | |
| | | |
| | **Total Lecture hours** | **45 hours** |

| **Text Book(s)** | |
|---|---|
| 1 | Joseph J. Carr and John M. Brown, **"Introduction to Biomedical Equipment Technology",** |
| 2 | Leslie Cromwell.,FredJ. Webell., Erich A. Pfeffer.,**"Bio-medical Instrumentation** |

| **Reference Books** | |
|---|---|
| 1 | Khandpur, **"Handbook on Biomedical Instrumentation",** Tata McGraw Hill Company, New |
| 2 | Ohn G Webster, Ed., **"Medical Instrumentation Application and Design",** Third Edition, John Wiley & Sons, Singapore, 1999 |
| 3 | Arumugam.M,**"BiomedicalInstrumentation",**AnuradhaAgenciesPublishers,Chennai,1992 |

| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
|---|---|
| 1 | https://www.youtube.com/watch?v=i2mZylgP1Fk |
| 2 | https://www.youtube.com/watch?v=4ldv98F7Zng |
| 3 | https://nptel.ac.in/courses/108/105/108105101/ |
| 4 | https://nptel.ac.in/courses/108/105/108105091/ |

Course Designed By:
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**Mapping with Programme Outcomes**

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

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

# Fourth Semester

| Course code | 43A | IC'S AND INSTRUMENTATION | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Core paper V | 5 | T | | 4 |
| Pre-requisite | | Basic Electronics | Syllabus Version | | 2025-26 | |

**Course Objectives:**

- To impart the knowledge on IC fabrication, Timer, PLL, and electronic instruments
- To enable the students to acquire the knowledge of Op-amp., transducers and its applications in electronic circuits and know the technique of measurements using electronic instruments

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Recognize the standards in IC Fabrication Technology | K1 |
| 2 | Understand the working of Timer and PLL | K2 |
| 3 | Design simple circuits using Op-amp. | K3 |
| 4 | Understand the principle of various types of transducers K2 Study the construction and working of frequently used equipment's like CRO | K4 |
| 5 | Digital Voltmeter etc. | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | IC FABRICATIONTECHNOLOGY | 12hours |
|---|---|---|

Fundamentals of Monolithic IC Technology – Basic Planar Process- Wafer Preparation EpitaxialGrowth–Oxidation–Photolithography–DiffusionofImpurities–Isolation Techniques–Metallization–Monolithic Transistors–Integrated Resistors- Thin and Thick Film Technology.

| Unit:2 | TIMERANDPLL | 12hours |
|---|---|---|

Functional Block Diagram of 555 timer – Monostable Operation – Applications: – Linear Ramp Generator – Pulse Width Modulator – Astable Operation – Applications: Schmitt Trigger – FSK Generator - Phase Locked Loop: Functional Block Diagram – Phase Detector / Comparator –Voltage Controlled Oscillator – Low Pass Filter .

| Unit:3 | OPERATIONALAMPLIFIER | 12hours |
|---|---|---|

Ideal Characteristics - Inverting and Non-inverting Amplifier – Op-amp Parameters – Summing Amplifier – Difference Amplifier – Integrator – Differentiator – Instrumentation Amplifier – Voltage to Current Converter – Current to Voltage Converter – Phase Shift Oscillator – Wein Bridge Oscillator–Square Wave and Triangular Wave Generator .

| Unit:4 | TRANSDUCERS | 12hours |
|---|---|---|

Introduction – Electrical Transducer – Basic requirements of Transducer – Classification of Transducers – Selection of Transducers – Resistive Transducers – Potentiometers – Thermistors – Thermocouple – Piezoelectric Transducers – Hall Effect Transducers – Photoelectric Transducers – Digital Displacement Transducers.

| Unit:5 | ELECTRONIC INSTRUMENTS | 12 hours |
|---|---|---|
| Q Meters- CRO: Block Diagram – Cathode Ray Tube – Measurement of Frequency – Measurement of Voltage and Current – Digital Oscilloscope – Digital voltmeter– Dual Slope Integrating Type DVM – Digital Multimeter – Humidity Measurement – Measurement of PH. | | |
| | **Total Lecture hours** | **60 hours** |

| **Text Book(s)** | |
|---|---|
| 1 | D.Roy Choudhury and Shahil B Jain, **Linear Integrated Circuits"**, Second Edition New Age International Publishers, 2004 |
| 2 | K.R.Botkar,**—Integrated Circuits"**, 10th Edition Khanna Publishers , 2006 |
| **Reference Books** | |
| 1 | J.B.GUPTA,‖ **A Course In Electronic and Electrical Measurements and Instrumentation"**, 12th Edition, S.K Kataria & Sons. |
| 2 | A.K. Sawhney,‖ **ELECTRICAL & ELECTRONIC MEASUREMENTS AND INSTRUMENTATION:**, Dhanpath Rai & Co (P) Ltd, 2004. |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | |
| 1 | https://nptel.ac.in/courses/108/108/108108111/Integrated circuits,opamps and their applications |
| 2 | https://nptel.ac.in/courses/117/106/117106030/Analog IC Design |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.. | |

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

| Course code | 4AD | PYTHON PROGRAMMING | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective / Supportive | | ALLIED PAPER IV | 5 | T | | 4 |
| Pre-requisite | | Knowledge on logic of the programs and oops Concept. | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

1. To introduce the fundamentals of Python Programming.
2. To teach about the concept of Functions in Python.
3. To impart the knowledge of Lists, Tuples, Files and Directories.
4. To learn about dictionaries in python.
5. To explore the object-oriented programming, Graphical programming aspects of python with help of built in modules.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Remembering the concept of operators, data types, looping statements in Python Programming. | **K1** |
| 2 | Understanding the concepts of Input / Output operations in file. | **K2** |
| 3 | Applying the concept of functions and exception handling | **K3** |
| 4 | Analyzing the structures of list, Tuples and maintaining dictionaries | **K4** |
| 5 | Demonstrate significant experience with python program development environment | **K4-K6** |

**K1**-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5** -Evaluate; **K6** -Create

| Unit:1 | BASICS OF PYTHON | 10hours |
|---|---|---|

**BASICS** : Python - Variables - Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Basic Syntax-Comments - Standard Data Types – Relational Operators – Logical Operators -Bit Wise Operators-Simple Input and Output.

| Unit:2 | CONTROL STATEMENTS | 10hours |
|---|---|---|

**CONTROL STATEMENTS**: Control Flow and Syntax - Indenting - if Statement - statements and expressions- string operations- Boolean Expressions -while Loop - break and continue - for Loop.**LISTS**:List-listslices-listmethods-listloop–mutability–aliasing-cloninglists-
List parameters**. TUPLES**: Tuple assignment, Tuple as return value-Sets– Dictionaries

| Unit:3 | FUNCTIONS | 10hours |
|---|---|---|

**FUNCTIONS**: Definition - Passing parameters to a Function - Built-in functions- Variable Number of Arguments. **Libraries in Python**: Tensor Flow, Matplotlib, Open CV,Pandas, NumPy, SciPy, Scrapy, PyTorch,
Scikit Learn.

| Unit:4 | ERROR HANDLING | 12hours |
|---|---|---|

**ERROR HANDLING**: Run Time Errors - Exception Model - Exception Hierarchy – Handling Multiple Exceptions-Handling IO Exceptions. **Data Streams**-Access Modes Writing-Data to a File Reading- Data From a File - File Methods – Working with Directories.

| | | |
|---|---|---|
| **Unit:5** | **OBJECT ORIENTED FEATURES** | **10hours** |
| **OBJECT ORIENTED FEATURES:** Classes Principles of Object Orientation - Creating Classes – Instance Methods-Class Variables–Inheritance – Polymorphism - Regular Expressions. | | |
| **Unit:6** | **Contemporary Issues** | **3hours** |
| Expert lectures, online seminars -webinars | | |
| | **Total Lecture hours** | **55hours** |

**TextBook(s)**

| | |
|---|---|
| 1 | Mark Summer field, Programming in Python3:AComplete introduction to the Python Language, Addison-Wesley Professional, 2009. |
| 2 | Martin C.Brown, PYTHON: The Complete Reference, McGraw-Hill, 2001 |
| 3 | E. Balagurusamy (2017), "Problem Solving and Python Programming", McGraw-Hill, First Edition. |

**Reference Books**

| | |
|---|---|
| 1 | Allen B.Downey,"Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff /O' Reilly Publishers, 2016 |
| 2 | Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated forPython3.2, Network Theory Ltd., 2011 |
| 3 | Wesley J Chun, Core Python Applications Programming, Prentice Hall,2012. |

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

| | |
|---|---|
| 1 | Python for Everybody-Specialisation - Coursera |
| 2 | Learn Python: The Complete Python Programming Course - Udemy |
| 3 | Python for Data Science – NPTEL / Swayam |

Course Designed By:

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Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

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

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

| Course Code | 43P | DIGITAL ELECTRONICS AND LINEAR IC's LAB | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | Core Practical III | | 2 | | P | 3 |
| Pre-Requisite: | Digital Electronics and Microprocessor theory | | Syllabus Version | | 2025-26 | |

**Course Objectives:**

**The Main Objectives of this course are to:**

- To understand the logical operation of various gates and theorems
- To develop various digital circuits
- To develop the assembly language programming of Microprocessor and to interface it with various peripheral devices

**Expected Course Outcomes:**

On the Successful completion of the course, student will be able to:

| | | |
|---|---|---|
| 1 | Analyze the circuit using Boolean laws | K6 |
| 2 | Design the Adder and subtractor circuit using logic gate | K6 |
| 3 | Gain knowledge of arithmetic Programming of8085 | K6 |
| 4 | Knowledge about logic Programming of8085 | K6 |
| 5 | Understand the wave form generation | K1 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

| Part I | DIGITAL ELECTRONICS (Any 12 Experiments) | 40 Hours |
|---|---|---|

1 Verification of Basic Gates and Universal gates
2 Verification of Demorgan's Theorem
3 Half Adder and Full Adder & Half Subtractor and Full Subtractor
4 Decade Counter &BCD Counter
5 Study of Flip-Flops
6 Multiplexer and De-Multiplexers
7 Encoder and Decoder
8 BCD to7-SegmentDisplay
9 Binary to Grey code and Grey to Binary code
10. Synchronous and Asynchronous Counter
11 Design and Simulation of Logic Gate using VHDL Coding
12.Design and Simulation of Adder Circuits using VHDL Coding

| Part II | LINEAR IC'S LAB | 45 ours |
|---|---|---|

1. Astable Multivibratorusing555
2. Monostable Multivibratorusing555
3. Inverting and Non Inverting Amplifier
4. Phase Shift Oscillator
5. Instrumentation Amplifier
6. Voltage to Current Converter and Current to Voltage Convertor
7. Wein Bridge Oscillator usingIC741
8. Square Wave and Triangular Generator
9. Adder and Subtractor usingIC741

| | | |
|---|---|---|
| | **Total Lecture hours** | **85 hours** |

Course Designed By:

Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

| Course Code | 43Q | ELECTRONIC CIRCUITS & COMMUNICATION LAB | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | Core Practical IV | | 2 | | P | 3 |
| Pre-Requisite: | Electronic circuits theory and Communication theory | | Syllabus Version | | 2025-26 | |

**Course Objectives:**

**The Main Objectives of this course are to:**

- To understand the concept of working of regulated power supplies, rectifiers, amplifiers and oscillators.
- To experiment the modulation and detection techniques.

**Expected Course Outcomes:**

On the Successful completion of the course, student will be able to:

| | | |
|---|---|---|
| 1 | sign power supply and rectifier circuits | K6 |
| 2 | sign Amplifier circuits | K6 |
| 3 | sign different Oscillator circuits | K6 |
| 4 | sign different Modulation circuits | K6 |
| 5 | Study on communication antennas | K1 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

| Part I | ELECTRONIC CIRCUITS (Any 12 Experiments) | 45 hours |
|---|---|---|

1. DC Regulated Power Supply using Zener Diode
2. Voltage Doubler
3. Feedback Amplifier
4. Emitter Follower
5. Transformer Coupled Amplifier
6. Hartley Oscillator
7. Colpitts Oscillator
8. Phase shift Oscillator
9. Wein Bridge Oscillator
10. RC Coupled Amplifier
11. Half Wave and Full Wave Rectifier
12. Filter Circuits

| Part II | ELECTRONIC COMMUNICATION | 40 hours |
|---|---|---|

1. Performance of IF Amplifier
2. AM Modulation and Detection
3. FM Modulation and Detection
4. PAM Modulation
5. PIN Diode Oscillator
6. Alignment of Dish Antenna
7. Alignment of Satellite Receiver
8. PWM Modulation
9. PPM Modulation
10. PCM Modulation
11. GUNN Diode Oscillator

| | **Total Lecture hours** | **85 hours** |
|---|---|---|

Course Designed By:

Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &

Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

| Course code | 43R | OBJECT ORIENTED PROGRAMMING USING C++ & PYTHON PROGRAMMING LAB | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/Supportive | | Allied Lab V | 2 | | P | 2 |
| Pre-requisite | | Basics of any Programming Language | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

1. This course presents an overview of elementary data items, lists, dictionaries, sets and tuples
2. To understand and write simple OOP WITH C++ Python programs
3. To Understand the OOPS concepts of Python
4. To develop web applications using Python

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | To write programs in Python using OOPS concepts | K1,K2 |
| 2 | To understand the concepts of File operations and Modules in Python | K2,K3 |
| 3 | Implementation of lists, dictionaries, sets and tuples as programs | K3,K4 |
| 4 | To develop web applications using Python | K5,K6 |

**K1**-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5** -Evaluate; **K6** -Create

| LIST OF PROGRAMS | 45 hours |
|---|---|

**OBJECT ORIENTED PROGRAMMING WITH C++ (Any 6 )**

1. Create a class to implement the data structure STACK . Write a constructor to initialize the TOP of the stack to 0 . Write a member function POP( ) to delete an element . Check for overflow and underflow conditions.

2. Create a class ARITH which consists of a FLOAT and an integer Variable . Write member ADD( ), SUB ( ), MUL ( ), DIV ( ), MOD ( ) to perform addition, multiplication, division and modulus respectively . Write member functions to get and display values.

3. Create a class MAT has a 2-d matrix and R&C represents the rows and columns of the matrix . Overload the operators +, -, * to add subtract and multiply two matrices. Write member functions to get and display MAT object values.

4. Create a class STRING . Write member function to initialize, get and display strings. Overload the operator + to concatenate two strings, = = to compare two strings and a member function to find the length of the string.

5. Create a class which consists of EMPLOYEE detail like eno, ename, dept, basic-salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and write a member function to calculate da , hra , pf depending on the grade and Display the Payslip in a neat format using console I/O.

6. Create a class SHAPE which consist of two VIRTUAL FUNCTIONS Cal_Area( ) and Cal_PERI to calculate AREA and PERIMETER of various figures. Derive three classes SQUARE,RECTANGLE and TRIANGLE from the class SHAPE and calculate AREA and PERIMETER of each class separately and Display the result.

7. Create two classes which consists of two private variables, one float And one integer variables in each class. Write member functions to get and display them . Write FRIEND function common to arguments. And the integer and float values of both the objects separately and Display the result.

8. Write a user defined function USERFUN( ) which has the formatting commands like setw( ), showpoint , showpos precision( ). Write a program which prints an multiplication table and uses USERFUN( ) for formatting.

9. Write a program to perform Insertion , Deletion and Updation using files .

10. Write a program which takes a file as argument and copies in to another file with line numbers using Command Line Arguments.

**PYTHON PROGRAMMING LAB (Any 6 )**

Implement the following in Python:

1. Write a Python program by getting input from the user and displays the following information: Your name, Full address, Mobile number, College name, Course, Subjects.
2. Write a Python program to find the largest three integers using if-else and conditional operator.
3. Write a Python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
4. Write a Python program to find the product of two matrices [A] m x p and [B] p x r.
5. Write recursive functions for Fibonacci sequence up to given number n.
6. Write recursive functions to display prime number from 2 to n.
7. Write a Python program that writes a series of random numbers to a file from 1 to n and display.
8. Write a Python program to sort a given sequence: String, List and Tuple.
9. Write a Python program to make a simple calculator using functions.
10. Write a Python program for Linear Search using functions.
11. Write a Python program for Inheritance.
12. Write a Python program to slice a given list.
13. Write a Python program to count the number of words.
14. Write a Python program to copy a file.
15. Write a Python program to check the given password is correct or not using regular expressions.

| | |
|---|---|
| **Total Lecture hours** | **45 hours** |

**Text Books**


| | |
|---|---|
| 1 | Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition - Second Release, 2014. |
| 2 | Mark Lutz, “Learning Python”, O’ Reilly, Fifth Edition, 2013. |


Course Designed By:
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Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

# Fifth Semester

| Course code | 53A | 8051 MICROCONTROLLER AND ITS APPLICATIONS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Core paper VI | 5 | T | | 4 |
| Pre-requisite: | | Digital Electronics8085 Microprocessor | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- To Study the architecture and addressing modesof8051
- To Impart knowledge about assembly language programsof8051
- to understand the importance of different peripheral devices and their interfacingto8051
- To Impart knowledge of different types of external interfaces including LCD, Keypad Matrix, Stepper motor and sensors

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Describe architecture and operation of Microcontroller 8051 | K1 |
| 2 | Foster ability to understand the design concept of interfacing Microcontroller with various peripherals | K2 |
| 3 | Analyze the data transfer and interfacing techniques | K3 |
| 4 | Foster ability to understand the role of embedded systems in industry | K4 |
| 5 | Analyze the data transfer through serial and parallel ports. | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | MICROCONTROLLER OVERVIEW | 18 hours |
|---|---|---|

Introduction to Microcontroller –- 8051 Microcontroller Block Diagram - 8051 Oscillator and Clock – A, B & Register Banks – Stack - Program Counter & Data Pointer– – Flag & PSW – Special Function Registers – Internal Memory – Input / Output Pins & Ports.

| Unit:2 | ADDRESSING MODES, ARITHMETIC AND LOGICAL INSTRUCTION | 18 hours |
|---|---|---|

Introduction – Addressing Modes: Direct – Indirect – Register - Indexed – Arithmetic Instructions: Addition, Subtraction, Multiplication, Division, Increment And Decrement – Logic & Compare Instructions: AND, OR, XOR, CPL & Compare – Rotate & Swap Instruction: RR, RL, RRC, RLC.

| Unit:3 | DATA TRANSFER AND BRANCH OPERATIONS | 18 hours |
|---|---|---|

Introduction – Internal Data Move - External Data Move – Code Memory Read Only Data Move - Loop and Jump Instructions – Conditional Jump – Unconditional Jump – Call Instructions: LCALL and ACALL – Push and Pop Instructions – Simple Programs.

| Unit:4 | PERIPHERALS | 18hours |
|---|---|---|

Timer and Counter: Timer Registers – TMOD – TCON - Mode 1 and 2 Programming – Counter Programming – Serial: MAX232 – Baud Rate – SBUF Register – SCON Register – Program to Transfer and Receive Data Serially.

| Unit:5 | INTERFACING | 18hours |
|---|---|---|
| Interfacing of LCD – LCD Operation – Pin Descriptions – Command and Data to the LCD – ADC 0804 – LM34 Temperature Sensor – Stepper Motor – Interfacing Key Board. | | |
| | | |
| | **Total Lecture hours** | **90 hours** |

| | **Text Book(s)** |
|---|---|
| 1 | Mohamed Ali Maszidi & Janice Gillispie Maszidi**, "The 8051 Microcontroller and Embedded System"**, Pearson Publishers |
| 2 | Kenneth J. Ayala, **"The 8051 Microcontroller Architecture, Programming and Application"**2 nd Edition, Penram Int ernational Publications |
| | |

| | **Reference Books** |
|---|---|
| 1 | Myke predko, **"Programming and Customizing the 8051 Microcontroller"**, Tata McGraw Hill, 1st Edition |
| 2 | AyalaJ.K., **—The8051 Microcontroller:Architecture, programming and applications"**, Penram International (2005) 3rd edition. |

| | **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** |
|---|---|
| 1 | https://www.youtube.com/watch?v=84YUQu8tE4w |
| 2 | https://www.youtube.com/watch?v=GPz_mR7Flas |
| 3 | https://www.youtube.com/watch?v=uFhDGagZzjs |

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode..

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

| Course Code | 53B | INTERNET OF THINGS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective /Supportive: | CORE PAPER VII | | 5 | T | | 4 |
| Pre-Requisite: | Basic Electronics | | Syllabus Version | | 2025-26 | |

**Course Objectives:**

**The Main Objectives of this course are to:**

- To enable the students to learn about IoT and also to understand the concept of embedded devices and Interfacing sensors.

**Expected Course Outcomes:**

On the Successful completion of the course, student will be able to:

| | | |
|---|---|---|
| 1 | Study the concept of basic IoT | K1 |
| 2 | Familiarize the principle of connected devices | K2 |
| 3 | Gain knowledge about embedded devices | K3 |
| 4 | Analyze different sensor Interface technology | K4 |
| 5 | Analyze the IoT applications | K4 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

| Unit:1 | IOT FUNDAMENTALS | 18 hours |
|---|---|---|

Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT – Technologies for IoT– Applications of IoT – Industrial IoT – Security in IoT

| Unit:2 | DESIGN PRINCIPLES FOR CONNECTED DEVICES | 18 hour s |
|---|---|---|

Introduction-IoT/M2m systems - Communication Technologies - Data management, data consolidation and Device management - Ease of Designing and Affordability.

| Unit:3 | PROGRAMMING FUNDAMENTALS WITH C USING ARDUINO IDE | 18 hours |
|---|---|---|

Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions.

| Unit:4 | SENSORS AND ACTUATORS | 18 hours |
|---|---|---|

Analog and Digital Sensors – Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino.

| Unit:5 | SENDING SENSOR DATA OVER INTERNET | 18 hours |
|---|---|---|

Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU using Arduino IDE – Using WiFi and NODEMCU to transmit data from temperature sensor.
.

| | |
|---|---|
| **Total Lecture hours** | **90 Hours** |

| | |
|---|---|
| **Text Book(s)** | |
| 1 | Arshdeep Bahga, Vijay Madisetti, **—Internet of Things: A Hands-On Approach‟**, 2014. ISBN: 978-0996025515 |
| 2 | Boris Adryan, Dominik Obermaier, Paul Fremantle, **—The Technical Foundations Of Iot‟**, Artech Houser Publishers, 2017. |
| **Reference Books** | |
| 1 | Michael Margolis,**—Arduino Cookbook‟**, O‟Reilly, 2011 |
| 2 | Marco Schwartz, **—Internet of ThingswithESP8266‟**, Packt Publishing,2016 |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | |
| 1 | https://nptel.ac.in/courses/106/105/106105166/Introduction to IoT Part I – Lecture 1 |
| 2 | -https://ocw.cs.pub.ro/courses/iot/courses/02Electronics for Internet of Things – Lecture II |
| 3 | https://nptel.ac.in/courses/106105166/Introduction to Arduino – I – Lecture 22 |

Course Designed By:

R.Archana, Assistant professor , Nehru Arts and Science College, Coimbatore.&
Dr.N Om Muruga , Assistant Professor, Government Arts College Ooty,
C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty.

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

| Course code | 5ZC | VISUAL PROGRAMMING | L | T | P | C |
|---|---|---|---|---|---|---|
| Core /Elective / Supportive: | | Skill Based Subject III: | 3 | T | | 3 |
| Pre-requisite | | Computer skills and familiarity with Microsoft Windows. | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To design and develop Windows-based applications usingVisualBasic
- ❖ To Emphasis on the fundamentals of design, development, implementation and documentation
- ❖ To Gain knowledge about to write visualC++programming

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Explore Visual Basic's | K1 |
| 2 | Implement syntax rules in Visual Basic programs | K2 |
| 3 | Explain variables and data types used in program development | K3 |
| 4 | Write and apply visual C++ principles and programming techniques | K4 |
| 5 | Write and apply procedures, sub-procedures, and functions to data transfer | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | VISUAL BASIC OVERVIEW | 9hours |
|---|---|---|

Introduction to Windows Programming – Event Driven Programming – Data Types – Resources – Window Message – Device Context – Document Interfaces – Dynamic Linking – Software Development Kit (SDK) Tools – Context Help.

| Unit:2 | VISUAL BASIC OBJECTS | 9hours |
|---|---|---|

Visual Basic Programming – Forum Design – VBX Controls – Properties – Event Procedures MenusandToolbars–UsingDialogBoxes–WorkingwithControlArrays–ActiveXControls Multiple Documents Interface (MDI) – File System Controls – Data Control – Database Applications.

| Unit:3 | BUILDING THE USER INTERFACE | 9hours |
|---|---|---|

Visual C++ Programming – Frame Work Classes – VC++ Components – Resources – Event Handling – Message Dispatch System – Model and Modeless Dialogs – Important VBX Controls – Document view Architecture – Serialization – Multiple Document Interface – Splitter Windows – Coordination between Controls

| Unit:4 | DATABASE AND APPLICATIONS | 9 hours |
|---|---|---|

Database Connectivity – Min Database Applications – Embedding Controls in View creating user defined DLL's – Dialog Based Applications – Dynamic Data Transfer Function – Data Base Management with ODBC – Communicating with other applications – ObjectLinking and Embedding

| Unit:5 | DESIGN AND DEVELOPMENT | 9 hours |
|---|---|---|

Basics of GUI Design – Visual Interface Design – File System – Storage and Retrieval System -Simultaneous Multi- Platform Development

| Total Lecture hours | 45 hours |
|---|---|

| | |
|---|---|
| **Text Book(s)** | |
| 1 | Petzold,‖**Windows Programming**‖, Microsoft Press, 1995 |
| 2 | Marion Cottingham,‖**Visual Basic**‖, Peachpitt Press, 1999 |
| 3 | Kate Gregory,‖**Using Visual C++**‖, Prentice Hall of India Pvt. Ltd |
| 4 | PapparandMurray,‖**VisualC++:TheCompleteReference**‖,TataMcGrawHill,NewDelhi, 2000. |
| **Reference Books** | |
| 1 | John Paul Muller, **"Visual C++ from the Ground Up"**, Tata McGraw Hill, Delhi. |
| 2 | Richard C. Leinecker and Tom Archer, **"Visual C++ 6 Programming Bible",** Wiley India Pvt Ltd. |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https://www.youtube.com/watch?v=5nahqfJTQXs |
| 2 | https://www.youtube.com/watch?v=1oGpl6qNKoQ |
| 3 | https://www.youtube.com/watch?v=gcFHyVYdeFU |
| | |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. | |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

# Sixth Semester

| **Course code** | **63A** | **DESIGN WITH PIC MICROCONTROLLER** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|---|
| **Core/Elective/ Supportive:** | | **Core paper VIII** | **6** | | | **4** |
| **Pre-requisite** | | Students having knowledge of electronics fundamentals coupled with some programming experiences are the ideal participants for this Course. | **Syllabus Version** | | **2025-26** | |

**Course Objectives:**

The main objectives of this course are to:

- To Study the architecture and addressing modes of PIC Microcontroller
  Impart knowledge about assembly language programs of PIC Microcontroller
- To know various peripheral devices and to interface them with PIC Microcontroller

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Understand the evolution in microcontroller technology | K1 |
| 2 | Describe Harvard architecture model and programming techniques | K2 |
| 3 | Describe the operation and need for interrupts and timers | K3 |
| 4 | List out various operators in modelling the design units | K4 |
| 5 | Apply the concept for I/O port expansion | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| **Unit:1** | **CPU ARCHITECTURE AND INSTRUCTION SET** | **15hours** |
|---|---|---|

Overview – Harvard Architecture and Pipelining – Program Memory Considerations – Register File Structure and Addressing Modes – CPU registers – Instruction Set – Simple Operations

| **Unit:2** | **LOOP TIME SUBROUTINE, TIMER 2 AND INTERRUPTS** | **15 hours** |
|---|---|---|

Timer 2 Use – Interrupt Logic – Timer 2 Scalar Initialization – Interrupt Service - Interrupt Service Routine – Loop Time Subroutine

| **Unit:3** | **EXTERNAL INTERRUPTS AND TIMERS** | **15 hours** |
|---|---|---|

RB0/INT External Interrupt Input – Timer 0 – Compare Mode – Capture Mode – Timer1/CCP Programmable Period Scalar – Timer1 External Event Counter – Timer1 and Sleep Mode – Pulse Width Modulated Outputs – Port B Change Interrupts

| **Unit:4** | **I/O PORT EXPANSION** | **15hours** |
|---|---|---|

Synchronous Serial Port Module – Serial Peripheral Interface – Output Port Expansion – Input Port Expansion – LCD Display

| **Unit:5** | **$I^2C$ BUS FOR PERIPHERAL CHIP ACCESS** | **15hours** |
|---|---|---|

I2C Bus Operation - I2C Bus Subroutines – DAC Output – Temperature Sensor – Serial EEPROM

| | **Total Lecture hours** | **75 hours** |
|---|---|---|

**Text Book(s)**

1 John B.Peatman,**—Design with PIC Microcontrollers—**,Pearson Education Publishing

**Reference Books**

| | |
|---|---|
| 1 | Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, **"The PIC MicrocontrollerandEmbeddedsystems**–UsingAssemblyandCforPIC18,‖Prentice Hall, 2007 |


| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
|---|---|
| 1 | https://www.youtube.com/watch?v=nLlBssKCN2w |
| 2 | https://www.youtube.com/watch?v=VEAYB1A9SiA |
| 3 | https://www.youtube.com/watch?v=aSsnLyKtIAU |
| | |

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

| **Course code** | **63R** | **8051 MICROCONTROLLER LAB** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|---|
| **Core/Elective/ Supportive:** | | **Core –Practical – VI** | 3 | | **p** | **4** |
| **Pre-requisite** | | **Digital Electronics and 8085 Microprocessor** | **Syllabus Version** | | **2025-26** | |

**Course Objectives:**

The main objectives of this course are to:

To introduces the assembly language programming of Microcontroller

To develop the student's Assembly language programming skills and gives practical training of interfacing the peripheral devices with the Microcontroller

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Apply the fundamentals of assembly level programming of microcontroller | K3 |
| 2 | Design and Develop program for real time interface | K6 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

**8051/ PIC PROGRAMMING**

(ANY 12 EXPERIMENTS)

1. Addition / Subtraction of 8 / 16bitData
2. Multiplication / division 8bitData
3. Block Data Transfer
4. Smallest / Largest of N Numbers
5. To Arrange in Ascending /Descending Order
6. Sum of N 8 bit Numbers
7. 1's and 2's Compliment of an Array (8 /16bit)
8. UP/DOWN Counter using 7SegmentDisplay
9. Traffic Light Control Interface
10. Wave Form Generation
11. ADC Interface
12. DAC Interface
13. Stepper Motor Interface
14. Solid State Relay Interface
15. DC Motor Interface
16. Temperature Controller
17. Rolling and Blinking of a Message
18. LCD Interface
19. Frequency Counter
20. Water Level Indicator

Course Designed By:

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| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | M | M | S | S | S | M | S | M | M | S |
| CO2 | S | S | S | M | M | M | S | M | L | L |
| CO3 | S | S | M | M | M | L | L | L | S | M |
| CO4 | S | S | M | S | S | S | L | L | S | M |
| CO5 | M | M | S | S | S | L | L | L | S | M |

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

| Course code | 63P | Internet of Things System Design Lab | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/ Supportive | | Core –Practical- VII | 3 | | P | 4 |
| Pre-requisite | | Basic knowledge of Electronic Circuits or permission of instructor | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To make the students to design IoT based circuits
- ❖ To understand the characteristics of Arduino & sensors .

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Interfacing the system and IoT | K4 |
| 2 | Understand the characteristics of Internet of Things . | K6 |
| 3 | Design the smart works | K5 |
| 4 | Design Various Applications using IoT | K5 |
| 5 | Understand the Sensors methods | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

**(ANY 8 EXPERIMENTS)**

1. Installation and Library Management
2. LED interfacing.
   a. Blinking
   b. Running Light
3. Switch Interfacing
   a. Without Interrupt
   b. With Interrupt
4. Serial Communication & Plotter
5. ADC Interfacing
6. Buzzer interfacing
7. Tone Generation
8. LCD interfacing
9. Servo Motor interfacing
10. Joystick interfacing
11. Tilt Sensor interfacing
12. Reed Switch interfacing
13. Thyristor protection circuit

Course Designed By:

Dr.T.Siva Kumar , Principal ,RVS College Of Arts and Science,Coimbatore&
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur .

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | M | M | S | S | S | M | S | M | M | S |
| CO2 | S | S | S | M | M | M | S | M | L | L |
| CO3 | S | S | M | M | M | L | L | L | S | M |
| CO4 | S | S | M | S | S | S | L | L | S | M |
| CO5 | M | M | S | S | S | L | L | L | S | M |

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

| Course code | 63Q | INDUSTRIAL AND POWER ELECTRONICS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/ Supportive | | Core –Practical- VIII | 3 | | P | 4 |
| Pre-requisite | | Basic knowledge of Electronic Circuits or permission of instructor | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To make the students to design triggering circuits of SCR.
- ❖ To understand the characteristics of power electronic devices.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Design triggering circuits of SCR | K4 |
| 2 | Understand the characteristics of power electronic devices. | K6 |
| 3 | Design power Inverter Circuits | K5 |
| 4 | Design Various Applications of SCR | K5 |
| 5 | Design Cyclo Converter Circuits | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit I | INDUSTRIAL AND POWER ELECTRONICS | 90 Hours |
|---|---|---|

**(ANY 12 EXPERIMENTS)**

1. Triggering of SCR by R, C and Diac.
2. Design of snubber circuit.
3. Fan regulator using Triac.
4. Thyristor chopper.
5. TRIAC Flasher.
6. Commutation Techniques.
7. Speed control of DC motor using SCR.
8. Automatic street light controller
9. Burglar Alarm
10. Sequencer Circuit.
11. Power Inverter
12. Switching Regulators
13. Automatic Battery Charger
14. Fire alarm
15. ON / OFF relay control using opto – coupler
16. Servo stabilizer
17. Layout and Art Work preparation for PCB
18. Etching Drilling and Component mounting of PCB
19. Temperature controller using AD 590/ LM 35.
20. Construction of Emergency Lamp.
21. Phase Control Circuit
22. Cyclo converter
23. Thyristor protection circuit

Course Designed By:
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Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | M | M | S | S | S | M | S | M | M | S |
| CO2 | S | S | S | M | M | M | S | M | L | L |
| CO3 | S | S | M | M | M | L | L | L | S | M |
| CO4 | S | S | M | S | S | S | L | L | S | M |
| CO5 | M | M | S | S | S | L | L | L | S | M |

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

| Course code | 6ZP | VISUAL PROGRAMMING LAB | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/ Supportive | | Skill Based Subject Practical-IV | 3 | | P | 2 |
| Pre-requisite | | Basic computer skills and familiarity with Microsoft Windows. | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ Learn to design and develop Windows-based business applications using Visual Basic Emphasis on the fundamentals of structured design, development, implementation, and documentation

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Implement syntax rules in Visual Basic programs | K2 |
| 2 | Explain variables and data types used in program development | K3 |
| 3 | Write visual C++ principles and programming techniques | K6 |
| 4 | Design Application Editor and Control | K5 |
| 5 | Design VB application Link | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

**VISUAL PROGRAMMING (ANY 8 EXPERIMENTS)**

1. Building Simple Applications using Basic Tools
2. Working with Intrinsic Control and Active X controls
3. Create an Application with Multiple Forms and Dialogs
4. Write a VB Program to Design an e-mail Registration Form
5. Create an Application with Menu Editor
6. Create an Application with DAO Controls
7. Create an Application using Common Dialogs
8. Write a program for Drag and Drop Events
9. Create a Database for library management using ADD Controls
10. Creating an Application using Active X control
11. Create a Scientific Calculator in VB
12. Develop a VB application to either link or Embed MS Word Document to an OLE Control
13. Display Student Information using Grid Control
14. Create an Application using RDO Controls
15. Develop an Application to perform the following operation in the Employee Table using DAO
    - i) Add a new Record.
    - ii) Delete a Record.
    - iii) Modify a Record.

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| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | M | M | S | S | S | M | S | M | M | S |
| CO2 | S | S | S | M | M | M | S | M | L | L |
| CO3 | S | S | M | M | M | L | L | L | S | M |
| CO4 | S | S | M | S | S | S | L | L | S | M |
| CO5 | M | M | S | S | S | L | L | L | S | M |

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

# Elective Courses

| Course Code | 5EA | PCB DESIGN AND FABRICATION | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/ Supportive | Elective-I-A | | 4 | T | | 3 |
| Pre-requisite | Basic knowledge of circuits familiar with the functions and performance of various components and have a good logical thinking ability. | | Syllabus Version | 2025-26 | | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To inculcate the knowledge of PCB design
- ❖ To impart knowledge on various methods of laying out a PCB
- ❖ To learn how to etch and solder
- ❖ To develop various techniques used for PCB design and fabrication

**Expected Course Outcomes:**

On the Successful completion of the course, student will be able to:

| | | |
|---|---|---|
| 1 | Classify the boards and layers | K1 |
| 2 | Design layout and make use of the photo printing and etching techniques | K2 |
| 3 | Understand the design rules and automation techniques | K3 |
| 4 | Understand basic concepts of transmission line, crosstalk and thermal issues | K4 |
| 5 | sign (schematic and layout) PCB for analog circuits, digital circuits and mixed circuits | K5 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

| **Unit:1** | **TYPES OFPCB** | **18 hours** |
|---|---|---|

Single sided board – double sided – Multilayer boards – Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's

| **Unit:2** | **LAYOUT AND ARTWORK** | **18 hours** |
|---|---|---|

Planning – General Rules Layout of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check-Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection

| **Unit:3** | **LAMINATES AND PHOTO PRINTING** | **18 hours** |
|---|---|---|

Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists

| **Unit:4** | **ETCHING AND SOLDERING** | **18 hours** |
|---|---|---|

Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice

| Unit:5 | DESIGN RULES AND AUTOMATION | 18 hours |
|---|---|---|
| Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD | | |
| | **Total Lecture hours** | **90 hours** |

| **Text Book(s)** | |
|---|---|
| 1 | Walter C. Bosshart, ―PCB Design and Technology‖, Tata McGraw Hill Publications, Delhi 1983 |
| 2 | RS Khandpur, ―Printed Circuit Board‖byTata McGraw Hill Education Pvt Ltd., New Delhi |
| **Reference Books** | |
| 1 | S D Mehta , ―ElectronicProduct Design‖ Volume-I, S Chand Publications |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | |
| 1 | https://www.wikihow.com/Create-Printed-Circuit-Boards |
| 2 | http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/ |
| 3 | https://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself |
| 4 | https://www.youtube.com/watch?v=mv7Y0A9YeUc |
| 4 | https://www.youtube.com/watch?v=imQTCW1yWkg |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. | |

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

| Course code | 5EB | ADVANCED COMMUNICATION SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/ Elective/ Supportive: | | Elective I B | 4 | T | | 3 |
| Pre-requisite | | Principles of Communication Systems | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To analyze various data communication systems
- ❖ To make the students understand the basic concept in the field of pulse communications and cellular communication systems
- ❖ To know basis of satellite communication and expose the learners to the basics of signal propagation through optical fibers

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Explain the different types of Pulse communication systems | K2 |
| 2 | Analyze the performance of modulation techniques | K4 |
| 3 | Demonstrate the Satellite and cellular communication system | K4 |
| 4 | Analyze the performance of cellular communication systems | K4 |
| 5 | Study the principle of optical fibre structure and its various applications | K4 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - An4alyze; **K5** - Evaluate; **K6** - Create

| Unit:1 | DATA COMMUNICATION | 18hours |
|---|---|---|

Introduction – Data Forms – Transmission Modes – Simplex, Half Duplex – Full Duplex – Point to Point Network – Star Network – Ring Network – Bus Network – Telephone Lines – Dial- up Lines – Dedicated Lines – Data Communication System – Asynchronous and Synchronous Transmission – USART's and ACIA's – RS 232 Inter Connect Cable – Modems –Protocols

| Unit:2 | PULSE COMMUNICATION | 18hours |
|---|---|---|

Basic Concepts of Pulse Modulation – Sampling Theorem – PAM – PTM – PFM – PPM – PCM – Differential PCM– Delta Modulation–Adaptive Delta Modulation–TDM– FDM– ASK–FSK– PSK

| Unit:3 | SATELLITE CONMMUNICATION | 18 hours |
|---|---|---|

Introduction – Satellite Orbit – Satellite Position – Up link – Down Link – Cross Link – Assignable Satellite Frequencies

Inside Satellite: Transponder – Antenna System – Power Package and Station Keeping – Forms of Modulation–Free Path Space Losses–Ground Station– Aligning the Satellite Dish

| Unit:4 | CELLULAR COMMUNICATION SYSTEM | 18hours |
|---|---|---|

Introduction Cellular Mobile System – Basic Cellular System – Operational Cellular System – Maximum number of Calls per Cell – Maximum Number of Frequency Channel - Concept of Frequency Channel Cell Splitting – Permanent Splitting – Real Time Splitting – Frequency Management – Channel Assignment

| Unit:5 | OPTICAL COMMUNICATION | 18hours |
|---|---|---|

Introduction to Optical Fibers – Optical Fiber Structure – Numerical aperture – Propagation of LightRaysthroughit–ApplicationsofOpticalFiber(Videolink,Satellitelink,Computerlink, Communicating Antenna Television link)

| Total Lecture hours | 90hours |
|---|---|

| | |
|---|---|
| **Text Book(s)** | |
| 1 | Robert J. Shoernbeck,—**Electronic Communications Modulation and Transmission**‖, PHI,1999 |
| 2 | . AnokSingh,—**Principles of Communication Engineering**‖, S.Chandand Company, 2nd Edition |
| 3 | Sanjeev Gupta,—**Electronic Communication System**‖,Kanna Publishing Company |
| | |
| **Reference Books** | |
| 1 | **Data communications and networking** (sie) By behrouz a. Forouzan (author) |
| 2 | **Electronic Communications** 4th Edition by Dennis Roddy and J Coolen, Pearson Education |
| | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https://nptel.ac.in/courses/108/101/108101113/ |
| 2 | https://nptel.ac.in/courses/117/105/117105143/ |
| 3 | https://nptel.ac.in/courses/106/106/106106167/ |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

| **Course Code** | **5EC** | **Introduction of Artificial Intelligence** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|---|
| **Core/Elective /Supportive:** | **Elective I -C** | | **4** | T | | **3** |
| **Pre-Requisite:** | New Technology Introduction | | **Syllabus Version** | | | **2025-26** |

**Course Objectives:**

**The Main Objectives of this course are to:**

- To presents various bio-potentials and working principles of medical instruments
- To enable the students to learn about bio-potentials and medical instruments

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Understand the evolution in microcontroller technology | K2 |
| 2 | Describe Harvard architecture model and programming techniques | K2 |
| 3 | Describe the operation and need for interrupts and timers | K3 |
| 4 | List out various operators in modeling the design units | K2 |
| 5 | Apply the concept for I/O port expansion | K4 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

| **Unit:1** | **Introduction** | **18 hours** |
|---|---|---|

Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI Problems.

| **Unit:2** | **Problem Solving Methods** | **18 hours** |
|---|---|---|

Problem Solving Methods – Search Strategies – Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.

| **Unit:3** | **Knowledge Representation** | **18 hours** |
|---|---|---|

Knowledge Representation – First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining – Backward – Chaining – Resolution – Knowledge Representation – Ontological Engineering – Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems

| **Unit:4** | **Software Agents** | **18 hours** |
|---|---|---|

| | | |
|---|---|---|
| Software Agents – Architecture for Intelligent Agents – Agent Communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent Systems. | | |
| **Unit:5** | **AI Applications** | **18 hours** |
| AI Applications – Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning - Moving. | | |
| | **Total Lecture hours** | **90 Hours** |

| | |
|---|---|
| **Text Book(s)** | |
| 1 | S. Russell and P. Norvig, ―Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009. |
| 2 | I. Bratko, - Prolog: Programming for Artificial Intelligence, Fourth Edition, Addison- Wesley Educational Publishers Inc., 2011. |
| **Reference Books** | |
| 1 | M. Tim Jones, - Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers Inc.; First Edition, 2008. |
| 2 | Nils J. Nilsson, - The Quest for Artificial Intelligence, Cambridge University Press, 2009. |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | |
| 1 | https://www.youtube.com/watch?v=i2mZylgP1Fk |
| 2 | https://www.youtube.com/watch?v=4ldv98F7Zng |
| 3 | https://nptel.ac.in/courses/108/105/108105101/ |
| 4 | https://nptel.ac.in/courses/108/105/108105091/ |

Course Designed By:

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**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | L | M | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | M | L | M | M | S | M |

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

| Course Code | 5ED | ADVANCED COMPUTER ARCHITECTURE | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/Supportive: | | ELECTIVE I-D | 4 | T | | 3 |
| Pre-requisite: | | Basic Computer Architecture | Syllabus version | | | 2025-26 |

**Course Objectives:**

The objectives of this course are:

- ❖ To provide knowledge on fundamentals of Advanced Computer design.
- ❖ To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated with it.
- ❖ To enhance the knowledge on advanced processors.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Gain the knowledge on advanced computer design principles. | K1 |
| 2 | Able to analyze the parallel computer model with instruction level parallelism. | K4 |
| 3 | Gain the knowledge on pipelining. | K2 |
| 4 | Understand the memory hierarchy in developing an advanced computer. | K2 |
| 5 | Apply the multiprocessor concepts in advanced processors. | K3 |

**K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create**

| Unit: 1 | PRINCIPLES OF COMPUTER DESIGN | 18 Hours |
|---|---|---|

Introduction-Quantitative principles of computer design - Control Units-Hardwired and Micro Programmed Design Concept – Microprogramming - Bus architectures: Uni-bus and multi-bus architectures.

| Unit: 2 | INSTRUCTION LEVEL PARALLELISM | 18 Hours |
|---|---|---|

Classification of parallel computers-Multiprocessors and multi-computers - Multi-vector and SIMD computers-Instruction Level Parallelism - Overcoming Data Hazards with Dynamic Scheduling-Reducing Branch Penalties with Dynamic – Hardware Support for Extracting More Parallelism.

| Unit: 3 | PIPELINING | 18 Hours |
|---|---|---|

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

| Unit: 4 | MEMORY HIERARCHY | 18 Hours |
|---|---|---|

Introduction- the Fundamentals of Caches-Reducing Cache Misses and Miss Penalty - Reducing Hit Time-Main Memory-Virtual Memory-Issues in Memory Hierarchy design.

| Unit: 5 | PRINCIPLES OF ADVANCED PROCESSOR | 18 Hours |
|---|---|---|

Advanced processor technology, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

| | Total Lecture Hours | 90 Hours |
|---|---|---|

**Text Books**


1. Kai Hwang,―Advanced computer architecture‖,Tata Mc.Graw Hill Science/Engineering/Math 1st Edition, 1992.
2. D.A.PattersonandJ.L.Hennessey,―Computerorganizationanddesign,‖MorganKaufmann, ARM Edition, 2010.


**Reference Books**


1. Hayes,J.P., ―Computer Architecture and Organization‖, 3rdEdition, TataMc-GrawHill, 1998.
2. William Stallings, ―Computer Organization and Architecture – Designing for Performance‖, 6th Edition, Pearson Education,2003.

| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
|---|---|
| 1 | https://nptel.ac.in/courses/106/103/106103206/ |
| 2 | https://www.youtube.com/watch?v=v7iefsovo9M |
| 3 | https://www.youtube.com/watch?v=L9X7XXfHYdU&list=PLxCzCOWd7aiHMonh3G6QNKq53C6oNXGrX |

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

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

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

| Course Code | 5EE | Arduino and Sensors | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/Supportive: | | ELECTIVE II-E | 4 | T | | 3 |
| Pre-requisite: | | Basic Computer Architecture | Syllabus version | | | 2025-26 |

**Course Objectives:**

The objectives of this course are:

- ❖ To provide knowledge on fundamentals of Advanced Computer design.
- ❖ To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated with it.
- ❖ To enhance the knowledge on advanced processors.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Gain the knowledge on advanced computer design principles. | K1 |
| 2 | Able to analyze the parallel computer model with instruction level parallelism. | K4 |
| 3 | Gain the knowledge on pipelining. | K2 |
| 4 | Understand the memory hierarchy in developing an advanced computer. | K2 |
| 5 | Apply the multiprocessor concepts in advanced processors. | K3 |

**K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create**

| Unit: 1 | Arduino and Sensors | 18 Hours |
|---|---|---|

Microcontroller - Install the Software - The Integrated Development Environment (IDE) - Our first circuit-Updated Circuit-Our First Program-Comments- Gotchas

;

| Unit: 2 | Embedded "C": | 18 Hours |
|---|---|---|

"Blinky" - IF Statements - ELSE Statements- WHILE statements - What is truth(true) - Combinations - FOR statements - Our New Circuit - Introducing Arrays

.

| Unit: 3 | Input and Output: | 18 Hours |
|---|---|---|

Input - Pushbuttons- Potentiometers - RGB LEDs- Sound Circuit - Simple note - Music - Music with functions – Making a digital thermometer - Serial Monitor - Measuring the temperature - Hooking up the LCD - Talking to the LCD - Bringing it all together

| Unit: 4 | Sensors-1 : | 18 Hours |
|---|---|---|

Introduction - Photo Cell (Light Sensor) - Tilt Sensor Reed Switch (Magnetic Field Detector) - Piezo Element (Vibration sensor)

| Unit: 5 | Sensors-2: | 18 Hours |
|---|---|---|

One Servo - Joystick Pan/Tilt bracket - Adding a firing mechanism

| | | |
|---|---|---|
| | **Total Lecture Hours** | **90 Hours** |
| **Text Books** | | |
| 1 | "Introduction to Arduino", Alan G. Smith, 2011, ISBN: 1463698348 and ISBN-13: 978-1463698348. | |
| **Reference Books** | | |
| 1 | "Exploring Arduino: Tools and Techniques for Engineering Wizardry" by Jeremy Blum**,** ISBN-10 1118549368, Publisher Wiley 2013. | |

| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
|---|---|
| 1 | https://nptel.ac.in/courses/106/103/106103206/ |
| 2 | https://www.youtube.com/watch?v=v7iefsovo9M |
| 3 | https://www.youtube.com/watch?v=L9X7XXfHYdU&list=PLxCzCOWd7aiHMonh3G6QNKq53C6oNXGrX |

Course Designed By:
Dr.T.Siva Kumar , Principal ,RVS College Of Arts and Science,Coimbatore &
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur .

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

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

| **Course Code** | **5EF** | **MICROWAVE AND FIBER OPTIC COMMUNICATION** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|---|
| **Core/Elective/ Supportive:** | **Elective II-F** | | **4** | T | | **3** |
| **Pre-Requisite:** | **Basic Electronics and Principles of Communication systems** | | **Syllabus Version** | | **2025-26** | |

**Course Objectives:**

**The Main Objectives of this course are to:**

- To inculcate the principle of microwave theory and working of waveguides
- To know the operation and applications of fibre optic communication
- To impart knowledge on the working principle of microwave amplifiers and oscillators

**Expected Course Outcomes:**

On the Successful completion of the course, student will be able to:

| | | |
|---|---|---|
| 1 | Understand various parameters of waveguide and use of component as per applications. | K1 |
| 2 | Analyze and find applications and limitations of microwave Semiconductor devices. | K4 |
| 3 | Discriminate different Radars, find applications and use of its supporting systems | K5 |
| 4 | Understand The structures of Fiber Optics and types | K2 |
| 5 | Apply Fiber optics in Sensors Application and in Network Design | K3 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

| **Unit:1** | **INTRODUCTION TO MICROWAVES** | **18 Hours** |
|---|---|---|

Introduction – Maxwell's Equation – Amperes Law – Faradays Law – Gauss Law – Wave Equation – Types of Wave Guides – TE and TM Modes – Propagation of TM Waves in Rectangular Wave Guide – TM Modes in Rectangular Wave Guide.

| **Unit:2** | **MICROWAVE AMPLIFIERS AND OSCILLATORS** | **18 Hours** |
|---|---|---|

Microwave Tubes: - Two Cavity Klystron – Multi cavity Klystron – Reflex Klystron – Traveling Wave Tube (TWT) – Backward Wave Oscillator (BWO) – Magnetron – Applications.

| **Unit:3** | **MICROWAVE DEVICES & RADAR** | **18 Hours** |
|---|---|---|

Microwave Transistors – Gallium Arsenide (GaAs) Metal Semi-conductor FET – Varactor Diode – PIN Diode – Schottky Diode – MASER Principle – Applications – RADAR Block Diagram – Classification – Radar Range Equation – Factors Affecting the Range of a Radar Receivers – Line Pulse Modulator – PPI (Plane Position Indicator) – Moving Target Indicator (MTI) – FM CW Radar- Applications.

| **Unit:4** | **OPTICAL FIBER COMMUNICATIO N** | **18 Hours** |
|---|---|---|

Basic Fiber Optic System – Frequencies – Fiber Optic Cables – Refraction – Numerical Aperture – Graded Index Cables – Single Mode – Multi Mode – Cable Constructions – Cable Losses – Connectors – Light Sources – Light Detector – Systems Components – Advantages and Disadvantages.

| Unit:5 | FIBER OPTICS SENSORS AND APPLICATIONS | 18 Hours |
|---|---|---|
| Intensity Modulated Sensors - Hybrid sensors- phase sensors - Diffraction Grating Sensor Inter ferometric sensor - Fiber Fabry Perot Fiber Optic sensor - Chemical Senor Community Antenna Television – Networking - Digital Video Transmission. | | |
| | **Total Lecture hours** | **90 Hours** |
| **Text Book(s)** | | |
| 1 | Kennedy; Davis,‖**Electronic Communication Systems",** Tata McGraw Hill Publishing Company Limited, III edition | |
| 2 | Gerd Keiser, **—Optical Fiber Communication",**McGraw Hill Publication,IV$^{th}$ Edition, 2011. | |
| **Reference Books** | | |
| 1 | Samuel Y. Liao **,"Microwave Devices and Circuits"**, PHI, III Edition. | |
| 2 | Govind P. Agrawal,‖**Fiber Optic Communication Systems"**, WileyPublications, IV$^{th}$ Edition, 2012. | |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | | |
| 1 | https://nptel.ac.in/courses/108/103/108103141/Introduction to microwave Engineering | |
| 2 | https://www.classcentral.com/course/swayam-microwave-engineering-14199Microwave engineering swayam course | |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. | | |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | M | S | M | M | L | L | L | M | M |
| CO4 | S | S | M | S | S | S | L | L | M | M |
| CO5 | S | S | S | S | M | L | M | M | S | M |

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

| Course code | 5EG | AUTOMOTIVE ELECTRONICS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/ Supportive | | Elective-II –G | 4 | T | | 3 |
| Pre-requisite | | Basic Electronics | Syllabus Version | | | 2025-26 |

**Course Objectives:**

The main objectives of this course are to:

- To understand the concepts of Automotive Electronics and its evolution and Trends automotive systems &subsystems overview.
- To understand sensors and sensor monitoring mechanisms aligned to automotive Systems, different signal conditioning techniques, interfacing techniques and actuator
- To understand, design and model various automotive control systems using Model based development technique.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Obtain an overview of automotive components and subsystems. | K2 |
| 2 | Interface automotive sensors and actuators with microcontrollers | K4 |
| 3 | Understand the design cycles, communication protocols and safety systems employed in today's automotive industry. | K2 |
| 4 | Understand the engine management systems | K2 |
| 5 | Analyze Engine Management System | K4 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | INTRODUCTION | 18hours |
|---|---|---|

Automotive Component, Operation, Electrical Wiring Terminals and Switching, Multiplexed Wiring Systems, Circuit Diagrams and Symbols. Charging Systems and Starting Systems: Charging Systems Principles, Alternations and Charging Circuits, Basic Starting Circuit

| Unit:2 | IGNITION SYSTEMS | 18hours |
|---|---|---|

Ignition Fundamental, Electronic Ignition Systems.
Distribution Less Ignition, Direct Ignition, Spark Plugs. Electronic Fuel Control: Basics of Combustion, Engine Fuelling and Exhaust Emissions, Electronic Control of Carburetion Petrol Fuel Injection, Diesel Fuel Injection

| Unit:3 | INSTRUMENTATION SYSTEMS | 18hours |
|---|---|---|

Introduction to Instrumentation Systems, Various Sensors Used for Different Parameters, Sensing Driver Instrumentation Systems, Vehicle Condition Monitoring Trip Computer, Different Types of Visual Display

| Unit:4 | ELECTRONIC CONTROL OF BRAKING AND TRACTION | 18 hours |
|---|---|---|

Introduction and Description Control Elements and Control Methodology, Electronic Control of Automatic Transmission: Introduction and Description Control Of Gear Shift and Torque Converter Lockup, Electric Power Steering, Electronic Clutch

| **Unit:5** | **ENGINE MANAGEMENT SYSTEMS** | **18hours** |
|---|---|---|
| Combined Ignition And Fuel Management Systems, Exhaust Emission Control, Digital Control Techniques, Complete Vehicle Control Systems, Artificial Intelligence and Engine Management, Automotive Microprocessor Uses. Lighting and Security Systems:SignallingCircuit,CentralLockingandElectricWindowsSecuritySystems, Airbags and Seat Belt Tensioners. | | |
| | | |
| | **Total Lecture hours** | **90hours** |

| **Text Book(s)** | |
|---|---|
| 1 | TOM DENTON, **Automobile Electrical and Electronic Systems**, Edward Arnold pb., 1995 |
| **Reference Books** | |
| 1 | 1.DON KNOWLES**, Automotive Electronic and Computer controlled Ignition Systems, Don** |
| 2 | WILLIAM, T.M., **Automotive Mechanics**, McGraw Hill Book Co., |
| 3 | WILLIAM, T.M., **Automotive Electronic Systems**, Heiemann Ltd., London, 1978. |
| 4 | Ronald K Jurgen, **Automotive Electronics Handbook**, McGraw Hill, Inc, 1999. |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https://nptel.ac.in/courses/107/103/107103084/ |
| 2 | https://nptel.ac.in/courses/107/106/107106088/ |
| 3 | https://www.youtube.com/watch?v=vJ4EfyGXehg |
| 4 | https://www.youtube.com/watch?v=BG4N2dBgJrQ |

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

| Course Code | 5EH | SATELLITE COMMUNICATIONS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/Supportive: | | ELECTIVE-II-H | 4 | T | | 3 |
| Pre-requisite: | | PRINCIPLES OF COMMUNICATION | Syllabus version | | 2025-26 | |

**Course Objectives:**

The objectives of this course are:

- ❖ To provide knowledge on fundamentals of Advanced Computer design.
- ❖ To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated with it.
- ❖ To enhance the knowledge on advanced processors.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Gain the knowledge on advanced computer design principles. | K1 |
| 2 | Able to analyze the parallel computer model with instruction level parallelism. | K4 |
| 3 | Gain the knowledge on pipelining. | K2 |
| 4 | Understand the memory hierarchy in developing an advanced computer. | K2 |
| 5 | Apply the multiprocessor concepts in advanced processors. | K3 |

**K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create**

| Unit: 1 | SATELLITE SYSTEMS – OVERVIEW | 18 Hours |
|---|---|---|

Introduction- Basic concepts of Satellite communications- Frequency allocations for satellite systems. Advantages and applications of satellite communications over other communications

| Unit: 2 | ORBITAL ASPECTS OF SATELLITE SYSTEMS | 18 Hours |
|---|---|---|

Orbital Mechanics- look angle determination- orbit perturbations- Orbital determination- launches and launch vehicles- orbital effects in communication systems performance.

| Unit: 3 | THE SPACE SEGMENT | 18 Hours |
|---|---|---|

Introduction- spacecraft subsystems- attitude and orbit control systems- Telemetry- tracking and command- power systems- communication subsystems.

| Unit: 4 | SATELLITE LINK DESIGN | 18 Hours |
|---|---|---|

Basic transmission theory- system noise temperature and G/T ratio- Design of down links- up link design- design of satellite link for specified C/N.

| Unit: 5 | APPLICATIONS OF SATELLITE SYSTEMS | 18 Hours |
|---|---|---|

INTELSAT Series- INSAT- VSAT- GSM- GPS- INMARSAT-Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH)- Digital audio broadcast (DAB)- World space services- Business TV(BTV)- GRAMSAT.

| | Total Lecture Hours | 90 Hours |
|---|---|---|

**Text Books**


1. Timothy Pratt, Charles Bostian,Jeremy Allnutt, Satellite Communications, 2nd edition, John willey, 2006.
2. W. L. Pritchard, H. G. Suyderhoud and R. A. Nelson, Satellite Communication systems Engineering, 2nd edition, Pearson educational publishers, New Delhi, 2003.


**Reference Books**


1. Dennis Roddy, Satellite Communications, 3rd edition, Mc Graw Hill, International, 2001.

| | |
|---|---|
| 2 | Dr D.C. Agrwal, Satellite Communications,4th edition,Khanna Publications, NewDelhi, 2001. |

| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** |
|---|
| https://nptel.ac.in/courses/117/105/117105131/ |
| https://www.youtube.com/watch?v=hXa3bTcIGPU |
| https://www.youtube.com/watch?v=BvjlBpP4zU8 |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. |

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

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

| Course code | 6EI | INDUSTRIAL AND POWER ELECTRONICS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/ Supportive | | Elective-III –I | 6 | T | | 3 |
| Pre-requisite | | Basic knowledge of Electronic Circuits or permission of instructor | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- ❖ To presents the principles and applications of industrial and power electronics
- ❖ To enable the students to learn and design industrial and power electronic circuits
- ❖ To develop the circuits designing skills related to the power electronics and understood the concept of industrial electronics

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Developed the Circuit designing skills power electronics. Understood the concept industrial electronics system design. | K1 |
| 2 | Acquire knowledge about fundamental concepts and techniques used in power electronics. | K2 |
| 3 | Ability to analyze various single phase and three phase power converter circuits and understand their applications. | K3 |
| 4 | Foster ability to identify basic requirements for power electronics based design application. | K4 |
| 5 | To develop skills to build, and troubleshoot power electronics circuits. | K5 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

| Unit:1 | THYRISTORS | 15hours |
|---|---|---|

Introduction– Principles, Construction, Operation and Characteristics of SCR – Two Transistor Model – GTO – SCS – SUS – SBS – LASCR .

| Unit:2 | TURN ON/OFF MECHANISMS | 15 hours |
|---|---|---|

Introduction– Types of Turn on Methods: AC Gate Triggering: Forward Voltage Triggering– Thermal Triggering– Radiation Triggering– DC Gate Triggering: Pulse Triggering – Types of Turn Off Methods: Natural Commutation – Forced Commutation: Self Commutation – External Pulse Commutation—Line Commutation – Thyristor Rating

| Unit:3 | CONTROLLED RECTIFIERS & INVERTERS | 15 hours |
|---|---|---|

Introduction– Single phase Half Wave Controlled Rectifiers with Resistive Load – HWCR with Inductive Load –Single phase Full Wave Controlled Rectifiers with Resistive, Inductive Loads– INVERTERS: Single Phase of Voltage Inverters

| Unit:4 | CYCLO CONVERTERS AND CHOPPERS | 15hours |
|---|---|---|

Introduction – Single Phase Centre Tapped Step-Up Cyclo Converter – Single Phase Centre Tapped Step- Down Cyclo Converter – Three Phase toSingle Phase Cyclo converter — Step-up and Step-downChoppers

| Unit:5 | APPLICATIONS | 15 hours |
|---|---|---|

Introduction –Dielectric Heating – Induction Heating – SMPS – UPS – Static Circuit Breaker – Battery Charger –Emergency Lighting System – Time Delay Control – Static Switches

| Total Lecture hours | 75 hours |
|---|---|

| | |
|---|---|
| **Text Book(s)** | |
| 1 | MDSingh,**—Power Electronics**‖, 2nd Edition, Tata-McGrawHill, 2007. |
| 2 | M.Ramamoorthy, **—ThyristorandtheirApplications**‖,2nd Edition,EastWestPvt.Ltd,1999 |
| | |
| **Reference Books** | |
| 1 | Harish C Rai, **"Industrial and Power Electronics"** 10th edition, Umesh publications 2002 |
| 2 | Timothy J Maloni, **"Industrial Solid State Electronic Devices and Circuits"** 2nd edition 1986 |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https://www.youtube.com/watch?v=1Auay7ja2oY |
| 2 | https://www.youtube.com/watch?v=oqnLQVFaqYI |
| 3 | https://www.youtube.com/watch?v=naxnRkOfh2Q |
| | |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &<br>Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode. | |

| **Mapping with Programme Outcomes** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
| CO1 | S | S | S | M | M | M | S | L | L | S |
| CO2 | S | S | S | M | M | M | S | L | L | L |
| CO3 | S | S | S | M | M | L | L | S | S | M |
| CO4 | M | M | M | S | S | S | L | L | M | M |
| CO5 | M | M | S | S | S | L | M | M | S | S |

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

| **Course Code** | **6EJ** | **ROBOTICS** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|---|
| **Core/Elective/ Supportive:** | | **Elective III –J** | **6** | T | | **3** |
| **Pre-Requisite:** | | **Basic Electronics** | **Syllabus Version** | | **2025-26** | |

**Course Objectives:**

**The Main Objectives of this course are to:**

- To familiarize the students with the applications of Robots
- To know about the sensors, actuators used in Robots designing

**Expected Course Outcomes:**

On the Successful completion of the course, student will be able to:

| | | |
|---|---|---|
| 1 | Describe the working concept and types of Robots | K3 |
| 2 | Apply the knowledge of types of sensors and actuators | K2 |
| 3 | Programming Languages for Robot design models | K6 |
| 4 | Understand the concept of Mobile Robotic Locomotion | K2 |
| 5 | Study the various applications of Robots | K3 |

**K1**:Remember; **K2**-Understand; **K3**-Apply; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

| **Unit:1** | **FUNDAMENTALS OF ROBOTS** | **15 hours** |
|---|---|---|

Introduction: Automations and Robotics - Robotics Drive System - Robot Anatomy - Work Volume - Control System and Precision of Movement - Serial Robot - Robot Subsystems - Motion Sub Systems - Recognition Sub System: Robot Classification : Coordinate Systems - Actuation Systems - Control Method - Program Method.

| **Unit:2** | **ROBOT END EFFECTORS** | **15hours** |
|---|---|---|

Introduction: Types of End Effectors - Mechanical Grippers - Other Types of Gripper – Vacuum Cups -Magnetic Gripper - Adhesive Gripper – Hook - Scoops other Miscellaneous Device - Tools as End Effectors - Considerations in Gripper Selections and Design

| **Unit:3** | **SENSORS IN ROBOTS** | **15 hours** |
|---|---|---|

Sensor Classification - Internal Sensors - External Sensors - Vision System - Sensors in Robotics: Tactile Sensors - Proximity and Range Sensors - Miscellaneous Sensors and Sensor based Systems - Uses of Sensors in Robotics - Actuators in Robotics - Pneumatic Actuators - Hydraulic Actuators - Electric Actuators - DC Motors - AC Motors.

| **Unit:4** | **MOBILE ROBOTICS LOCOMOTION** | **15 hours** |
|---|---|---|

Introduction Key Uses for Locomotion - Leg Mobile Robots - Leg Configuration and Assembly - Consideration for Dynamics - Types of Legged Robot Locomotion - One Leg; Two Legs Biped - Four Legs (Quadruped) - Six Legs (Hexapod) - Concept of Wheeled Mobile Robots

| **Unit:5** | **ROBOTIC APPLICATIONS** | **15 hours** |
|---|---|---|

Industrial Applications: Material Handling - Processing Applications - Arc Welding - Assembly Applications - Inspection Applications - Robotics for Arc Welding - Assembly Applications - Robot Safety - Non Industrial Application of Robotics: Home Sector - Health Sector - Service Sector - Agriculture Farms - Research and Exploration.

| | |
|---|---|
| **Total Lecture hours** | **75 hours** |

| | |
|---|---|
| **Text Book(s)** | |
| 1 | M.P.Groover,Mitchellweiss,Roger.N.Nagel,NicholasG.Odrey,‖**Industrial Robotics– Technology, programming and Application**‖, McGraw-Hill, 2008. |
| 2 | Ghosh,**—Control in Robotics and Automation: Sensor Based Integration”**, Allied Publishers, Chennai,1998. |
| **Reference Books** | |
| 1 | Deb. S.R., **—Robotics Technology and flexible Automation**‖, John Wiley,USA 1992. |
| 2 | KlafterR.D., ChimielewskiT.A., Negin M., **—Robotic Engineering– An integrated approach**‖, Prentice Hall of India, New Delhi, 1994. |
| **Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]** | |
| 1 | https://nptel.ac.in/courses/112/105/112105249/Introduction to Robots |
| 2 | https://nptel.ac.in/courses/112/101/112101098/Robotics and Automation |
| Course Designed By:<br>Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur<br>& Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.. | |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | M | S | M | M | L | L | L | M | M |
| CO4 | S | S | M | S | S | S | L | L | M | M |
| CO5 | S | S | S | S | M | L | M | M | S | M |

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

| Course code | 6EK | PROGRAMMABLE LOGIC CONTROLLERS | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/ Supportive: | | Elective III – K | 3 | T | | 6 |
| Pre-requisite | | Digital Electronics and computer Architecture and Organization | Syllabus Version | | 2025-26 | |

**Course Objectives:**

The main objectives of this course are to:

- To provide knowledge levels needed for PLC programming and operating input and output modules.
- To train the students to create ladder diagrams from process control description and understand various types of PLC registers
- Apply PLC Timers and Counters for the control of industrial processes, PLC functions and Data Handling Functions.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Gain knowledge on Programmable Logic Controllers and will understand different types of Devices to which PLC input and output modules | K2 |
| 2 | Gain knowledge about various types of PLC registers, ladder diagrams from process control descriptions | K2 |
| 3 | Develop a coil and contact control system and analog PLC operations | K4 |
| 4 | Apply time delay on PLC operations | K3 |
| 5 | Able to use different types PLC functions, data handling functions and its various | K2 |

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

| Unit:1 | PROGRAMMABLE LOGIC | 15hours |
|---|---|---|

Programmable Logic – Introduction - Programmable Logic Structures - Programmable Logic Arrays (PLAS), Programmable Array Logic (Pals), Programmable Gate Arrays (PGAS), Field Programmable Gate Arrays(FPGAS) - Sequential Network Design With Programmable Logic Devices (PLDs) -Design of Sequential Networks Using ROMs and Flash -Traffic Light Controller Using PAL

| Unit:2 | PROGRAMMABLE LOGIC CONTROLLERS | 15hours |
|---|---|---|

Programmable Logic Controllers(PLCS) - Introduction Parts Of PLC - Principles of Operation-PLC Sizes - PLC Hardware Components - I/O Section- Analog I/O Section

| Unit:3 | BASICS OF PLC PROGRAMMING | 15hours |
|---|---|---|

PLC Programming-Simple Instructions - Programming EXAMINE ON And EXAMINE OFF Instructions -Electromagnetic Control Relays-Motor Starters -Manually Operated Switches –Mechanically Operated and Proximity Switches - Output Control Devices - Latching Relays - PLC Ladder Diagram - Converting Simple Relay Ladder Diagram into PLC Relay Ladder Diagram

| Unit:4 | PLC INSTRUCTIONS | 15 hours |
|---|---|---|

| Unit:5 | APPLICATIONS OF PLC | 15hours |
|---|---|---|
| Applications of PLC - Simple Materials Handling Applications - Automatic Control of Warehouse Door - Automatic Lubricating Oil Supplier Conveyor Belt - Motor Control Automatic Car Washing Machine - Bottle Label Detection - Process Control Application | | |

| | | |
|---|---|---|
| | **Total Lecture hours** | **75 Hours** |
| **Text Book(s)** | | |
| 1 | Charles H. Roth, Jr **"Fundamentals of Logic Design ",** Fourth Edition, Jaico Publishing | |
| 2 | Frank D. Petruzella" **Programmable Logic Controllers ",** McGraw- Hill book, company, | |
| 3 | **Siemens "PLC Handbook "**. | |
| **Reference Books** | | |
| 1 | 1. William I. Fletcher **"An Engineering Approach to Digital Design "**, Prentice, Hall of India Ltd., New Delhi, 1999. | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | |
| 1 | https://unitronicsplc.com/what-is-plc-programmable-logic-controller/ | |

Course Designed By:

Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | M | S | M | M | S |
| CO2 | S | M | M | M | M | M | S | L | L | L |
| CO3 | S | M | S | M | M | L | L | L | M | M |
| CO4 | S | S | M | S | S | S | L | L | M | M |
| CO5 | S | S | S | S | M | L | M | M | S | M |

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

| Course Code | 6EL | VLSI DESIGN | L | T | P | C |
|---|---|---|---|---|---|---|
| Core/Elective/Supportive: | | ELECTIVE – III-L | 6 | T | | 3 |
| Pre-requisite: | | Digital Principles and Applications | Syllabus version | | | 2025-26 |

**Course Objectives:**

The objectives of this course are:

- To provide knowledge on Fabrication Process of NMOS,PMOS ,CMOS AND BICMOS, Super integration concepts.
- To develop the skill to analyze the electrical properties of MOS transistor, design stick diagrams and layout diagrams for MOS transistors, contacts and wires.
- To investigate the effect of floor planning, placement, routing and power delay estimation in physical design of digital circuits and memory design.
- To apply the concept of Combinational and Sequential Circuit Testing.

**Expected Course Outcomes:**

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

| | | |
|---|---|---|
| 1 | Gain the knowledge on fabrication principles. | K1 |
| 2 | Able to analyze the electrical properties of MOS transistors. | K4 |
| 3 | Apply the appropriate layout design rule to create a VLSI layout for a design. | K6 |
| 4 | Understand the physical design steps and gain the knowledge on types of VLSI design styles. | K2 |
| 5 | Gain the knowledge, analyze and apply test principles to evaluate the VLSI designs. | K5 |

**K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create**

| Unit: 1 | VLSI TECHNOLOGY | 15 Hours |
|---|---|---|

Fabrication sequence – process flow – Testing – Super integration concepts – Integrated Passive components – MOS Resistors and capacitors – Crossovers – NMOS – PMOS – CMOS – BICMOS fabrication processes – comparison.

| Unit: 2 | ELECTRICAL PROPERTIES OF MOS DEVICES | 15 Hours |
|---|---|---|

Drain to source current ( $I_{ds}$ ) versus Drain to source voltage ( $V_{ds}$ ) relationships – MOS transistor threshold voltage ($V_t$) – MOS transistor trans-conductance $g_m$ and output conductance $g_{ds}$ – figure of merit ($\omega_0$) – pass transistor- pull – up to pull – down ratio.

| Unit: 3 | DESIGN PROCESSES | 15 Hours |
|---|---|---|

VLSI design flow- stick diagram design rules with examples- Design rules for Layout Diagrams of digital circuits–sheet resistance $R_s$–standard unit of capacitance–Inverter delays–Propagation delays- scaling of MOS circuits – limitations of scaling.

| Unit: 4 | VLSI PHYSICAL DESIGN AND STYLES | 15 Hours |
|---|---|---|

**PHYSICAL DESIGN:**

Floor Planning – Placement – Routing – Power Delay Estimation – Clock Routing – Power Routing.

**VLSI DESIGN STYLES:**

Full Custom – Semi custom – Standard Cells – Gate Arrays – FPGAs – CPLDs.

| Unit: 5 | TESTING OF VLSI CIRCUITS | 15 Hours |
|---|---|---|

Test Principles-BIST-Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques.

| | Total Lecture Hours | 75 Hours |
|---|---|---|

| | |
|---|---|
| **Text Books** | |
| 1 | Basic VLSI Design, Douglas ,3rd Edition, A. Pucknell, Kamran Eshraghian, PHI, New Delhi, 2011. |
| 2 | Modern VLSI design, Wayne Wolf, 3rdEdition, Pearson Education, New Delhi, 4th impression 2008. |
| **Reference Books** | |
| 1 | Introduction to VLSI Circuits and Systems, John .P. Uyemura, John Wiley, Student Edition, New Delhi, Reprint 2006. |
| 2 | Principles of CMOS VLSI Design, N.H.E Weste , K.Eshraghian, Adisson Wesley, 2nd Edition, New Delhi. |
| 3 | Application Specific Integrated Circuits, Michel John Sebastian Smith, Addison Wesley, Indian Edition, 4th Indian Reprint 2001, New Delhi. |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https://nptel.ac.in/courses/117/101/117101058/ |
| 2 | https://www.youtube.com/watch?v=9SnR3M3CIm4 |
| 3 | https://www.youtube.com/watch?v=Y8FvvzcocT4 |
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| | **Mapping with Program Outcomes** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1 | S | L | L | L | L | L | L | L | L | L |
| CO2 | S | S | L | S | M | L | M | L | L | L |
| CO3 | S | M | S | L | S | L | M | M | L | S |
| CO4 | S | L | M | L | S | L | L | L | M | L |
| CO5 | S | S | M | M | S | L | L | L | M | S |

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

# Annexure

## BHARATHIAR UNIVERSITY: COIMBATORE 6410 46.

## DEPARTMENT OF DEPARTMENT OF ELECTRONICS

## MISSION

- To develop appropriate facilities for promoting research activities
- To inculcate leadership qualities among students for self and societal growth
- To nurture students on emerging technologies for serving industry needs through industry institute interface
- To enrich teaching learning process by transforming young minds to be resourceful engineers