

**B. Sc. Computer Science & Applications**

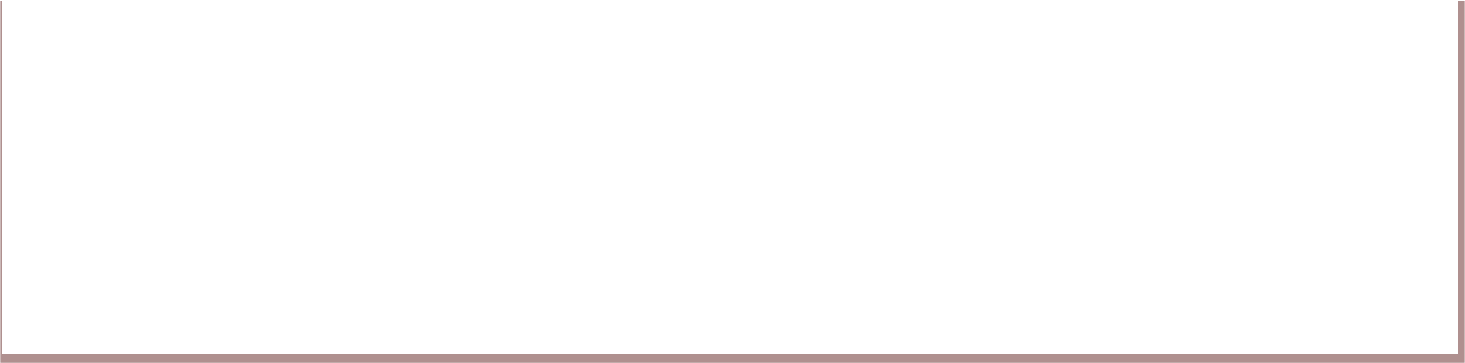
Syllabus

AFFILIATED COLLEGES

**Program Code: \*\*\***

**2022 – 2023 onwards**





**BHARATHIAR UNIVERSITY**

**(A State University, Accredited with “A” Grade by NAAC, Ranked 13th among Indian Universities by MHRD-NIRF,**

**World Ranking : Times - 801-1000, Shanghai - 901-1000, URAP - 982)**

**Coimbatore - 641 046, Tamil Nadu, India**



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| **Program Educational Objectives (PEOs)** | |
| The **B. Sc. Computer Science and Applications** program describe accomplishments that graduates are expected to attain within five to seven years after graduation | |
| PEO1 | Graduates of the program will be engaged in the computing profession, and will be engaged in learning, understanding, and applying new ideas and  technologies as the field evolves. |
| PEO2 | To Design, implement, and evaluate a computing-based solution to meet a given  set of computing requirements in the context of the program’s discipline. |
| PEO3 | Possess an attitude and aptitude for research, entrepreneurship and higher  studies in the field of Computer Science & Engineering and Information Technology. |
| PEO4 | Able to provide socially acceptable technical solutions to real world problems  with the application of modern and appropriate programming techniques. |
| PEO5 | Possess better communication, presentation, time management and team work  skills leading to responsible & competent professionals and will be able to address challenges in the field of IT at global level. |



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| **Program Specific Outcomes (PSOs)** | |
| After the successful completion of **B.Sc. Computer Science Applications** program, the  students are expected to | |
| PSO1 | To impart education with clear knowledge of the fundamentals and applied  aspects of Computer Science and engineering. |
| PSO2 | To Design next-generation computer systems, networking devices, search  engines, soft computing and intelligent systems, web browsers, and knowledge discovery tools. |
| PSO3 | To expose the students to open Source technologies so that they become familiar with it and can seek appropriate opportunity in trade and industry. |
| PSO4 | Ability to apply mathematical methodologies to solve computation task, model  real world problem using appropriate data structure and suitable algorithm |
| PSO5 | To inculcate effective communication skills combined with professional &  ethical attitude. |



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| **Program Outcomes (POs)** | |
| On successful completion of the B.Sc. **Computer Science Applications** program | |
| PO1 | **Disciplinary knowledge:** Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design  of computer based systems of varying complexity. |
| PO2 | **Scientific reasoning**/ **Problem analysis**: Ability to critically analyze, categorizes,  formulate and solve the problems that emerges in the field of computer science. |
| PO3 | **Problem solving:** Able to provide software solutions for complex scientific and business related problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal  and environmental considerations. |
| PO4 | **Environment and sustainability:** Understand the impact of software solutions  in environmental and societal context and strive for sustainable development. |
| PO5 | **Modern tool usage:** Use contemporary techniques, skills and tools necessary for  integrated solutions. |
| PO6 | **Ethics:** Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive  attitude. |
| PO7 | **Cooperation / Team Work:** Function effectively as member or leader on  multidisciplinary teams to accomplish a common objective. |
| PO8 | **Communication Skills:** An ability to communicate effectively with diverse  types of audience and also able to prepare and present technical documents to different groups. |
| PO9 | **Self-directed and Life-long Learning:** Graduates will recognize the need for self-motivation to engage in lifelong learning to be in par with changing  technology. |
| PO10 | Enhance the research culture and uphold the scientific integrity and objectivity |

**BHARATHIAR UNIVERSITY::COIMBATORE 641 046**

**B. Sc. Computer Science and Applications (CBCS PATTERN)**

(*For the students admitted from the academic year* ***2022-2023*** *and onwards*)

**Scheme of Examination**

|  |  |  |  |  |  |  |  |
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| **Part** | **Title of the Course** | **Hours/ Week** | **Examination** | | | | **Credits** |
| **Duration**  **in Hours** | **Maximum Marks** | | |
| **CIA** | **CEE** | **Total** |
|  | **Semester I** | | | | | | |
| I | Language - I | 6 | 3 | 50 | 50 | 100 | 4 |
| II | English - I | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core 1: Computing Fundamentals and C  Programming | 4 | 3 | 50 | 50 | 100 | 4 |
| III | Core 2: Digital Fundamentalsand Computer  Architecture | 4 | 3 | 50 | 50 | 100 | 4 |
| III | Core Lab 1: Programming Lab - C | 3 | 3 | 50 | 50 | 100 | 4 |
| III | Allied 1: Mathematical Structures for Computer  Science | 5 | 3 | 50 | 50 | 100 | 4 |
| IV | Environmental Studies\* | 2 | 3 | - | 50 | 50 | 2 |
|  | **Total** | **30** |  | **300** | **350** | **650** | **26** |
|  | **Semester II** | | | | | | |
| I | Language – II | 6 | 3 | 50 | 50 | 100 | 4 |
| II | English – II& | 4 | 3 | 25 | 25 | 50 | 2 |
| III | Core 3: C++ Programming | 5 | 3 | 50 | 50 | 100 | 4 |
| III | Core Lab 2: Programming Lab - C++ | 4 | 3 | 50 | 50 | 100 | 4 |
| III | Core Lab 3: Internet Basics | 2 | 3 | 25 | 25 | 50 | 2 |
| III | Allied 2: Discrete Mathematics | 5 | 3 | 50 | 50 | 100 | 4 |
| IV | Value Education – Human Rights\* | 2 | 3 | - | 50 | 50 | 2 |
|  | NaanMuthalvan - Skill Course  Effective English  http://kb.naanmudhalvan.in/images/c/c7/Cambridge\_Course\_Details.pdf | 2 |  | 25 | 25 | 50 | 2 |
|  | **Total** | **30** |  | **275** | **325** | **600** | **24** |
|  | **Semester III** | | | | | | |
| III | Core 4: Data Structures | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core 5: Java Programming | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core Lab 4: Programming Lab – JAVA | 5 | 3 | 50 | 50 | 100 | 4 |
| III | Allied 3: Management Information Systems | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Skill based Subject 1: Internet Programming | 5 | 3 | 30 | 45 | 75 | 3 |
| IV | Tamil\*\* / Advanced Tamil\* (OR) Non-  major elective - I (Yoga for Human Excellence)\* / Women’s Rights\* | 2 | 3 | - | 50 | 50 | 2 |
|  | **Total** | **30** |  | **230** | **295** | **525** | **21** |
|  | **Semester IV** | | | | | | |
| III | Core 6: System Software andOperating System | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core 7: Linux and Shell Programming | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core Lab 5: Linux and Shell Programming Lab | 3 | 3 | 25 | 25 | 50 | 2 |
| III | Allied 4: Organizational Behavior | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Skill based Subject 2 Lab: PHP Programming -  Lab | 4 | 3 | 30 | 45 | 75 | 3 |
| IV | Tamil\*\*/Advanced Tamil\* (OR) Non- major elective -II (General Awareness\*) | 2 | 3 | - | 50 | 50 | 2 |
|  | NaanMuthalvan – Skill Course  Office Fundamentals - Lab  http://kb.naanmudhalvan.in/Bharathiar\_University\_(BU) | 3 |  | 25 | 25 | 50 | 2 |
|  | **Total** | **30** |  | **230** | **295** | **525** | **21** |

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|  | **Semester V** | | | | | | |
| III | Core 8: RDBMS & Oracle | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core 9: Visual Basic | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core Lab 6: Programming Lab  – VB & Oracle | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Elective – I: Client Server Computing / E- Commerce / Software Engineering | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Skill based Subject 3: Web designing with  ASP and ASP .NET | 6 | 3 | 30 | 45 | 75 | 3 |
|  | **Total** | **30** |  | **230** | **245** | **475** | **19** |
|  | **Semester VI** | | | | | | |
| III | Core 10: Graphics &Multimedia | 6 | 3 | 50 | 50 | 100 | 4 |
| III | Core 11: Project Work Lab %% | 6 | - | 60 | 90 | 150 | 6 |
| III | Core Lab 7: Programming Lab  – Graphics & Multimedia | 3 | 3 | 50 | 50 | 100 | 4 |
| III | Elective – II: Network Security &  Cryptography / Distributed Computing / Computer Networks | 5 | 3 | 50 | 50 | 100 | 4 |
| III | Elective – III: Mobile Computing / Web  Technology / Software Testing | 5 | 3 | 50 | 50 | 100 | 4 |
| III | Skill Based Subject 4(Lab): ASP Lab | 3 | 3 | 30 | 45 | 75 | 3 |
| V | Extension Activities\*\* | - | - | 50 | - | 50 | 2 |
|  | Naan Muthalvan - Skill Course  Cyber Security **@**  <http://kb.naanmudhalvan.in/images/7/71/Cybersecurity.pdf>  (or) Machine Learning **#**  <http://kb.naanmudhalvan.in/images/1/19/PBL_Google.pdf>  (or) Android APP Development **$** <http://kb.naanmudhalvan.in/images/0/08/Android_App_Dev.pdf> | 2 | 2 | 25 | 25 | 50 | 2 |
|  | **Total** | **30** |  | **365** | **360** | **725** | **29** |
|  | **Grand Total** |  |  | **1630** | **1870** | **3500** | **140** |

* \*No Continuous Internal Assessment (CIA). Only University Examinations.
* \*\* No University Examinations. Only Continuous Internal Assessment (CIA).
* **#** Govt – Non-Autonomous Colleges, **$** Aided – Non-Autonomous Colleges, **@** Self - Financing **(**Non – Autonomous).
* **&** The 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.

* NaanMudhalvan – skill courses- external 25 marks will be assessed by Industry

and internal will be offered by respective course teacher.



First Semester



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| **Course code** | |  | **Computing Fundamentals and C**  **Programming** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Paper: 1** | **4** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Students should have basic Computer  Knowledge | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To impart knowledge about Computer fundamentals 2. To understand the concepts and techniques in C Programming 3. To equip and indulge themselves in problem solving using C | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Learn about the Computer fundamentals and the Problem solving | | | | | | | **K2** | |
| 2 | Understand the basic concepts of C programming | | | | | | | **K2** | |
| 3 | Describe the reason why different decision making and loop constructs are  available for iteration in C | | | | | | | **K3** | |
| 4 | Demonstrate the concept of User defined functions , Recursions , Scope and  Lifetime of Variables, Structures and Unions | | | | | | | **K4** | |
| 5 | Develop C programs using pointers Arrays and file management | | | | | | | **K3** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **Fundamentals of Computers & Problem Solving in C** | | | **12 hours** | | | | |
| Fundamentals of Computers : Introduction – History of Computers-Generations of Computers- Classification of Computers-Basic Anatomy of a Computer System-Input Devices-Processor-  Output Devices-Memory Management – Types of Software- Overview of Operating System- Programming Languages-Translator Programs-Problem Solving Techniques - Overview of C. | | | | | | | | | |
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| **Unit:2** | | **Overview of C** | | | **15 hours** | | | | |
| Overview of C - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators - Arithmetic Expressions - Evaluation of expression - precedence of arithmetic operators - Type conversion in expression – operator precedence & associativity - Mathematical functions - Reading & Writing a character - Formatted input and  output. | | | | | | | | | |
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| **Unit:3** | | **Decision Making , Looping and Arrays** | | **15 hours** | | | | | |
| Decision Making and Branching: Introduction – if, if….else, nesting of if …else statements- else if ladder – The switch statement, The ?: Operator – The goto Statement. Decision Making and Looping: Introduction- The while statement- the do statement – the for statement-jumps in loops.  Arrays – Character Arrays and Strings | | | | | | | | | |
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| **Unit:4** | | **User-Defined Functions, Structures and Unions** | | **15 hours** | | | | | |
| User-Defined Functions: Introduction – Need and Elements of User-Defined Functions-  Definition-Return Values and their types - Function Calls – Declarations – Category of Functions- Nesting of Functions - Recursion – Passing Arrays and Strings to Functions - The | | | | | | | | | |

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| Scope, Visibility and Lifetime of Variables- Multi file Programs. Structures and Unions | | | |
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| **Unit:5** | | **Pointers & File Management** | **15 hours** |
| Pointers: Introduction-Understanding pointers -Accessing the address of a variable Declaration and Initialization of pointer Variable – Accessing a variable through its pointer Chain of pointers- Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers and Strings – Array of pointers – Pointers as Function Arguments Functions returning pointers –  Pointers to Functions – Pointers and Structures. File Management in C. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Problem Solving through C Programming - Edureka | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second  Reprint 2008 | | |
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| **Reference Books** | | | |
| 1 | Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002. | | |
| 2 | Henry Mullish & Hubert L.Cooper: The Sprit of C, Jaico, 1996. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | Introduction to Programming in C – NPTEL | | |
| 2 | Problem solving through Programming in C – SWAYAM | | |
| 3 | C for Everyone : Programming Fundamentals – Coursera | | |
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| Course Designed By: | | | |

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



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| **Course code** | |  | **Digital Fundamentals and Computer Architecture** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Paper : 2** | **4** | | | **0** | | **-** | **4** |
| **Pre-requisite** | | | **Student should have basic computer**  **knowledge** | **Syllabus**  **Version** | | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | | |
| On successful completion of this subject the students should have Knowledge on   1. To familiarize with different number systems and digital arithmetic & logic circuits 2. To understand the concepts of Combinational Logic and Sequential Circuits 3. To impart the knowledge of buses, I/O devices, flip flops, Memory and bus structure. 4. To understand the concepts of memory hierarchy and memory organization 5. To understand the various types of microprocessor architecture | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Learn the basic structure of number system methods like binary, octal and  hexadecimal and understand the arithmetic and logical operations are performed by computers. | | | | | | | | K3 | |
| 2 | Define the functions to simplify the Boolean equations using logic gates. | | | | | | | | K1 | |
| 3 | Understand various data transfer techniques in digital computer and control unit operations. | | | | | | | | K2 | |
| 4 | Compare the functions of the memory organization | | | | | | | | K4 | |
| 5 | Analyze architectures and computational designs concepts related to architecture  organization and addressing modes | | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **Number System and Arithmetic circuits** | | | | **12 hours** | | | | |
| Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal – Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Half subtractor, Full  subtractor, Parallel binary subtractor - Digital Logic: The Basic Gates – NOR, NAND, XOR Gates. | | | | | | | | | | |
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| **Unit:2** | | **Combinational Logic and Sequential Circuits** | | | | **14 hours** | | | | |
| Combinational Logic Circuits: Boolean algebra – Karnaugh map – Canonical form Construction and properties – Implementations – Don’t care combinations - Product of sum, Sum of products, Simplifications. Sequential circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers –  Decoder Encoder – Shift Registers-Counters. | | | | | | | | | | |
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| **Unit:3** | | **Input – Output Organization and Data Transfer** | | | **12 hours** | | | | | |
| Input – Output Organization: Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking – Priority Interrupt: Daisy- Chaining Priority,  Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication. | | | | | | | | | | |
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| **Unit:4** | | **Memory Organization** | **10 hours** |
| Memory Organization: Memory Hierarchy – Main Memory- Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization. Virtual Memory: Address Space and  Memory Space, Address Mapping Using Pages, Associative Memory, Page Table, Page Replacement. | | | |
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| **Unit:5** | | **Case Studies** | **6 hours** |
| CASE STUDY: Pin out diagram, Architecture, Organization and addressing modes of 80286-  80386-80486-Introduction to microcontrollers. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **56 hours** |
| **Text Book(s)** | | | |
| 1 | Digital principles and applications, Albert Paul Malvino, Donald P Leach, TMH, 1996. | | |
| 2 | Computer System Architecture -M. Morris Mano , PHI. | | |
| 3 | Microprocessors and its Applications-Ramesh S. Goankar | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Digital Electronics Circuits and Systems, V.K. Puri, TMH. | | |
| 2 | Computer Architecture, M. Carter, Schaum‘s outline series, TMH. | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https://nptel.ac.in/courses/106/103/106103068/ | | |
| 2 | <http://www.nptelvideos.in/2012/12/digital-computer-organization.html> | | |
| 3 | <http://brittunculi.com/foca/materials/FOCA-Chapters-01-07-review-handout.pdf> | | |
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| Course Designed By: | | | |

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

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



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| **Course code** | | |  | **Programming Lab – C** | | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core Lab: 1** | | **0** | | **0** | | **3** | **4** |
| **Pre-requisite** | | | | Students should have basic knowledge in C  programming and algorithms | | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | | | |
| The main objectives of this course are to:   1. To practice the Basic concepts, Branching and Looping Statements and Strings in C programming 2. To implement and gain knowledge in Arrays, functions, Structures, Pointers and File   handling | | | | | | | | | | | |
|  | | | | | | | | | | | |
| **Expected Course Outcomes:** | | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | | |
| 1 | | Remember and Understand the logic for a given problem and to generate Prime  numbers & Fibonacci Series **(Program-1,2,3)** | | | | | | | | **K1, K2** | |
| 2 | | Apply the concepts to print the Magic square, Sorting the data , Strings, Recursive  functions and Pointers **(Program-4,5,6,8,10)** | | | | | | | | **K2, K3** | |
| 3 | | Remember the logic used in counting the vowels in a sentence **(Program-7)** | | | | | | | | **K1** | |
| 4 | | Apply and Analyze the concepts of Structures and File management  **(Program-9,11,12)** | | | | | | | | **K3&K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | | |
|  | | | | | | | | | | | |
| **Programs** | | | | | | | **36 hours** | | | | |
| 1. Write a C program to find the sum, average, standard deviation for a given set of numbers. | | | | | | | | | | | |
| 2. Write a C program to generate n prime numbers. | | | | | | | | | | | |
| 3. Write a C program to generate Fibonacci series. | | | | | | | | | | | |
| 4. Write a C program to print magic square of order n where n > 3 and n is odd. | | | | | | | | | | | |
| 5. Write a C program to sort the given set of numbers in ascending order. | | | | | | | | | | | |
| 6. Write a C program to check whether the given string is a palindrome or not using pointers. | | | | | | | | | | | |
| 7. Write a C program to count the number of Vowels in the given sentence. | | | | | | | | | | | |
| 8. Write a C program to find the factorial of a given number using recursive function. | | | | | | | | | | | |
| 9. Write a C program to print the students Mark sheet assuming roll no, name, and marks in 5 subjects in a structure. Create an array of structures and print the mark sheet in the university  pattern. | | | | | | | | | | | |
| 10. Write a function using pointers to add two matrices and to return the resultant matrix to the  calling function. | | | | | | | | | | | |
| 11. Write a C program which receives two filenames as arguments and check whether the file  contents are same or not. If same delete the second file | | | | | | | | | | | |
| 12. Write a program which takes a file as command line argument and copy it to another file. At  the end of the second file write the total i) no of chars ii) no. of words and iii) no. of lines. | | | | | | | | | | | |
|  | | | **Total Lecture hours** | | **36 hours** | | | | | | |
| **Text Book(s)** | | | | | | | | | | | |
| 1 | E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second  Reprint 2008 | | | | | | | | | | |

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| **Reference Books** | |
| 1 | Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002. |
| 2 | Henry Mullish & Hubert L.Cooper: The Sprit of C, Jaico, 1996. |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | Introduction to Programming in C - NPTEL |
| 2 | Problem solving through Programming in C - SWAYAM |
| 3 | C for Everyone : Programming Fundamentals – Course |
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| Course Designed By: | |

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

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



Second Semester



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| **Course code** | |  | **C++ PROGRAMMING** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core: 3** | **5** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Before starting this course one should have a basic understanding of computer programs and computer programming language. If you know the concepts of C programming it will be much easier to understand this course | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Impart knowledge of object oriented programming concepts and implement them in C++ 2. Enable to differentiate procedure oriented and object-oriented concepts. 3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance. 4. Explain the importance of data hiding in object oriented programming | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Define the different programming paradigm such as procedure oriented and object oriented programming methodology and conceptualize elements of OO  methodology | | | | | | | K1 | |
| 2 | Illustrate and model real world objects and map it into programming objects for a  legacy system. | | | | | | | K2 | |
| 3 | Identify the concepts of inheritance and its types and develop applications using  overloading features. | | | | | | | K3 | |
| 4 | Discover the usage of pointers with classes | | | | | | | K4 | |
| 5 | Explain the usage of Files, templates and understand the importance of exception  Handling | | | | | | | K5 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO C++** | | | **10 hours** | | | | |
| Key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If.. Else, jump, goto, break, continue, Switch case statements - Loops in C++: for, while, do - functions in C++ -  inline functions – Function Overloading.. | | | | | | | | | |
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| **Unit:2** | | **CLASSES AND OBJECTS** | | | **10 hours** | | | | |
| Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes –  Constructor and destructor with static members. | | | | | | | | | |
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| **Unit:3** | | **OPERATOR OVERLOADING** | | **12 hours** | | | | | |
| Overloading unary, binary operators – Overloading Friend functions – type conversion –  Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path | | | | | | | | | |

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| inheritance – Virtual base Classes – Abstract Classes. | | | |
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| **Unit:4** | | **POINTERS** | **13 hours** |
| Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes  – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions. | | | |
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| **Unit:5** | | **FILES** | **13 hours** |
| File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing  string objects – String Attributes – Miscellaneous functions . | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education,  2003. | | |
| 2 |  | | |
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| **Reference Books** | | | |
| 1 | E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998. | | |
| 2 | Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002. | | |
| 3 | John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https:/[/www.spoke](http://www.spoken-tutorial.org/)n[-tutorial.org](http://www.spoken-tutorial.org/) | | |
| 2 | https:/[/www.tutorialspoint.com/cplusplus/inde](http://www.tutorialspoint.com/cplusplus/index.htm)x[.htm](http://www.tutorialspoint.com/cplusplus/index.htm) | | |
| 3 | https:/[/www.w3schools.com/](http://www.w3schools.com/cpp/)c[pp/](http://www.w3schools.com/cpp/) | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | M | M | M | M | M | L |
| **CO2** | S | S | S | S | S | S | S | M | M | M |
| **CO3** | S | S | S | S | S | S | S | M | M | M |
| **CO4** | S | S | S | S | S | S | S | M | M | S |
| **CO5** | S | S | S | S | S | S | S | M | M | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **PROGRAMMING LAB - C++** | **L** | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Lab : 2** | **0** | | **0** | **4** | **4** |
| **Pre-requisite** | | | Basic understanding of computer programs and  computer programming language like C. | **Syllabus Version** | | | 2021-22  Onwards | |
| **Course Objectives:** | | | | | | | | |
| The main objectives of this course are to:   1. Impart knowledge of object oriented programming concepts and implement them in C++ 2. Enable to differentiate procedure oriented and object-oriented concepts. 3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance. 4. Explain the importance of data hiding in object oriented programming | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Define the different programming paradigm such as procedure oriented and object oriented programming methodology and conceptualize elements of OO  methodology | | | | | | K1 | |
| 2 | Illustrate and model real world objects and map it into programming objects for a  legacy system. | | | | | | K2 | |
| 3 | Identify the concepts of inheritance and its types and develop applications using  overloading features. | | | | | | K3 | |
| 4 | Discover the usage of pointers with classes | | | | | | K4 | |
| 5 | Explain the usage of Files, templates and understand the importance of exception  Handling | | | | | | K5 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | |
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| **Programs** | | | | | **36 hours** | | | |
| 1. Write a C++ Program to create a class to implement the data structure STACK. Write a constructor to initialize the TOP of the STACK. Write a member function PUSH() to insert an element and  member function POP() to delete an element check for overflow and underflow conditions.. | | | | | | | | |
| 2. Write a C++ Program to create a class ARITHMETIC which consists of a FLOAT and an INTEGER variable. Write member functions ADD (), SUB(), MUL(), DIV() to perform addition, subtraction,  multiplication, division respectively. Write a member function to get and display values. | | | | | | | | |
| 3. Write a C++ Program to read an integer number and find the sum of all the digits until it reduces to a  single digit using constructors, destructors and inline member functions. | | | | | | | | |
| 4. Write a C++ Program to create a class FLOAT that contains one float data member. Overload all the  four Arithmetic operators so that they operate on the object FLOAT | | | | | | | | |
| 5. Write a C++ Program to create a class STRING. Write a Member Function to initialize, get and display stings. Overload the operators ++ and == to concatenate two Strings and to compare two  strings respectively. | | | | | | | | |
| 6. Write a C++ Program to create class, which consists of EMPLOYEE Detail like E\_Number, E\_Name, Department, Basic, Salary, Grade. Write a member function to get and display them.  Derive a class PAY from the above class and write a member function to calculate DA, HRA and PF depending on the grade. | | | | | | | | |
| 7. Write a C++ Program to create a class SHAPE which consists of two VIRTUAL FUNCTIONS Calculate\_Area() and Calculate\_Perimeter() to calculate area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE, TRIANGE from class Shape and Calculate Area and | | | | | | | | |

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| Perimeter of each class separately and display the result. | |
| 8. Write a C++ Program to create two classes each class consists of two private variables, a integer and a float variable. Write member functions to get and display them. Write a FRIEND Function common to both classes, which takes the object of above two classes as arguments and the integer and float values of both objects separately and display the result. | |
| 9. Write a C++ Program using Function Overloading to read two Matrices of different Data Types such  as integers and floating point numbers. Find out the sum of the above two matrices separately and display the sum of these arrays individually. | |
| 10. Write a C++ Program to check whether the given string is a palindrome or not using Pointers | |
| 11. Write a C++ Program to create a File and to display the contents of that file with line numbers. | |
| 12. Write a C++ Program to merge two files into a single file. | |
| **Text Book(s)** | |
| 1 | Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education,  2003 |
| 2 |  |
|  |  |
|  | |
| **Reference Books** | |
| 1 | E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998. |
| 2 | Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002. |
| 3 | John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002. |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | M | M | M | M | M | L |
| **CO2** | S | S | S | S | S | S | S | M | M | M |
| **CO3** | S | S | S | S | S | S | S | M | M | M |
| **CO4** | S | S | S | S | S | S | S | M | M | S |
| **CO5** | S | S | S | S | S | S | S | M | M | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Internet Basics** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Lab : 3** | **0** | | **0** | | **2** | **2** |
| **Pre-requisite** | | | Knowledge of WINDOWS Operating Systems | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Introduce the fundamentals of Internet and the Web functions. 2. Impart knowledge and essential skills necessary to use the internet and its various components. 3. Find, evaluate, and use online information resources. 4. Use Google Apps for education effectively. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the fundamentals of Internet and the Web concepts | | | | | | | K2 | |
| 2 | Explain the usage of internet concepts and analyze its components. | | | | | | | K2 | |
| 3 | Identify and apply the online information resources | | | | | | | K3 | |
| 4 | Inspect and utilize the appropriate Google Apps for education effectively | | | | | | | K3,  K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Programs** | | | | | **36 hours** | | | | |
| 1. Create an email account in Gmail. Using the account created compose a mail to invite other  college students for your college fest, enclose the invitation as attachment and send the mail to at least 50 recipients. Use CC and BCC options accordingly | | | | | | | | | |
| 2. Open your inbox in the Gmail account created, check the mail received from your peer from  other college inviting you for his college fest, and download the invitation. Reply to the mail with a thank you note for the invite and forward the mail to other friends. | | | | | | | | | |
| 3. Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume. | | | | | | | | | |
| 4. Create a meeting using Google calendar and share meeting id to the attendees. Transfer  the ownership to the Manager once the meeting id is generated. | | | | | | | | | |
| 5. Create a label and upload bulk contacts using import option in Google Contacts | | | | | | | | | |
| 6. Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every  subject and upload all unit wise E-Content Materials. | | | | | | | | | |
| 7. Create and share a folder in Google Drive using ‘share a link’ option and set the  permission to access that folder by your friends only. | | | | | | | | | |
| 8. Create one-page story in your mother tongue by using voice recognition facility of Google  Docs. | | | | | | | | | |
| 9. Create a registration form for your Department Seminar or Conference using Google  Forms. | | | | | | | | | |
| 10. Create a question paper with multiple choice types of questions for a subject of your  choice, using Google Forms. | | | | | | | | | |
| 11. Create a Google form with minimum 25 questions to conduct a quiz and generate a certificate after  submission. | | | | | | | | | |

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| 12. Create a meet using Google Calendar and record the meet using Google Meet. | |
| 13. Create a Google slides for a topic and share the same with your friends. | |
| 14. Create template for a seminar certificate using Google Slides. | |
| 15. Create a sheet to illustrate simple mathematical calculations using Google Sheets. | |
| 16. Create student’s internal mark statement and share the Google sheets via link. | |
| 17. Create different types of charts for a range in CIA mark statement using Google Sheets. | |
| 18. Create a mark statement in Google Sheets and download it as PDF, .xls and .csv files | |
| **Text Book(s)** | |
| 1 | Ian Lamont, Google Drive & Docs in 30 Minutes, 2nd Edition. |
| 2 |  |
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| **Reference Books** | |
| 1 | Sherry Kinkoph Gunter, My Google Apps, 2014. |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https:/[/www](http://www.youtube.com/watch?v=NzPNk44tdlQ).[youtube.com/watch?v=NzPNk44tdlQ](http://www.youtube.com/watch?v=NzPNk44tdlQ) |
| 2 | https:/[/www](http://www.youtube.com/watch?v=PKuBtQuFa-8).[youtube.com/watch?v=PKuBtQuFa-8](http://www.youtube.com/watch?v=PKuBtQuFa-8) |
| 4 | https:/[/www](http://www.youtube.com/watch?v=hGER1hP58ZE).[youtube.com/watch?v=hGER1hP58ZE](http://www.youtube.com/watch?v=hGER1hP58ZE) |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | M | S | S | S | S | M | M | S | L |
| **CO2** | S | M | S | S | S | S | S | S | S | M |
| **CO3** | S | S | S | S | S | S | S | S | S | S |
| **CO4** | S | S | S | S | S | S | S | S | S | S |

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



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| **Coursecode** |  | **Effective English** | **L** | **T** | **P** | **C** |
| **Core/Elective/ Supportive** | | **Naan Mudhalvan Skill based Course** | **2** | **0** | **0** | **2** |
| [**http://kb.naanmudhalvan.in/images/c/c7/Cambridge\_Course\_Details.pdf**](http://kb.naanmudhalvan.in/images/c/c7/Cambridge_Course_Details.pdf) **Refer the Content of the Serial. No. 6** | | | | | | |

Third Semester



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| **Course code** | |  | **Data Structures** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core: 4** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Basic understanding of Data storage, retrieval  and algorithms. | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To introduce the fundamental concept of data structures 2. To emphasize the importance of data structures in developing and implementing efficient algorithms. 3. Understand the need for Data Structures when building application 4. Ability to calculate and measure efficiency of code 5. Improve programming logic skills. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the basic concepts of data structures and algorithms | | | | | | | K1-K2 | |
| 2 | Construct and analyze of stack and queue operations with illustrations | | | | | | | K2-K4 | |
| 3 | Enhance the knowledge of Linked List and dynamic storage management. | | | | | | | K2-K3 | |
| 4 | Demonstrate the concept of trees and its applications | | | | | | | K2-K3 | |
| 5 | Design and implement various sorting and searching algorithms  for applications and understand the concept of file organizations | | | | | | | K1-K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION** | | | **15 hours** | | | | |
| Introduction of Algorithms, Analysing Algorithms. Arrays: Sparse Matrices - Representation of  Arrays. Stacks and Queues. Fundamentals - Evaluation of Expression Infix to Postfix Conversion - Multiple Stacks and Queues | | | | | | | | | |
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| **Unit:2** | | **LINKED LIST** | | | **12 hours** | | | | |
| Linked List: Singly Linked List - Linked Stacks and Queues - Polynomial Addition- More on  Linked Lists - Sparse Matrices - Doubly Linked List and Dynamic – Storage Management - Garbage Collection and Compaction. | | | | | | | | | |
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| **Unit:3** | | **TREES** | | **15 hours** | | | | | |
| Basic Terminology - Binary Trees - Binary Tree Representations – Binary Trees-Traversal-More On Binary Trees – Threaded Binary Trees - Binary Tree. Representation of Trees - Counting  Binary Trees. Graphs: Terminology and Representations-Traversals, Connected Components and Spanning Trees, Shortest Paths and Transitive Closure | | | | | | | | | |
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| **Unit:4** | | **EXTERNAL SORTING** | | **15 hours** | | | | | |
| Storage Devices -Sorting with Disks: K-Way Merging – Sorting with Tapes Symbol Tables: Static Tree Tables - Dynamic Tree Tables - Hash Tables: Hashing Functions - Overflow  Handling. | | | | | | | | | |
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| **Unit:5** | | **INTERNAL SORTING** | **15 hours** |
| Insertion Sort - Quick Sort - 2 Way Merge Sort - Heap Sort – Shell Sort - Sorting on Several  Keys. Files: Files, Queries and Sequential organizations – Index Techniques -File Organizations. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Ellis Horowitz, Sartaj Shani, Data Structures, Galgotia Publication. | | |
| 2 | Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran, Computer Algorithms, Galgotia  Publication. | | |
| 3 | S.Lovelyn Rose, R.Venkatesan, Data Structures, Wiley India Private Limited,2015, 1st Edition | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Jean-Paul,Tremblay & Paul G.Sorenson , An Introduction to Data structures with Applications  Tata McGraw Hill Company 2008, 2ndEdition. | | |
| 2 | Samanta.D , Classic Data Structure Prentice Hall of India Pvt Ltd 2007, 9th Edition | | |
| 3 | Seymour Lipschutz, Data Structures McGraw Hill Publications, 2014, 1st Edition | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 |  | | |
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| Course Designed By: | | | |

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

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| **Course code** | |  | **Java Programming** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core: 5** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | The objective of the course is to train the students to acquire problem-solving skills through  object oriented programming | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To expose the students with the introduction to OOPs and advantages of object oriented programming. 2. The concepts of OOPs make it easy to represent real world entities. 3. The course introduces the concepts of converting the real time problems into objects and methods and their interaction with one another to attain a solution. 4. Simultaneously it provides the syntax of programming language Java for solving the real world problems. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | The competence and the development of small to medium sized application  programs that demonstrate professionally acceptable coding | | | | | | | K1-K2 | |
| 2 | Demonstrate the concept of object oriented programming through Java | | | | | | | K2-K4 | |
| 3 | Apply the concept of Inheritance, Modularity, Concurrency, Exceptions handling  and data persistence to develop java program | | | | | | | K3 | |
| 4 | Develop java programs for applets and graphics programming | | | | | | | K3 | |
| 5 | Understand the fundamental concepts of AWT controls, layouts and  events | | | | | | | K1-K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING** | | | **15 hours** | | | | |
| Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming –Application of Object-Oriented Programming. Java Evolution: History – Features – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers. Overview of Java: simple Java program – Structure – Java Tokens – Statements – Java  Virtual Machine. | | | | | | | | | |
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| **Unit:2** | | **BRANCHING AND LOOPING** | | | **12 hours** | | | | |
| Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching:  if, if...else, nested if, switch, ? : Operator - Decision Making and Looping: while, do, for – Jumps in Loops - Labeled Loops – Classes, Objects and Methods. | | | | | | | | | |
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| **Unit:3** | | **ARRAYS AND INTERFACES** | | **15 hours** | | | | | |
| Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes  together – Multithreaded Programming. | | | | | | | | | |
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| **Unit:4** | | **ERROR HANDLING** | | **15 hours** | | | | | |
| Managing Errors and Exceptions – Applet Programming – Graphics Programming. | | | | | | | | | |
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| **Unit:5** | | **MANAGING INPUT / OUTPUT FILES IN JAVA** | **15 hours** |
| Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using  streams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading / Writing characters, Byte-Handling Primitive data Types – Random Access Files. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Programming with Java – A Primer - E. Balagurusamy, 5th Edition, TMH. | | |
| 2 | Herbert Schildt , Java: The Complete Reference, McGraw Hill Education, Oracle Press 10th  Edition, 2018 | | |
| 3 | Programming with Java – A Primer - E. Balagurusamy, 3rd Edition, TMH. | | |
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| **Reference Books** | | | |
| 1 | The Complete Reference Java 2 - Patrick Naughton & Hebert Schildt, 3rd Edition, TMH | | |
| 2 | Programming with Java – John R. Hubbard, 2nd Edition, TMH. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | [www.spoken-tutorial.org](http://www.spoken-tutorial.org/) | | |
| 2 | [www.nptel.ac.in](http://www.nptel.ac.in/) | | |
| 3 | https:/[/www.w3schools.in/java](http://www.w3schools.in/java-tutorial/)-[tutorial/](http://www.w3schools.in/java-tutorial/) | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | S | L | S | M | M | M |
| **CO2** | S | S | S | M | S | L | S | M | M | M |
| **CO3** | S | S | S | M | S | M | S | S | M | M |
| **CO4** | S | S | S | M | S | M | M | S | M | M |
| **CO5** | S | S | S | M | S | M | S | S | M | M |
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\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **Programming Lab – JAVA** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Lab: 4** | **0** | | **0** | | **5** | **4** |
| **Pre-requisite** | | | Students should know about the OOPs concept  and basic knowledge in java theory. | **Syllabus**  **Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. The main objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training. 2. To practice the Basic concepts, Branching and Looping Statements and Strings in C programming 3. To implement and gain knowledge in Arrays, functions, Structures, Pointers and File   handling | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the basic concepts of Java Programming with emphasis on ethics and  principles of professional coding | | | | | | | **K1, K2** | |
| 2 | Demonstrate the creation of objects, classes and methods and the  concepts of constructor, methods overloading, Arrays, branching and looping | | | | | | | **K2** | |
| 3 | Create data files and Design a page using AWT controls and Mouse Events in Java  programming Implement the concepts of code reusability and debugging. | | | | | | | **K2, K3** | |
| 4 | Develop applications using Strings, Interfaces and Packages and applets | | | | | | | **K3** | |
| 5 | Construct Java programs using Multithreaded Programming and  Exception Handling | | | | | | | **K3** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Programs** | | | | | **36 hours** | | | | |
| 1. Write a Java Applications to extract a portion of a character string and print the extracted string. | | | | | | | | | |
| 2. Write a Java Program to implement the concept of multiple inheritance using Interfaces. | | | | | | | | | |
| 3. Write a Java Program to create an Exception called payout-of-bounds and throw the  exception. | | | | | | | | | |
| 4. Write a Java Program to implement the concept of multithreading with the use of any three  multiplication tables and assign three different priorities to them. | | | | | | | | | |
| 5. Write a Java Program to draw several shapes in the created windows. | | | | | | | | | |
| 6. Write a Java Program to create a frame with four text fields name, street, city and pin code with suitable tables. Also add a button called my details. When the button is clicked its  corresponding values are to be appeared in the text fields. | | | | | | | | | |
| 7. Write a Java Program to demonstrate the Multiple Selection List-box. | | | | | | | | | |
| 8. Write a Java Program to create a frame with three text fields for name, age and qualification  and a text field for multiple line for address | | | | | | | | | |
| 9. Write a Java Program to create Menu Bars and pull down menus. | | | | | | | | | |
| 10. Write a Java Program to create frames which respond to the mouse clicks. For each events  with mouse such as mouse up, mouse down, etc., the corresponding message to be displayed. | | | | | | | | | |
| 11. Write a Java Program to draw circle, square, ellipse and rectangle at the mouse click | | | | | | | | | |



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| positions. | | | |
| 12. Write a Java Program which open an existing file and append text to that file. | | | |
|  | | **Total Lecture hours** | **36 hours** |
| **Text Book(s)** | | | |
| 1 | Programming with Java – A Primer – E. Balagurusamy, 5th Edition, TMH. | | |
| 2 | Herbert Schildt , Java: The Complete Reference, McGraw Hill Education, Oracle Press 10th  Edition, 2018 | | |
| 3 | Programming with Java – A Primer – E. Balagurusamy, 3rd Edition, TMH. | | |
| **Reference Books** | | | |
| 1 | The Complete Reference Java 2 – Patrick Naughton & Hebert Schildt, 3rd Edition, TMH | | |
| 2 | Programming with Java – John R. Hubbard, 2nd Edition, TMH. | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https:/[/www.w3r](http://www.w3resource.com/java-exercises/)e[source.com/java-exercises/](http://www.w3resource.com/java-exercises/) | | |
| 2 | https:/[/www.ude](http://www.udemy.com/introduction-to-java-programming/)m[y.com/introduction-to-java-programming/](http://www.udemy.com/introduction-to-java-programming/) | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | L | S | S | S | M | M | L |
| **CO3** | S | S | S | L | S | M | S | M | M | L |
| **CO3** | S | S | S | M | S | M | S | M | M | L |
| **CO4** | S | S | S | M | S | M | S | S | M | S |
| CO5 | S | S | S | M | S | S | S | S | M | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **INTERNET PROGRAMMING** | **L** | | **T** | | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Skill based Subject: 1** | **5** | | **0** | | | **0** | **3** |
| **Pre-requisite** | | | Students should have basic Computer  Knowledge | **Syllabus Version** | | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to learn internet basics, web development using HTML and scripting language to respond the events. 2. To learn the standard notation XML, CSS, DTD and XSD. 3. To study the dynamic web application development using ASP and PHP. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the basics of internet, internet services, protocols, remote access and  transaction. | | | | | | **K2** | | | |
| 2 | Understand the basics of HTML, HTML tags, Tables, Frames and Forms and  apply to develop web pages. | | | | | | **K2,K4** | | | |
| 3 | Understand the basics of scripting and apply the java script, VB script and Perl  script for developing web pages. | | | | | | **K2-K4** | | | |
| 4 | Knowledge on XML, CSS, XSL, DTD and XSD. | | | | | | **K4** | | | |
| 5 | Knowledge on dynamic web applications, basics of ASP, ASP objects and  basics of PHP. | | | | | | **K2-K4** | | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **BASICS OF INTERNET** | | | **12 hours** | | | | | |
| Basics of Internet communication - Hardware elements associated with internet - Internet Services  - Internet Protocols - TCP/IP, UDP, and HTTP - other Protocols - Telnet - Gopher - Mail and its types - FTP - Remote access and Transaction - Web Indexes Search Engines. | | | | | | | | | | |
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| **Unit:2** | | **INTRODUCTION TO HTML** | | | **15 hours** | | | | | |
| Introduction to HTML - Tags and Documents - Link documents using Anchor Tags - Images and  Pictures - Tables -HTML Forms - Frames - Framesets. | | | | | | | | | | |
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| **Unit:3** | | **INTRODUCTION TO SCRIPTING** | | **15 hours** | | | | | | |
| Introduction to Scripting - Java Script - Data types - Operators - Variables - Conditional Statements  - Functions -Objects - Document object - Image Object – Event Handling -Introduction to VBScript and Perl Script. | | | | | | | | | | |
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| **Unit:4** | | **INTRODUCTION TO XML** | | **15 hours** | | | | | | |
| Introduction to XML - Well formed XML - CSS - XSL - Valid XML - DTD - XSD -Introduction  to DOM and SAX. | | | | | | | | | | |
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| **Unit:5** | | **INTRODUCTION TO DYNAMIC WEB**  **APPLICATIONS** | | **15 hours** | | | | | | |
| Introduction to Dynamic web applications -Active Server Page Basics – ASP Object Model -  Collections - Introduction to PHP. | | | | | | | | | | |

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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Problem Solving through C Programming - Edureka | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Deitel & Deitel, Internet and WWW How to Pprogram, Prentice Hall 2000. | | |
| 2 | David Hunter et al., Beginning XML, Wrox Publications 2000. | | |
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| **Reference Books** | | | |
| 1 | Daniel C.Lynch, Marehall T. Rose. Internet Systems Handbook , Addison Wesley 1993. | | |
| 2 | Thomas Penny, How to do Everything with HTML, McGraw-Hill Education, 2 edition, 2003. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | M | M | M | M | S | M | S | L |
| **CO3** | S | M | S | S | M | M | S | M | M | L |
| **CO3** | M | S | S | S | M | M | M | M | M | M |
| **CO4** | S | M | M | M | S | M | M | M | S | M |
| CO5 | M | S | S | M | M | M | S | S | S | M |
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\*S-Strong; M-Medium; L-Low



Fourth Semester



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| **Course code** | |  | **System Software and Operating Systems** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core : 6** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Students Should have the basic knowledge in  computer. | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To understand the processing of programs on a computer system to design and implementation of language processor. 2. To enhance the ability of program generation through expansion and gain knowledge about Code optimization using software tools. 3. Students will gain knowledge of basic operating system concepts. 4. To have an in-depth understanding of process concepts, deadlock and memory management. 5. To provide an exposure to scheduling algorithms, devices and information management. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Know the program generation and program execution activities in detail | | | | | | | K1 | |
| 2 | Understand the concepts of Macro Expansions and Gain the knowledge of Editing  processes | | | | | | | K2-K3 | |
| 3 | Remember the basic concepts of operating system | | | | | | | K1 | |
| 4 | Understand the concepts like interrupts, deadlock , memory management and file  management | | | | | | | K2 | |
| 5 | Analyze the need for scheduling algorithms and implement different algorithms used for representation, scheduling, and allocation in DOS and UNIX operating  system. | | | | | | | K1-K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO SYSTEM SOFTWARE** | | | **12 hours** | | | | |
| Introduction–System Software and machine architecture. Loader and Linkers: Basic Loader Functions - Machine dependent loader features –Machine independent loader features - Loader  design options | | | | | | | | | |
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| **Unit:2** | | **MACHINE AND COMPILER** | | | **15 hours** | | | | |
| Machine dependent compiler features - Intermediate form of the program - Machine dependent code optimization - Machine independent compiler features - Compiler design options - Division  into passes – Interpreters – p-code compilers - Compiler-compilers. | | | | | | | | | |
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| **Unit:3** | | **OPERATING SYSTEM** | | **15 hours** | | | | | |
| What is an Operating System? – Process Concepts: Definition of Process - Process States - Process States Transition – Interrupt Processing – Interrupt Classes - Storage Management: Real Storage: Real Storage Management Strategies – Contiguous versus Non-contiguous storage allocation – Single User Contiguous Storage allocation- Fixed partition multiprogramming –  Variable partition multiprogramming. | | | | | | | | | |
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| **Unit:4** | | **VIRTUAL STORAGE** | **15 hours** |
| Virtual Storage: Virtual Storage Management Strategies – Page Replacement Strategies –  Working Sets – Demand Paging – Page Size. Processor Management: Job and Processor Scheduling: Preemptive Vs Non-preemptive scheduling – Priorities – Deadline scheduling. | | | |
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| **Unit:5** | | **DEVICE AND INFORMATION MANAGEMENT** | **15 hours** |
| Device and Information Management Disk Performance Optimization: Operation of moving head disk storage – Need for disk scheduling – Seek Optimization – File and Database Systems: File  System – Functions – Organization – Allocating and freeing space – File descriptor – Access control matrix. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Leland L.Beck, System Software: An Introduction to Systems Programming, Pearson, Third  Edition. | | |
| 2 | H.M. Deitel, Operating Systems, 2nd Edition, Perason, 2003. | | |
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| **Reference Books** | | | |
| 1 | Achy8ut S. Godbole, Operating Systems, TMH, 2002. | | |
| 2 | John J. Donovan, Systems Programming, TMH, 1991. | | |
| 3 | D.M. Dhamdhere, Systems Programming and Operating Systems, 2nd Revised Edition, TMH. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | M | M | M | S | M | M | M | M | L |
| **CO2** | S | S | S | S | S | M | M | M | S | L |
| **CO3** | S | M | M | M | S | M | S | S | S | L |
| **CO4** | S | S | S | M | S | S | S | M | M | M |
| **CO5** | S | S | S | M | S | S | S | M | M | M |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Linux and Shell Programming** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core : 7** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Before starting the course students should have  the basic knowledge about operating system and C programming. | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Linux is a multi-user and multi-tasking operating system and after learning the concepts of an operating system 2. Student will be able to write simple shell programming using Linux utilities, pipes and filters. 3. The file system, process management and memory management are discussed. 4. Various commands used by Linux shell is also discussed which makes the users to interact with each other. 5. Bourne shell programming is dealt in depth which can be used to develop applications. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Describe the architecture and features of Linux Operating System and distinguish it  from other Operating System. | | | | | | | K1 | |
| 2 | Develop Linux utilities to perform File processing, Directory handling, User  Management and display system configuration | | | | | | | K2-K3 | |
| 3 | Develop shell scripts using pipes, redirection, filters and Pipes | | | | | | | K2 | |
| 4 | Apply and change the ownership and file permissions using advance Unix  commands. | | | | | | | K3 | |
| 5 | Build Regular expression to perform pattern matching using utilities and  implement shell scripts for real time applications. | | | | | | | K3-K6 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION** | | | **12 hours** | | | | |
| Introduction to LINUX Operating System: Introduction - The LINUX Operating System. | | | | | | | | | |
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| **Unit:2** | | **MANAGING FILES AND DIRECTORIES** | | | **15 hours** | | | | |
| Managing Files and Directories: Introduction – Directory Commands in LINUX – File Commands  in LINUX. | | | | | | | | | |
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| **Unit:3** | | **VI EDITOR** | | **15 hours** | | | | | |
| Creating files using the vi editor: Text editors – The vi editor. Managing Documents: Locating  files in LINUX – Standard files – Redirection – Filters – Pipes. | | | | | | | | | |
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| **Unit:4** | | **SECURING FILES** | | **15 hours** | | | | | |
| Securing files in LINUX: File access permissions – viewing File access permissions – Changing File access permissions. Automating Tasks using Shell Scripts: Introduction – Variables- Local  and Global Shell variables – Command Substitution. | | | | | | | | | |
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| **Unit:5** | | **CONDITIONAL EXECUTION IN SHELL SCRIPTS** | | **15 hours** | | | | | |

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| Using Conditional Execution in Shell Scripts: Conditional Execution – The case…esac Construct. Managing repetitive tasks using Shell Scripts: Using Iteration in Shell Scripts – The while construct – until construct – for construct – break and continue commands – Simple Programs  using Shell Scripts. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Operating System LINUX, NIIT, PHI, 2006, Eastern Economy Edition. | | |
| 2 | N.B. Venkateswarlu , Introduction to Linux: Installation and Programming, BS Publications,  2008, 1st Edition | | |
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| **Reference Books** | | | |
| 1 | Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing  Company Limited, New Delhi, Edition 2008. | | |
| 2 |  | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <http://spoken-tutorial.org/> | | |
| 2 | https:/[/www.tutorialspoint.com/linu](http://www.tutorialspoint.com/linux/index.htm)x[/index.htm](http://www.tutorialspoint.com/linux/index.htm) | | |
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| Course Designed By: | | | |

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



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| **Course code** | |  | **Programming Lab –**  **LINUX and SHELL PROGRAMMING** | **L** | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Lab: 5** | **0** | | **0** | **3** | **2** |
| **Pre-requisite** | | | Students should have the prior basic knowledge  in operating system. | **Syllabus Version** | | | 2021-22  Onwards | |
| **Course Objectives:** | | | | | | | | |
| The main objectives of this course are to:   1. Describe the architecture and features of Linux Operating System 2. To create programs in the Linux environment using Linux utilities and commands. 3. Student is given an introduction of Linux shell commands and they will be able to write own shell scripts. 4. Shell programming is dealt in depth which can be used to develop applications. | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Develop Linux utilities to perform File processing, Directory handling and User  Management | | | | | | **K1, K2** | |
| 2 | Understand and develop shell scripts using pipes, redirection, filters, Pipes and  display system configuration | | | | | | **K2-K3** | |
| 3 | Develop simple shell scripts applicable to file access permission network  administration | | | | | | **K3** | |
| 4 | Apply and change the ownership and file permissions using advance Unix  commands. | | | | | | **K4-K5** | |
| 5 | Create shell scripts for real time applications. | | | | | | **K6** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | |
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| **Programs** | | | | | **36 hours** | | | |
| 1. Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff. | | | | | | | | |
| 1. Write a shell script to show the following system configuration :    1. currently logged user and his log name    2. current shell , home directory , Operating System type , current Path setting , current working directory    3. show currently logged number of users, show all available shells    4. show CPU information like processor type , speed    5. show memory information | | | | | | | | |
| 3. Write a Shell Script to implement the following: pipes, Redirection and tee commands. | | | | | | | | |
| 4. Write a shell script for displaying current date, user name, file listing and directories by  getting user choice. | | | | | | | | |
| 5. Write a shell script to implement the filter commands. | | | | | | | | |
| 6. Write a shell script to remove the files which has file size as zero bytes. | | | | | | | | |
| 7. Write a shell script to find the sum of the individual digits of a given number. | | | | | | | | |
| 8. Write a shell script to find the greatest among the given set of numbers using command line | | | | | | | | |

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| arguments. | | | |
| 9. Write a shell script for palindrome checking. | | | |
| 10. Write a shell script to print the multiplication table of the given argument using for loop. | | | |
|  | | **Total Lecture hours** | **36 hours** |
| **Text Book(s)** | | | |
| 1 | Operating System LINUX, NIIT, PHI, 2006, Eastern Economy Edition. | | |
| 2 | N.B. Venkateswarlu , Introduction to Linux: Installation and Programming, BS Publications,  2008, 1st Edition | | |
| **Reference Books** | | | |
| 1 | Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill  Publishing Company Limited, New Delhi, Edition 2008. | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https:/[/www.w3r](http://www.w3resource.com/linux-exercises/)e[source.com/linux-exercises/](http://www.w3resource.com/linux-exercises/) | | |
| 2 | <http://spoken-tutorial.org/> | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | S | M | S | M | M | M |
| **CO3** | S | S | S | M | S | M | S | S | M | M |
| **CO3** | S | S | S | S | S | S | S | S | S | S |
| **CO4** | S | S | S | S | S | S | S | S | S | S |
| CO5 | S | S | S | S | S | S | S | S | S | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | | |  | **Lab - PHP Programming** | | **L** | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Skill Based Subject 2 (Lab) :1** | | **0** | | **0** | **4** | **3** |
| **Pre-requisite** | | | | **Students should have knowledge in PHP and SQL** | | **Syllabus Version** | | | 2021-22  Onwards | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To enhance the knowledge of students in web programming and make them to do elegant applications in PHP using Array class, OOPs concepts, etc. 2. To understand how to develop data centric web application using PHP and SQLite. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | | Understand the basics of PHP. | | | | | | | K1 | |
| 2 | | Understand the programming concepts in PHP and create web applications | | | | | | | K1-K3 | |
| 3 | | Knowledge on Array object, storing data in Arrays, processing Arrays with  loops, functions of Array class and implementing applications. | | | | | | | K3-K4 | |
| 4 | | Understand the OOPs concepts, Files and Directories | | | | | | | K1-K3 | |
| 5 | | Knowledge on working database centric application using SQL, SQLite | | | | | | | K1-K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Programs** | | | | | | | **36 hours** | | | |
| 1. Develop a PHP program using controls and functions | | | | | | | | | | |
| 2. Develop a PHP program and check message passing mechanism between pages. | | | | | | | | | | |
| 3. Develop a PHP program using String function and Arrays. | | | | | | | | | | |
| 4. Develop a PHP program to display student information using MYSQL table. | | | | | | | | | | |
| 5. Develop a PHP program to design a college application form using MYSQL table. | | | | | | | | | | |
| 6. Develop a PHP program using parsing functions (use Tokenizing) | | | | | | | | | | |
| 7. Develop a PHP program and check Regular Expression, HTML functions, Hashing  functions. | | | | | | | | | | |
| 8. Develop a PHP program and check File System functions, Network functions, Date and  time functions. | | | | | | | | | | |
| 9. Develop a PHP program using session | | | | | | | | | | |
| 10. Develop a PHP program using cookie and session | | | | | | | | | | |
|  | | | **Total Lecture hours** | | **36 hours** | | | | | |
| **Text Book(s)** | | | | | | | | | | |
| 1 | Programming PHP, Rasmus Lerdorf and Levin Tatroe, O‗Reilly, 2002 | | | | | | | | | |
| 2 | Core Python Programming, Wesley J. Chun, Prentice Hall, 2001 | | | | | | | | | |
| **Reference Books** | | | | | | | | | | |
| 1 | PHP: The Complete Reference, 2nd Edn, Steve Holzner, TMH 2009. | | | | | | | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | | | | | | | | |
| 1 | https:/[/www.w3r](http://www.w3resource.com/linux-exercises/)e[source.com/linux-exercises/](http://www.w3resource.com/linux-exercises/) | | | | | | | | | |
| 2 | <http://spoken-tutorial.org/> | | | | | | | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | M | M | S | M | S | L |
| **CO2** | L | M | S | M | M | L | S | L | S | L |
| **CO3** | S | S | L | M | M | M | S | M | S | M |
| **CO4** | S | M | S | M | S | M | S | M | S | M |
| CO5 | M | S | S | M | M | M | S | M | S | M |
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\*S-Strong; M-Medium; L-Low



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| **Coursecode** |  | **Office Fundamentals** | **L** | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | **Naan Mudhalvan Skill Based Course** | **0** | **0** | **3** | **2** |
| <http://kb.naanmudhalvan.in/Bharathiar_University_(BU)>  **Refer the Content of the Serial. No. 2** | | | | | | |

Fifth Semester



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| **Course code** | |  | **RDBMS & Oracle** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core : 8** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Basic knowledge about the data, table and  database in computers | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. The course describes the data, organizing the data in database, database administration. 2. To grasp the different issues involved in the design of a database system. 3. To study the physical and logical database designs and database modeling like relational, Hierarchical, network models, database security, integrity and normalization. 4. It also gives introduction to SQL language to retrieve the data from the database with suitable application development. 5. Provide strong foundation of database concepts and to introduce students to application development in DBMS. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the basic concepts of Relational Data Model, Entity-  Relationship Model and process of Normalization | | | | | | | **K1-K2** | |
| 2 | Understand and construct database using Structured Query Language  (SQL) in Oracle9i environment. | | | | | | | **K1-K3** | |
| 3 | Learn basics of PL/SQL and develop programs using Cursors,  Exceptions, Procedures and Functions. | | | | | | | **K1-K4** | |
| 4 | Understand and use built-in functions and enhance the knowledge of  handling multiple tables | | | | | | | **K1-K3** | |
| 5 | Attain a good practical skill of managing and retrieving of data using  Data Manipulation Language (DML) | | | | | | | **K2-K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **DATABASE CONCEPTS** | | | **15 hours** | | | | |
| Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and  Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams – De -normalization – Another Example of Normalization. | | | | | | | | | |
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| **Unit:2** | | **ORACLE9i** | | | **15 hours** | | | | |
| Oracle9*i*: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL \*Plus Environment – SQL – Logging into SQL \*Plus - SQL \*Plus Commands – Errors & Help – Alternate Text Editors - SQL \*Plus Worksheet - *i*SQL \*Plus. Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types  – Spooling – Error codes. | | | | | | | | | |
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| **Unit:3** | | **WORKING WITH TABLE** | | **15 hours** | | | | | |
| Working with Table: Data Management and Retrieval: DML – adding a new Row/Record –  Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting | | | | | | | | | |

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| Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in  functions –Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations. | | | |
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| **Unit:4** | | **PL/SQL** | **15 hours** |
| PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQ L in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause –  Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions. | | | |
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| **Unit:5** | | **PL/SQL COMPOSITE DATA TYPES** | **12 hours** |
| PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks: Procedures –  Functions – Packages –Triggers –Data Dictionary Views. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Database Systems using Oracle, Nilesh Shah, 2nd edition, PHI. | | |
| 2 | E-Book : Diana Lorentz, “Oracle® Database SQL Reference”, ORACLE, Dec, 2005. | | |
| 3 | E-Book : Bill Pribyl, Steven Feuerstein, “Oracle PL/SQL Programming”, O'Reilly Media, Inc.,  6th Edition, February 2014. | | |
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| **Reference Books** | | | |
| 1 | Database Management Systems, Majumdar & Bhattacharya, 2007, TMH. | | |
| 2 | Database Management Systems, Gerald V. Post, 3rd edition, TMH. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <http://www.digimat.in/nptel/courses/video/106105175/L01.html> | | |
| 2 | https://[www.tutorialspoint.com/oracle\_sql/index.htm](http://www.tutorialspoint.com/oracle_sql/index.htm) | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | S | M | M | M | M | L |
| **CO2** | S | S | S | M | S | M | M | M | M | L |
| **CO3** | S | S | S | S | S | S | S | S | M | M |
| **CO4** | S | S | S | S | S | M | S | S | M | L |
| **CO5** | S | S | S | S | S | M | S | S | M | L |

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

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| **Course code** | |  | **Visual Basic** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core : 9** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Knowledge in programming language and oops  concept. | **Syllabus**  **Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. The main aim of the course is to cover visual basic programming skills required for modern software development. 2. To study the advantages of Controls available with visual basic. 3. To gain a basic understanding of database access and management using data controls. 4. To facilitate the learner to carry out project works using the tools available in VB and MS Access. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Demonstrate fundamental skills in utilizing the tools of a visual environment such  as command, menus and toolbars. | | | | | | | **K1** | |
| 2 | Implement SDI and MDI applications using forms, dialogs and other types of GUI  components. | | | | | | | **K2** | |
| 3 | Understand the connectivity between VB with MS-ACCESS database. | | | | | | | **K3** | |
| 4 | Implement the methods and techniques to develop projects. | | | | | | | **K4** | |
| 5 | Attain a good practical skill of managing ODBC and Data Access Objects | | | | | | | **K2-K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO VB** | | | **15 hours** | | | | |
| Getting Started with VB6, Programming Environment, working with Forms, Developing an application, Variables, Data types and Modules, procedures and control structures, arrays. Working  with Controls: Creating and using controls, working with control arrays. | | | | | | | | | |
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| **Unit:2** | | **MENUS IN VB** | | | **15 hours** | | | | |
| Menus, Mouse events and Dialog boxes: Mouse events, Dialog boxes, MDI and Flex grid: MDI,  Using the Flex grid control. | | | | | | | | | |
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| **Unit:3** | | **ODBC AND DATA ACCESS OBJECTS** | | **15 hours** | | | | | |
| ODBC and Data Access Objects: Data Access Options, ODBC, Remote data objects, ActiveX EXE and ActiveX DLL: Introduction, Creating an ActiveX EXE Component, Creating ActiveX  DLL Component. | | | | | | | | | |
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| **Unit:4** | | **OBJECT LINKING AND EMBEDDING** | | **15 hours** | | | | | |
| Object Linking and Embedding: OLE fundamentals, Using OLE Container Control, Using OLE Automation objects, OLE Drag and Drop, File and File System Control: File System Controls,  Accessing Files. | | | | | | | | | |
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| **Unit:5** | | **CONTROLS IN VB** | | **12 hours** | | | | | |
| Additional controls in VB: sstab control, setting properties at runtime, adding controls to tab, list  control, tabstrip control, MS Flexgrid control, Why ADO, Establishing a reference, Crystal and Data reports. | | | | | | | | | |



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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007. **(Unit I**  **to Unit IV)** | | |
| 2 | Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth  Reprint, 2006. **(Unit V)** | | |
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| **Reference Books** | | | |
| 1 | Gray Cornell (2003), ”Visual Basic 6 from ground up” TMH, New Delhi, 1st Edition, | | |
| 2 | Deitel and Deitel, T.R.Nieto (1998), “Visual Basic 6 - How to Program”, Pearson Education.  First Edition. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | L | M | M | M | M | M | L |
| **CO2** | S | S | S | M | M | M | S | S | M | L |
| **CO3** | S | S | S | S | S | M | S | S | S | M |
| **CO4** | S | S | S | S | S | S | S | S | S | S |
| **CO5** | S | S | S | S | S | S | S | S | S | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Programming Lab – VB & Oracle** | **L** | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Lab : 6** | **0** | | **0** | **6** | **4** |
| **Pre-requisite** | | | Students should have the theoretical knowledge  in visual basic and oops concept. | **Syllabus Version** | | | 2021-22  Onwards | |
| **Course Objectives:** | | | | | | | | |
| The main objectives of this course are to:   1. To develop applications using Graphical User Interface tools. 2. To understand the design concepts. 3. To design and build database systems and demonstrate their competence. 4. To create requirement analysis and specification for software applications. | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Understand the concepts of Visual Basic. | | | | | | **K1** | |
| 2 | Learn the advantages of Controls in VB | | | | | | **K2** | |
| 3 | Design and develop the event- driven applications using Visual Basic framework. | | | | | | **K3** | |
| 4 | Apply the knowledge of database methods. | | | | | | **K4** | |
| 5 | Learn basics of PL/SQL and develop programs using Cursors, Exceptions,  Procedures and Functions | | | | | | **K6** | |
| **K1** – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create | | | | | | | | |
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| **Programs** | | | | | **36 hours** | | | |
| 1. Construction of an Arithmetic Calculator (Simple). | | | | | | | | |
| 1. Writing simple programs using loops and decision-making statements.    1. Generate Fibonacci series.    2. Find the sum of N numbers. | | | | | | | | |
| 3. Write a program to create a menu and MDI Forms. | | | | | | | | |
| 4. Write a program to display files in a directory using DriveListBox, DirListBox and FileListBox control and open, edit and save text file using Rich text box control. | | | | | | | | |
| 5. Write a program to illustrate Common Dialog Control and to open, edit and save text file. | | | | | | | | |
| 6. Write a program to implement animation using timers. | | | | | | | | |
| 1. Write a simple VB program to accept a number as input and convert it into   a. Binary b. Octal c. Hexa-decimal | | | | | | | | |
| 8. Create a table for Employee details with Employee Number as primary key and following fields:  Name, Designation, Gender, Age, Date of Joining and Salary. Insert at least ten rows and perform various queries using any one Comparison, Logical, Set, Sorting and Grouping operators. | | | | | | | | |
| 9. Write a PL/SQL to update the rate field by 20% more than the current rate in inventory table which has the following fields: Prono, ProName and Rate. After updating the table a  new field (Alter) called for Number of item and place for values for the new field without using PL/SQL block. | | | | | | | | |

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| 10. Write a PL/SQL program to implement the concept of Triggers | | | |  |
| 11. Write a PL/SQL program to implement the concept “Procedures”. | | | |
| 12. Write a VB program to manipulate the student mark list with oracle database connectivity  program. | | | |
|  | | **Total Lecture hours** | **36 hours** |
| **Text Book(s)** | | | |
| 1 | Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007. **(Unit I**  **to Unit IV)** | | |
| 2 | Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth  Reprint, 2006. **(Unit V)** | | |
| 3 | E-Book : Bill Pribyl, Steven Feuerstein, “Oracle PL/SQL Programming”, O’Reilly Media, Inc.,  6th Edition, February 2014. | | | |
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| **Reference Books** | | | |
| 1 | Gray Cornell (2003), ”Visual Basic 6 from ground up” TMH, New Delhi, 1st Edition, | | |
| 2 | Deitel and Deitel, T.R.Nieto (1998), “Visual Basic 6 – How to Program”, Pearson Education.  First Edition. | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | L | M | L | S | M | M | L |
| **CO3** | S | S | S | L | M | M | S | M | S | L |
| **CO3** | S | S | S | M | S | M | S | S | S | M |
| **CO4** | S | S | S | M | S | M | S | S | M | M |
| CO5 | S | S | S | S | S | S | S | S | S | M |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **CLIENT/SERVER COMPUTING** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: I** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Basic knowledge in computer and computing | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to learn the basics of client/server computing and applications of client/server computing. 2. To understand the connectivity components, software and hardware components of client/server applications. 3. To learn future enabling technologies for client/server computing. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the basics of client/server applications, advantages and improve performance  and reduce the network traffic. | | | | | | | K1-K2 | |
| 2 | Knowledge in client and server role, the networking operating system and the server  operating system. | | | | | | | K2 | |
| 3 | Understanding the connectivity components of client/server applications, open  system interconnect and WAN technologies. | | | | | | | K2-K3 | |
| 4 | Understanding the software and hardware components of client/server applications. | | | | | | | K2-K3 | |
| 5 | Knowledge in components of client/server applications and future enabling  technologies for client/server computing. | | | | | | | K2-K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **CLIENT / SERVER COMPUTING** | | | **15 hours** | | | | |
| Client / Server Computing – Advantages of Client / Server Computing – Technology Revolution –  Connectivity – Ways to improve Performance – How to reduce network Traffic. | | | | | | | | | |
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| **Unit:2** | | **COMPONENTS OF CLIENT / SERVER**  **APPLICATIONS – THE CLIENT** | | | **12 hours** | | | | |
| Components of Client / Server Applications – The Client: Role of a Client – Client Services – Request for Service. Components of Client / Server Applications – The Server: The Role of a Server – Server Functionality in Detail – The Network Operating System – What are the Available  Platforms – The Server Operating system. | | | | | | | | | |
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| **Unit:3** | | **COMPONENTS OF CLIENT / SERVER APPLICATIONS – CONNECTIVITY** | | **15 hours** | | | | | |
| Components of Client / Server Applications – Connectivity: Open System Interconnect –  Communications Interface Technology – Inter-process communication – WAN Technologies. | | | | | | | | | |
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| **Unit:4** | | **COMPONENTS OF CLIENT / SERVER**  **APPLICATIONS** | | **15 hours** | | | | | |
| Components of Client / Server Applications – Software. Components of Client / Server  Applications – Hardware. | | | | | | | | | |

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| **Unit:5** | | **COMPONENTS OF CLIENT / SERVER APPLICATIONS** | **15 hours** |
| Components of Client / Server applications – Service and Support: System Administration. The  Future of Client / Server Computing: Enabling Technologies – Transformational Systems. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Client /Server Computing, Patrick Smith, Steve Guenferich, 2nd edition, PHI. | | |
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| **Reference Books** | | | |
| 1 | Robert Orfali, Dan Harkey, Jeri Edwards: The Essential Client/Server Survival Guide, 2nd  edition, Galgotia Publications. | | |
| 2 | Dewire and Dawana Travis, Client/ Server Computing, TMH. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | L | S | S | M | S | M | M | M |
| **CO2** | S | S | S | M | M | M | S | S | M | M |
| **CO3** | S | S | S | M | S | M | M | M | M | L |
| **CO4** | S | S | M | S | M | M | S | S | M | M |
| **CO5** | S | S | S | M | M | S | S | M | M | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **E Commerce** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: I** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic understanding in use of internet in commercial applications** | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to learn and understand the E-Commerce strategies. 2. To understand the E-Market and EDI standards and implementations. 3. To study and understand the online payments in E-Commerce applications and other E-Commerce applications used in the internet. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understanding the basics of E-Commerce and its strategies. | | | | | | | **K1, K2** | |
| 2 | Knowledge in basics of business strategy, E-Commerce implementation, the credit  transaction trade cycle. | | | | | | | **K2** | |
| 3 | Understand the E-markets, EDI standards, communication and implementations. | | | | | | | **K3** | |
| 4 | Understand the internet, HTML, server side scripting and client side scripting  languages, online payments in E-Commerce applications. | | | | | | | **K4** | |
| 5 | Knowledge in the internet bookshops, electronic newspapers, virtual auctions  gambling on the Net and e-diversity. | | | | | | | **K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **Introduction to E-Commerce** | | | **10 hours** | | | | |
| The Scope of E-Commerce – Definition-E-Commerce & the Trade Cycle – Electronic Market – Electronic Data Interchange – The Internet Commerce – The E-Commerce in Perspective. Business Strategy: The Value Chain – Supply Chains – Porter’s Value Chain Model – The Inter  Organizational Value Chain | | | | | | | | | |
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| **Unit:2** | | **The Introduction to Business Strategy** | | | **10 hours** | | | | |
| The Introduction to Business Strategy – Strategic Implications of IT – Technology – Business Environment – Business Capability – Existing Business Strategy – Strategy Formulation & Implementation Planning – e-Commerce Implementation -Commerce Evaluation. The Inter  Organizational Transactions – The Credit Transaction Trade Cycle. A Variety of Transactions – Pens & Things. | | | | | | | | | |
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| **Unit:3** | | **E-Markets** | | **10 hours** | | | | | |
| Markets – E-Markets-Usage of E-Markets-Advantages & Disadvantages of E-Markets. EDI: Introduction – Definition - Benefits of EDI – EDI Standards – EDI Communication EDI  Implementation – EDI Agreement – EDI Security | | | | | | | | | |
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| **Unit:4** | | **The Internet** | | **12 hours** | | | | | |
| The Internet – The Development of the Internet – TCP/IP – Internet Components – Uses of the  Internet – A Page on the Web: HTML Basics – Introduction to HTML – Further HTML – Client Side Scripting – Server Side Scripting – HTML Editors & Editing – The Elements of E-Commerce | | | | | | | | | |

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| : Elements – e-Visibility – The e-Shop – On line Payments - Delivering the Goods – Internet e-  Commerce Security . | | | |
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| **Unit:5** | | **E-Business: Introduction** | **12 hours** |
| - The Internet Bookshops – Grocery Supplies - Software Supplies and Support – Electronic Newspapers – The Internet Banking - The Virtual Auctions – Online Share Dealing – Gambling on  the Net – e-Diversity. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **55 hours** |
| **Text Book(s)** | | | |
| 1 | David Whiteley, E-Commerce – Strategy, Technology & Applications, Tata McGrawHill. | | |
| 2 |  | | |
|  | | | |
| **Reference Book(s)** | | | |
| 1 | E-Commerce - An Indian Perspective, P.T.Joseph, S.J., Fourth Edition, PHI 2012. | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | L | M | L | S | M | M | L |
| **CO3** | S | S | S | L | M | M | S | M | S | L |
| **CO3** | S | S | S | M | S | M | S | S | S | M |
| **CO4** | S | S | S | M | S | M | S | S | M | M |
| CO5 | S | M | M | M | M | S | S | S | S | M |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Software Engineering** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: I** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic understanding in software project and system analysis and design concepts** | **Syllabus Version** | | | 2021-22  Onwards | | |
| **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 explores the object-oriented programming, Graphical programming aspects of python with help of built in modules.. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understanding the basics of software engineering, planning a software project. | | | | | | | **K1-K2** | |
| 2 | Obtain the knowledge in software cost estimation and techniques. | | | | | | | **K2-K3** | |
| 3 | Knowledge on software requirements specification, formal specification techniques,  and software design. | | | | | | | **K3** | |
| 4 | Understanding the design notation, techniques, structured coding techniques,  standards and guidelines. | | | | | | | **K4** | |
| 5 | Knowledge on verification and validation techniques, software maintenance and  configuration management. | | | | | | | **K2-K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO SOFTWARE ENGINEERING** | | | **10 hours** | | | | |
| Introduction to Software Engineering: Definitions – Size Factors – Quality and Productivity Factors. Planning a Software Project: Planning the Development Process – Planning an  Organizational Structure. | | | | | | | | | |
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| **Unit:2** | | **SOFTWARE COST ESTIMATION** | | | **10 hours** | | | | |
| Software Cost Estimation: Software cost Factors – Software Cost Estimation Techniques –  Staffing-Level Estimation – Estimating Software Estimation Costs. | | | | | | | | | |
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| **Unit:3** | | **SOFTWARE REQUIREMENTS** | | **10 hours** | | | | | |
| Software Requirements Definition: The Software Requirements specification – Formal Specification Techniques. Software Design: Fundamental Design Concepts – Modules and  Modularization Criteria. | | | | | | | | | |
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| **Unit:4** | | **DESIGN NOTATIONS** | | **12 hours** | | | | | |
| Design Notations – Design Techniques. Implementation Issues: Structured Coding Techniques – Coding Style – Standards and Guidelines – Documentation Guidelines. | | | | | | | | | |
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| **Unit:5** | | **VERIFICATION AND VALIDATION**  **TECHNIQUES** | | **12 hours** | | | | | |

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| Verification and Validation Techniques: Quality Assurance – Walkthroughs and Inspections – Unit Testing and Debugging – System Testing. Software Maintenance: Enhancing Maintainability during Development – Managerial Aspects of Software Maintenance – Configuration  Management. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **55 hours** |
| **Text Book(s)** | | | |
| 1 | Software Engineering Concepts, Richard Fairley, 1997, TMH. (UNIT-I: 1.1-1.3, 2.3-2.4 UNIT- II: 3.1-3.4 UNIT III: 4.1-4.2, 5.1-5.2 UNIT-IV: 5.3-5.4, 6.1-6.4 UNIT-V: 8.1-8.2, 8.5-8.6, 9.1-  9.3) | | |
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| **Reference Books** | | | |
| 1 | Software Engineering for Internet Applications, Eve Anderson, Philip Greenspun, Andrew  Grumet, 2006, PHI. | | |
| 2 | Software Engineering Project Management – 2nd Edition, Wiley India. | | |
| 3 | Software Quality Engineering, Jeff Tian, Student Edition, 2006, Wiley India. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | L | S | L | L | L | S | S |
| **CO2** | M | S | S | M | S | M | L | L | S | S |
| **CO3** | S | M | M | L | S | M | M | M | S | S |
| **CO4** | M | S | S | M | S | L | M | L | S | S |
| **CO5** | S | S | S | L | S | L | M | L | M | M |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **WEB DESIGNING WITH ASP AND ASP .NET** | **L** | | **T** | | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Skill based Subject: 3** | **6** | | **0** | | | **0** | **3** |
| **Pre-requisite** | | | Students should have basic Computer  Knowledge and web applications | **Syllabus**  **Version** | | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to learn basics of web designing with ASP.NET and VB script. 2. To learn the ADO.NET model to develop data base web applications. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the basics of web design and web design process. | | | | | | **K2** | | | |
| 2 | Understand the ASP and VB script, ASP objects, and server side components. | | | | | | **K2,K4** | | | |
| 3 | Understand the basics of ASP.NET, program flow , coding techniques,  ASP.NET objects and components. | | | | | | **K2-K4** | | | |
| 4 | Knowledge on web services ActiveX data objects, ADO.NET model, and  developing data base applications. | | | | | | **K4** | | | |
| 5 | Knowledge on working with ADO.NET and SQL server and creating web  application using it. | | | | | | **K2-K4** | | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO WEB DESIGN** | | | **12 hours** | | | | | |
| Introduction to web design : what is web design – the web design process – frames – LINKING : text – buttons – icons & graphics – search & designing – text : fonts –text layout – colors – images  and backgrounds – cookies | | | | | | | | | | |
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| **Unit:2** | | **ASP AND VB SCRIPT** | | | **15 hours** | | | | | |
| Introduction to ASP VB Script –active server objects: Applications, server, session, response,  request - active server components: server side components. | | | | | | | | | | |
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| **Unit:3** | | **ASP.NET** | | **15 hours** | | | | | | |
| Introduction to ASP.Net: what is ASP.Net – setting up for ASP.Net – Programming basics: basics of programming –program flow – effective coding techniques –processing ASP.Net applications.  Web founds and ASP.Net – ASP.Net and state – scope – ASP.Net objects and components. | | | | | | | | | | |
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| **Unit:4** | | **WEB SERVICES AND ASP.NET WITH SQL SERVER** | | **15 hours** | | | | | | |
| Web services and ASP.Net –ASP.Net and SQL server –using SQL server –using database in  ASP.Net applications – ActiveX data objects –ADO.Net object model. | | | | | | | | | | |
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| **Unit:5** | | **ADO AND ADO.NET** | | **15 hours** | | | | | | |
| Introduction to ADO- working with ADO connection object, command object and record set objects – over view of ADO and ADO.Net – ADO.Net providers , process – editing data with  ADO.Net – ADO and SQL server. | | | | | | | | | | |
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| **Unit:6** | | **Contemporary Issues** | | **3 hours** | | | | | | |

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| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | The Complete reference WEB design by Thomos A Powel TMH Publications 2000 Edn. | | |
| 2 | Using Active server pages by Scot Johnson PHI Spl Edn. | | |
| 3 | ASP.Net a beginners guide by Dave Merces TMH 2002 Edn. | | |
| 4 | ADO & ADO.Net programming by Mike Yenderloy BPB publications 2002 Edn. | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Internet and Web Design, ITL Education, Macmillan India Ltd. | | |
| 2 |  | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | M | M | M | M | S | M | S | L |
| **CO3** | S | M | S | S | M | M | S | M | M | L |
| **CO3** | M | S | S | S | M | M | M | M | M | M |
| **CO4** | S | M | M | M | S | M | M | M | S | M |
| CO5 | M | S | S | M | M | M | S | S | S | M |
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\*S-Strong; M-Medium; L-Low



Sixth Semester



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| **Course code** | |  | **Graphics & Multimedia** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core: 10** | **6** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Basic knowledge in 2D, 3D and multimedia file  formats | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Design and apply two dimensional graphics and transformations. 2. Design and apply three dimensional graphics and transformations. 3. Apply Illumination, color models and clipping techniques to graphics. 4. Understood Different types of Multimedia File Format. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Explain applications, principles ,commonly used and techniques of computer graphics and algorithms for Line-Drawing, Circle- Generating and Ellipse-  Generating. | | | | | | | **K2** | |
| 2 | Students will get the concepts of 2D and 3D, Viewing, Curves and surfaces, Hidden  Line/surface elimination techniques | | | | | | | **K3** | |
| 3 | Studies concepts of Multimedia Systems, Text, Audio and Video tools | | | | | | | **K3** | |
| 4 | Compressing audio and video using MPEG-1 and MPEG-2 | | | | | | | **K4** | |
| 5 | Creates Animation with special effects using algorithms | | | | | | | **K6** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **OUTPUT PRIMITIVES** | | | **15 hours** | | | | |
| Output Primitives: Points and Lines – Line-Drawing algorithms – Loading frame Buffer – Line function – Circle-Generating algorithms – Ellipse-generating algorithms. Attributes of Output Primitives: Line Attributes – Curve attributes – Color and Grayscale Levels – Area-fill attributes –  Character Attributes. | | | | | | | | | |
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| **Unit:2** | | **2D GEOMETRIC TRANSFORMATIONS** | | | **15 hours** | | | | |
| 2D Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations. 2D Viewing: The Viewing Pipeline – Viewing Co- ordinate Reference Frame – Window-to-Viewport Co-ordinate Transformation - 2D Viewing  Functions – Clipping Operations. | | | | | | | | | |
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| **Unit:3** | | **TEXT** | | **15 hours** | | | | | |
| Text: Types of Text – Unicode Standard – Font – Insertion of Text – Text compression – File formats. Image: Image Types – Seeing Color – Color Models – Basic Steps for Image Processing – Scanner – Digital Camera – Interface Standards – Specification of Digital Images – CMS – Device Independent Color Models – Image Processing software – File Formats – Image Output on  Monitor and Printer. | | | | | | | | | |
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| **Unit:4** | | **AUDIO** | | **15 hours** | | | | | |
| Audio: Introduction – Acoustics – Nature of Sound Waves – Fundamental Characteristics of Sound  – Microphone – Amplifier – Loudspeaker – Audio Mixer – Digital Audio – Synthesizers – MIDI – | | | | | | | | | |

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| Basics of Staff Notation – Sound Card – Audio Transmission – Audio File formats and CODECs – Audio Recording Systems – Audio and Multimedia – Voice Recognition and Response - Audio  Processing Software. | | | |
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| **Unit:5** | | **VIDEO AND ANIMATION** | **12 hours** |
| Video: Analog Video Camera – Transmission of Video Signals – Video Signal Formats – Television Broadcasting Standards – PC Video – Video File Formats and CODECs – Video Editing – Video Editing Software. Animation: Types of Animation – Computer Assisted Animation – Creating Movement – Principles of Animation – Some Techniques of Animation – Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio –  MPEG-1 Video - MPEG-2Audio – MPEG-2 Video. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Computer Graphics, Donald Hearn, M.Pauline Baker, 2nd edition, PHI. (UNIT-I: 3.1-3.6,4.1-  4.5 & UNIT-II: 5.1-5.4,6.1-6.5) | | |
| 2 | Principles of Multimedia, Ranjan Parekh, 2007, TMH. (UNIT III: 4.1-4.7,5.1-5.16 UNIT-IV:  7.1-7.3,7.8-7.14,7.18-7.20,7.22,7.24,7.26-28 UNIT-V: 9.5-9.10,9.13,9.15,10.10-10.13) | | |
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| **Reference Books** | | | |
| 1 | Computer Graphics, Amarendra N Sinha, Arun D Udai, TMH. | | |
| 2 | Multimedia: Making it Work, Tay Vaughan, 7th edition, TMH. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| Course Designed By: | | | |



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



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| **Course code** | |  | **Project Work Lab** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core: 11** | **0** | | **0** | | **6** | **6** |
| **Pre-requisite** | | | Students should have the strong knowledge in any  one of the programming languages in this course. | **Syllabus**  **Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To understand and select the task based on their core skills. 2. To get the knowledge about analytical skill for solving the selected task. 3. To get confidence for implementing the task and solving the real time problems. 4. Express technical and behavioral ideas and thought in oral settings. 5. Prepare and conduct oral presentations | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Formulate a real world problem and develop its requirements develop a design  solution for a set of requirements. | | | | | | | **K3** | |
| 2 | Test and validate the conformance of the developed prototype against the original  requirements of the problem. | | | | | | | **K5** | |
| 3 | Work as a responsible member and possibly a leader of a team in developing  software solutions. | | | | | | | **K3** | |
| 4 | Express technical ideas, strategies and methodologies in written form. Self-learn new tools, algorithms and techniques that contribute to the software solution of  the project. | | | | | | | **K1-K4** | |
| 5 | Generate alternative solutions, compare them and select the optimum one. | | | | | | | **K6** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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|  | | **AIM OF THE PROJECT WORK** | | |  | | | | |
| 1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied. 2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application oriented concepts. 3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.   **Viva Voce**   * 1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the **Annexure Report** available in the College, for a total of 200 marks at the last day of the practical session.   2. Out of 200 marks, 160 marks for project report and 40 marks for Viva Voce. | | | | | | | | | |

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| **Project Report Format** |
| **PROJECT WORK**  **TITLE OF THE DISSERTATION**  Bonafide Work Done by STUDENT NAME REG. NO.  Dissertation submitted in partial fulfillment of the requirements for the award of  <Name of the Degree>  of Bharathiar University, Coimbatore-46**.**  College Logo  Signature of the Guide Signature of the HOD  Submitted for the Viva-Voce Examination held on  Internal Examiner External Examiner  Month – Year |
| **CONTENTS**  **Acknowledgement Contents**  **Synopsis**   1. **Introduction**    1. Organization Profile    2. System Specification       1. Hardware Configuration       2. Software Specification 2. **System Study**    1. Existing System |



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| 2.1.1 Drawbacks   * 1. Proposed System      1. Features  1. **System Design and Development**    1. File Design    2. Input Design    3. Output Design    4. Database Design    5. System Development       1. Description of Modules (Detailed explanation about the project work) 2. **Testing and Implementation** 3. **Conclusion Bibliography Appendices** 4. Data Flow Diagram 5. Table Structure 6. Sample Coding 7. Sample Input 8. Sample Output |
| Course Designed By: |

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

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| **Course code** | |  | **Programming Lab – Graphics & Multimedia** | | **L** | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Lab : 7** | | **0** | | **0** | **3** | **4** |
| **Pre-requisite** | | | Students should have the basic knowledge on C and C++ to do computer graphics and  multimedia applications. | | **Syllabus Version** | | | 2021-22  Onwards | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To learn the basic principles of 2-dimensional computer graphics. 2. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition. 3. Provide an understanding of mapping from a world coordinates to device coordinates, clipping and projections. 4. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization and business applications. 5. To comprehend and analyse the fundamentals of animation, virtual reality, underlying   technologies, principles and applications. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the basic concepts of computer graphics. | | | | | | | **K1** | |
| 2 | Design scan conversion problems using C and C++ programming. | | | | | | | **K2** | |
| 3 | Apply clipping and filling techniques for modifying an object. | | | | | | | **K3** | |
| 4 | Understand the concepts of different type of geometric transformation of  objects in 2D. | | | | | | | **K4** | |
| 5 | Understand and develop the practical implementation of modeling, rendering,  viewing of objects in 2D | | | | | | | **K6** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
|  | | | | | | | | | |
| **Programs** | | | | | | **36 hours** | | | |
| **Graphics** | | | | | |  | | | |
| 1. Write a program to rotate an image. | | | | | | | | | |
| 2. Write a program to drop each word of a sentence one by one from the top. | | | | | | | | | |
| 3. Write a program to drop a line using DDA Algorithm. | | | | | | | | | |
| 4. Write a program to move a car with sound effect. | | | | | | | | | |
| 5. Write a program to bounce a ball and move it with sound effect. | | | | | | | | | |
| 6. Write a program to test whether a given pixel is inside or outside or on a polygon. | | | | | | | | | |
| **Multimedia** | | | | | | | | | |
| 7. Create Sun Flower using Photoshop. | | | | | | | | | |
| 8. Animate Plane flying in the Clouds using Photoshop. | | | | | | | | | |
| 9. Create Plastic Surgery for the Nose using Photoshop. | | | | | | | | | |
| 10. Create See-through text using Photoshop. | | | | | | | | | |
| 11. Create a Web Page using Photoshop. | | | | | | | | | |
| 12. Convert Black and White Photo to Color Photo using Photoshop. | | | | | | | | | |
|  | | **Total Lecture hours** | | **36 hours** | | | | | |
| **Text Book(s)** | | | | | | | | | |



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| **Reference Books** | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | M | M | M | S | M | L | L | M | L |
| **CO3** | S | S | S | M | M | M | M | M | M | L |
| **CO3** | S | S | S | M | S | M | M | M | M | L |
| **CO4** | S | S | S | S | S | M | M | M | M | M |
| CO5 | S | S | S | S | S | M | S | S | S | M |
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\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **Network Security and Cryptography** | **L** | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: II** | **5** | | **0** | **0** | **4** |
| **Pre-requisite** | | | **Basics of computer networks** | **Syllabus Version** | | | 2021-22  Onwards | |
| **Course Objectives:** | | | | | | | | |
| The main objectives of this course are to:   1. To learn the need for network security and security approaches. 2. To inculcate the concept of transferring authentic data along the network with several methods and algorithms. 3. To enrich the knowledge on different types of Internet Security Protocols. | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Remember the basic concept of Cryptography and various types of attacks. | | | | | | **K1** | |
| 2 | Understand about various types of protocols for Internet Security. | | | | | | **K2** | |
| 3 | Implement various algorithms for Cryptography | | | | | | **K3** | |
| 4 | Review Firewall and IP security | | | | | | **K4** | |
| 5 | To be familiar with network security threats and countermeasure | | | | | | **K3-K5** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | |
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| **Unit:1** | | **SERVICE MECHANISM** | | | **15 hours** | | | |
| Service mechanism and attacks – The OSI security architecture – A model for network security –  symmetric Cipher model – Substitution techniques – transposition techniques – simplified des – block chipper principles – the strength of des – block chipper design principles and modes of operation. | | | | | | | | |
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| **Unit:2** | | **TYPES OF DES** | | | **12 hours** | | | |
| Triple des-blow fish – RCS Advanced Symmetric Block Ciphers –RC4 stream Cipher confidentially  using symmetric encryption – introduction to number theory – public – key cryptography and RSA. | | | | | | | | |
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| **Unit:3** | | **KEY MANAGEMENT** | | **15 hours** | | | | |
| Key management – Diffle Hellman key exchange – message authentication and hash function – hash  algorithm – digital signature and authentication protocols – digital signature standard. | | | | | | | | |
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| **Unit:4** | | **AUTHENTICATION** | | **15 hours** | | | | |
| Authentication application – pretty good privacy – S/MIME – ip security – web security  considerations –secure socket layer transport layer security –secure electronic transaction. | | | | | | | | |
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| **Unit:5** | | **INTRUDERS** | | **15 hours** | | | | |
| Intruders –intrusion detection – password management –viruses and related threats – virus  countermeasures – fire wall design principles – trusted systems | | | | | | | | |
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| **Unit:6** | | **Contemporary Issues** | | **3 hours** | | | | |
| Expert lectures, online seminars – webinars | | | | | | | | |
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|  | | **Total Lecture hours** | | **75 hours** | | | | |
| **Text Book(s)** | | | | | | | | |



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| 1 | William Stallings, Cryptography and Network Security Principles and Practices, Fourth edition, PHI  Education Asia |
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| **Reference Books** | |
| 1 | Atul Kahate, Cryptography and Network Security, 2nd Edition, TMH. |
| 2 | Behrouz A.Forouzan, Cryptography and Network Security, TMH. |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | L | S | L | L | L | S | S |
| **CO2** | S | M | S | L | S | L | M | L | S | S |
| **CO3** | S | S | S | L | S | L | M | L | S | S |
| **CO4** | S | M | S | L | S | L | M | L | S | S |
| **CO5** | S | S | S | L | S | L | M | L | S | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Distributed Computing** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: II** | **5** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Basic knowledge in databases, client and server | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to learn the concepts and techniques in distributed computing and client server computing. 2. To learn the pros and cons of distributed computing, distributed databases. 3. To familiar with design considerations in distributed computing 4. To understand the client server models and R\* projection techniques | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the concepts and techniques in distributed computing and client server  computing. | | | | | | | **K1** | |
| 2 | Understand the pros and cons of distributed processing, databases, challenges. | | | | | | | **K2** | |
| 3 | Understand the design considerations in distributed computing | | | | | | | **K2** | |
| 4 | Understand and analyse the client server network model, file server, printer server  and email server. | | | | | | | **K3** | |
| 5 | Understand and obtaining the Knowledge on distributed databases, R\* project  techniques. | | | | | | | **K2-K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
|  | | | | | | | | | |
| **Unit:1** | | **Introduction to Distributed Systems** | | | **15 hours** | | | | |
| Distributed Systems: Fully Distributed Processing systems – Networks and interconnection  structures – designing a distributed processing g system. | | | | | | | | | |
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| **Unit:2** | | **Challenges and Managing Distributed Resources** | | | **15 hours** | | | | |
| Distributed systems: Pros and Cons of distributed processing – Distributed databases – the challenges of distributed data – loading, factors – managing the distributed resources division of  responsibilities. | | | | | | | | | |
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| **Unit:3** | | **Design Considerations** | | **15 hours** | | | | | |
| Design considerations: Communication Line loading – line loading calculations- partitioning and  allocation - data flow systems – dimensional analysis- network database design considerations- ration analysis- database decision trees- synchronization of network databases | | | | | | | | | |
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| **Unit:4** | | **Client Server Network Model** | | **15 hours** | | | | | |
| Client server network model: Concept – file server – printer server and e-mail server. | | | | | | | | | |
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| **Unit:5** | | **Distributed Databases** | | **12 hours** | | | | | |
| Distributed databases: An overview, distributed databases- principles of distributed databases –  levels of transparency- distributed database design- the R\* project techniques problem of heterogeneous distributed databases. | | | | | | | | | |

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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars – webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | John A. Sharp, An introduction to distributed and parallel processing, Blackwell Scientific Publication(Unit I & III) | | |
| 2 | Uyless D. Black, Data communication and distributed networks‖(unit II) | | |
| 3 | Joel M.Crichllow , Introduction to distributed & parallel computing (Unit IV) | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Stefans Ceri, Ginseppe Pelagatti , Distributed database Principles and systems, McGraw Hill | | |
| 2 |  | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | M | M | M | S | M | L | L | M | L |
| **CO2** | S | S | S | M | M | M | M | M | M | L |
| **CO3** | S | S | S | M | S | M | L | M | L | L |
| **CO4** | S | S | S | S | S | M | M | M | M | M |
| CO5 | S | S | S | S | S | M | S | S | S | M |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Computer Networks** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: II** | **5** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Students should have the knowledge on computer  connectivity and connectivity peripherals. | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To identify various components in a data communication system and understand state-of- the-art in network protocols, architectures and applications. 2. To enable students through the concepts of computer networks, different models and their involvement in each stage of network communication. 3. To educate the concepts of terminology and concepts of the OSI reference model and the TCP/IP reference model and protocols such as TCP, UDP and IP. 4. To be familiar with the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks. 5. Introduce the student to a network routing for IP networks and how a collision occurs and how to solve it and how a frame is created and character count of each frame. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Remember the organization of computer networks, factors influencing computer  network development and the reasons for having variety of different types of networks. | | | | | | | **K1** | |
| 2 | Understand Internet structure and can see how standard problems are solved and  the use of cryptography and network security. | | | | | | | **K2** | |
| 3 | Apply knowledge of different techniques of error detection and correction to detect  and solve error bit during data transmission. | | | | | | | **K3** | |
| 4 | Analyze the requirements for a given organizational structure and select the most  appropriate networking architecture and technologies | | | | | | | **K4** | |
| 5 | Knowledge about different computer networks, reference models and the functions  of each layer in the models | | | | | | | **K2-K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **BASICS OF NETWORKS AND OSI MODEL** | | | **15 hours** | | | | |
| Network Hardware: LAN – WAN – MAN – Wireless – Home Networks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. Reference Models: OSI  Reference Model – TCP/IP reference Model – Comparison of OSI and TCP/IP -Critique of OSI and protocols – Critique of the TCP/IP Reference model. | | | | | | | | | |
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| **Unit:2** | | **PHYSICAL LAYER** | | | **15 hours** | | | | |
| PHYSICAL LAYER - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication  Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber. | | | | | | | | | |
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| **Unit:3** | | **DATA-LINK LAYER** | **15 hours** |
| DATA-LINK LAYER: Error Detection and correction – Elementary Data-link Protocols – Sliding  Window Protocols. MEDIUM-ACCESS CONTROL SUB LAYER: Multiple Access Protocols – Ethernet – Wireless LANs - Broadband Wireless – Bluetooth. | | | |
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| **Unit:4** | | **NETWORK LAYER** | **15 hours** |
| NETWORK LAYER: Routing algorithms – Congestion Control Algorithms. TRANSPORT  LAYER: Elements of Transport Protocols – Internet Transport Protocols: TCP. | | | |
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| **Unit:5** | | **APPLICATION LAYER** | **12 hours** |
| APPLICATION LAYER: DNS – E-mail. NETWORK SECURITY: Cryptography – Symmetric  Key Algorithms – Public Key Algorithms – Digital Signatures. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Computer Networks, Andrew S. Tanenbaum, 4th edition, PHI. *(UNIT-I:1.2-1.4 UNIT-II:2.2-2.4*  *UNIT-III:4.2-4.6 UNIT-IV:5.2,5.3,6.2,6.5 UNIT-V:7.1,7.2,8.1-8.4)* | | |
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| **Reference Books** | | | |
| 1 | Data Communication and Networks, Achyut Godbole, 2007, TMH. | | |
| 2 | Computer Networks: Protocols, Standards, and Interfaces, Uyless Black, 2nd ed, PHI | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | M | S | L | S | M | L | M | S | S |
| **CO2** | S | M | S | L | S | M | L | M | S | S |
| **CO3** | S | M | S | L | S | M | L | M | S | S |
| **CO4** | S | M | S | L | S | M | L | M | S | S |
| **CO5** | S | M | S | L | S | M | L | M | S | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Mobile Computing** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: III** | **5** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge on mobile technologies** | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to study on the emerging technologies in mobile computing. 2. To learn the basics of mobile computing and IVR application 3. To make the students to learn about the architecture of mobile computing 4. To understand the mobile technologies GPRS,CDMA and 3G | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the history of mobile computing, applications, standards and mobile  computing architecture. | | | | | | | **K1-K2** | |
| 2 | Understand the mobile computing techniques related to telephone, access  procedures, IVR applications and Voice XML. | | | | | | | **K2** | |
| 3 | Understand and analyse the emerging technologies Bluetooth, RFID, WiMAX, etc.  also GSM. | | | | | | | **K1-K3** | |
| 4 | Knowledge on GPRS, GPRS network architecture, Data services, applications for  GPRS and limitations. | | | | | | | **K4** | |
| 5 | Knowledge on CDMA and 3G, CDMA Vs GSM, applications of 3G wireless LAN,  Architecture, Adhoc and sensor networks and security features. | | | | | | | **K1-K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION** | | | **10 hours** | | | | |
| Introduction: Mobility of Bits and Bytes –Wireless The Beginning – Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Application and services- Developing Mobile computer Applications – security in mobile computing – Standards \_ Why is it necessary – Standard bodies. MOBILE COMPUTTING ARCHITECTURE: History of computers and Internet  – Architecture for mobile computing – Three-tier architecture – Design considerations for mobile computing – Mobile computing through Internet – Making exiting applications mobile enabled | | | | | | | | | |
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| **Unit:2** | | **MOBILE COMPUTING THROUGH TELEPHONY** | | | **10 hours** | | | | |
| UNIT II: MOBILE COMPUTING THROUGH TELEPHONY: Evaluation of telephony – Multiple  access procedures – Mobile computing through telephone – IVR Application –Voice XML – TAPI | | | | | | | | | |
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| **Unit:3** | | **EMERGING TECHNOLOGIES** | | **10 hours** | | | | | |
| EMERGING TECHNOLOGIES: Blue Tooth – RFID – WiMAX – Mobile IP – IPv6 – Java Card. GSM : Global System for mobile communications – GSM Architecture – GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Addresses and Identifiers – Network Aspects in GSM  – GSM Frequency allocations – Authentications and Security. SMS | | | | | | | | | |
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| **Unit:4** | | **GPRS** | | **12 hours** | | | | | |
| GPRS – GPRS and packet data network – GPRS network architecture – GPRS network operations | | | | | | | | | |

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| – Data services in GPRS – Application for GPRS- Limitations – Billing and Charging. WAP :  MMS – GPRS Applications | | | |
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| **Unit:5** | | **CDMA and 3G** | **12 hours** |
| CDMA and 3G: Spread spectrum technology – Is 95 – CDMA vs GSM – Wireless Data – Third generation networks – Applications on 3G WIRELESS LAN: Wireless LAN advantages – IEEE  802.11 standards – Architecture – Mobile in Wireless LAN – Deploying wireless LAN – Mobile adhoc networks and sensor networks – Wireless LAN Security – WiFi vs 3G. | | | |
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|  | | **Total Lecture hours** | **55 hours** |
| **Text Book(s)** | | | |
| 1 | MOBILE COMPUTING, Asoke K Talukder , Roopa R Yavagal, TMH, 2005 | | |
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| **Reference Books** | | | |
| 1 | Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi,  2007. | | |
| 2 | Dharma Prakash Agarval, Qing and An Zeng, “Introduction to Wireless and Mobile systems”,  Thomson Asia Pvt Ltd, 2005. | | |
| 3 | Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile  Computing”, Springer, 2003. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **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 | M |
| **CO3** | S | S | S | L | S | L | L | M | M | M |
| **CO4** | S | S | S | L | S | L | L | M | M | M |
| **CO5** | S | S | S | L | S | M | L | M | S | M |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Web Technology** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective: III** | **5** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Basic knowledge in web server, browser and web application | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:  1.On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies.  1. Students will gain the skills and project-based experience needed for entry into web application and development careers   1. Understand best technologies for solving web client/server problems 2. Use Java script for dynamic effects and to validate form input entry 3. Analyze to Use appropriate client-side or Server-side applications | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand and analyse the TCP/IP basics. | | | | | | | **K1** | |
| 2 | Understand Domain server name, FTP, TFTP, basics of WWW, web browser  architecture. | | | | | | | **K2** | |
| 3 | Knowledge of Microsoft and java technologies, dynamic web pages, DHTML, ASP  and JSP. | | | | | | | **K2-K3** | |
| 4 | Understanding active web pages, Java Applet, Java bean, CORBA, RMI and EDI  architecture | | | | | | | **K2-K3** | |
| 5 | Knowledge on XML, XML parser, WAP | | | | | | | **K4-K6** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create | | | | | | | | | |
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| **Unit:1** | | **TCP/IP** | | | **15 hours** | | | | |
| TCP/IP: TCP/IP Basics – Why IP address – Logical Address - TCP/IP Example- The concept of IP address – Basics of TCP – Features of TCP – Relationship between TCP and IP – Ports and Sockets – Active Open and Passive Open - TCP Connections – What makes TCP reliable? – TCP  Packet format - Persistent TCP connections – UDP – Differences between TCP and UDP. | | | | | | | | | |
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| **Unit:2** | | **DNS** | | | **12 hours** | | | | |
| DNS – E-mail – FTP – TFTP – History of WWW – Basics of WWW and Browsing - Local  information on the internet – HTML – Web Browser Architecture – Web Pages and Multimedia – Remote Login (TELNET). | | | | | | | | | |
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| **Unit:3** | | **INTRODUCTION TO WEB TECHNOLOGY** | | **15 hours** | | | | | |
| Introduction to Web Technology: Web pages – Tiers – Concept of a Tier – Comparison of Microsoft and Java Technologies – Web Pages – Static Web Pages – Plug-ins – Frames – Forms. Dynamic Web Pages: Need – Magic of Dynamic Web Pages – Overview of Dynamic Web Page Technologies – Overview of DHTML – Common Gateway Interface – ASP – ASP Technology –  ASP Example – Modern Trends in ASP – Java and JVM – Java Servlets – Java Server Pages. | | | | | | | | | |
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| **Unit:4** | | **ACTIVE WEB PAGES** | **15 hours** |
| Active Web Pages: Active Web Pages in better solution – Java Applets – Why are Active Web Pages Powerful? – Lifecycle of Java Applets – ActiveX Controls – Java Beans. Middleware and Component-Based E-Commerce Architectures: CORBA – Java Remote Method Invocation –  DCOM. EDI: Overview – Origins of EDI – Understanding of EDI – Data Exchange Standards – EDI Architecture – Significance of EDI – Financial EDI – EDI and internet. | | | |
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| **Unit:5** | | **XML** | **15 hours** |
| XML: SGML – Basics of XML – XML Parsers – Need for a standard. WAP: Limitations of Mobile devices – Emergence of WAP – WAP Architecture – WAP Stack – Concerns about WAP  and its future – Alternatives to WAP. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars – webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Web Technologies: TCP/IP to Internet Applications Architectures – Achyut S Godbole & Atul Kahate, 2007, TMH. *(UNIT-I: 3.1-3.5,4.1-4.12 UNIT-II: 5.1-5.4,6.1-6.7 UNIT III:8.1-8.1,9.1-9.13*  *UNIT IV: 10.1-10.7,15.1-15.3,16.1-16.8 UNIT-V: 17.1-17.4,18.1-18.6)* | | |
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| **Reference Books** | | | |
| 1 | Internet and Web Technologies, Rajkamal, TMH. | | |
| 2 | TCP/IP Protocol Suite, Behrouz A. Forouzan, 3rd edition, TMH. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | L | S | L | L | L | S | S |
| **CO2** | S | S | S | M | S | M | L | L | S | S |
| **CO3** | S | S | S | L | S | M | M | M | S | S |
| **CO4** | S | S | S | M | S | L | M | L | S | S |
| **CO5** | S | S | S | L | S | L | M | L | S | S |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | |  | **Software Testing** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Elective - III** | **5** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | Students should know about the software and  Software Development Life Cycle. | **Syllabus Version** | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To study fundamental concepts in software testing 2. To discuss various software testing issues and solutions in software unit test, integration and system testing. 3. To expose the advanced software testing topics, such as object-oriented software testing methods. 4. List a range of different software testing techniques and strategies and be able to apply specific automated unit testing method to the projects. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Explain the basic concepts and the processes that lead to software testing | | | | | | | **K2** | |
| 2 | Design test cases from the given requirements using Black box testing techniques | | | | | | | **K3** | |
| 3 | Identify the test cases from Source code by means of white box testing techniques | | | | | | | **K3** | |
| 4 | Know about user acceptance testing and generate test cases for it | | | | | | | **K4** | |
| 5 | Examine the test adequacy criteria to complete the testing process | | | | | | | **K4** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **SOFTWARE DEVELOPMENT LIFE CYCLE MODELS** | | | **15 hours** | | | | |
| Software Development Life Cycle models: Phases of Software project – Quality, Quality Assurance, Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing – Structural Testing –  Challenges in White-Box Testing. | | | | | | | | | |
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| **Unit:2** | | **BLACK-BOX TESTING** | | | **15 hours** | | | | |
| Black-Box Testing: What is Black-Box Testing? - Why Black-Box Testing? – When to do Black- Box Testing? – How to do Black-Box Testing? – Challenges in White Box Testing - Integration  Testing: Integration Testing as Type of Testing – Integration Testing as a Phase f Testing – Scenario Testing – Defect Bash. | | | | | | | | | |
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| **Unit:3** | | **SYSTEM AND ACCEPTANCE TESTING** | | **15 hours** | | | | | |
| System and Acceptance Testing: system Testing Overview – Why System testing is done? – Functional versus Non-functional Testing - Functional testing - Non-functional Testing –  Acceptance Testing – Summary of Testing Phases. | | | | | | | | | |
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| **Unit:4** | | **PERFORMANCE TESTING** | | **15 hours** | | | | | |
| Factors governing Performance Testing – Methodology of Performance Testing – tools for Performance Testing – Process for Performance Testing – Challenges. Regression Testing: What is  Regression Testing? – Types of Regression Testing – When to do Regression Testing – How to do Regression Testing – Best Practices in Regression Testing. | | | | | | | | | |
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| **Unit:5** | | **TEST PLANNING, MANAGEMENT, EXECUTION AND REPORTING** | **12 hours** |
| Test Planning, Management, Execution and Reporting: Test Planning – Test Management – Test Process – Test Reporting –Best Practices. Test Metrics and Measurements: Project Metrics –  Progress Metrics – Productivity Metrics – Release Metrics. | | | |
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| **Unit:6** | | **Contemporary Issues** | **3 hours** |
| Expert lectures, online seminars - webinars | | | |
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|  | | **Total Lecture hours** | **75 hours** |
| **Text Book(s)** | | | |
| 1 | Software Testing Principles and Practices, Srinivasan Desikan & Gopalswamy Ramesh, 2006, Pearson Education. *(UNIT-I: 2.1-2.5, 3.1-3.4 UNIT-II: 4.1-4.4, 5.1-5.5 UNIT III: 6 .1-6.7*  *(UNIT IV: 7.1-7.6, 8.1-8.5 UNIT-V: 15.1-15.6, 17.4-17.7)* | | |
| 2 | Limaye M.G., “Software Testing Principles, Techniques and Tools”, Second Reprint, TMH  Publishers, 2010. | | |
| 3 | Aditya P.Mathur, “Foundations of Software Testing”, 2nd Edition, Pearson Education, 2013. | | |
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| **Reference Books** | | | |
| 1 | Effective Methods of Software Testing, William E. Perry, 3rd ed, Wiley India. | | |
| 2 | Software Testing, Renu Rajani, Pradeep Oak, 2007, TMH. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
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| **Mapping with Programme Outcomes** | | | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | M | M | M | S | M | L | L | M | L |
| **CO2** | S | S | S | M | M | M | M | M | M | L |
| **CO3** | S | S | S | M | S | M | M | M | M | L |
| **CO4** | S | S | S | S | S | M | M | M | M | M |
| CO5 | S | S | S | S | S | M | S | S | S | M |
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\*S-Strong; M-Medium; L-Low



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| **Course code** | | |  | **ASP LAB** | **L** | | **T** | | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Skill Based Subject: 4** | **0** | | **0** | | | **4** | **3** |
| **Pre-requisite** | | | | Basic knowledge in web pages, web server and  client. | **Syllabus Version** | | | | 2021-22  Onwards | | |
| **Course Objectives:** | | | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to learn basics of web designing with ASP.NET and VB script. 2. To learn the ADO.NET model to develop data base web applications. | | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | | |
| 1 | | Understand the basics of web design and web design process. | | | | | | **K2** | | | |
| 2 | | Understand the ASP and VB script, ASP objects, and server side components. | | | | | | **K2,K4** | | | |
| 3 | | Understand the basics of ASP.NET, program flow, coding techniques,  ASP.NET objects and components. | | | | | | **K2-K4** | | | |
| 4 | | Knowledge on web services ActiveX data objects, ADO.NET model, and  developing data base applications. | | | | | | **K4** | | | |
| 5 | | Knowledge on working with ADO.NET and SQL server and creating web  application using it. | | | | | | **K2-K4** | | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | | |
|  | | | | | | | | | | | |
| **Programs** | | | | | | **36 hours** | | | | | |
| 19. Design a personal web page using ASP. | | | | | | | | | | | |
| 20. Design a data entry form in ASP. | | | | | | | | | | | |
| 21. Write a Program in ASP to get data using a form, validate the data and returns the same data for correction if any using the same form. | | | | | | | | | | | |
| 22. Write a program in ASP to display the Session properties. | | | | | | | | | | | |
| 23. Write a program in ASP that makes use of Ad Rotator component. | | | | | | | | | | | |
| 24. Write a program in ASP that makes use of Browser Capabilities component. | | | | | | | | | | | |
| 25. Write a program in ASP that makes use of Content Rotator component. | | | | | | | | | | | |
| 26. Write a program in ASP that makes use of page counter component. | | | | | | | | | | | |
| 27. Write a program in ASP to get the data of students using forms and stores them in  database. | | | | | | | | | | | |
| 28. Write a program in ASP to perform record navigation using a form. | | | | | | | | | | | |
| **Text Book(s)** | | | | | | | | | | | |
| 1 | The Complete reference WEB design by Thomos A Powel TMH Publications 2000 Edn | | | | | | | | | | |
| 2 | Using Active server pages by Scot Johnson PHI Spl Edn. | | | | | | | | | | |
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| **Reference Books** | | | | | | | | | | | |
| 1 | ASP.Net a beginners guide by Dave Merces TMH 2002 Edn. | | | | | | | | | | |
| 2 | ADO & ADO.Net programming by Mike Yenderloy BPB publications 2002 Edn. | | | | | | | | | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 |  |
| 2 |  |
| 3 |  |
|  | |
| Course Designed By: | |

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

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



Annexure

**BHARATHIAR UNIVERSITY : : COIMBATORE 641046**

**DEPARTMENT OF Computer Science and Applications**

**MISSION**

* To develop IT professionals with ethical and human values.
* To organize, connect, create and communicate mathematical ideas effectively, through industry 4.0.
* To provide a learning environment to enhance innovations, problem solving abilities, leadership potentials, team-spirit and moral tasks.
* To nurture the research values in the developing areas of Computer Science and interdisciplinary fields.
* Promote inter-disciplinary research among the faculty and the students to create state of art research facilities.
* To promote quality and ethics among the students.
* Motivate the students to acquire entrepreneurial skills to become global leaders.