## DEPARTMENT OF INFORMATION TECHNOLOGY

## VELAGAPUDI RAMAKRISHNA SIDDHARTHA ENGINEERING COLLEGE

## VR20 REGULATIONS – COURSE OUTCOMES MAPPING WITH PO'S AND PSO's

| Course Code | Course Name | CO | Course outcomes | PO 1 | PO 2 | PO 3 | PO 4 | P O5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 |
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| **20BS1101** | **MATRICES AND DIFFERENTIAL CALCULUS** | | | | | | | | | | | | | | | | |
| | | CO1 | Determine Eigen values, Eigen vectors of a matrix. | 3 | 2 | | | 1 | | | | | | | | | |
| | | CO2 | Estimate Maxima and Minima of Multivariable functions. | 3 | 2 | | | 1 | | | | | | | | | |
| | | CO3 | Solve the Linear differential equations with constant coefficients. | 3 | 2 | | | 1 | | | | | | | | | |
| | | CO4 | Solve the Linear differential equations with variable coefficients. | 3 | 2 | | | 1 | | | | | | | | | |
| **20BS1102B** | **APPLIED PHYSICS** | CO1 | Understand the importance of quantum mechanics. | 3 | | | | | | | | | | | | | |
| | | CO2 | Analyse and understand various types of lasers and their applications. | 3 | | | | | | | | | | | | | |
| | | CO3 | Elaborate different types | 3 | | 2 | | | | | | | | | | | |

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| | | | of optical fibers and understand the concept of Superconductivity. | | | | | | | | | | | | | | |
| | | CO4 | Understand the fabrication of nanomaterials and carbon Nanotubes. | 3 | | 1 | | 2 | | | | | | | | | |
| **20ES1103** | **PROGRAMMING FOR PROBLEM SOLVING** | | | | | | | | | | | | | | | | |
| | | CO1 | Understand the different types of problem solving approaches | 3 | 1 | | | | | | | | | | | | |
| | | CO2 | Apply the selections, loops, arrays, and string concepts in C to solve problems. | | 2 | 3 | | | | | | | | | | 2 | |
| | | CO3 | Apply functions and pointer concepts in C to solve problems. | | 2 | 3 | | | | | | | | | | 3 | |
| | | CO4 | Solve problems using enum, structures, unions, and file handling functions. | | 2 | 3 | | | | | | | | | | 3 | |
| **20ES1104** | **BASICS OF ELECTRICAL ENGINEERING** | | | | | | | | | | | | | | | | |
| | | CO1 | Analyze Electric Circuit fundamentals. | 3 | 3 | | | 2 | | | | | | | | 1 | |
| | | CO2 | Understand the basic concepts of Alternating Quantities and | 3 | 3 | | | | | | | | | | | 1 | |

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| | | | MagneticCircuits. | | | | | | | | | | | | | | |
| | | CO3 | Analyze the basic concepts of Electric Machines. | 2 | 1 | | | 2 | | | | | | | | 1 | |
| | | CO4 | Understand Measuring Instruments & Solar Photo Voltaic System concepts. | 2 | 1 | | | | | | | | | | | 1 | |
| 20HS1105 | **TECHNICAL ENGLISH AND COMMUNICATION SKILLS** | | | | | | | | | | | | | | | | |
| | | CO1 | Develop administrative and professional compilations with felicity of expression | | | | | | **2** | | | | **3** | | | | |
| | | CO2 | Demonstrate Proficiency in advanced reading and context oriented writing | | | | | | **2** | | | **2** | **3** | | | | |
| | | CO3 | Apply the elements of functional English with sustained understanding for authentic use of language in any given academic and/or professional environment | | | | | | **2** | | | **2** | **3** | | | | |
| | | CO4 | Execute tasks in Technical communication with competence | | | | | | | | | | **3** | | | | |

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| 20MC1106 | **TECHNOLOGY AND SOCIETY** | | | | | | | | | | | | | | | | |
| | | CO1 | Understand the origins of technology and its role in the history of human progress. | 3 | | | | | | | 1 | | | | | 3 | |
| | | CO2 | Know the Industrial Revolution and its impact on Society | 3 | | | | 2 | | 1 | | | | | | 3 | |
| | | CO3 | Interpret the developments in various fields of technology till Twentieth Century. | 3 | | | | | | | 1 | | | | | 3 | |
| | | CO4 | Distinguish the impacts of Technology on the Environment and achievements of great scientists. | 3 | | | | 2 | | 1 | | | | | | 3 | |
| 20BS1151A | **ENGINEERING PHYSICS LABORATORY** | | | | | | | | | | | | | | | | |
| | | CO1 | Use function generator, spectrometer and travelling microscope in various experiments. | | | | 3 | | | | | | | | | | |
| | | CO2 | Test optical components using principles of interference and diffraction of light. | | | | 3 | | | | | | | | | | |
| | | CO3 | Determine the V-I characteristics of solar | 2 | | | 3 | | | | | | | | | 2 | |

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| | | | cell and photo cell and appreciate the accuracy in measurements. | | | | | | | | | | | | | | |
| 20ES1152 | **PROGRAMMING FOR PROBLEM SOLVING LABORATORY** | | | | | | | | | | | | | | | | |
| | | CO1 | Implement the use of programming constructs in a structural programming language. | 1 | | 3 | | | | | | | | | | | 1 |
| | | CO2 | Apply the selections, loops, arrays, and string concepts in C to solve problems. | | 1 | 3 | | | | | | | | | | 1 | |
| | | CO3 | Apply functions, pointer, and Enum concepts in C to solve problems. | | 1 | 3 | | | | | | | | | | 3 | |
| | | CO4 | Solve problems using structures, Unions, and file handling functions. | | 1 | 3 | | | | | | | | | | 3 | |
| 20HS1153 | **TECHNICAL ENGLISH AND COMMUNICATION SKILLS LABORATORY** | | | | | | | | | | | | | | | | |
| | | CO1 | Develop active and authentic listening comprehension skills relevant for the professional world. | | | | | | 3 | | | | 3 | | | | |

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| | | CO2 | Execute web related(On-line) communication with felicity of expression | | | | | | | | | 2 | 3 | | | | |
| | | CO3 | Apply relevant speech patterns including standard pronunciation. | | | | | | | | | | 3 | | | | |
| | | CO4 | Demonstrate Proficiency in Interpersonal Communication with fluency and accuracy. | | | | | | | | | 2 | 3 | | | | |
| 20ES1154 | **COMPUTING AND PERIPHERALS LABORATORY** | | | | | | | | | | | | | | | | |
| | | CO1 | Able to assemble a PC and install operating system and other software. | 3 | 3 | | | | | | | | | | | 3 | 3 |
| | | CO2 | Able to trouble shoot hardware and software issues. | 3 | 2 | | | | | | | 3 | | | | 3 | 2 |
| | | CO3 | Able to configure network settings to connect to internet. | 3 | | | 1 | 2 | | | | | | | | 3 | |
| | | CO4 | Able to create documents, presentations and spread sheets using office productivity tools. | 3 | | | | | | | | | 2 | | | 3 | |
| 20BS2101 | **LAPLACE** | | | | | | | | | | | | | | | | |

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| | **TRANSFORMS AND INTEGRAL CALCULUS** | | | | | | | | | | | | | | | | |
| | | CO1 | Solve the Linear differential equations using Laplace Transforms. | 3 | 2 | | | 1 | | | | | | | | | |
| | | CO2 | Evaluate areas and volumes using Double, Triple Integrals. | 3 | 2 | | | 1 | | | | | | | | | |
| | | CO3 | Evaluate Grad, Div & Curl of scalar and vector point functions. | 3 | 2 | | | 1 | | | | | | | | | |
| | | CO4 | Convert Line Integrals to Area Integrals and Surface Integrals to Volume Integrals. | 3 | 2 | | | 1 | | | | | | | | | |
| 20BS2102 | **ENGINEEERING CHEMISTRY** | | | | | | | | | | | | | | | | |
| | | CO1 | Analyze various water treatment methods and boiler troubles. | | 3 | | | | | | | | | | | | 3 |
| | | CO2 | Apply the concept of phase equilibrium to different materials and the knowledge of working of electrodes and batteries in various technological fields. | 2 | | | | | | | | | | | | 2 | |
| | | CO3 | Evaluate corrosion processes as well as protection methods. | | | 3 | | | | | | | | | | | |

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| | | CO4 | Apply the knowledge of conventional fuels and mechanistic aspects of conducting polymers for their effective and efficient utilisation. | | | | | 2 | | | | | | | | | |
| 20ES2103A | **OBJECT ORIENTED PROGRAMMING USING PYTHON** | | | | | | | | | | | | | | | | |
| | | CO1 | Interpret the python syntax and semantics of control flow statements | 2 | 2 | 1 | | 2 | | | | | | 1 | | 3 | |
| | | CO2 | Apply functions, modules and string handling in Python to solve problems | | | 1 | | 2 | | | | | | 1 | | 1 | |
| | | CO3 | Determine the methods to create and manipulate programs with Python data structures | | 1 | 1 | | 1 | | | | | | 1 | | 2 | |
| | | CO4 | Analyse the concepts of object oriented approach to solve problems | | 3 | 2 | | 2 | | | | | | 2 | | 3 | |
| 20ES2104A | **BASIC ELECTRONICS ENGINEERING** | | | | | | | | | | | | | | | | |
| | | CO1 | Comprehend the fundamentals of electronic components, devices, transducers | 3 | 3 | | | 2 | | | | | | | | | |
| | | CO2 | Understand and apply the principles of digital | 3 | 3 | | | | | | | | | | | | |

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| | | | electronics | | | | | | | | | | | | | | |
| | | CO3 | Learn the principles of various communication systems. | 2 | | | | 2 | | | | | | | | | |
| 20ES2105 | **ENGINEERING GRAPHICS** | | | | | | | | | | | | | | | | |
| | | CO1 | Understand the Scales and conics. | **3** | | **3** | | | | **3** | | | | | | **3** | |
| | | CO2 | Draw Orthographic projections of points, Lines and Planes. | 2 | | **3** | | | | **3** | | | | | | 2 | |
| | | CO3 | Draw Orthographic projections of Solids and to understand basics of Auto CAD. | 2 | | **3** | | | | **3** | | | | | | 2 | |
| | | CO4 | Understand the sections, Developments of solids and draw isometric views using Auto CAD. | 1 | | **3** | | | | **3** | | | | | | 1 | |
| 20MC2106 | **PROFESSIONAL ETHICS & PRACTICE** | | | | | | | | | | | | | | | | |
| | | CO1 | Know the moral autonomy and uses of ethical theories. | 2 | | | | | | | | | | | | 2 | |
| | | CO2 | Understand Engineering as Experimentation | | | | | 3 | | | | | | | | | |
| | | CO3 | Understand about safety, risk and professional | | | | | 3 | | | | | | | | | |

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| | | | rights. | | | | | | | | | | | | | | |
| | | CO4 | Know the ethics regarding Global issues related to Environment, Computers and weapon's development. Understand general principles of contracting. | | | | | | | | | | | 2 | | | |
| 20BS2151B | **ENGINEERING CHEMISTRY LABORATORY** | | | | | | | | | | | | | | | | |
| | | CO1 | Analyze ores, commercial samples, quality parameters of water samples from different sources | | **3** | | | | | | | | | | | | **3** |
| | | CO2 | Perform quantitative analysis using instrumental methods. | | | | **2** | | | | | | | | | | |
| | | CO3 | Apply the knowledge of preparation of polymers, separation of ions, mechanism of corrosion and photochemical reactions. | **2** | | | | | | | | | | | | **2** | |
| 20ES2152A | **OBJECT ORIENTED PROGRAMMING USING PYTHON LABORATORY** | | | | | | | | | | | | | | | | |
| | | CO1 | Demonstrate the usage of Python syntax and | 2 | 2 | 1 | | 2 | | | | | | 1 | | 3 | |

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| | | | semantics in solving the problems | | | | | | | | | | | | | | |
| | | CO2 | Develop python programs using functions and built in modules | | | 1 | | 2 | | | | | | 1 | | 1 | 2 |
| | | CO3 | Implement Python data structures to solve the complex problems | | 1 | 1 | | 1 | | | | | | 1 | | 2 | 2 |
| | | CO4 | Apply object oriented concepts to design solution to real world scenarios | | 2 | 2 | | 2 | | | | | | 2 | | 3 | |
| 20ES2153 | **ENGINEERING WORKSHOP** | | | | | | | | | | | | | | | | |
| | | CO1 | Understand the basic joints using wood and familiarize with various fundamental aspects of house wiring. | | | 2 | | | | | 1 | | | 3 | 2 | | 2 |
| | | CO2 | Prepare basic models using sheet metal and practice joining of metals using arc welding technique. | | | 2 | | | | | 1 | | | 3 | 2 | 2 | 2 |
| | | CO3 | Familiarize with various manufacturing processes such as injection moulding and 3D | | | 2 | | | | | 1 | | | 3 | 2 | | |

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| | | | printing | | | | | | | | | | | | | | |
| | | CO4 | Understand the preparation of PCB | | | | | | 1 | | | | | | | 1 | 1 |
| | | CO5 | Understand simple IOT Applications using Arduino | | | | | | | 2 | | | | | | 1 | 1 |
| **20BS3101** | **COMPLEX ANALYSIS AND NUMERICAL METHODS** | | | | | | | | | | | | | | | | |
| | | CO1 | | **3** | **2** | | | | | | | | | | | | |
| | | CO2 | Determine analytic, non-analytic functions and evaluate complex integrals. | **3** | **2** | | | | | | | | | | | | |
| | | CO3 | Analyze Taylor, Laurent series and apply residue theorem for computing real definite integrals. | **3** | **2** | | | **2** | | | | | | | | **1** | **1** |
| | | CO4 | Find solutions for algebraic, transcendental, system of equations and estimate functions using polynomial interpolation. | **3** | **2** | | | **2** | | | | | | | | **1** | 1 |
| **20ES3102** | **DISCRETE MATHEMATICS FOR INFORMATION TECHNOLOGY** | | Solve initial value problems numerically. | | | | | | | | | | | | | | |

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| | | CO1 | | 3 | 3 | 3 | | | 3 | | | | 3 | | | | |
| | | CO2 | Understand the logical inference and counting techniques | 3 | 3 | 3 | | | 3 | | | | 3 | | | | |
| | | CO3 | Solve problems involving recurrence relations and generating functions | 3 | 3 | 3 | | | 1 | | | | 1 | | | | |
| | | CO4 | Apply abstract algebra and evaluate the algebraic structures | 3 | 3 | 1 | | | | | | | 1 | | | | |
| **20IT3303** | **DATA STRUCTURES** | | Classification of graphs and interpret their applications. | | | | | | | | | | | | | | |
| | | CO1 | | 2 | 2 | 3 | | | | | | | | | | 2 | 1 |
| | | CO2 | Illustrate various techniques for searching, sorting and hashing. | 2 | 2 | 2 | | | | | | | | | | 1 | 1 |
| | | CO3 | Demonstrate the operations on linear data structures like stack, queue and linked list. | | 2 | 2 | | | | | | | | | | 1 | 1 |
| | | CO4 | Analyze various operations on nonlinear data structures – binary tree, binary search tree, AVL and B-trees. | | 3 | 3 | | | | | | | | 2 | | 3 | 2 |
| **20IT3304** | **COMPUTER ORGANIZATIO** | | Apply data structures to solve real-time problems efficiently. | | | | | | | | | | | | | | |

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| | **N** | | | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **3** | | | | | | | | | | | | **1** |
| | | **CO2** | Understand register transfer operations, Multiprocessors, CPU organizations and various Addressing Modes | | **1** | | | | | | | | | | | **1** | **3** |
| | | **CO3** | Identify the design requirements in organization of hardware that enables the CPU to fetch and execute instructions. | **3** | | | | | | | | | | | | **1** | **3** |
| | | **CO4** | Illustrate Fixed Point and Floating point Arithmetic Operations. | | **1** | | | | | | | | | | | | **1** |
| **20IT3305** | **OPERATING SYSTEMS** | | Analyze different ways of communicating with I/O devices and Memory organizations. | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **1** | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Understand the concepts of operating system operations services, Process, Multithreading,file, directory and RAID | **3** | **2** | | | | | | | | | | | **2** | **1** |

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| | | | structures. | | | | | | | | | | | | | | |
| | | **CO3** | Apply synchronization, Page Replacement, CPU scheduling algorithms. | **1** | **3** | | | | | | | | | | | **2** | **1** |
| | | **CO4** | Analyze the techniques for handling IPC, deadlocks & memory management | **2** | **2** | | | | | | | | | | | **1** | **1** |
| 20TP3106 | **LOGIC AND REASONING** | | Illustrate various file allocation, free space management and disk scheduling techniques | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | **2** | | | | | | | | |
| | | **CO2** | Think reason logically in any critical situation | | **2** | | | | | | | | | | | | |
| | | **CO3** | Analyze given information to find correct solution | | | | | | | | **2** | | | | | | |
| | | **CO4** | To reduce the mistakes in day to day activities in practical life | | | | | | | | | **2** | | | | | |
| | | **CO5** | Develop time management skills by approaching different shortcut methods | **2** | | | | | | | | | | | | | |

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| | | **CO6** | Use mathematical based reasoning to make decisions | **1** | | | | | | | | | | | | | |
| 20MC3107A | **ENVIRONMENTALSTUDIES** | | Apply logical thinking to solve problems and puzzles in qualifying exams for companies and in other competitive exams | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | | | | | | **1** | | | | | **1** | |
| | | **CO2** | Identify various factors causing degradation of natural resource and Control Measures | | **1** | **1** | | | | | | | **1** | | | **1** | |
| | | **CO3** | Identify various ecosystem and need for biodiversity | | | | **1** | **1** | | | | | | | **1** | **1** | |
| | | **CO4** | Realize and explore the problems related to environmental pollution and its management | | | | | | **1** | **1** | **1** | | | | | **1** | |
| **20IT3308** | **OBJECT ORIENTED PROGRAMMING USING C++** | | Apply the information and technology to analyze social issues, use acts associated with environment | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Outline the essential features and elements of the C++ programming | | **2** | **3** | | | | | | | | | | **2** | **1** |

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| | | | language | | | | | | | | | | | | | | |
| | | **CO3** | Identify class hierarchies using the object-oriented design process | | **2** | | | | | | | | | | | **2** | **1** |
| | | **CO4** | Apply exception handling mechanism to handle errors occur at runtime | | | **3** | | | | | | | | | **2** | **1** | **1** |
| 20ES3351- | **WEB PROGRAMMING LAB** | | Summarize generic classes with C++ templates. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | | | | | | | | **1** | | **1** | **2** | |
| | | **CO2** | Develop static web pages using open source technologies. | | | | | **3** | | | | | **3** | | **2** | **1** | |
| | | **CO3** | Analyze different types of Cascading Style sheets | | | | | **2** | | | | | **2** | | **2** | **2** | |
| | | **CO4** | Design web application that interacts with a web server | **1** | | | | **3** | | | | | **1** | | **1** | **2** | |
| | | **CO5** | Implement Model-View-Controller pattern for web applications development | **1** | | | | **2** | | | | | **2** | | **2** | **1** | |
| | | **CO6** | Apply custom validations to validate web forms. | **1** | | | | **3** | | | | | **2** | | **2** | **2** | |
| **20IT3352** | **DATA STRUCTURES** | | Create websites using Django framework with | | | | | | | | | | | | | | |

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| | **LAB** | | interactive server side scripting. | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **2** | **1** | | **2** | | | | | | **1** | | **3** | |
| | | **CO2** | Implement various searching and sorting algorithm techniques | **2** | | **1** | | **2** | | | | | | **1** | | **1** | **2** |
| | | **CO3** | Demonstrate various operations of stack and queue data structures for problem solving | **2** | **1** | **1** | | **1** | | | | | | **1** | | **2** | **2** |
| | | **CO4** | Implement different types of operations on lists. | **2** | **2** | **2** | | **2** | | | | | | **2** | | **3** | **1** |
| | | **CO5** | Implement operations on basic tree data structures. | **2** | **1** | **1** | | **1** | | | | | | **1** | | **1** | **2** |
| | | **CO6** | Perform operations on balanced data structures - AVL and B-trees | **2** | **2** | **2** | | **2** | | | | | | **2** | **2** | **2** | **2** |
| **20IT3353** | **OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY** | | Solve scenario based problems using appropriate data structures | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | **3** | | | | | | | | | | **1** | |
| | | **CO2** | Demonstrate an understanding of the overall syntax and semantics of C++ | | | **2** | | | | | | | | | **2** | | **1** |

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| | | | programs by writing programs from specifications given in class. | | | | | | | | | | | | | | |
| | | **CO3** | Develop C++ programs to implement overload of functions, constructors and operators | | **2** | | | | | | | | | | | | **2** |
| | | **CO4** | Implement inheritance and its variants using C++ | | **2** | | | | | | | | | | | | |
| | | **CO5** | Apply virtual and pure virtual function & complex programming situation. | | | | **2** | | | | | | | | | **2** | |
| | | **CO6** | Apply the knowledge of exception handling to design error free applications | | | **2** | | | | | | | | | **2** | **2** | **2** |
| **20BS4101** | **STATISTICS WITH R** | | Create programs using generic classes and Standard Template Libraries for solving real time scenarios. | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **2** | | | | | | | | | | | **2** | **2** |
| | | **CO2** | Understand the fundamental syntax of R through readings, practice exercises, demonstrations, writing R code and Visualize | **2** | **1** | | | **2** | | | | | | | | **2** | **2** |

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| | | | data attributes using ggplot2 and other R packages. | | | | | | | | | | | | | | |
| | | **CO3** | Manipulate numeric and textual data types using the R programming language and R Studio. | **3** | **2** | | **3** | | | | | | | **2** | | **3** | **2** |
| | | **CO4** | Apply the knowledge of Probability and conduct Tests of Hypothesis for Statistical Inference. | **3** | **2** | **3** | **2** | **2** | | | | | | **3** | | **3** | **2** |
| **20IT4302** | **JAVA PROGRAMMING** | | Fit some basic types of Statistical Models. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **2** | | | | | | | | | | | | |
| | | **CO2** | Understand object-oriented programming principles to build classes and create objects | | **2** | **3** | | | | | | | | **2** | | **1** | **2** |
| | | **CO3** | Analyze assertions and exception handling techniques to debug correctness and handle run time errors | **1** | **3** | **2** | | | | | | | | **3** | | **3** | **3** |
| | | **CO4** | Apply the knowledge of generics, collections and multi-threading to solve the problems | | | **2** | | | | | | | | **2** | | **2** | **3** |
| **20IT4303** | **ADVANCED DATA** | | Demonstrate the knowledge of lambda | | | | | | | | | | | | | | |

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| | **STRUCTURES AND ALGORITHMS** | | expressions and Stream API operations to solve the problems. | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **1** | **3** | | | | | | | | | | **2** | **1** |
| | | **CO2** | Understand the asymptotic performance of algorithms and various operations on data structures | **1** | **2** | **3** | **2** | | | | | | | | **2** | **1** | **1** |
| | | **CO3** | Synthesize design techniques and choose appropriate technique to solve problems. | **1** | **2** | **3** | **2** | | | | | | | | **1** | **1** | **3** |
| | | **CO4** | Analyze algorithm design techniques to provide optimal solution for given problem. | | **3** | **2** | | | | | | | | | | **3** | **2** |
| **20IT4304** | **DATABASE MANAGEMENT SYSTEMS** | | Distinguish deterministic and non-deterministic algorithms and their performances. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | **1** | | | | | | | | **1** | | **2** | **1** |
| | | **CO2** | Demonstrate DBMS architecture and conceptual database modeling for database design | **3** | | **2** | | | | | | | | **3** | | **2** | **1** |
| | | **CO3** | Formulate solutions to handle databases using indexing, SQL, | **3** | | **2** | | | | | | | | **3** | | **2** | **2** |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | relational algebra and NOSQL | | | | | | | | | | | | | | |
| | | **CO4** | Develop database schemas using normalization approaches. | **2** | | **3** | | | | | | | | **1** | | **2** | **3** |
| **20HS4105** | **UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY** | | Apply the concepts relevant to transaction processing in database systems. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | **1** | | | **2** | | | | | |
| | | **CO2** | Understand and aware of themselves and their surroundings (family, society and nature). | | | **3** | | | | | | | | | | | |
| | | **CO3** | Handle problems with sustainable solutions, while keeping human relationships and human nature in mind. | | | | | | **2** | | | | | | | | |
| | | **CO4** | Exhibit critical ability and become sensitive to their commitment towards their understanding of human values, human relationship and human society. | | | | | | | | **3** | | | | **2** | | |
| **20IT4351** | **JAVA PROGRAMMIN** | | Apply what they have learnt to their own self | | | | | | | | | | | | | | |

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| | **G LAB** | | in different day-to-day settings in real life. | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | | | | | | | | | **3** | | **2** | **1** | |
| | | **CO2** | Design solutions to applications using object oriented approach using Java | | **2** | **3** | | | | | | | **2** | | **3** | **1** | |
| | | **CO3** | Implement java technology to solve runtime errors and test the correctness of programs using exception handling and assertions | | **2** | **2** | | | | | | **3** | | **2** | **2** | **2** | **2** |
| | | **CO4** | Develop java applications to make use of collections framework and generics to solve real world problems | | **2** | **2** | | | | | | **2** | | **1** | **3** | **2** | **3** |
| | | **CO5** | Apply the knowledge of delegation event model to handle semantic and low level events | | **2** | **2** | | | | | | **3** | | **2** | **2** | **2** | **2** |
| | | **CO6** | Solve real world problems using Java legacy classes | | **2** | **2** | | | | | | **2** | | **1** | **3** | **2** | **3** |
| **20IT4351** | **DATABASE MANAGEMENT SYSTEMS LAB** | | Design graphical user interface applications using Java Swings | | | | | | | | | | | | | | |

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| | | **CO1** | | **1** | | **1** | | | | | | | | **1** | | **2** | **1** |
| | | **CO2** | Experiment DDL and DML statements with integrity constraints | **2** | | **2** | | | | | | | | **1** | | **2** | **1** |
| | | **CO3** | Apply various SQL functions and operators in RDBMS | **2** | | **2** | | | | | | | | **2** | | **2** | **1** |
| | | **CO4** | Develop solutions to query problems using nested queries with various operators. | **1** | | **2** | | | | | | | | **2** | | **2** | **2** |
| 20IT4353 | **ADVANCED PROGRAMMING LAB-I** | | Implement PL/SQL on stored databases. | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **2** | **2** | | | **2** | | | | | **3** | **3** | **2** | **3** |
| | | **CO2** | Demonstrate the knowledge of problem solving and to find solutions that use different types of programming paradigms. | **1** | **2** | **2** | | | **2** | | | | | **2** | **2** | **1** | **1** |
| | | **CO3** | Apply the knowledge of number theory to solve problems and generate solutions. | **3** | **2** | **3** | | | **2** | | | | | **3** | **3** | **3** | **3** |
| | | **CO4** | Design solutions to the problems by applying linear and non-linear | **1** | **2** | **2** | | | **2** | | | | | **2** | **2** | **1** | **1** |

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| | | | data structures. | | | | | | | | | | | | | | |
| | | **CO5** | Develop combinatory solutions to the real world problems. | **3** | **2** | **3** | | | **3** | | | | | **3** | **3** | **3** | **3** |
| | | **CO6** | Execute basic algorithmic ideas using greedy approach to solve competitive programming problems. | **3** | **2** | **3** | | | **3** | | | | | **3** | **3** | **3** | **3** |
| **20TP4106** | **ENGLISH FOR PROFESSIONALS** | | Analyze dynamic programming approaches to generate solution to the problems . | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | **3** | **3** | | | |
| | | **CO2** | Present themselves effectively in the professional world by shedding off their inhibitions about communicating in English | | | | | | | | | | **3** | **3** | | | |
| | | **CO3** | Introduce themselves as well as others appropriately | | | | | | | | | | **3** | **3** | | | |
| | | **CO4** | Use vocabulary to form sentences and narrate stories by using creative thinking skills | | | | | | | | **2** | | **3** | **3** | | | |
| | | **CO5** | Involve in practical activity oriented sessions | | | | | | | | **2** | | | | | | |

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| | | | and respond positively by developing their analytical thinking skills. | | | | | | | | | | | | | | |
| **20MC4108B** | **INDIAN CONSTITUTION** | | Learn about various expressions to be used in different situations. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | **2** | | | | |
| | | **CO2** | Know the fundamental law of the land | | | | | | | | | | | | | | |
| | | **CO3** | Understand how fundamental rights are protected | | | | | | | **1** | | | | | | | |
| | | **CO4** | Perceive the structure and formation of the Indian Government System | | | | | | | **2** | | | | | **3** | | |
| **20IT3501** | **COMPUTER NETWORKS** | | Explain when and how an emergency can be imposed and what are the consequences. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the functioning of the network components in wired and wireless communication | **3** | **2** | **1** | | | | | | | | | | **2** | **1** |
| | | **CO3** | Apply error detection, correction and security methods in a network | | **3** | | | **1** | | | | | | | | **2** | |

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| | | **CO4** | Analyze different protocols functioning at Application layer, Transport layer and Network layer. | **2** | **1** | **3** | | | | | | | | | **3** | | |
| **20IT5302** | **SOFTWARE ENGINEERING** | | Evaluate the shortest path in data transfer with Routing algorithms | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | **3** | **1** | |
| | | **CO2** | Understand the basic fundamentals of software development life cycle. | **1** | | | **2** | | | | | | **2** | | **2** | | |
| | | **CO3** | Apply process models and testing techniques to real time applications. | | **2** | | | | | | | | **3** | **2** | | **1** | |
| | | **CO4** | Analyze requirements, specifications to build system architecture. | | | **3** | | | | | | | **2** | **3** | **2** | **2** | |
| **20HS5103** | **ENGINEERING ECONOMICS AND MANAGEMENT** | | Create UML diagrams that represent static and dynamic aspects of a software. | | | | | | | | | | | | | | |
| | | **CO1** | | **3** | | | | | | | | | | | **3** | **3** | |
| | | **CO2** | Understand various forms of organizations and principles of management | **3** | | | | **3** | | | | | | | **3** | **3** | |
| | | **CO3** | Understand the various aspects of business | **3** | | | | | | | | | | | **3** | **3** | |

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| | | | economics. | | | | | | | | | | | | | | |
| | | **CO4** | Perceive the knowledge on Human resources and Marketing functions | **3** | | | | **3** | | | | | | | **3** | | **3** |
| **20IT5404A** | **DATA MINING** | | Evaluate various alternatives economically. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the basic concepts of warehousing and mining. | 1 | 2 | 3 | | | | | | | | | | 2 | 1 |
| | | **CO3** | Derive various interesting patterns and associations in datasets. | 2 | 3 | 3 | | | | | | | | | | 3 | 2 |
| | | **CO4** | Design classifier models to predict future trends. | 2 | 2 | 3 | | | | | | | | | | 3 | 1 |

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| 20IT5404B | **DOT NET TECHNOLOGIES** | | **Apply unsupervised learning techniques for a given application.** | | | | | | | | | | | | | | |
| | | **CO1** | | **3** | | | | | | | | | | | | | |
| | | **CO2** | Understand the Microsoft .NET Framework Architecture and its features such as delegates and Lambda expressions. | **3** | | | | | **2** | | | | | | | **2** | |
| | | **CO3** | Apply the object oriented features of Dot Net frame work in solving Real world applications. | **3** | | | **2** | **3** | | | | | | | | **2** | **2** |
| | | **CO4** | Implement modern database interactivity using the Entity framework for database connectivity. | | | **3** | | **3** | | | | | | | | **3** | **2** |

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| **20IT5404C** | **BLOCKCHAIN TECHNOLOGIES** | | Develop a dynamic web application using ASP.net core Razor pages. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **1** | | | **1** | | | | | | **2** | | **1** | **2** |
| | | **CO2** | Understand block chain terminologies and its properties and the emerging models for blockchain technology | **2** | **3** | | | | | | | | | **3** | | **1** | **1** |
| | | **CO3** | Familiarize with the functional/operational aspects of cryptocurrency ecosystem and identify major challenges and technical gaps existing between theory and practice in cryptocurrency domain | **3** | **1** | | | | | | | | | **1** | | **1** | **2** |
| | | **CO4** | Design Smart Contracts of blockchain Technology using Solidity and Remix IDE | **3** | **3** | | **2** | | | | | | | **1** | | **1** | **1** |

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| **20IT5205A** | **AI TOOLS, TECHNIQUES AND APPLICATIONS.** | | Build private-permissioned block chain-based applications for enterprises and businesses | | | | | | | | | | | | | | |
| | | **CO1** | | **3** | | | | | **1** | | | | | | | **1** | **1** |
| | | **CO2** | Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. | | | | | **2** | | **1** | | | | | | **2** | **3** |
| | | **CO3** | Analyze Reinforcement Learning to real life planning problems. | | | **1** | **3** | | | | | | | | | **3** | **2** |
| | | **CO4** | Evaluate techniques for computer-based representation and manipulation of complex information, and uncertainty. | | | | | **3** | | | | | **2** | | | **1** | **2** |
| **20IT5205B** | **MOBILE APPLICATION DEVELOPMENT** | | Create chat bots for various application using AI tools. | | | | | | | | | | | | | | |

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| | | **CO1** | | | **1** | | | | | | | | | | | **2** | |
| | | **CO2** | Interpret features of android environment and development tools. | | | **3** | | **2** | | | | | | | | | **2** |
| | | **CO3** | Design rich user interfaces by using various controls & views. | | | | | **3** | | | | | | | | **3** | |
| | | **CO4** | Apply the knowledge of fragment and activity life cycles to design apps | | **2** | | | | | | | | | | | | **3** |
| 20IT5205C | **INTRODUCTION TO DATABASEMANAGEMENT SYSTEMS** | | Analyze various layout managers and widgets to develop Android applications. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand functional components of the DBMS and ER Modelling. | **2** | | **2** | | **2** | | | | | | **2** | | **1** | |
| | | **CO3** | Design different data models for real-time applications. | **2** | | | | **2** | | | | | | **2** | | **2** | |

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| | | **CO4** | Develop queries using Structured Query Language. | **3** | | | | | | | | | | **2** | | **2** | **2** |
| **20IT5351A** | **DATA MINING LAB** | | Apply normalization technique for schema refinement. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **2** | **2** | **1** | **3** | | | | | | **1** | **2** | **3** | **1** |
| | | **CO2** | Create a Data warehouse for the given database. | | **1** | **2** | | **2** | | | | | | | | **3** | **1** |
| | | **CO3** | Implement data preprocessing to the given dataset. | **1** | **2** | **3** | **2** | **3** | | | | | | **1** | **2** | **3** | **2** |
| | | **CO4** | Design a model to extract the patterns from the data. | | **2** | | | **2** | | | | | | | | | **1** |
| **20IT5351B** | **DOTNET TECHNOLOGIES LAB** | | Evaluate the model designed for pattern extraction. | | | | | | | | | | | | | | |
| | | **CO1** | | | **1** | | | | | | | | | | | | |
| | | **CO2** | Implement the Console Applications in C#. | | | | | | | | | | | | **2** | **2** | |

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| | | **CO3** | Implement the object oriented features of Dot Net frame work in solving Real-world Applications. | | **2** | | | **3** | | | | | | | | | **3** |
| | | **CO4** | Design web application with variety of web controls and validation controls. | | **3** | | | **3** | | | | **3** | | | **2** | | **3** |
| **20IT5351C** | **BLOCKCHAIN TECHNOLOGIES LAB** | | Develop dynamic web applications that include database interactivity. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **1** | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Build smart contracts using Remix IDE, Ganache and Myether Wallet in Ethereum Platform. | | **1** | **3** | | **1** | | | | | | | | **2** | **1** |
| | | **CO3** | Build private-permissioned block chain-based applications for enterprises and businesses. | | | | **3** | | | | | **1** | | | | **1** | **2** |
| | | **CO4** | Develop IPFS file system using peer to peer networks | **1** | **1** | | | | | | | | | | | **2** | **3** |

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| 20IT5352 | **ADVANCED PROGRAMMING LAB - II** | | Build a block chain raffle using Solidity programming language | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **2** | **3** | | | **2** | | | | | | **3** | | **3** |
| | | **CO2** | Combine fundamental data structures and algorithmic techniques in building a complete solution to a given problem | **2** | **2** | **2** | | | **2** | | | | | | **2** | **1** | **1** |
| | | **CO3** | Solve recurrences describing the performance of string algorithms. | **3** | **2** | **3** | | | **2** | | | | | | **2** | **2** | **2** |
| | | **CO4** | Develop combinatory solutions to the real-world problems . | **3** | **2** | **2** | | | **2** | | | | | | **2** | **3** | **1** |
| | | **CO5** | Analyze dynamic programming strategies to solve a given problem. | **3** | **2** | **3** | | | **3** | | | | | | **2** | | **2** |
| | | **CO6** | Derive solutions to the problems based on Computational Geometry. | **3** | **2** | **3** | | | **3** | | | | | | **2** | **3** | **2** |
| **20TP1507** | **PERSONALITY DEVELOPMEN** | | Evaluate new techniques for solving specific problems in | | | | | | | | | | | | | | |

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| | **T** | | line with space and time requirements. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | **2** | | **3** | | | | |
| | | **CO2** | Understand the corporate etiquette. | | | | | | | | | **2** | **3** | | | | |
| | | **CO3** | Make presentations effectively with appropriate body language | | | | | | | | | | **3** | | | | |
| | | **CO4** | Be composed with positive attitude | | | | | | | | | **2** | **3** | | | | |
| **20IT5607** | **REACT PROGRAMMING** | | Understand the core competencies to succeed in professional and personal life | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Understand the client-side JavaScript application development through React library | **2** | | | | | | | | | | | | **1** | **1** |
| | | **CO3** | Apply React features such as forms, reuse and nest components | | **2** | | | **2** | | | | | | | | **2** | **2** |
| | | **CO4** | Develop functional front-end web application using | **3** | | | | **2** | | | | | | | | **1** | **3** |

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| | | | React | | | | | | | | | | | | | | |
| **20IT5607** | **GOOGLE GO** | | Implement state management, routing and data incorporation in React | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the Go Language Environment and its features. | **3** | | | | **2** | | | | | | | | **2** | |
| | | **CO3** | Manipulate GO language data types such as Arrays, Strings and Pointers. | | **2** | | | **2** | | | | | | | | **3** | **2** |
| | | **CO4** | Implement code reusability, modularity, and flexibility to solve complex compositions. | | **3** | | | **3** | | | | | | | | **3** | **2** |
| **20IT6301** | **CLOUD COMPUTING** | | Analyze predefined and user defined packages, servers to develop real time applications | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **2** | | | | | | | | | | | **1** | |

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| | | **CO2** | Interpret the concepts of cloud computing and its standards. | | **2** | | | | | | | | | **2** | | | **1** |
| | | **CO3** | Analyze cloud models, security and storage accessibility in different cloud ecosystems | | **1** | | | **3** | | | | | | **2** | | **2** | **1** |
| | | **CO4** | Illustrate cloud services offered by various cloud vendors for an enterprise | | **2** | | | **2** | | | | | | | | **3** | |
| **20IT5302** | **MACHINE LEARNING** | | Implement cloud environment for various real time applications. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | **1** | |
| | | **CO2** | Understand the fundamental concepts of machine learning | **2** | **2** | | | | | | | | | | | **3** | **1** |
| | | **CO3** | Apply linear, distance based, and decision tree based models | **2** | **2** | | | | | | | | | | | **3** | **1** |
| | | **CO4** | Analyze probabilistic, neural network models | **2** | **3** | | | | | | | | | | | **3** | **2** |
| **20IT6303** | **WEB PROGRAMMING AND DEVELOPMEN** | | Design a suitable machine learning model for a given scenario | | | | | | | | | | | | | | |

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| | **T** | | | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Understand features of Spring Boot, Spring Framework, Spring cloud and process involved to connect to Java Database Connectivity | **2** | | | | **2** | | | | | | | | **1** | |
| | | **CO3** | Apply concepts of Servlets to develop server side applications | | | **3** | | **2** | | | | | | | | **2** | |
| | | **CO4** | Design web applications with Spring Boot Annotations and connecting to JPA with Spring MVC and Spring Boot | | | **3** | | **2** | | | | | | | | **2** | |
| **20IT5404A** | **DATA VISUALIZATION** | | Develop Representational State Transfer services in Spring Boot applications | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **1** | **2** | | | | | | | | **1** | | **1** | **1** |

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| | | **CO2** | Illustrate visualizations that represent the relationships contained in complex data sets and their interpretation. | **1** | **1** | **2** | | | | | | | **1** | | **1** | **1** |
| | | **CO3** | Analyze data to create a visualization for a particular research application. | | **2** | | | | | | | | | | **1** | **2** |
| | | **CO4** | Identify appropriate visualization chart to present and represent design solutions. | **1** | | **1** | | **2** | | | | | | | **2** | **1** |
| **20IT6404B** | **BIG DATA** | | Choose leading open source software packages to create and publish visualizations that enable clear interpretations of big, complex and real world data. | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | |
| | | **CO2** | Understand Big data characteristics, Hadoop, Hive, HDFS and Map Reduce architectures. | **2** | **2** | | | **2** | | | | | | | **3** | |

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| | | **CO3** | Use Nosql Databases to process different varieties of Data. | **2** | | **3** | | **3** | | | | | | | | **3** | **2** |
| | | **CO4** | Apply Pig Latin, Hive Scripts and Map Reduce programming on real time applications. | **1** | | **2** | | **2** | | | | | | | | **2** | |
| **20IT6404C** | **INTERNET OF THINGS** | | Develop In-Memory Data Analytics with Spark and Spark Streaming. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | **3** | | **1** | | **2** | | | | | **2** | **1** | |
| | | **CO2** | Analyze various protocols, privacy and security of Internet of Things. | **1** | | **2** | | **2** | | **2** | | | | | | **1** | **2** |
| | | **CO3** | Apply the methods of data acquiring, organizing and analytics using Cloud platform for IoT applications. | **1** | | **2** | | **2** | | **3** | | | | | | **1** | |
| | | **CO4** | Design portable IoT system using Rasperry Pi and Arduino. | **1** | | **2** | | **2** | | **3** | | | | | **2** | **1** | **2** |
| **20IT6404D** | **INFORMATION RETRIEVAL SYSTEM** | | Apply the steps of the design methodology in developingIoT applications. | | | | | | | | | | | | | | |

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| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the basic concepts and techniques in Information Retrieval | **1** | **1** | | | **2** | | | | | | | | **1** | **1** |
| | | **CO3** | Evaluate information retrieval system performance and queries formulation | **1** | **2** | **2** | | **3** | | | | | | | | **1** | **1** |
| | | **CO4** | Infer relevance feedback and query operations on a text database | **1** | **2** | **2** | | **3** | | | | | | | | **2** | **2** |
| **20IT6205A** | **AGILE SOFTWARE DEVELOPMENT** | | Analyze the web characterization and digital libraries implications | | | | | | | | | | | | | | |
| | | **CO1** | | **3** | | | | | | | | | | **2** | | **3** | |
| | | **CO2** | Apply software development methods for time management of agile projects. | | **3** | | | | | | | | | **2** | | **1** | |
| | | **CO3** | Analyze agile software development processes, quality and team work in learning. | | | | **3** | | | | | | | **1** | | **1** | **1** |
| | | **CO4** | Evaluate measures that suit agile software | | | | | **3** | | | | **1** | | | | **1** | **1** |

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| | | | development environments to process and product quality which delves into the details of TDD implementation. | | | | | | | | | | | | | | | |
| **20IT6205B** | **AUTOMATA AND COMPILER DESIGN** | | Build teams to establish a professional software development that promotes team members accountability and responsibility. | | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the concepts of abstract machines, compiler design, language classes & grammar relationships and variants of syntax trees. | **2** | | **2** | | | | | | | | | | **1** | | |
| | | **CO3** | Apply code generation and code optimization techniques, top down and bottom up parsing techniques on context free grammars | **2** | | **3** | | | | | | | | | | **1** | **1** | |

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| | | **CO4** | Construct finite state machines, Parsing Tables and regular expressions for modeling and solving computation problems. | **2** | | **3** | | | | | | | | | | | **2** |
| **20IT6205C** | **INTRODUCTION TO DATA STRUCTURES** | | Design Context free grammars, Pushdown Automata and Turing machines for the formal languages. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **2** | | | | | | | | | | | **2** | **1** |
| | | **CO2** | Apply linear data structures to solve different applications. | **1** | | | | | | | | | | | | **1** | |
| | | **CO3** | Develop algorithms to solve a given problem using appropriate data structure. | | **1** | | | | | | | | | | **1** | **2** | **2** |
| | | **CO4** | Implement operations on binary trees, binary search trees and sorting. | | | | **1** | | | | | **1** | | | **1** | | |
| **20IT6351** | **WEB PROGRAMMING AND DEVELOPMENT LAB** | | Solve problems using algorithm design methods such as the divide and conquer, greedy method and dynamic programming. | | | | | | | | | | | | | | |

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| | | **CO1** | | | **2** | | | **2** | | | | | | | | | |
| | | **CO2** | Implement Java Database Connectivity Application Programming Interface to connect to relational databases | **3** | | | | **2** | | | | | | | | | |
| | | **CO3** | Build server side applications to interact with server using Java Servlets | | | **3** | | **2** | | | | | | | | **2** | **2** |
| | | **CO4** | Design Web applications that interact with server as well as the relational databases | **2** | | | | **3** | | | | | | | | **1** | |
| | | **CO5** | Implement dependency injection and inversion of control to solve problems in Spring Boot | **3** | | | | **2** | | | | | | | | **2** | **2** |
| | | **CO6** | Apply Spring Boot annotations to provide solutions to real world problems | | | **3** | | **3** | | | | | | | | **2** | **2** |
| **20IT6352A** | **DATA VISUALIZATION LAB** | | Create Spring Boot applications that uses Representational State Transfer services | | | | | | | | | | | | | | |

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| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the visualization pipeline with its relationship to other data analysis pipelines | **1** | **1** | **2** | | | | | | | | **1** | | | **2** |
| | | **CO3** | Design considerations for the components of the good visualization | | **2** | | | | | | | | | | | | **3** |
| | | **CO4** | Construct visualizations for effective data analysis | **1** | | **1** | | | | | | | | **1** | | **3** | |
| **20IT6352B** | **BIG DATA LAB** | | Build interactive dashboards for better decision making | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | | **3** | | **3** | | | | | | | | **3** | **2** |
| | | **CO2** | Implement Map Reduce programming on real time applications. | **2** | **2** | | | **3** | | | | | | | | **3** | **2** |
| | | **CO3** | Apply NOSQL Concepts on real time applications. | **2** | | **3** | | **3** | | | | | | | | **3** | **2** |
| | | **CO4** | Apply Pig Latin and Hive Script programming on real time applications. | **2** | | **3** | | **3** | | | | | | | | **3** | **3** |

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| **20IT6352C** | **INTERNET OF THINGS LAB** | | Solve various business applications using Big data concepts. | | | | | | | | | | | | | | |
| | | **CO1** | | 1 | | 1 | | | | | | | | | 3 | | 1 |
| | | **CO2** | Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved. | 1 | | 1 | | | | | | | | | 3 | 1 | |
| | | **CO3** | Choose the right sensors and actuators for an application. | | | | 2 | 2 | | | | | | | 3 | 2 | 2 |
| | | **CO4** | Test and experiment different sensors for application development. | | | | 2 | 2 | | | | | | | 3 | 1 | 2 |
| | | **CO5** | Develop IoT applications using Arduino/Raspberry Pi/open platform. | | | 1 | 2 | | | | | | | | | | |
| | | **CO6** | Develop smart IoT Applications using smart sensor devices cloud systems. | | | 1 | 2 | | | | | | | | | | |
| **20IT6352D** | **INFORMATION RETRIEVAL SYSTEM LAB** | | Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi | | | | | | | | | | | | | | |

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| | | **CO1** | | **1** | **1** | **2** | | | | | | | **1** | | **1** | |
| | | **CO2** | Demonstrate genesis and diversity of information retrieval situations for text and hypermedia. | **1** | **1** | **2** | | | | | | | **1** | | **1** | **1** |
| | | **CO3** | Interpret different types of algorithms to provide better search results | | **2** | | | **2** | | | | | | | **2** | **2** |
| | | **CO4** | Analyze the functions of web search engines. | **2** | | **2** | | **2** | | | | | **2** | | **2** | **2** |
| **20IT6353** | **ADVANCED PROGRAMMING LAB – III** | | Apply techniques for compressing dictionaries and inverted indexes | | | | | | | | | | | | | |
| | | CO1 | | | | | | | | | | | | | 1 | |
| | | CO2 | Understand the basic concepts such as Stacks, Queues, Linked Lists and Hashing Techniques in the programming language. | 2 | | | | 2 | | | | | | | 2 | |
| | | CO3 | Demonstrate the use of stacks, queues and sequences in solving real world scenarios. | 2 | | | | | | | | | | | 2 | |

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| | | CO4 | Apply tries and trees in solving network related scenarios. | | 2 | | | 2 | | | | | | | | 1 | |
| | | CO5 | Solve the problems with given test cases. | | 2 | | | | | | | | | | | 2 | |
| | | CO6 | Analyze the solutions for the problems using algorithm analysis concepts | 2 | 2 | | | | | | | | | | | 1 | |
| 20MC6107A | **INNOVATION, IPR AND ENTREPRENEURSHIP** | | Apply programing skills for optimized code and derive the solutions according to the provided constraints. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | | | | | **2** | **2** | | **2** | | | | |
| | | **CO2** | To learn the innovation concepts related to business organizations. | **2** | | | | | | **1** | **2** | | **2** | | | | |
| | | **CO3** | To understand the importance of innovation in new start-ups. | **2** | | | | | | **2** | **3** | | **3** | | | | |
| | | **CO4** | To know fundamental aspects of Intellectual property Rights. | **1** | | | | | | **3** | **2** | | **2** | | | | |
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| **20IT5404C** | **BLOCKCHAIN TECHNOLOGIES** | | Develop a dynamic web application using ASP.net core Razor pages. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **1** | | | **1** | | | | | | **2** | | **1** | **2** |
| | | **CO2** | Understand block chain terminologies and its properties and the emerging models for blockchain technology | **2** | **3** | | | | | | | | | **3** | | **1** | **1** |
| | | **CO3** | Familiarize with the functional/operational aspects of cryptocurrency ecosystem and identify major challenges and technical gaps existing between theory and practice in cryptocurrency domain | **3** | **1** | | | | | | | | | **1** | | **1** | **2** |
| | | **CO4** | Design Smart Contracts of blockchain Technology using Solidity and Remix IDE | **3** | **3** | | **2** | | | | | | | **1** | | **1** | **1** |

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| **20IT5205A** | **AI TOOLS, TECHNIQUES AND APPLICATIONS.** | | Build private-permissioned block chain-based applications for enterprises and businesses | | | | | | | | | | | | | | |
| | | **CO1** | | **3** | | | | | **1** | | | | | | | **1** | **1** |
| | | **CO2** | Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. | | | | | **2** | | **1** | | | | | | **2** | **3** |
| | | **CO3** | Analyze Reinforcement Learning to real life planning problems. | | | **1** | **3** | | | | | | | | | **3** | **2** |
| | | **CO4** | Evaluate techniques for computer-based representation and manipulation of complex information, and uncertainty. | | | | | **3** | | | | | **2** | | | **1** | **2** |
| **20IT5205B** | **MOBILE APPLICATION DEVELOPMENT** | | Create chat bots for various application using AI tools. | | | | | | | | | | | | | | |

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| | | **CO1** | | | **1** | | | | | | | | | | | **2** | |
| | | **CO2** | Interpret features of android environment and development tools. | | | **3** | | **2** | | | | | | | | | **2** |
| | | **CO3** | Design rich user interfaces by using various controls & views. | | | | | **3** | | | | | | | | **3** | |
| | | **CO4** | Apply the knowledge of fragment and activity life cycles to design apps | | **2** | | | | | | | | | | | | **3** |
| 20IT5205C | **INTRODUCTION TO DATABASEMANAGEMENT SYSTEMS** | | Analyze various layout managers and widgets to develop Android applications. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand functional components of the DBMS and ER Modelling. | **2** | | **2** | | **2** | | | | | | **2** | | **1** | |
| | | **CO3** | Design different data models for real-time applications. | **2** | | | | **2** | | | | | | **2** | | **2** | |

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| | | **CO4** | Develop queries using Structured Query Language. | **3** | | | | | | | | | | **2** | | **2** | **2** |
| **20IT5351A** | **DATA MINING LAB** | | Apply normalization technique for schema refinement. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **2** | **2** | **1** | **3** | | | | | | **1** | **2** | **3** | **1** |
| | | **CO2** | Create a Data warehouse for the given database. | | **1** | **2** | | **2** | | | | | | | | **3** | **1** |
| | | **CO3** | Implement data preprocessing to the given dataset. | **1** | **2** | **3** | **2** | **3** | | | | | | **1** | **2** | **3** | **2** |
| | | **CO4** | Design a model to extract the patterns from the data. | | **2** | | | **2** | | | | | | | | | **1** |
| **20IT5351B** | **DOTNET TECHNOLOGIES LAB** | | Evaluate the model designed for pattern extraction. | | | | | | | | | | | | | | |
| | | **CO1** | | | **1** | | | | | | | | | | | | |
| | | **CO2** | Implement the Console Applications in C#. | | | | | | | | | | | | **2** | **2** | |

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| | | **CO3** | Implement the object oriented features of Dot Net frame work in solving Real-world Applications. | | **2** | | | **3** | | | | | | | | | **3** |
| | | **CO4** | Design web application with variety of web controls and validation controls. | | **3** | | | **3** | | | | **3** | | | **2** | | **3** |
| **20IT5351C** | **BLOCKCHAIN TECHNOLOGIES LAB** | | Develop dynamic web applications that include database interactivity. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **1** | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Build smart contracts using Remix IDE, Ganache and Myether Wallet in Ethereum Platform. | | **1** | **3** | | **1** | | | | | | | | **2** | **1** |
| | | **CO3** | Build private-permissioned block chain-based applications for enterprises and businesses. | | | | **3** | | | | | **1** | | | | **1** | **2** |
| | | **CO4** | Develop IPFS file system using peer to peer networks | **1** | **1** | | | | | | | | | | | **2** | **3** |

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| 20IT5352 | **ADVANCED PROGRAMMING LAB - II** | | Build a block chain raffle using Solidity programming language | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **2** | **3** | | | **2** | | | | | | **3** | | **3** |
| | | **CO2** | Combine fundamental data structures and algorithmic techniques in building a complete solution to a given problem | **2** | **2** | **2** | | | **2** | | | | | | **2** | **1** | **1** |
| | | **CO3** | Solve recurrences describing the performance of string algorithms. | **3** | **2** | **3** | | | **2** | | | | | | **2** | **2** | **2** |
| | | **CO4** | Develop combinatory solutions to the real-world problems . | **3** | **2** | **2** | | | **2** | | | | | | **2** | **3** | **1** |
| | | **CO5** | Analyze dynamic programming strategies to solve a given problem. | **3** | **2** | **3** | | | **3** | | | | | | **2** | | **2** |
| | | **CO6** | Derive solutions to the problems based on Computational Geometry. | **3** | **2** | **3** | | | **3** | | | | | | **2** | **3** | **2** |
| **20TP1507** | **PERSONALITY DEVELOPMEN** | | Evaluate new techniques for solving specific problems in | | | | | | | | | | | | | | |

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| | **T** | | line with space and time requirements. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | **2** | | **3** | | | | |
| | | **CO2** | Understand the corporate etiquette. | | | | | | | | | **2** | **3** | | | | |
| | | **CO3** | Make presentations effectively with appropriate body language | | | | | | | | | | **3** | | | | |
| | | **CO4** | Be composed with positive attitude | | | | | | | | | **2** | **3** | | | | |
| **20IT5607** | **REACT PROGRAMMING** | | Understand the core competencies to succeed in professional and personal life | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Understand the client-side JavaScript application development through React library | **2** | | | | | | | | | | | | **1** | **1** |
| | | **CO3** | Apply React features such as forms, reuse and nest components | | **2** | | | **2** | | | | | | | | **2** | **2** |
| | | **CO4** | Develop functional front-end web application using | **3** | | | | **2** | | | | | | | | **1** | **3** |

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| | | | React | | | | | | | | | | | | | | |
| **20IT5607** | **GOOGLE GO** | | Implement state management, routing and data incorporation in React | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the Go Language Environment and its features. | **3** | | | | **2** | | | | | | | | **2** | |
| | | **CO3** | Manipulate GO language data types such as Arrays, Strings and Pointers. | | **2** | | | **2** | | | | | | | | **3** | **2** |
| | | **CO4** | Implement code reusability, modularity, and flexibility to solve complex compositions. | | **3** | | | **3** | | | | | | | | **3** | **2** |
| **20IT6301** | **CLOUD COMPUTING** | | Analyze predefined and user defined packages, servers to develop real time applications | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **2** | | | | | | | | | | | **1** | |

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| | | **CO2** | Interpret the concepts of cloud computing and its standards. | | **2** | | | | | | | | | **2** | | | **1** |
| | | **CO3** | Analyze cloud models, security and storage accessibility in different cloud ecosystems | | **1** | | | **3** | | | | | | **2** | | **2** | **1** |
| | | **CO4** | Illustrate cloud services offered by various cloud vendors for an enterprise | | **2** | | | **2** | | | | | | | | **3** | |
| **20IT5302** | **MACHINE LEARNING** | | Implement cloud environment for various real time applications. | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | **1** | |
| | | **CO2** | Understand the fundamental concepts of machine learning | **2** | **2** | | | | | | | | | | | **3** | **1** |
| | | **CO3** | Apply linear, distance based, and decision tree based models | **2** | **2** | | | | | | | | | | | **3** | **1** |
| | | **CO4** | Analyze probabilistic, neural network models | **2** | **3** | | | | | | | | | | | **3** | **2** |
| **20IT6303** | **WEB PROGRAMMING AND DEVELOPMEN** | | Design a suitable machine learning model for a given scenario | | | | | | | | | | | | | | |

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| | **T** | | | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Understand features of Spring Boot, Spring Framework, Spring cloud and process involved to connect to Java Database Connectivity | **2** | | | | **2** | | | | | | | | **1** | |
| | | **CO3** | Apply concepts of Servlets to develop server side applications | | | **3** | | **2** | | | | | | | | **2** | |
| | | **CO4** | Design web applications with Spring Boot Annotations and connecting to JPA with Spring MVC and Spring Boot | | | **3** | | **2** | | | | | | | | **2** | |
| **20IT5404A** | **DATA VISUALIZATION** | | Develop Representational State Transfer services in Spring Boot applications | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | **1** | **2** | | | | | | | | **1** | | **1** | **1** |

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| | | **CO2** | Illustrate visualizations that represent the relationships contained in complex data sets and their interpretation. | **1** | **1** | **2** | | | | | | | **1** | | **1** | **1** |
| | | **CO3** | Analyze data to create a visualization for a particular research application. | | **2** | | | | | | | | | | **1** | **2** |
| | | **CO4** | Identify appropriate visualization chart to present and represent design solutions. | **1** | | **1** | | **2** | | | | | | | **2** | **1** |
| **20IT6404B** | **BIG DATA** | | Choose leading open source software packages to create and publish visualizations that enable clear interpretations of big, complex and real world data. | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | |
| | | **CO2** | Understand Big data characteristics, Hadoop, Hive, HDFS and Map Reduce architectures. | **2** | **2** | | | **2** | | | | | | | **3** | |

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| | | **CO3** | Use Nosql Databases to process different varieties of Data. | **2** | | **3** | | **3** | | | | | | | | **3** | **2** |
| | | **CO4** | Apply Pig Latin, Hive Scripts and Map Reduce programming on real time applications. | **1** | | **2** | | **2** | | | | | | | | **2** | |
| **20IT6404C** | **INTERNET OF THINGS** | | Develop In-Memory Data Analytics with Spark and Spark Streaming. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | **3** | | **1** | | **2** | | | | | **2** | **1** | |
| | | **CO2** | Analyze various protocols, privacy and security of Internet of Things. | **1** | | **2** | | **2** | | **2** | | | | | | **1** | **2** |
| | | **CO3** | Apply the methods of data acquiring, organizing and analytics using Cloud platform for IoT applications. | **1** | | **2** | | **2** | | **3** | | | | | | **1** | |
| | | **CO4** | Design portable IoT system using Rasperry Pi and Arduino. | **1** | | **2** | | **2** | | **3** | | | | | **2** | **1** | **2** |
| **20IT6404D** | **INFORMATION RETRIEVAL SYSTEM** | | Apply the steps of the design methodology in developingIoT applications. | | | | | | | | | | | | | | |

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| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the basic concepts and techniques in Information Retrieval | **1** | **1** | | | **2** | | | | | | | | **1** | **1** |
| | | **CO3** | Evaluate information retrieval system performance and queries formulation | **1** | **2** | **2** | | **3** | | | | | | | | **1** | **1** |
| | | **CO4** | Infer relevance feedback and query operations on a text database | **1** | **2** | **2** | | **3** | | | | | | | | **2** | **2** |
| **20IT6205A** | **AGILE SOFTWARE DEVELOPMENT** | | Analyze the web characterization and digital libraries implications | | | | | | | | | | | | | | |
| | | **CO1** | | **3** | | | | | | | | | | **2** | | **3** | |
| | | **CO2** | Apply software development methods for time management of agile projects. | | **3** | | | | | | | | | **2** | | **1** | |
| | | **CO3** | Analyze agile software development processes, quality and team work in learning. | | | | **3** | | | | | | | **1** | | **1** | **1** |
| | | **CO4** | Evaluate measures that suit agile software | | | | | **3** | | | | **1** | | | | **1** | **1** |

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| | | | development environments to process and product quality which delves into the details of TDD implementation. | | | | | | | | | | | | | | | |
| **20IT6205B** | **AUTOMATA AND COMPILER DESIGN** | | Build teams to establish a professional software development that promotes team members accountability and responsibility. | | | | | | | | | | | | | | | |
| | | **CO1** | | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the concepts of abstract machines, compiler design, language classes & grammar relationships and variants of syntax trees. | **2** | | **2** | | | | | | | | | | **1** | | |
| | | **CO3** | Apply code generation and code optimization techniques, top down and bottom up parsing techniques on context free grammars | **2** | | **3** | | | | | | | | | | **1** | **1** | |

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| | | **CO4** | Construct finite state machines, Parsing Tables and regular expressions for modeling and solving computation problems. | **2** | | **3** | | | | | | | | | | | **2** |
| **20IT6205C** | **INTRODUCTION TO DATA STRUCTURES** | | Design Context free grammars, Pushdown Automata and Turing machines for the formal languages. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | **2** | | | | | | | | | | | **2** | **1** |
| | | **CO2** | Apply linear data structures to solve different applications. | **1** | | | | | | | | | | | | **1** | |
| | | **CO3** | Develop algorithms to solve a given problem using appropriate data structure. | | **1** | | | | | | | | | | **1** | **2** | **2** |
| | | **CO4** | Implement operations on binary trees, binary search trees and sorting. | | | | **1** | | | | | **1** | | | **1** | | |
| **20IT6351** | **WEB PROGRAMMING AND DEVELOPMENT LAB** | | Solve problems using algorithm design methods such as the divide and conquer, greedy method and dynamic programming. | | | | | | | | | | | | | | |

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| | | **CO1** | | | **2** | | | **2** | | | | | | | | | |
| | | **CO2** | Implement Java Database Connectivity Application Programming Interface to connect to relational databases | **3** | | | | **2** | | | | | | | | | |
| | | **CO3** | Build server side applications to interact with server using Java Servlets | | | **3** | | **2** | | | | | | | | **2** | **2** |
| | | **CO4** | Design Web applications that interact with server as well as the relational databases | **2** | | | | **3** | | | | | | | | **1** | |
| | | **CO5** | Implement dependency injection and inversion of control to solve problems in Spring Boot | **3** | | | | **2** | | | | | | | | **2** | **2** |
| | | **CO6** | Apply Spring Boot annotations to provide solutions to real world problems | | | **3** | | **3** | | | | | | | | **2** | **2** |
| **20IT6352A** | **DATA VISUALIZATION LAB** | | Create Spring Boot applications that uses Representational State Transfer services | | | | | | | | | | | | | | |

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| | | **CO1** | | | | | | | | | | | | | | | |
| | | **CO2** | Understand the visualization pipeline with its relationship to other data analysis pipelines | **1** | **1** | **2** | | | | | | | | **1** | | | **2** |
| | | **CO3** | Design considerations for the components of the good visualization | | **2** | | | | | | | | | | | | **3** |
| | | **CO4** | Construct visualizations for effective data analysis | **1** | | **1** | | | | | | | | **1** | | **3** | |
| **20IT6352B** | **BIG DATA LAB** | | Build interactive dashboards for better decision making | | | | | | | | | | | | | | |
| | | **CO1** | | **2** | | **3** | | **3** | | | | | | | | **3** | **2** |
| | | **CO2** | Implement Map Reduce programming on real time applications. | **2** | **2** | | | **3** | | | | | | | | **3** | **2** |
| | | **CO3** | Apply NOSQL Concepts on real time applications. | **2** | | **3** | | **3** | | | | | | | | **3** | **2** |
| | | **CO4** | Apply Pig Latin and Hive Script programming on real time applications. | **2** | | **3** | | **3** | | | | | | | | **3** | **3** |

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| **20IT6352C** | **INTERNET OF THINGS LAB** | | Solve various business applications using Big data concepts. | | | | | | | | | | | | | | |
| | | **CO1** | | 1 | | 1 | | | | | | | | | 3 | | 1 |
| | | **CO2** | Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved. | 1 | | 1 | | | | | | | | | 3 | 1 | |
| | | **CO3** | Choose the right sensors and actuators for an application. | | | | 2 | 2 | | | | | | | 3 | 2 | 2 |
| | | **CO4** | Test and experiment different sensors for application development. | | | | 2 | 2 | | | | | | | 3 | 1 | 2 |
| | | **CO5** | Develop IoT applications using Arduino/Raspberry Pi/open platform. | | | 1 | 2 | | | | | | | | | | |
| | | **CO6** | Develop smart IoT Applications using smart sensor devices cloud systems. | | | 1 | 2 | | | | | | | | | | |
| **20IT6352D** | **INFORMATION RETRIEVAL SYSTEM LAB** | | Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi | | | | | | | | | | | | | | |

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| | | **CO1** | | **1** | **1** | **2** | | | | | | | **1** | | **1** | |
| | | **CO2** | Demonstrate genesis and diversity of information retrieval situations for text and hypermedia. | **1** | **1** | **2** | | | | | | | **1** | | **1** | **1** |
| | | **CO3** | Interpret different types of algorithms to provide better search results | | **2** | | | **2** | | | | | | | **2** | **2** |
| | | **CO4** | Analyze the functions of web search engines. | **2** | | **2** | | **2** | | | | | **2** | | **2** | **2** |
| **20IT6353** | **ADVANCED PROGRAMMING LAB – III** | | Apply techniques for compressing dictionaries and inverted indexes | | | | | | | | | | | | | |
| | | CO1 | | | | | | | | | | | | | 1 | |
| | | CO2 | Understand the basic concepts such as Stacks, Queues, Linked Lists and Hashing Techniques in the programming language. | 2 | | | | 2 | | | | | | | 2 | |
| | | CO3 | Demonstrate the use of stacks, queues and sequences in solving real world scenarios. | 2 | | | | | | | | | | | 2 | |

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| | | CO4 | Apply tries and trees in solving network related scenarios. | | 2 | | | 2 | | | | | | | | 1 | |
| | | CO5 | Solve the problems with given test cases. | | 2 | | | | | | | | | | | 2 | |
| | | CO6 | Analyze the solutions for the problems using algorithm analysis concepts | 2 | 2 | | | | | | | | | | | 1 | |
| 20MC6107A | **INNOVATION, IPR AND ENTREPRENEURSHIP** | | Apply programing skills for optimized code and derive the solutions according to the provided constraints. | | | | | | | | | | | | | | |
| | | **CO1** | | **1** | | | | | | **2** | **2** | | **2** | | | | |
| | | **CO2** | To learn the innovation concepts related to business organizations. | **2** | | | | | | **1** | **2** | | **2** | | | | |
| | | **CO3** | To understand the importance of innovation in new start-ups. | **2** | | | | | | **2** | **3** | | **3** | | | | |
| | | **CO4** | To know fundamental aspects of Intellectual property Rights. | **1** | | | | | | **3** | **2** | | **2** | | | | |
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## DEPARTMENT OF INFORMATION TECHNOLOGY

## VELAGAPUDI RAMAKRISHNA SIDDHARTHA ENGINEERING COLLEGE

## VR17 REGULATIONS – COURSE OUTCOMES MAPPING WITH PO'S AND PSO's

| Course Code | Course Name | CO | Course outcomes | PO 1 | PO 2 | PO 3 | PO 4 | P O5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **17MA1101** | **Matrices And Differential Calculus** | | | | | | | | | | | | | | | | |
| | | **CO1** | Determine Eigen values, Eigen vectors of a matrix. | 3 | | | | | | | | 2 | | 1 | | | |
| | | CO2 | Estimate Maxima and Minima of Multi Variable Functions. | 3 | | | | | | | | 2 | | 1 | | | |
| | | **CO3** | Solve the Linear differential equations with constant coefficients. | 3 | | | | | | | | 2 | | 1 | | | |
| | | **CO4** | Solve the Linear differential equations with variable coefficients. | 3 | | | | | | | | 2 | | 1 | | | |
| 17PH1102B | **Applied Physics** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the importance of quantum mechanics. | 3 | | | | | | | | | | | | | |

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| | | **CO2** | Analyse and understand various types of lasers and their applications. | 3 | | | | | | | | | | | | | |
| | | **CO3** | Elaborate different types of optical fibers and understand holography. | 3 | | | | | | | | 2 | | | | | |
| | | **CO4** | Understand the fabrication of nanomaterials and carbon Nanotubes. | 3 | | | | | | | | 2 | | | | | |
| 17CS1103 | **Problem Solving Methods** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the Computer problem solving approaches, efficiency and analysis of algorithms | **3** | 2 | | | | | | | | | | | | |
| | | **CO2** | Apply the factoring methods to solve the given problem | **1** | | **3** | | | | | | | | | | | |
| | | **CO3** | Apply the array techniques to find the solution for the given problem | **1** | | **3** | | | | | | | | | | | |
| | | **CO4** | Solve the problems using MATLAB | **1** | **1** | | | | | | | **3** | | | | | |

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| 17EE1104 | **Basics Of Electrical Engineering** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze Electric Circuit fundamentals. | **3** | **1** | | | **2** | | | | | | | | | |
| | | **CO2** | Understand the basic concepts of Alternating Quantities and Magnetic Circuits | **3** | **1** | | | | | | | | | | | | |
| | | **CO3** | Analyze the basic concepts of Electric Machines | **2** | | | | **2** | | | | | | | | | |
| | | **CO4** | Understand Measuring Instruments & Solar Photo Voltaic System concepts | **2** | | | | | | | | | | | | | |
| 17HS1105 | **Technical English & Communication Skills** | | | | | | | | | | | | | | | | |
| | | **CO1** | Develop administrative and professional compilations including web related(On-line) communication with felicity of expression | | | | **2** | **3** | **3** | **3** | **3** | | **2** | | | | |

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| | | **CO2** | Demonstrate Proficiency in Interpersonal Communication, in addition to standard patterns of Pronunciation | | | | **3** | **3** | **3** | **3** | **3** | | **2** | | | | |
| | | **CO3** | Apply the elements of functional English with sustained understanding for authentic use of language in any given academic and/or professional environment | **2** | | | **3** | **3** | **3** | **3** | **3** | | **2** | | | | |
| | | **CO4** | Apply the elements of functional English with sustained understanding for authentic use of language in any given academic and/or professional environment | **1** | **1** | **2** | **3** | 2 | **3** | **3** | **3** | | **2** | | | | |
| 17PH1151 | **Applied Physics Laboratory** | | | | | | | | | | | | | | | | |
| | | **CO1** | Use function generator, spectrometer and travelling microscope | **3** | | | | | | | | | | **2** | | | |

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| | | | in various experiments | | | | | | | | | | | | | | |
| | | **CO2** | Test optical components using principles of interference and diffraction of light | **3** | | | | | | | | | | | | | |
| | | **CO3** | Determine the V-I characteristics of solar cell and photo cell and appreciate the accuracy in measurements | **3** | | | | | | | | | | | | | |
| 17CS1152 | **Computing And Peripherals Laboratory** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand and Apply MS Office tools | **1** | | | | | | | | **3** | | | | | |
| | | **CO2** | Configure the components on the motherboard and install different operating systems | **3** | **1** | | | | | | | | | | | | |
| | | **CO3** | Understand and configure different storage media | **3** | | **1** | | | | | | | | | | | |

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| | | **CO4** | Perform Networking, troubleshooting and system administration tasks | | | **3** | | | | | | **1** | | | | | |
| 17ME1153 | **Basic Workshop** | | | | | | | | | | | | | | | | |
| | | **CO1** | Model and develop various basic prototypes in the Carpentry trade. | **3** | | | **1** | | | | | | | | | | |
| | | **CO2** | Develop various basic prototypes in the trade of Welding. | **2** | | **1** | | | | | | | | | | | |
| | | **CO3** | Model and develop various basic prototypes in the trade of Tin Smithy. | **2** | | **1** | | | | | | | | | | | |
| | | **CO4** | Familiarize with various fundamental aspects of house wiring. | **1** | | **1** | | | | | | | | | | | |
| 17MC1106A | **Technology And Society** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the origins of technology and its role in the history of human progress. | | | | | | | | **1** | | | | | | |

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| | | **CO2** | Know the Industrial Revolution and its impact on Society | | | | | **2** | | **1** | | | | | | | |
| | | **CO3** | Interpret the developments in various fields of technology till Twentieth Century. | | | | | | | | **1** | | | | | | |
| | | **CO4** | Distinguish the impacts of Technology on the Environemnt and achievements of great scientists. | | | | | **2** | | **1** | | | | | | | |
| 17MA1201 | **Laplace Transforms And Integral Calculus** | | | | | | | | | | | | | | | | |
| | | **CO1** | Solve Linear Differential Equations using Laplace Transforms. | **3** | **1** | | | | | | | | | | | | |
| | | **CO2** | Examine the nature of the Infinite series. | **3** | **1** | | | | | | | | | | | | |
| | | **CO3** | Evaluate areas and volumes using Double, Triple Integrals. | **3** | **1** | | | | | | | | | | | | |

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| | | **CO4** | Convert Line Integrals to Area Integrals and Surface Integrals to Volume Integrals. | **3** | **1** | | | | | | | | | | | | |
| 17CH1202A | **Engineeering Chemistry** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze various water treatment methods and boiler troubles. | | **3** | | | | | | | | | | | | |
| | | **CO2** | Apply the principles of spectroscopic techniques to analyse different materials and apply the knowledge of conventional fuels for their effective utilisation. | **2** | | | | | | | | | | | | | |
| | | **CO3** | Apply the knowledge of working principles of conducting polymers, electrodes and batteries for their application in various technological fields. | | | | | | | | | | | | | | |
| | | **CO4** | Evaluate corrosion processes as well as protection methods. | | | **2** | | | | | | **3** | | | | | |
| 17CS1203 | **Programming** | | | | | | | | | | | | | | | | |

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| | **In C** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the fundamentals and structure of a C programming language | **3** | | | | | | | | | | | | | |
| | | **CO2** | Apply the loops, arrays, functions and string concepts in C to solve the given problem. | | **1** | **3** | | | | | | | | | | | |
| | | **CO3** | Apply the pointers and text input output files concept to find the solution for the given applications. | | **1** | **3** | | | | | | | | | | | |
| | | **CO4** | Use the Enumerated, Data types, Structures and Unions. | **3** | **1** | | | | | | | | | | | | |
| 17EC1204A | **Basic Electronic Engineering** | | | | | | | | | | | | | | | | |
| | | **CO1** | Fundamentals of electronic components, devices, transducers | **3** | **3** | | | **2** | | | | | | | | | |
| | | **CO2** | Principles of digital electronics | **3** | **3** | | | | | | | | | | | | |

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| | | **CO3** | Principles of various communication systems. | **2** | | | | **2** | | | | | | | | | |
| 17ME1205 | **Engineering Graphics** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the Scales, conics and Cycloidal curves. | **3** | | | **3** | | | | | | | **1** | | | |
| | | **CO2** | Draw Orthographic projections of points, Lines, Planes and Solids | **2** | | | **3** | | | | | | | **2** | | | |
| | | **CO3** | Understand Sectional views of Solids, Development of surfaces and their representation | **2** | | | **2** | | | | | | | **2** | | | |
| | | **CO4** | Construct isometric scale, isometric projections ,isometric views and convert pictorial views to orthographic projections | **1** | | | **3** | | | | | | | **2** | | | |
| 17CH1251 | **Engineering Chemistry Laboratory** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze quality parameters of water samples from different sources | | | **3** | | | | | | | | | | | |

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| | | **CO2** | Perform quantitative analysis using instrumental methods. | | | | | | | | **2** | | | | | | |
| | | **CO3** | Apply the knowledge of mechanism of corrosion inhibition, metallic coatings and photochemical reactions. | | **2** | | | | | | | | | | | | |
| 17CS1252 | **Computer Programming Laboratory** | | | | | | | | | | | | | | | | |
| | | **CO1** | Implement the use of programming constructs in a structured oriented programming language | **1** | | **3** | | | | | | | | | | | |
| | | **CO2** | Analyze and implement user defined functions to solve real time problems | | **1** | **3** | | | | | | | | | | | |
| | | **CO3** | Implement the usage of pointers and file operations on data | | **1** | **3** | | | | | | | | | | | |
| | | **CO4** | Implement the user defined data types via structures and unions to solve real | | | **3** | | | | | | | | **1** | | | |

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| | | | life problems | | | | | | | | | | | | | | |
| 17MC1206B | **Professional Ethics & Human Values** | | | | | | | | | | | | | | | | |
| | | **CO1** | Know the moral autonomy and uses of ethical theories. | **2** | | | | | | | | | | | | | |
| | | **CO2** | Understand morals, Honesty and character. | | | | | | | | **2** | | | | | | |
| | | **CO3** | Understand about safety, risk and professional rights. | | | | | **3** | | | | | | | | | |
| | | **CO4** | Know the ethics regarding Global issues related to Environment, Computers and weapon's development. | | | | | | | | | | | **2** | | | |
| **17MA1301** | **Complex Analysis And Numerical Methods** | | | | | | | | | | | | | | | | |

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| | | **CO1** | Determine analytic, non-analytic functions and evaluate complex integrals. | **3** | **2** | | | | | | | | | | | | |
| | | **CO2** | Analyze Taylor, Laurent series and evaluate real definite integrals using residue theorem. | **3** | **2** | | | | | | | | | | | | |
| | | **CO3** | Solve Algebraic, transcendental, system of equations and estimate functions using polynomial interpolation. | **3** | **2** | | **2** | **2** | | | | | | | | **1** | **1** |
| | | **CO4** | Solve initial and boundary value problems numerically. | **3** | **2** | | **2** | **2** | | | | | | | | **1** | **1** |
| **17IT3302** | **Discrete Mathematical Structures** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the logical inference and counting techniques | **3** | **3** | | | **3** | | | | **3** | | | | | **1** |
| | | **CO2** | Classify functions, relations and concepts of generating functions. | **3** | **3** | | | **3** | | | | **3** | | | | | **1** |
| | | **CO3** | Solve recurrence relations and understand the concepts of Groups and their properties. | **3** | **3** | | | **1** | | | | **1** | | | | **1** | **1** |

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| | | **CO4** | Classify Groups and Graph isomorphism. | **3** | **1** | | | | | | | **1** | | | | **1** | |
| **17IT3303** | **Data Structures** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze operations on linear data structures like stack, queue and linked | **3** | **2** | **2** | **1** | | **1** | | | | | **2** | | **2** | **1** |
| | | **CO2** | Develop algorithms to solve a given problem using appropriate data structure | **2** | **2** | **2** | **2** | | **1** | | | | | **2** | | **1** | **2** |
| | | **CO3** | Demonstrate the algorithms for operations on binary, binary search, AVL and B-trees | **2** | **2** | **2** | **3** | | **1** | | | | | **2** | | **3** | **2** |
| | | **CO4** | Implement searching& sorting techniques and assess its performance. | **3** | **2** | **2** | **1** | | **1** | | | | | **2** | | **3** | **1** |
| **17IT3304** | **Computer Organization** | | | | | | | | | | | | | | | | |
| | | **CO1** | Design combinational & sequential circuits,digital components, arithmetic logic and control units | **2** | **1** | **2** | | | | | | | | **1** | **1** | **1** | **1** |
| | | **CO2** | Analyze the basic organization of computer, different instruction formats and addressing modes. | **1** | **1** | **2** | | | | | | | | **1** | **1** | **1** | **1** |
| | | **CO3** | Apply computer algorithms for | **3** | | | | | | | | | | **1** | **1** | **1** | **1** |

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| | | | performing arithmetic operations on binary number system. | | | | | | | | | | | | | | |
| | | **CO4** | Analyze components of memory organization and modes of data transfer between CPU and I/O devices | **1** | | **1** | | | | | | | | **1** | | **1** | **1** |
| **15IT3305A** | **Yoga& Meditation** | | | | | | | | | | | | | | | | |
| | | **CO1** | Equip better attitude and behaviour. | | | | | | **2** | | **3** | **2** | | | **2** | **1** | **1** |
| | | **CO2** | Imbibe set of values enabling a balanced life focused on an ethical material life. | | | | | | **2** | | **3** | **2** | | | **2** | **1** | **1** |
| | | **CO3** | Develop levels of concentration through mediation | | | | | | **3** | | | **2** | | | **3** | **1** | **1** |
| | | **CO4** | Apply conscience for the missions of life | | | | | | | | | **2** | | | **2** | **1** | **1** |
| **17HS2305D** | **Philosophy** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand major philosophical issues. | | | | | | **2** | | **1** | **1** | | | **1** | **1** | **1** |
| | | **CO2** | Appreciate the philosophical doctrines of western thinkers. | | | | | | **2** | | | | **2** | | | **1** | **1** |
| | | **CO3** | Understand the eminence of Indian classical thought. | | | | | | **2** | | | **1** | | | **2** | **1** | **1** |

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| | | **CO4** | Appreciate relation between science and values. | | | | | | **2** | | **2** | | | | **2** | **1** | **1** |
| **17HS2305I** | **Foreign Language - German** | | | | | | | | | | | | | | | | |
| | | **CO1** | Learn basics of German Language. | | | | | | | | | **1** | H | | **1** | **1** | **1** |
| | | **CO2** | Write German Writing | | | | | | | | | **1** | H | | **1** | **1** | **1** |
| | | **CO3** | Understand German Hearing | | | | | | | | | **1** | H | | **1** | **1** | **1** |
| | | **CO4** | Form sentence in Present , past and future tense | | | | | | | | | **1** | H | | **2** | **1** | **1** |
| **17HS2305J** | **Psychology** | | | | | | | | | | | | | | | | |
| | | **CO1** | Relate biological and socio-cultural factors in understanding human Behaviour. | | | | | | **3** | | | **2** | **1** | | **2** | | |
| | | **CO2** | Understand the nature of sensory processes, types of attentions. | | | | | | **2** | | | **2** | **2** | | **2** | | |
| | | **CO3** | Explain different types of learning and the procedures, distinguishes between different types of memory, | | | | | | | | | | **2** | | **2** | | |
| | | **CO4** | Demonstrate an understanding of some cognitive processes involved in | | | | | | | | | | **3** | | **2** | | |

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| | | | Problem solving and decision-making. | | | | | | | | | | | | | | |
| **17TP1306** | **Logic & Reasoning** | | | | | | | | | | | | | | | | |
| | | **CO1** | Think reason logically in any critical situation | | **2** | | | | **2** | | | | | | | | |
| | | **CO2** | Analyze given information to find correct solution | | **2** | | | | **2** | | | | | | | | |
| | | **CO3** | Reduce the mistakes in day to day activities in practical life | | **2** | | | | **2** | | | | | | | | |
| | | **CO4** | Develop time management skills by approaching different shortcut methods | | **2** | | | | **2** | | | | | | | | |
| | | **CO5** | Use mathematical based reasoning to make decisions | | **2** | | | | **2** | | | | | | | | |
| | | **CO6** | Apply logical thinking to solve problems and puzzles in qualifying exams for companies and in other competitive exams | | **2** | | | | **2** | | | | | | | | |
| **17IT3308** | **Object Oriented Programming** | | | | | | | | | | | | | | | | |
| | | **CO1** | Examine the characteristics of object oriented approach | **3** | | | | | | | | | | | | **2** | **1** |
| | | **CO2** | Demonstrate the concept of polymorphism in | **3** | | **2** | | | | | | | | | | **2** | **1** |

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| | | | overload of functions and operators | | | | | | | | | | | | | | |
| | | **CO3** | Construct object oriented programs through inheritance and templates | **3** | **2** | **3** | | | | | | **2** | | **3** | | **2** | **2** |
| | | **CO4** | Apply exception handling mechanism to handle errors occur at runtime | **3** | | **3** | | | | | | | | **3** | | **2** | **2** |
| **17IT3351** | **Data Structures Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Implement various operations of stack, queue and linked list data types. | **3** | | **2** | **2** | | | | | | | | | **2** | **1** |
| | | **CO2** | Analyze and solve a given problem using appropriate data structure. | **3** | **2** | **2** | **1** | | **1** | | | | | **2** | | **1** | **2** |
| | | **CO3** | Implement operations on different trees data structures like binary, binary search, AVL and Btrees. | **2** | **2** | **2** | **2** | | **1** | | | | | **2** | **1** | **3** | **2** |
| | | **CO4** | Design various searching and sorting algorithms. | **2** | **2** | **2** | **3** | | **1** | | | | | **2** | **1** | **3** | **1** |
| **17HS1352** | **Communication Skills Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Execute rational pronunciation of speech sounds | | | | | | **3** | | | | **3** | | | **1** | **2** |

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| | | | including accentuation. | | | | | | | | | | | | | | |
| | | **CO2** | Apply elements of listening comprehension in professional environments. | | | **2** | **2** | **2** | **3** | **3** | **3** | **2** | **3** | **2** | | **1** | **2** |
| | | **CO3** | Develop the abilities of rational argumentation and skills of public speaking. | **3** | | **2** | **2** | **2** | **3** | **3** | **2** | **3** | **3** | **2** | | **1** | **3** |
| | | **CO4** | Demonstrate proficiency in the elements of professional communication including the competitive examination | **2** | **1** | **2** | **2** | **1** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **1** | **3** |
| **17MC1307** | **Environmental Studies** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the various natural resources, analyze and explore degradation management | | | | | | | **3** | **1** | | **1** | | | | |
| | | **CO2** | Understand the Ecosystems and need of Biodiversity | | **1** | | | **3** | | **3** | | | | | | | |
| | | **CO3** | Realize and Explore the Problems related to Environmental pollution and its management | | **1** | | | **3** | | | | | | | | | |

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| | | **CO4** | Apply the Role of Information Technology and analyze social issues, Acts associated with Environment. | | **1** | | | **3** | | **3** | | **1** | | | | | |
| **17IT3401** | **Statistics With R** | | | | | | | | | | | | | | | | |
| | | **CO1** | Comprehend the semantics, data handling and control statements in R | **2** | **2** | | | | | | | | | | | **2** | **2** |
| | | **CO2** | Analyze the libraries for data manipulation and to data visualization in R | **2** | **1** | | | **2** | | | | | | | | **2** | **2** |
| | | **CO3** | Demonstrate the knowledge of probability and conduct hypothesis tests for statistical inference | **3** | **2** | | **3** | | | | | | | **2** | | **3** | **2** |
| | | **CO4** | Synthesize data to fit linear and nonlinear models | **3** | **2** | **3** | **2** | **2** | | | | | | **3** | | **3** | **2** |
| **17IT3402** | **Database Management Systems** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze the characteristics, architecture of DBMS and constraints of relational model | **1** | | **1** | | | | | | | | **1** | | **2** | **1** |

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| | | **CO2** | Formulate solutions to a broad range of query problems using SQL and relational algebra | **3** | | **2** | | | | | | | **3** | | **2** | **1** |
| | | **CO3** | Design the databases using ER model and normalization for a given requirement specification | **3** | | **2** | | | | | | | **3** | | **2** | **2** |
| | | **CO4** | Implement the isolation property using serializabilty and concurrency control techniques | **2** | | **3** | | | | | | | **1** | | **2** | **3** |
| **17IT3403** | **Design And Analysis of Algorithms** | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze the performance of algorithms using time and space complexities. | **1** | **1** | **1** | | **1** | | | | | **1** | | **1** | **3** |
| | | **CO2** | Synthesize design techniques like Divide & Conquer, Greedy and choose appropriate technique to solve novel problems. | **3** | **3** | **1** | | **3** | | | | | | | **2** | |
| | | **CO3** | Apply algorithm design techniques using non-linear data structures to solve problems. | **1** | **3** | **2** | **3** | **3** | | | | | **3** | | | **2** |

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| | | **CO4** | Classify problems as P, NP, NP-hard and NP-complete and analyze the significance | | **1** | | | **2** | | | | | | | | | **1** |
| **17IT3404** | **Python Programming** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the basic building blocks in python programming language to construct different applications. | **3** | **2** | **2** | | | | | | **2** | | | **3** | **2** | **1** |
| | | **CO2** | Apply the necessary data structures to solve a given problem. | **2** | **2** | **2** | | | | | | **2** | | | **3** | **1** | **2** |
| | | **CO3** | Extract and import packages for developing different solutions for real time problems. | **2** | **2** | **2** | | | | | | **2** | | | **3** | **3** | **2** |
| | | **CO4** | Implement the problems in terms of real-world objects using concept of OOPS. | **2** | **2** | **2** | | | | | | **2** | | | **3** | **3** | **1** |
| **17TP1405** | **English For Professionals** | | | | | | | | | | | | | | | | |
| | | **CO1** | Present themselves effectively in the professional world by shedding off their inhibitions about communicating in English | | **2** | | | | **2** | | | | | | | | |

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| | | **CO2** | Introduce themselves as well as others appropriately. | | **2** | | | | **2** | | | | | | | | | |
| | | **CO3** | Use vocabulary to form sentences and narrate stories by using creative thinking skills | | **2** | | | | **2** | | | | | | | | | |
| | | **CO4** | Involve in practical activity oriented sessions. | | **2** | | | | **2** | | | | | | | | | |
| | | **CO5** | Learn about various expressions to be used in different situations. | | **2** | | | | **2** | | | | | | | | | |
| | | **CO6** | Respond positively by developing their analytical thinking skills. | | **2** | | | | **2** | | | | | | | | | |
| **17IT3406** | **Operating Systems** | | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze different Operating Systems and its Services & Functions | | | | | | | | | | | | **2** | **1** | **1** |
| | | **CO2** | Implement CPU scheduling & synchronization algorithms | **1** | **2** | | | | | | | | | | **2** | **1** | **1** |
| | | **CO3** | Demonstrate the techniques for handling deadlock & memory management | **1** | **2** | | | | | | | | | | **3** | **1** | **1** |
| | | **CO4** | Analyze various I/O management, File | **2** | **2** | | | | | | | | | | **3** | **1** | **1** |

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| | | | systems and disk scheduling techniques | | | | | | | | | | | | | | |
| **17IT3451** | **Database Management Systems Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Experiment DDL and DML commands with different integrity constraints | **1** | | **1** | | | | | | | | **1** | | **2** | **1** |
| | | **CO2** | Apply functions and operators in SQL queries | **2** | | **2** | | | | | | | | **1** | | **2** | **1** |
| | | **CO3** | Formulate solutions to query problems using nested queries and aggregate operators | **2** | | **2** | | | | | | | | **2** | | **2** | **1** |
| | | **CO4** | Demonstrate PL/SQL concepts on the given database | **1** | | **2** | | | | | | | | **2** | | **2** | **2** |
| **17IT3452** | **Python Programming Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Implement python programming constructs to build small to large scale applications. | **3** | | **2** | | | | | | **2** | | | **3** | **2** | **1** |
| | | **CO2** | Implement the problems in terms of real-world objects usingOOPs technology. | **3** | **2** | **2** | | | | | | **2** | | | **3** | **1** | **2** |

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| | | **CO3** | Evaluate and handle the errors during runtime involved in a program. | **2** | **2** | **2** | | | | | | **2** | | | **3** | **3** | **2** |
| | | **CO4** | Extract and import packages for developing different solutions for real time problems. | **2** | **2** | **2** | | | | | | **2** | | | **3** | **3** | **1** |
| **17IT3453** | **Web Programming Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the importance of the web as an effective medium of communication | **1** | **1** | | | | | | | | | | | **2** | **2** |
| | | **CO2** | Develop basic skills in analyzing the usability of a web site using HTML. | | | | | **3** | | | | | | | | **2** | **2** |
| | | **CO3** | Develop hands on experience using open source technologies such as HTML, CSS, JavaScript, PHP and MySQL | **1** | | | | **3** | | | | | | | | **2** | **2** |
| | | **CO4** | Generate an application based upon the concepts of HTML & PHP | **1** | | | | | | | | | | | | **2** | **2** |
| **17MC1407B** | **Indian Constitution** | | | | | | | | | | | | | | | | |
| | | **CO1** | Know the fundamental law of the land | | | | | | | | | | **2** | | | | |

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| | | **CO2** | Understand how fundamental rights are protected | | | | | | | | | | | | | | |
| | | **CO3** | Perceive the structure and formation of the Indian Government System | | | | | | | **1** | | | | | | | |
| | | **CO4** | Explain when and how an emergency can be imposed and what are the consequences. | | | | | | | **2** | | | | | **3** | | |
| **17IT3501** | **Software Engineering** | | | | | | | | | | | | | | | | |
| | | **CO1** | Identify an appropriate software model that would implement the customer requirements. | **1** | **2** | | | **1** | | | | | | **2** | | **2** | **1** |
| | | **CO2** | Analyze the requirements and identify the suitable architecture for the problem. | | **3** | **1** | | | | **1** | **1** | **2** | **1** | **2** | | **1** | **1** |
| | | **CO3** | Discriminate the specifications at each stage of Software Development Life Cycle. | | **3** | **1** | | | | **1** | **1** | **2** | **1** | **2** | **2** | **2** | **2** |
| | | **CO4** | Implement various software testing strategies for verification and validation of the software products. | | **3** | **1** | **2** | | | | | | | **2** | **2** | **2** | **2** |
| **17IT3502** | **Data Mining** | | | | | | | | | | | | | | | | |

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| | | **CO1** | Understand the basic concepts of warehousing and mining. | | | | **3** | **1** | | | | | | | **2** | **3** | **1** |
| | | **CO2** | Derive various interesting patterns and associations in datasets. | **1** | **2** | | **3** | **1** | | | | | | | | **3** | **1** |
| | | **CO3** | Design and develop classifier models to predict future trends. | **2** | **2** | | **3** | **2** | | | | | | | **1** | **3** | **1** |
| | | **CO4** | Apply unsupervised learning techniques for a given application. | **3** | **2** | | **3** | **2** | | | | | | | **2** | **3** | **1** |
| **17IT3503** | **Computer Networks** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze the reference models and physical connections of network systems | | | | | **1** | | | | | | **1** | | **3** | **2** |
| | | **CO2** | Apply different protocols functioning at Application layer and Transport layer. | | **1** | | | **1** | **2** | **2** | | | | **1** | | **3** | **2** |
| | | **CO3** | Evaluate various Routing algorithms for finding the optimal path. | **3** | **1** | | | **2** | | **1** | | | | **1** | | **3** | **2** |
| | | **CO4** | Understand the concepts of wireless communication , mobility and security | **1** | | | | **1** | | **2** | | | | **1** | | **3** | **2** |
| **17IT2504A** | **AI Tools, Techniques** | | | | | | | | | | | | | | | | |

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| | **And Applications** | | | | | | | | | | | | | | | | |
| | | **CO1** | Identify problems that are amenable to solution by AI methods and Represent knowledge of the world using logic and Infer new facts from that knowledge | **3** | **2** | | | **1** | | | | | | | | **1** | |
| | | **CO2** | Demonstrate the capability to create simple AI applications using Natural Language Processing and machine learning. | **1** | **3** | **1** | | | **2** | | | **1** | | | | | **1** |
| | | **CO3** | Elucidate the best practices for Chatbot development | | **2** | | | **3** | | | | | | | | **2** | |
| | | **CO4** | Explicate the purpose of Reinforcement Learning and apply Reinforcement Learning to real life planning problems. | | **1** | **2** | | **2** | **1** | | | | | | | | **2** |
| **17IT2504B** | **Linux Programming** | | | | | | | | | | | | | | | | |
| | | **CO1** | Apply Linux utilities and Shell scripting language (bash) to solve Problems. | **1** | **3** | | | **2** | | | | | | | | **2** | **1** |
| | | **CO2** | Develop the skills necessary for working with files | **1** | **1** | | | | | | | | | | | **2** | **1** |

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| | | **CO3** | Understanding of Linux environment which includes program arguments and Environment variables. | **1** | **1** | | | **1** | | | | | | | | **2** | **1** |
| | | **CO4** | Familiar with the skills necessary for memory Management, process management and Locks. | **2** | **2** | | | **2** | | | | | | | | **2** | **2** |
| **17IT2504C** | **Mobile Application Development** | | | | | | | | | | | | | | | | |
| | | **CO1** | Comprehend the basics of Android development framework. | **1** | **1** | | | | | | | | | **3** | | **3** | **1** |
| | | **CO2** | Develop an application using the interfaces, Intents & Layouts | | **1** | **3** | **3** | | | | | | | | | **3** | **1** |
| | | **CO3** | Create the User Interface Programmatically. | | **1** | **3** | **3** | | | | | | | | | **3** | **1** |
| | | **CO4** | Demonstrate the saving of data & Navigation using Maps. | **3** | | | | | | | | | | **3** | | **3** | **1** |
| **17IT2505A** | **Database Management Systems** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze the information storage issues and derive an | **1** | **3** | | | | | | | | | | | **1** | **1** |

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| | | | information model in the form of an entity relation diagram. | | | | | | | | | | | | | | |
| | | **CO2** | Transform information model into a relational database schema. | | **1** | **3** | | | | | | | | **2** | | **1** | **2** |
| | | **CO3** | Formulate solutions to a broad range of query problems using formal and Informal query languages. | | **2** | | **3** | | | | | | | **1** | | **1** | **2** |
| | | **CO4** | Understand the normalization theory and construct normalized databases. | **1** | **3** | | **3** | | | | | | | **3** | **3** | **2** | **2** |
| **17IT2505B** | **Object Oriented Programming** | | | | | | | | | | | | | | | | |
| | | **CO1** | Examine the characteristics of object oriented approach | **3** | | | | | | | | | | | | **2** | **1** |
| | | **CO2** | Demonstrate the concept of polymorphism in overload of functions and operators | **3** | | **2** | | | | | | | | | | **2** | **1** |
| | | **CO3** | Construct object oriented programs through inheritance and templates | **3** | **2** | **3** | | | | | | **2** | | **3** | | **2** | **2** |
| | | **CO4** | Apply exception handling mechanism to handle errors occur at | **3** | | **3** | | | | | | | | **3** | | **2** | **2** |

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| | | | runtime | | | | | | | | | | | | | | |
| **17IT2505C** | **Python Programming** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze the constructs, conditional and iterative statements in python | **3** | | **2** | **2** | | | | | | | | | **3** | **2** |
| | | **CO2** | Demonstrate the applicability of file and string handling in python | **3** | **2** | **2** | **1** | | **1** | | | | | **2** | | **3** | **2** |
| | | **CO3** | Interpret the knowledge of python modules and packages | **2** | **2** | **2** | **2** | | **1** | | | | | **2** | **1** | **2** | **2** |
| | | **CO4** | Synthesize data structures such as list, dictionary, set and tuple to solve a given problem | **2** | **2** | **2** | **3** | | **1** | | | | | **2** | **1** | **2** | **3** |
| **17TP1507** | **Personality Development** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the corporate etiquette. | | | | | | | | **2** | | **3** | | | | |
| | | **CO2** | Make presentations effectively with appropriate body language | | | | | | | | | **2** | **3** | | | **1** | **2** |
| | | **CO3** | Be composed with positive attitude | | | | | | | | | | **3** | | | **1** | **1** |
| | | **CO4** | Understand the core competencies to succeed in professional and personal life | | | | | | | | | **2** | **3** | | | | **1** |

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| **17IT3509** | **Java Programming** | | | | | | | | | | | | | | | | |
| | | **CO1** | Paraphrase the fundamental concepts of object oriented approach | **1** | | | | | | | | | | | | **2** | **1** |
| | | **CO2** | Analyze exception handling techniques and I/O streams to handle user input and output | | **2** | **3** | | | | | | | | | | **1** | **2** |
| | | **CO3** | Demonstrate the usage of multi threads and collection framework for structures | | | **2** | | | | | | **3** | | | **2** | **3** | **3** |
| | | **CO4** | Synthesize Graphical User Interfaces using applets and event handling | | | **2** | | | | | | **2** | | | **3** | **2** | **3** |
| **17IT3551** | **Java Programming Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Design Java Applications on object oriented concepts | **1** | | | | | | | | | | | | **2** | **2** |
| | | **CO2** | Implement techniques to handle run time errors and different types of inheritance | | **2** | **3** | | | | | | | | | | **2** | **2** |
| | | **CO3** | Develop java applications on multithreading and collection classes | | | **2** | | | | | | **3** | | | **2** | **2** | **2** |

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| | | **CO4** | Design GUI applications through Swing components and handle the raised events. | | | **2** | | | | | | **2** | | | **3** | **2** | **3** |
| **17IT3552** | **Advanced Programming Lab I** | | | | | | | | | | | | | | | | |
| | | CO1 | Demonstrate the knowledge to find solutions that uses structured and object oriented languages | **3** | | | | | **3** | | | | | **3** | **3** | **3** | **2** |
| | | CO2 | Implement data structures linear, non-linear and python structures to solve real world problems | **3** | | | | | **3** | | | | | **3** | **3** | **3** | **2** |
| **17MC1508A** | **Biology For Engineers** | | | | | | | | | | | | | | | | |
| | | **CO1** | Describe the fundamental Principles and methods of engineering | | **3** | | **2** | | | | | | | | | | |
| | | **CO2** | Identify the functions of different types in bio-molecules | | **3** | | | | | | | | | | | | |
| | | **CO3** | Describe mechanisms underlying the working of molecular biological processes including enzyme catalysis, metabolic pathways, gene expression. | | **2** | | **3** | | | | | | | | | | |

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| | | **CO4** | Use Excel, MATLAB and other computational tools to quantitatively analyze biological processes. | | **1** | | **2** | **3** | | | | | | | | | |
| **17IT3601** | **Machine Learning** | | | | | | | | | | | | | | | | |
| | | **CO1** | Recognize the characteristics of machine learning , binary classification and Bayesian learning | **2** | **1** | **1** | **1** | **2** | | | | | | | | **2** | **2** |
| | | **CO2** | Solve classification problems using concept learning and decision trees | **3** | **2** | **2** | **2** | **3** | | | | | | | | **3** | **3** |
| | | **CO3** | Apply Linear and distance based learning models | **3** | **2** | **2** | **2** | **3** | | | | | | | | **3** | **3** |
| | | **CO4** | Analyze Genetic and Neural network algorithms | **3** | **2** | **2** | **2** | **3** | | | | | | | | **3** | **3** |
| **17IT3602** | **Web Programming And Development** | | | | | | | | | | | | | | | | |
| | | **CO1** | Develop secure and dynamic web pages using JavaScript | **2** | **2** | **3** | | | | | | | | **1** | | **2** | **1** |
| | | **CO2** | Design applications that interact with relational databases through Java Database Connectivity | **2** | **2** | **3** | | | | | | | | **1** | | **2** | **1** |

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| | | **CO3** | Develop and deploy Servlets and JSP technologies | **2** | **2** | **3** | | | | | | | | **1** | | **2** | **2** |
| | | **CO4** | Design single page web applications through Angular technology | | | **3** | | | | | | | | **3** | | **2** | **2** |
| **17IT4603A** | **Fundamentals of Data Science** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the need and significance of data life cycle. | **3** | | | | | | | | | | | | **3** | **2** |
| | | **CO2** | Apply statistical techniques to visualize the data and evaluate Type I and II errors. | **1** | **2** | | **2** | | | | | | | | | **3** | **2** |
| | | **CO3** | Design classifier model to predict future trends and validate accuracy of the classifier and to implement clustering techniques on the datasets. | **2** | **1** | | | | | | | | | | **2** | **3** | **2** |
| | | **CO4** | Implement Linear model selection methods for real time applications/ Analyze algorithms for dimensionality reduction on data. | **2** | **2** | | **2** | | | | | | | | | **3** | **2** |
| **17IT4603B** | **Network Security** | | | | | | | | | | | | | | | | |

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| | | **CO1** | Understand security attacks, services, mechanisms and encryption algorithms to mitigate security issues in a network | **1** | **2** | **2** | **2** | | **1** | | **2** | **1** | | | | **2** | **1** |
| | | **CO2** | Apply authentication techniques to safeguard the data transfer. | **1** | **3** | **3** | **2** | **3** | | | **2** | | | | | **3** | **2** |
| | | **CO3** | Analyze security practices in IP and web based systems. | **1** | **3** | **3** | **2** | **2** | | | **2** | | | | | **2** | **2** |
| | | **CO4** | Identify malicious activities and incorporate counter measures on digital data. | | | **3** | | | **3** | | **3** | | | | | **2** | **2** |
| **17IT4603C** | **Automata And Compiler Design** | | | | | | | | | | | | | | | | |
| | | **CO1** | Construct finite state machines and regular expressions for modeling and solving computation problems. | **1** | **1** | | | **1** | | | | | | **2** | | **1** | **2** |
| | | **CO2** | Implement top down and bottom up parsing techniques on context free grammars | **2** | **3** | | | | | | | | | **3** | | **1** | **1** |
| | | **CO3** | Apply techniques for code generation and code optimization. | **3** | **1** | | | | | | | | | **1** | | **1** | **2** |

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| | | **CO4** | Design Pushdown Automata and Turing machines for the given grammar or language. | 3 | 3 | | **2** | | | | | | | 1 | | 1 | 1 |
| **17IT4603D** | **Agile Software Development** | | | | | | | | | | | | | | | | |
| | | CO1 | Understand the nature of agile software development to establish a professional software development environment and build teams. | 1 | **2** | | | | | | | | | | | 1 | **2** |
| | | CO2 | Analyze the customer role and time related problems in agile development environments. | 1 | | | | | | | | | | | | 1 | **2** |
| | | CO3 | Apply measures for quality assurance and Test Driven Development in agile software development environments. | 1 | | 1 | | | | | | | | | **2** | 1 | **2** |
| | | CO4 | Analyze the abstraction levels in agile software development and develop trust among team members in learning environment. | | **2** | | | | | | | | | | **2** | 1 | 1 |
| **17IT4604A** | **Big Data** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze Hadoop Architecture—Name Node, Big Data | **2** | | | 1 | **2** | | | | | | | | | |

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| | | | Lifecycle. | | | | | | | | | | | | | | |
| | | **CO2** | Master the concepts of Hadoop Distributed File System. | 1 | | | | **2** | | | | | | | | | |
| | | **CO3** | Acquire knowledge on Map Reduce Framework. | **2** | | | | **2** | | | | | | | | | |
| | | **CO4** | Apply Pig and Hive concepts for Data Processing. | **2** | | | 1 | 3 | | | | | | | | | |
| **17IT4604B** | **Internet of Things** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the design concepts, protocols, privacy and security of Internet of Things | 1 | | 3 | | 1 | | **2** | | | | | **2** | 1 | |
| | | **CO2** | Analyze the methods of data acquiring, organizing and analytics using Cloud platform for IoT applications. | 1 | | **2** | | **2** | | **2** | | | | | | 1 | **2** |
| | | **CO3** | Design IoT applications using Raspberry Pi board using Python interfacing various sensors. | 1 | | **2** | | **2** | | **2** | | | | | | 1 | |
| | | **CO4** | Apply the steps of the design methodology in developing IoT applications. | 1 | | **2** | | **2** | | **2** | | | | | **2** | 1 | **2** |

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| **17IT4604C** | **Dot Net Technologies** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understanding the architecture and benefits of Dot Net Frame work.. | 1 | **3** | | 1 | | | | | **3** | | **3** | | | **3** |
| | | **CO2** | Analyze the importance of object oriented features in Dot Net frame work. | | **3** | | **3** | | | | | **3** | | **3** | | | **3** |
| | | **CO3** | Design dynamic web applications using web Controls and validation controls. | | **3** | | **3** | **3** | | | | **3** | | **3** | | | **3** |
| | | **CO4** | Build web applications that include database interactivity with different databases. | | **3** | | **3** | | | | | **3** | | **3** | | | **3** |
| **17IT4604D** | **Software Testing Methodologies** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the differences between testing and debugging | 1 | **2** | 1 | | 1 | | | | | | | **2** | 1 | |
| | | **CO2** | Analyze the testing techniques for performing Transaction-Flow and Data-Flow testing | **2** | **2** | **2** | **2** | | | | | | | **2** | | | 1 |
| | | **CO3** | Implement transaction flow testing, domain testing and state testing for a given application and apply in commercial | **3** | 1 | **2** | 1 | | | | | **2** | **2** | | | | **2** |

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| | | | environments. | | | | | | | | | | | | | | |
| | | **CO4** | Interpret the control flow graph and identify the path products, path sums and path expressions. | **2** | 1 | **3** | 1 | | | | | 1 | | | | 1 | |
| **17IT2605A** | **Cyber Security** | | | | | | | | | | | | | | | | |
| | | **CO1** | Identify the assets of information and significance of security. | 1 | **3** | **3** | | | | | | | | | | **2** | **3** |
| | | **CO2** | Apply data leakage, protection and security policies on digital systems. | | | 1 | **2** | | | | | | | | | **2** | **2** |
| | | **CO3** | Analyze log files and backup strategies for securing the data in real time environment. | 1 | 1 | **3** | 1 | 1 | | | | | | | | 1 | **2** |
| | | **CO4** | \|Implement the issues in handling web vulnerabilities. | 1 | | **2** | **3** | 1 | 1 | | | | | | | **3** | 1 |
| **17IT2605B** | **Data Visualization** | | | | | | | | | | | | | | | | |
| | | **CO1** | Illustrate visualizations that represent the relationships contained in complex data sets and their interpretation. | **2** | 1 | **2** | | | | | | | | 1 | | 1 | |
| | | **CO2** | Analyze and select appropriate data that can be used in order to create a visualization that answers a | 1 | 1 | **2** | | | | | | | | 1 | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | particular research application | | | | | | | | | | | | | | |
| | | **CO3** | Identify the statistical analysis needed to validate the trends present in data visualizations. | | **2** | | | | | | | | | | | | 1 |
| | | **CO4** | Choose leading open source software packages to create and publish visualizations that enable clear interpretations of big, complex and real world data. | 1 | | 1 | | | | | | | | 1 | | 1 | |
| **17IT2605 C** | **M Commerce** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the application of tools and services to the development of small scale E-Commerce applications | **2** | 1 | **2** | | | | | | | | 1 | | 1 | |
| | | **CO2** | Identify the benefits and limitations of M-Commerce to support mobile marketing | 1 | 1 | **2** | | | | | | | | 1 | | 1 | |
| | | **CO3** | Recognize the impact of technology advances in Wireless devices for M-Commerce | | **2** | | | | | | | | | 1 | | | 1 |
| | | **CO4** | Analyze the factors influencing the adoption of Mobile Gaming Services and | 1 | | 1 | | | | | | | | 1 | | 1 | |

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| | | | M-Commerce Business Models. | | | | | | | | | | | | | | |
| **17TP1606** | **Quantitative Aptitude** | | | | | | | | | | | | | | | | |
| | | **CO1** | Solve various Basic Mathematics problems by following different methods | **2** | | | | | | | | | | | | | **1** |
| | | **CO2** | Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems | | **2** | | | | | | | | | | | **1** | **1** |
| | | **CO3** | Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life. | **2** | | | | | | | | | | | | **1** | **2** |
| | | **CO4** | Analyze, summarize and present information in quantitative forms including table, graphs and formulas | | | | **2** | | | | | | | | | **1** | **1** |
| **17IT3651 A** | **Big Data Lab** | | | | | | | | | | | | | | | | |
| | | CO1 | Understand the concepts and challenges in analyzing big data. | **3** | **3** | | **1** | **3** | | | | **1** | | | | **1** | **2** |
| | | CO2 | Learn to work with ecosystems available in | **3** | **3** | | **1** | **3** | | | | **1** | | | | **1** | **2** |

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| | | | Hadoop. | | | | | | | | | | | | | | |
| | | CO3 | Understand the impact of big data for business strategies & decisions. | **3** | | | | **1** | | | | **1** | | | **1** | | **1** |
| **17IT3651B** | **IoT Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze the architecture of various embedded platforms | **1** | | **1** | | | | | | | | | **3** | **1** | **2** |
| | | **CO2** | Implement basic IoT applications on embedded platform reading the data from analog and digital sensors | **1** | | **1** | | | | | | | | | **3** | **1** | **2** |
| **17IT3651C** | **Dot Net Technologies Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Develop applications that make use of data types and control strutures | **1** | **3** | | **1** | | | | | **3** | | **3** | | **2** | **3** |
| | | **CO2** | Implement object oriented features in Dot Net frame work. | | **3** | | **3** | | | | | **3** | | **3** | | **2** | **3** |
| | | **CO3** | Design dynamic web applications using web Controls and validation controls. | | **3** | | **3** | **3** | | | | **3** | | **3** | | **2** | **3** |
| | | **CO4** | Build web applications that include database interactivity with different databases. | | **3** | | **3** | | | | | **3** | | **3** | | **2** | **3** |
| **17IT3651D** | **Software Testing** | | | | | | | | | | | | | | | | |

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| | **Methodologies Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Develop test suits for applications. | **1** | **2** | **1** | | **1** | | | | | | | **2** | **2** | **3** |
| | | **CO2** | Understand the JUnit tool to perform testing. | **2** | **2** | **2** | **2** | | | | | | | **2** | | **2** | **3** |
| | | **CO3** | Understand Selenium tool to perform testing. | **3** | **1** | **2** | **1** | | | | | **2** | **2** | | | **2** | **3** |
| | | **CO4** | Analyze bug tracking and QTP tool. | **2** | **1** | **3** | **1** | | | | | **1** | | | | **2** | **3** |
| **17IT3652** | **Web Programming And Development Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Develop secure and dynamic web pages using JavaScrip and Angular | **1** | | | | **1** | | | | | | | | **2** | **2** |
| | | **CO2** | Implement the basics of XML and JDBC Objects | | | | | | | | | | | **2** | | **3** | **2** |
| | | **CO3** | Develop and deploy Servlets, JSP technologies | **2** | | | | **2** | | | | | | **3** | | **2** | **2** |
| **17IT3654** | **Advanced Programming Lab II** | | | | | | | | | | | | | | | | |
| | | **CO1** | Demonstrate the knowledge to find solutions that uses structured and object oriented languages | **3** | | | | | **3** | | | | | **3** | **3** | **3** | **2** |

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| | | **CO2** | Implement data structures linear, non-linear and python structures to solve real world problems | **3** | | | | | **3** | | | | | **3** | **3** | **3** | 2 |
| **17IT5653** | **Project Work** | | | | | | | | | | | | | | | | |
| | | **CO1** | Identify societal problem from the villages or towns with well-defined objectives. | **1** | **3** | 1 | 2 | 2 | **3** | **3** | **3** | **3** | | **1** | 2 | **1** | 2 |
| | | **CO2** | Build a model for the problem chosen using modern tools and technology. | 2 | 2 | 2 | 2 | **3** | **1** | | 2 | 2 | | **1** | **1** | 2 | **1** |
| | | **CO3** | Organize the Technical report effectively. | | | | | | **1** | | **3** | 2 | **3** | 2 | **1** | **1** | 2 |
| **17IT3701** | **Cloud Computing** | | | | | | | | | | | | | | | | |
| | | CO1 | Analyze the architecture, services and models of cloud computing | **1** | **1** | | | | | | | | **3** | | | **1** | **1** |
| | | CO2 | Deploy applications for storing data and accessibility in different cloud ecosystems | | 2 | **3** | | **1** | | | | | | | | 2 | **3** |
| | | CO3 | Interpret local cloud and virtualization techniques based on application requirements | | | | **3** | | | | **1** | | | | | 2 | 2 |

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| | | CO4 | Identify real time cloud applications in different scenarios appropriate to society | | | **1** | | | **3** | | | | | | | **1** | 2 |
| **17IT4702 A** | **Data Analytics** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the basics and Life cycle of Data Analytics | **1** | | | | | | | | | | | | **1** | |
| | | **CO2** | Apply probability and Sampling distributions for data modeling. | 2 | **1** | | **1** | | | | | | | | | **1** | **1** |
| | | **CO3** | Develop forecasting and Monte Carlo simulation models | **1** | 2 | | **1** | | | | | | | | | 2 | **1** |
| | | **CO4** | Solve linear optimization and Decision problems | 2 | 2 | | 2 | | | | | | | | | 2 | **1** |
| **17IT4702B** | **Computer Vision** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the basic concepts and methods in computer vision | **3** | | 2 | | **1** | | | | | | | | **1** | 2 |
| | | **CO2** | Analyze various feature extraction and image segmentation techniques. | 2 | | **1** | | | | | | | | | | | 2 |
| | | **CO3** | Apply various clustering and classification techniques for different applications. | | 2 | | | | **3** | | | | | | **1** | 2 | **3** |
| | | **CO4** | Explore video processing methods in | **3** | | **3** | | 2 | | | | | | | **1** | **1** | 2 |

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| | | | computer vision. | | | | | | | | | | | | | | |
| **17IT4702C** | **Routing And Switching Essentials** | | | | | | | | | | | | | | | | |
| | | CO1 | Determine the role of dynamic routing protocols in the context of modern network design. | 1 | 1 | 1 | 1 | | 1 | | | | | | | 1 | 1 |
| | | CO2 | Apply the configuration steps for static and dynamic routing in the topology. | | | | | **3** | | | 2 | | | | | 1 | 2 |
| | | CO3 | Compare the working of various routing protocols. | 1 | | 1 | 1 | **3** | 1 | | | | | | | 1 | 1 |
| | | CO4 | Apply distance routing protocols in network communication. | | 2 | | | | 1 | | 2 | | | | | 1 | 1 |
| **17IT4703A** | **Deep Learning** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand linear and non linear activation functions, over fitting, different neural network architectures, dimensionality reduction | 1 | | | | | | | | | | | | 1 | 1 |
| | | **CO2** | Analyze feed forward neural network and auto encoder architecture for various applications | | 2 | | 2 | | | | | | | 2 | | 2 | 2 |

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| | | **CO3** | Apply convolution, pooling operations in convolution neural networks and choose various encoding frameworks for a given application. | **3** | | | | 2 | | | | | | 2 | **3** | **3** | **3** |
| | | **CO4** | Identify a suitable RNN architecture for the given sequence modeling. | | 2 | | | | | | | | | | **3** | 2 | 2 |
| **17IT4703B** | **Blockchain Technologies** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand blockchain terminologies and its properties and the emerging models for blockchain technology | **1** | | **1** | | | | | | | | | | **1** | **1** |
| | | **CO2** | Familiarize with the functional/operational aspects of crypto currency ecosystem. | **1** | **1** | | | | | | | | | | | **1** | **1** |
| | | **CO3** | Design, code, deploy and execute a smart contract – the computational element of the blockchain technology using Solidity and Remix IDE | 2 | 2 | 2 | | **3** | **1** | | | | | | | 2 | 2 |
| | | **CO4** | Build private-permissioned blockchain-based applications for | **3** | 2 | 2 | | 2 | **1** | | | | | | | 2 | 2 |

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| | | | enterprises and businesses | | | | | | | | | | | | | | |
| **17IT4703C** | **Information Retrieval System** | | | | | | | | | | | | | | | | |
| | | CO1 | Interpret the functional processes and effectiveness of information storage and retrieval systems | | **1** | **1** | | | | | | | | | | | **1** |
| | | CO2 | Utilize techniques and architectures necessary to speed up the retrieval process for information retrieval systems | | **1** | | 2 | | | | | | | | | **1** | 2 |
| | | CO3 | Apply metadata organization for effective information access. | **1** | 2 | 2 | | | 3 | | | | | | | **1** | 2 |
| | | CO4 | Evaluate and use different information retrieval techniques in various application areas | **1** | 2 | 2 | 2 | | 3 | | | | | | | 3 | 3 |
| **17IT4704 A** | **Natural Language Processing** | | | | | | | | | | | | | | | | |
| | | **CO1** | Comprehend the concepts of natural language processing, its applications and | **1** | | **1** | **1** | | | | | | | | | **1** | 2 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | language modeling techniques | | | | | | | | | | | | | | |
| | | **CO2** | Evaluate probabilistic language models and Solve NLP sub problems using tokenizing and tagging | **3** | | | **3** | 2 | | | | **1** | | | | **1** | 2 |
| | | **CO3** | Analyze linguistic structure in text using parsing and CFG | 2 | 2 | | 2 | | | | | | | | | **1** | 2 |
| | | **CO4** | Interpret Methods to recognize syntactic and semantics structures of a sentence | **3** | 2 | 2 | | 2 | | | | 2 | | | | **1** | 2 |
| **17IT4704B** | **Cloud Based CRM Platform (Salesforce)** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the basic concepts and framework of salesforce platform. | **1** | | | | | | | | | | | | **1** | **1** |
| | | **CO2** | Explore data modelling and management techniques. | | | **1** | 2 | | | | | | | L | | **1** | 2 |
| | | **CO3** | Analyze various levels to control data access and issues in lightening flow & apex programming | **3** | **1** | | | | | | | 2 | | | | **1** | **1** |
| | | **CO4** | Apply testing for various functionalities of applications. | **3** | | | | **1** | | | | | | | 2 | 2 | 2 |

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| **17IT4704C** | **Devops Essentials** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the basic concepts of Devops, Kubernetes and trends of microservices. | **2** | | | | | | | | | | | | **2** | **1** |
| | | **CO2** | Apply Docker file syntax for developing a Dockerfile. | **1** | | **3** | | **1** | | | | | | | | **2** | **1** |
| | | **CO3** | Analyze Kubernetes resources, objects, namespaces which is a portable, extensible open-source platform for managing. | | | | **3** | | | | | | | **1** | | **2** | **1** |
| | | **CO4** | Create kubernetes namespaces for monitoring and logging external resources. | | | **2** | | **3** | | | | **1** | | | | **1** | **3** |
| **17HS1705** | **Engineering Economics And Finance** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand various forms of organizations and principles of management. | **2** | | | | | | | | | | | **2** | | **2** |
| | | **CO2** | Understand the various aspects of business economics | **2** | | | | **3** | | | | | | | **2** | | **2** |
| | | **CO3** | Acquire knowledge on Human resources and Marketing functions | **2** | | | | | | | | | | | **2** | | **2** |

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| | | **CO4** | Understand different methods used in calculating depreciation and evaluating alternatives economically | **2** | | | | **3** | | | | | | | **2** | | **2** |
| **17IT3751** | **Cloud Computing Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Analyze the applications in cloud environment | **1** | **1** | | | | | | | | **3** | | | **1** | **2** |
| | | **CO2** | Develop applications in IaaS, PaaS and SaaS cloud models. | | **1** | **3** | | **1** | | | | | | | **2** | **1** | **1** |
| | | **CO3** | Develop applications in different cloud ecosystems. | | | | **3** | | | | **1** | | | | **2** | **2** | **2** |
| **17IT4752 A** | **Deep Learning Lab** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the installation process and basics of tensor flow | | | | | **2** | | | | | | | | | |
| | | **CO2** | Construct a Multi Layer Neural Network | **2** | **1** | | **2** | | | | | | | | | **2** | **2** |
| | | **CO3** | Build a convolution neural network model for image classification | **1** | **2** | | **1** | | | | | | | | | **1** | **1** |
| | | **CO4** | Implement a sentiment analysis | **3** | **2** | | **2** | | | | | | | | | **2** | **2** |

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| | | | model using LSTM | | | | | | | | | | | | | | |
| **17IT4752 B** | **Blockchain Technologies Lab** | | | | | | | | | | | | | | | | |
| | | CO1 | Build smart contracts using Remix IDE, Ganache and Myether Wallet in Ethereum Platform. | **1** | **1** | | | | | | | | | | | 3 | |
| | | CO2 | Build private-permissioned blockchain-based applications for enterprises and businesses. | | **1** | 3 | | **1** | | | | | | | | | |
| | | CO3 | Develop IPFS file system using peer to peer networks | | | | 3 | | | | | **1** | | | | | |
| **17IT4752C** | **Information Retrieval System Lab** | | | | | | | | | | | | | | | | |
| | | CO1 | Demonstrate genesis and diversity of information retrieval situations for text and hyper media. | **1** | **1** | | | | | | | | 3 | | | **1** | **1** |
| | | CO2 | Analyze the usage of different data/file structures in building computational search engines. | | **1** | 3 | | **1** | | | | | | | | **2** | **2** |
| | | CO3 | Implement applications for the performance of information retrieval | | | | 3 | | | | **1** | | | | | **2** | **2** |

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| | | | using classification, clustering, and filtering over multimedia. | | | | | | | | | | | | | | |
| **17IT5753** | **MINI PROJECT** | | | | | | | | | | | | | | | | |
| | | CO1 | Identify the problem, define objectives and scope of the project. | **2** | 1 | | | | | **2** | 3 | **2** | | 1 | 1 | | 1 |
| | | CO2 | Analyse the problem from state of the art for arriving at feasible solutions. | | 3 | **2** | **2** | | | | | | | **2** | **2** | **2** | **2** |
| | | CO3 | Prepare an organized report employing elements of technical writing & critical thinking. | | | | | | 3 | **2** | 3 | **2** | **2** | **2** | 1 | 1 | **2** |
| | | CO4 | Summarize and communicate the content to audience in an effective manner. | | | | | | 1 | **2** | **2** | 3 | 3 | | **2** | 1 | 1 |
| **17IT4801A** | **Business Intelligence** | | | | | | | | | | | | | | | | |
| | | CO1 | Describe the concepts and components of business intelligence | | 1 | 1 | | | | | | | | | | | 1 |
| | | CO2 | Evaluate the use of BI for supporting decision making in | | 1 | | **2** | | | | | | | | | 1 | **2** |

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| | | | an organization. | | | | | | | | | | | | | | |
| | | CO3 | Discover the requirements need to design a business intelligence model. | 1 | **2** | **2** | | 3 | | | | | | | 1 | **2** | |
| | | CO4 | Implement a behavioural model to assess the behaviour of the customer. | 1 | **2** | **2** | **2** | 3 | | | | | | | 3 | 3 | |
| **17IT4801B** | **Mobile Computing** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand the concept of mobile computing paradigm, its novel applications and access techniques. | | | | | **2** | | **2** | | | 3 | | 1 | **2** | 1 |
| | | **CO2** | Analyze cellular systems that adapt mobility for wireless data transmissions | | 3 | | 1 | | | **2** | | | | | **2** | | **2** |
| | | **CO3** | Analyze wireless data transmission techniques in mobile communications | | | | 3 | | | | | **2** | | | **2** | | **2** |
| | | **CO4** | Evaluate mechanisms extended in network layer for mobility and satellite systems for supporting mobile communications | 1 | | | | **2** | | | | | | **2** | 3 | 3 | 3 |
| **17IT4801C** | **Service Oriented Architecture** | | | | | | | | | | | | | | | | |

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| | | **CO1** | Build applications based on XML using Document Object Model and Simple API for XML | **1** | **3** | | | | | | | | | | | **1** | **3** |
| | | **CO2** | Understand the basic principles and standards of Service-Oriented Architecture | | **1** | **3** | | | | | | | | **2** | | | **1** |
| | | **CO3** | Analyze web services using technology elements | | **2** | | **3** | | | | | | | **1** | | | **2** |
| | | **CO4** | Build SOA-based applications for intra-enterprise and inter-enterprise applications. | **1** | **3** | | **3** | | | | | | | **3** | **3** | **1** | **3** |
| **17IT4801D** | **Software Metrics And Quality Management** | | | | | | | | | | | | | | | | |
| | | **CO1** | Understand different metrics associated with Software Development and evaluation | | | | | | | | | | | **1** | **1** | **3** | **1** |
| | | **CO2** | Apply quality measurement , metrics and quality plan for software projects. | **2** | | | **2** | | | | | | | **2** | **1** | **2** | **1** |
| | | **CO3** | Analyze various SQA standards and software process assessments | **1** | | | | | | | | | | | **1** | **3** | **1** |

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| | | **CO4** | Identify quality factors, quality metrics and SQA models and their impact on the final product. | **1** | | | **1** | | | | | | | **3** | **1** | **2** | **1** |
| **17IT5851** | **Major Project** | | | | | | | | | | | | | | | **2** | |
| | | **CO1** | Apply appropriate research methodology to provide a solution to the chosen problem | **2** | **3** | **3** | **3** | **2** | | | | **2** | | | **2** | **2** | **2** |
| | | **CO2** | Design, develop and test software using current techniques. | **1** | **2** | **3** | **2** | **3** | | | | | | **2** | **2** | **2** | **2** |
| | | **CO3** | Prepare a comprehensive report of the project work using modern tools | | | | | | **3** | **2** | **3** | **2** | **2** | **1** | **1** | **1** | **2** |
| | | **CO4** | Demonstrate and Communicate the project objectives and outcomes in an effective manner. | | | | | | **1** | **2** | **2** | **3** | **3** | | **2** | **1** | **1** |