VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY
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Accredited by NAAC with 'A' Grade, ISO 9001:2015 Certified
Nambur, Pedakakani (M), Guntur (Dt) - 522508
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
B.Tech Programme Accredited by NBA

# R20 Articulation Matrix

## I-I

**Mathematics-I**

| | |
|---|---|
| CO1 | Solve the differential equations related to various engineering fields.(K3) |
| CO2 | Utilize mean value theorems to real life problems.(K3) |
| CO3 | Familiarize with functions of several variables which is useful in optimization.(K1) |
| CO4 | Apply double integration techniques in evaluating areas bounded by region(K3) |
| CO5 | Use important tools of calculus in higher dimensions,will become familiar with 2-dimensional and 3 – dimensional coordinate systems.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO4 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO5 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |

| | |
|---|---|
| CO1 | Explain the preparation, properties and applications of thermoplastics, thermosettings, elastomers and conducting polymers.(K1) |
| CO2 | Know the importance of various materials and their uses in the construction of batteries and fuel cells.(K1) |
| CO3 | Know the applications of advanced materials in various industries.(K1) |
| CO4 | Apply the principles of supramolecular chemistry in the applications of molecular machines, need of green chemistry.(K3) |

**Applied Chemistry**

| | |
|---|---|
| CO5 | Explain the principles of spectrometry such as UV, IR, and NMR.(K1) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | - | - | - | - | 3 | - | - | - | - | - | - | - |
| CO2 | 2 | 2 | - | - | - | - | 2 | - | - | - | - | - | - | - |
| CO3 | 2 | 2 | - | - | - | - | 2 | - | - | - | - | - | - | - |
| CO4 | 2 | 2 | - | - | - | - | 3 | - | - | - | - | - | - | - |
| CO5 | 2 | 2 | - | - | - | - | 3 | - | - | - | - | - | - | - |

**Basic Electrical and Electronics Engineering**

| | |
|---|---|
| CO1 | Apply concepts of KVL/KCL in solving DC circuits.(K3) |
| CO2 | Choose correct machine for a specific application.(K2) |
| CO3 | Illustrate working principles of DC and AC Machines.(K2) |
| CO4 | Describe working principles of diodes and transistors.(K2) |
| CO5 | Summarize the applications of diodes and transistors.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO4 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO5 | 3 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |

| | |
|---|---|
| CO1 | Identify various hardware components of a system and apply their knowledge about computer peripherals to identify / rectify problems onboard. |

**Computer Engineering and Workshop**

| | |
|---|---|
| CO2 | Assemble the computer. |
| CO3 | Use various Microsoft tools. |
| CO4 | Integrate the PCs into local area network and re-install operating system and various application programs. |
| CO5 | Manage data backup and restore operations on computer and update application software. |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | 1 | - | - | - | - | - | - | - | - | 1 | 1 | - |
| CO2 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 1 | - |
| CO3 | 2 | - | 1 | - | 1 | - | - | - | - | - | - | 1 | 1 | - |
| CO4 | 2 | - | 1 | - | 1 | - | - | - | - | - | - | 1 | 1 | - |
| CO5 | 2 | - | 1 | - | 1 | - | - | - | - | - | - | 1 | 1 | - |

**Problem Sloving using C**

| | |
|---|---|
| CO1 | Comprehend algorithms and basic terminology of C (K1) |
| CO2 | Solve problems using control structures and modular approach (K2) |
| CO3 | Demonstrate 1D and 2D arrays along with strings for linear data handling (K3) |
| CO4 | Determine the use of pointers and structures (K3) |
| CO5 | Implement various operations on data files. (K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO2 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | - | 2 |
| CO3 | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 |
| CO4 | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO5 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 2 | 2 | 2 |

**Applied Chemistry Lab**

| | |
|---|---|
| CO1 | Estimate the amount of metal ions present in different solutions.(K4) |
| CO2 | Analyze the quality parameters of water.(K3) |
| CO3 | Determine the strength of different solutions by using different instrumentation techniques.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 2 | - | - | 1 | 2 | - | - | 2 | - | - | - | - |
| CO2 | - | 2 | 3 | - | - | 1 | 3 | - | - | 1 | - | - | - | - |
| CO3 | - | 1 | 2 | - | - | 1 | 2 | - | - | 1 | - | - | - | - |

**Basic Electrical and Electronics Engineering Lab**

| | |
|---|---|
| CO1 | Verify Kirchhoff's Laws and voltage and current division rules for DC supply. (K2) |
| CO2 | Analyze the performance of AC and DC Machines by testing.(K3) |
| CO3 | Perform speed control of DC shunt motor.(K3) |
| CO4 | Perform the half wave and full wave rectifier.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 1 | - | - |
| CO2 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | - | - |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |

| | | |
|---|---|---|
| | CO1 | Implement the various concepts of a C language.(K3) |

**Problem Solving using C Lab**

| | |
|---|---|
| CO2 | Develop algorithms and flowchart.(K3) |
| CO3 | Use modular programming skills.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 2 | 1 | - | - | - | 3 | 3 | 1 | 2 | 1 | 2 |
| CO2 | 2 | 3 | 3 | 2 | - | - | - | - | 1 | 1 | 2 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 2 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 2 | 2 |

## I-II

**Mathematics-II**

| | |
|---|---|
| CO1 | Evaluate approximate in the roots of polynomial and transcendental equations by different algorithms.(K4) |
| CO2 | Solve system of linear algebraic equations using Gauss Jacobi, Gauss Seidel and apply Newton's forward and backward interpolation and Lagrange's formulae for |
| CO3 | Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations and also by Laplace the transforms for |
| CO4 | Find or compute the Fourier series of periodic signals (SOLVE, APPLY, FIND, ANALYSE). (K4) |
| CO5 | Apply integral expressions for the forwards and inverse Fourier transform to range of non-periodic waveforms.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO4 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO5 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |

| | |
|---|---|
| CO1 | Apply the principles such as interference and diffraction to design and enhance the resolving power of various optical instruments. (K2) |

**Applied Physics**

| | |
|---|---|
| CO2 | Infer concepts of LASER light Sources and Apply them to holography.(K2) |
| CO3 | Enlist the magnetic and dielectric materials to enhance the utility aspects of materials.(K2) |
| CO4 | Summarize the fundamental concepts of Quantum behavior of matter.(K2) |
| CO5 | Identify the type of semiconductors using Hall Effect.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO4 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO5 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |

**Communicative English**

| | |
|---|---|
| CO1 | Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.(K2) |
| CO2 | Speak clearly on a specific topic using suitable discourse markers in informal discussions.(K3) |
| CO3 | Write summaries based on global comprehension of reading/listening texts.(K2) |
| CO4 | Produce a coherent paragraph interpreting a figure/graph/chart/table.(K3) |
| CO5 | Take notes while listening to a talk/lecture to answer questions.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |
| CO2 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |
| CO3 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |
| CO4 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO5 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |

**Problem Solving using Python**

| | |
|---|---|
| CO1 | Develop essential programming skills in computer programming concepts like data types, containers (K1) |
| CO2 | Solve coding tasks related to conditions, loops and String processing (K2) |
| CO3 | Experiment with various Data structures in interpreted Language and to build modules and packages for real software needs. (K2) |
| CO4 | Implement Files and object-oriented principles in Python (K3) |
| CO5 | Identify solutions using GUI in Python. (K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 2 |
| CO3 | 1 | - | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 2 |
| CO4 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO5 | - | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | 2 |

**Digital Logic Design**

| | |
|---|---|
| CO1 | Distinguish the analog and digital systems, apply positional notations, number systems and computer codes in digital systems.(K2) |
| CO2 | Apply the Boolean algebra theorems, simplify and design logic circuits.(K3) |
| CO3 | Implement combinational logic circuit design and modular combinational circuits using encoders, decoders, multiplexers and demultiplexers.(K3) |
| CO4 | Summarize the basic elements of sequential logic circuits.(K2) |
| CO5 | Design and analyze the registers and counters.(K4) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | 2 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO3 | 1 | - | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO4 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO5 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 2 |

**Applied Physics and Virtual Lab**

| | |
|---|---|
| CO1 | Operate optical instruments like microscope and spectrometer.(K3) |
| CO2 | Determine thickness of a paper with the concept of interference.(K2) |
| CO3 | Estimate the wavelength of different colors using diffraction grating and resolving power.(K4) |
| CO4 | Plot the intensity of the magnetic field of circular coil carrying current with distance.(K3) |
| CO5 | Calculate the band gap of a given semiconductor.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 2 | - | - | 1 | 2 | - | - | 2 | - | - | - | - |
| CO2 | - | 2 | 3 | - | - | 1 | 3 | - | - | 1 | - | - | - | - |
| CO3 | - | 1 | 2 | - | - | 1 | 2 | - | - | 1 | - | - | - | - |
| CO4 | - | 1 | 2 | - | - | - | - | - | - | 2 | - | - | - | - |
| CO5 | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| Target | - | 1.8 | 2.2 | - | - | 1 | 2.3 | - | - | 1.5 | - | - | - | - |

**ve English Lab**

| | |
|---|---|
| CO1 | Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English and speak clearly on a |
| CO2 | Take notes while listening to a talk/lecture; to answer questions in English; formulate sentences using proper grammatical structures and correct word forms; |
| CO3 | Write summaries based on global comprehension of reading/listening texts; produce a coherent write-up interpreting a figure/graph/chart/table; and use English |

**Communicati**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |
| CO2 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |
| CO3 | - | - | - | - | - | - | - | - | 2 | 3 | - | 1 | - | - |

**Problem Solving Using Python Lab**

| | |
|---|---|
| CO1 | Demonstrate the use of an interpreted language for problem solving through control statements including loops and conditionals.(K3) |
| CO2 | Practice with data structures for quick programming solutions.(K3) |
| CO3 | Apply modular approach and exception handling into reusable functions and modules.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 1 | 3 |
| CO2 | - | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | - |
| CO3 | 2 | 3 | - | 3 | - | - | - | - | - | - | - | - | 3 | 1 |

**Environmental Science**

| | |
|---|---|
| CO1 | Summarize The concepts of the ecosystem.(K2) |
| CO2 | Analyze The natural resources and their importance.(K3) |
| CO3 | Summarize the biodiversity of India and the threats to biodiversity,and Apply conservation practices.(K3) |
| CO4 | Analyze Various attributes of the pollution and their impacts.(K3) |
| CO5 | Analyze Social issues both rural and urban environment.(K3) |
| CO6 | Infer environmental Impact assessment and evaluate the stages involved in EIA.(K4) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 3 | - | 2 | - | 3 | - | 3 | - | 3 | 2 | - | - |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | 2 | - | 2 | - | 2 | - | 3 | - | 2 | - | 3 | 2 | - | - |
| CO3 | 3 | - | 3 | - | 2 | - | 3 | - | 2 | - | 3 | 3 | - | - |
| CO4 | 2 | - | 3 | - | 2 | - | 3 | - | 2 | - | 3 | 3 | - | - |
| CO5 | 3 | - | 1 | - | 3 | - | 3 | - | 3 | - | 3 | 2 | - | - |
| CO6 | 2 | - | 2 | - | 3 | - | 3 | - | 3 | - | 3 | 2 | - | - |

## II-I

**Mathematics-III**

| | |
|---|---|
| CO1 | Develop the use of matrix algebra techniques that is needed by engineers for practical applications.(K3) |
| CO2 | Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan.(K3) |
| CO3 | Interpret the physical meaning of different operators such as gradient, curl and divergence.(K3) |
| CO4 | Estimate the work done against a field, circulation and flux using vector calculus.(K4) |
| CO5 | Identify the solution methods for partial differential equation that model physical processes.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO4 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO5 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |

**Science**

| | |
|---|---|
| CO1 | Use mathematical logic to solve problems.(K3) |
| CO2 | Apply sets, relations and discrete structures.(K3) |
| CO3 | Use number theory to perform modulo arithmetic and computer arithmetic.(K3) |

**Mathematical Foundations of Computer**

| | |
|---|---|
| CO4 | Solve problems on recurrence relations and counting principles.(K3) |
| CO5 | Identify and solve real world problems using graphs and trees.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 |
| CO2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | 1 | - | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO4 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 1 |
| CO5 | - | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 1 | 1 |

**Data Structures**

| | |
|---|---|
| CO1 | Implement linear lists.(K3) |
| CO2 | Examine static and dynamic data structures with suitable applications.(K4) |
| CO3 | Summarize trees applications.(K2) |
| CO4 | Summarize the importance and significance of graph algorithms in building and solving real world applications.(K2) |
| CO5 | Implement algorithms for text processing.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | - | 3 | 2 |
| CO2 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 2 |
| CO3 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 2 |
| CO4 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 2 |
| CO5 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 2 |

**Java Programming**

| | |
|---|---|
| CO1 | Summarize object-oriented programming concepts for problem solving.(K2) |
| CO2 | Build class hierarchy and packages for real world problems.(K3) |
| CO3 | Develop thread safe Java programs with appropriate Exception handling.(K3) |
| CO4 | Implement multithreaded application programs through a language.(K3) |
| CO5 | Design GUI applications using swings and multithreading.(K4) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 3 | 2 | 2 | - | - | - | - | - | 2 | - | 3 | 2 |
| CO2 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | - | 3 | 2 |
| CO3 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | - | 3 | 2 |
| CO4 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | - | 3 | 2 |
| CO5 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | - | 3 | 2 |

**Software Engineering**

| | |
|---|---|
| CO1 | Define and develop s/w projects from requirement gathering to implementation.(K3) |
| CO2 | Summarize principles and practices of software engineering.(K2) |
| CO3 | Infer the fundamentals of modelling a software project.(K2) |
| CO4 | Enlist estimation and maintenance models of software systems.(K2) |
| CO5 | Design test cases, schedules and perform testing for SQA.(K4) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | - | - | - | 3 | - | 2 | 3 | 2 | 1 | 2 | 1 |
| CO2 | - | 2 | 3 | 1 | 2 | 2 | 2 | - | 1 | 2 | 1 | - | 3 | 1 |
| CO3 | - | - | 2 | - | 3 | 3 | 1 | - | 2 | 1 | 3 | - | 3 | 2 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO4 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | - | - | 2 | 2 | - | 3 | 1 |
| CO5 | - | - | 2 | - | 3 | 2 | - | 2 | 2 | - | 2 | - | 2 | 1 |

**Data Structures Lab**

| | |
|---|---|
| CO1 | Evaluate appropriate data structure.(K4) |
| CO2 | Solve a variety of computational problems aptly.(K3) |
| CO3 | Analyze their results and develop an algorithm. (K4) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 |
| CO2 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | 2 |
| CO3 | - | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | 2 |

**Java Programming Lab**

| | |
|---|---|
| CO1 | Develop programs for solving real world problems using java collection frame work.(K3) |
| CO2 | Develop and apply multithreaded programs in network applications.(K3) |
| CO3 | Develop GUI programs using swing controls in Java.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 |
| CO2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 |
| CO3 | - | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 1 | 1 |

**ab**

| | |
|---|---|
| CO1 | Perform requirement analysis and feasibility study.(K3) |
| CO2 | Design optimum model for the given real-world problem.(K4) |

**Software Engineering La**

| | |
|---|---|
| CO3 | Formulate test cases based on requirements and design.(K4) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 3 | 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - |
| CO2 | 1 | 3 | 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - |
| CO3 | 1 | 3 | 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - |

**Advanced Python Programming (SOC)**

| | |
|---|---|
| CO1 | Summarize the usage of Python Concepts.(K2) |
| CO2 | Use different Python packages for Data Visualization.(K3) |
| CO3 | Implement File handling & text processing.(K3) |
| CO4 | Build applications that perform Image processing.(K3) |
| CO5 | Connect database with Python.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | 3 | 3 | 3 | 3 | - | - | - | - | - | 1 | 2 | 2 |
| CO2 | - | - | 3 | 3 | 3 | 3 | - | - | - | - | - | 1 | 3 | 2 |
| CO3 | - | - | 3 | 3 | 3 | 3 | - | - | - | - | - | 1 | 3 | 2 |
| CO4 | - | - | 3 | 3 | 3 | 3 | - | - | - | - | - | 1 | 3 | 2 |
| CO5 | - | - | 3 | 3 | 3 | 3 | - | - | - | - | - | 1 | 3 | 2 |

## II-II

| | |
|---|---|
| CO1 | Classify the concepts of data science and its importance.(K2) |
| CO2 | Interpret the association of characteristics and through correlation and regression tools.(K3) |
| CO3 | Infer the concepts of probability and their applications, apply discrete and continuous probability distributions.(K2) |

**Probability and Statistics**

| | |
|---|---|
| CO4 | Design the components of a classical hypothesis test.(K4) |
| CO5 | Infer the statistical inferential methods based on small and large sampling tests.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO2 | 2 | 3 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO3 | 2 | 3 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO4 | 2 | 3 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO5 | 2 | 3 | - | - | - | - | - | - | - | - | - | 1 | 2 | - |

**Computer Organization**

| | |
|---|---|
| CO1 | Comprehend basic structures of computers and to summarize various machine Instructions.(K2) |
| CO2 | Learn and use the addressing modes and types of instructions.(K2) |
| CO3 | Analyze I/O organization of a computer.(K4) |
| CO4 | Comprehend various memory systems.(K2) |
| CO5 | Analyze functionalities done by processing unit and also learn micro programmed control.(K4) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 3 | - |
| CO2 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | 3 | - |
| CO4 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | 3 | - |
| CO5 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 2 |

**Operating Systems**

| | |
|---|---|
| CO1 | Summarize the structure and functionalities of Operating System.(K2) |
| CO2 | Demonstrate the concept of Process, Threads and CPU Scheduling Algorithms.(K3) |
| CO3 | Use the principles of Concurrency to solve Synchronization problems various methods for handling Deadlocks.(K2) |
| CO4 | Infer various Memory Management Techniques.(K2) |
| CO5 | Illustrate File System Implementation.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 2 | 1 | - | - | - | 3 | 3 | 1 | 2 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 2 | - | - | - | - | 1 | 1 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 3 | 3 |
| CO4 | 2 | 2 | 2 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 2 | 2 |
| CO5 | 2 | 2 | 2 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 2 | 2 |

**Database Management Systems**

| | |
|---|---|
| CO1 | Summarize the basics of database systems and applications.(K2) |
| CO2 | Construct logical design of database and information retrieval.(K3) |
| CO3 | Demonstrate relational model practically (Structured Query Language).(K3) |
| CO4 | Demonstrate and relate normalization for database design.(K3) |
| CO5 | Outline the necessity of transaction management, recovery management, file organization & indexing.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | 3 | - | - | - | - | - | 1 | - |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 |
| CO3 | 3 | 2 | 1 | - | 3 | - | - | - | - | - | - | - | 2 | 3 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO4 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 3 |
| CO5 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - |

**Advanced Java Programming**

| | |
|---|---|
| CO1 | Use various data structures using java collections. (K2) |
| CO2 | Comprehend the trade-offs of implementation of priority queues.(K3) |
| CO3 | Implement web-based applications using features of HTML and XML.(K3) |
| CO4 | Apply graph algorithms in building and solving real world applications.(K3) |
| CO5 | Comprehend and implement algorithms for pattern matching in a text.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |
| CO2 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |
| CO3 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |
| CO4 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |
| CO5 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |

**Operating Systems Lab**

| | |
|---|---|
| CO1 | Examine various process management techniques like CPU scheduling, process synchronization and deadlocks.(K3) |
| CO2 | Prioritize various memory management techniques like page replacement algorithms.(K3) |
| CO3 | Analyze various storage management techniques like file allocation and disk scheduling. (K4) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 2 | 1 | - | - | - | 3 | 3 | 1 | 2 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 2 | - | - | - | - | 1 | 1 | 2 | 2 | 3 | 2 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO3 | 3 | 3 | 3 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 3 | 3 |

| | | |
|---|---|---|
| **Database Management Systems Lab** | CO1 | Create database for user (Creation of Database).(K4) |
| | CO2 | Solve various SQL queries for user defined schemas.(K3) |
| | CO3 | Develop PL/ SQL blocks.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 2 |
| CO2 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | 3 |
| CO3 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - |

| | | |
|---|---|---|
| **Advanced Java Programming Lab** | CO1 | Create static web pages using HTML, CSS, and JavaScript.(K4) |
| | CO2 | Create XML documents and work with web servers to create web applications.(K3) |
| | CO3 | Build server-side programs using Java Servlets and JSP.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |
| CO2 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |
| CO3 | - | 3 | 3 | - | 3 | - | - | - | 2 | - | 2 | - | 2 | - |

| | | |
|---|---|---|
| **nt (SOC)** | CO1 | Implement Basic Mobile applications .(K3) |
| | CO2 | Design data flow for the Mobile App.(K4) |
| | CO3 | Implement GPS tracking Applications as a case study.(K3) |

| Mobile Application Developme | | |
|---|---|---|
| | CO4 | Deploy Mobile Apps with Fire base.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | 3 | 3 | 3 | - | - | - | 2 | 2 | 2 | 1 | 2 | - |
| CO2 | - | - | 3 | 3 | 3 | - | - | - | 2 | 2 | 2 | 1 | 2 | - |
| CO3 | - | - | 3 | 3 | 3 | - | - | - | 2 | 2 | 2 | 1 | 2 | - |
| CO4 | - | - | 3 | 3 | 3 | - | - | - | 2 | 2 | 2 | 1 | 2 | - |

## III-I

| Computer Networks | | |
|---|---|---|
| | CO1 | Explain OSI and TCP/IP reference models and Example networks, characteristics of transmission media and classify multiplexing techniques.(K2) |
| | CO2 | Summarize various Error Control, Flow Control techniques and Medium Access Control Protocols.(K2) |
| | CO3 | Summarize various access methods in MAC.(K2) |
| | CO4 | Explore different routing algorithms.(K2) |
| | CO5 | Illustrate the working of various application layer protocols.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO3 | 1 | - | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO4 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO5 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 2 |

| | | |
|---|---|---|
| | CO1 | Summarize fundamental summarizeing of the history of artificial intelligence (AI) and its foundations.(K2) |

**Artificial Intelligence**

| | |
|---|---|
| CO2 | Apply basic principles of AI in solutions that require problem solving, inference, perception and learning.(K3) |
| CO3 | Analyze the Knowledge representation in problem solving.(K4) |
| CO4 | Demonstrate proficiency developing applications in an 'AI language', expert system shell.(K3) |
| CO5 | Use proficiency in applying fuzzy sets and logic.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | - | - | 2 | 1 | - | - | - | - | - | 3 | 2 |
| CO2 | 2 | 2 | 2 | - | - | 1 | - | - | 1 | 1 | 2 | - | 3 | 2 |
| CO3 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | 3 |
| CO4 | 2 | 1 | 1 | - | - | 2 | 1 | - | - | - | - | - | 3 | 2 |
| CO5 | 2 | 1 | 1 | - | - | 1 | - | - | - | - | - | - | 3 | 2 |

**Formal Languages and Automata Theory**

| | |
|---|---|
| CO1 | Summarize basic concepts in formal language theory, grammars,automata theory, computability theory, and complexity theory.(K2) |
| CO2 | Demonstrate abstract models of computing, including deterministic (DFA), non-deterministic (NFA) models and their power to recognize the regular |
| CO3 | Relate practical problems to Context Free Languages and constructs automata, PDA for it. |
| CO4 | Apply mathematical and formal techniques for solving problems with Turing machines in computer science. (K3) |
| CO5 | Summarize the relationship among language classes and grammars with the help of Chomsky Hierarchy.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 2 | 3 |
| CO2 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | 2 | 3 |
| CO3 | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 2 | 3 |
| CO4 | - | 1 | 2 | - | - | - | - | - | - | - | - | - | 2 | 3 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO5 | 1 | 1 | 2 | - | 2 | - | - | - | - | - | - | - | 2 | 3 |

**Data Warehousing and Data Mining**

| | |
|---|---|
| CO1 | Infer about Data Warehousing & Data Mining.(K2) |
| CO2 | Demonstrate Pre-processing Techniques before Data Mining.(K2) |
| CO3 | Infer Classification & recite different approaches.(K2) |
| CO4 | Infer Association Analysis & recite different approaches.(K2) |
| CO5 | Infer Cluster Analysis & recite different approaches.(K2) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 |
| CO2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | 1 | - | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO4 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 1 |
| CO5 | - | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 1 | 1 |

**Front End Development**

| | |
|---|---|
| CO1 | Summarize Client-side design of the web.(K2) |
| CO2 | Explore different ES6 features in Java script.(K2) |
| CO3 | Implement components and props through React.(K3) |
| CO4 | Apply React Hooks.(K3) |
| CO5 | Use NodeJS for data availability.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 2 | 1 | 2 | - | - | - | 2 | - | 1 | - | 2 | 2 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO2 | - | 3 | 2 | 1 | 2 | - | - | - | 2 | - | 1 | - | 2 | 2 |
| | CO3 | - | 3 | 2 | 2 | 2 | - | - | - | 2 | - | 2 | - | 2 | 2 |
| | CO4 | - | 3 | 2 | 2 | 2 | - | - | - | 2 | - | 2 | - | 2 | 2 |
| | CO5 | - | 3 | 2 | 2 | 2 | - | - | - | 2 | - | 2 | - | 2 | 2 |

**Front End Devlopment Lab**

| | |
|---|---|
| CO1 | Use Higher Order functions like filter(), reduce(), map().(K2) |
| CO2 | Develop a react application using class & functional components.(K3) |
| CO3 | Develop a complete react application with data base connectivity.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 3 | 3 | 3 | - | - | - | - | - | - | 2 | 3 | - |
| CO2 | - | 3 | 3 | 3 | 3 | - | - | - | - | - | - | 2 | 3 | - |
| CO3 | - | 3 | 3 | 3 | 3 | - | - | - | - | - | - | 2 | 3 | - |

**Artificial Intelligence Tools and Techniques Lab**

| | |
|---|---|
| CO1 | Develop appropriate AI methods to solve a given problem.(K3) |
| CO2 | Develop a solution for the given problem in the language /framework of different AI methods.(K3) |
| CO3 | Develop basic AI algorithms.(K3) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |
| CO2 | 2 | 2 | 3 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |
| CO3 | 2 | 2 | 3 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |

| | | |
|---|---|---|
| .NET Programming Lab(SAC) | CO1 | Create user interactive web pages using ASP.Net.(K4) |
| | CO2 | Create simple data binding applications using ADO.Net connectivity. (K4) |
| | CO3 | Implement Database operations for Windows Form and web applications.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 3 | 3 | 3 | - | - | - | - | - | - | 2 | 2 | - |
| CO2 | - | 3 | 3 | 3 | 3 | - | - | - | - | - | - | 2 | 2 | - |
| CO3 | - | 3 | 3 | 3 | 3 | - | - | - | - | - | - | 2 | 2 | - |

| | | |
|---|---|---|
| Academic Internship | CO1 | Apply Strong Practical Knowledge(K3) |
| | CO2 | Build professional network and opportunities .(K2) |
| | CO3 | Demonstrate the project experience.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 3 | 3 | 3 | 3 | 1 | - | - | 3 | | | 2 | 2 | 2 |
| CO2 | | 3 | 3 | 3 | 3 | 1 | - | - | 3 | | | 2 | 2 | 2 |
| CO3 | | 3 | 3 | 3 | 3 | 1 | - | - | 3 | 3 | 2 | 2 | 2 | 2 |

## III – II

| | | |
|---|---|---|
| d Management | CO1 | The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product and Input-Output-Cost relationships. |
| | CO2 | The Learner is also ready to understand the nature of different markets and also to have the knowledge of Money & Banking. |
| | CO3 | The Learner will acquire the knowledge on management, HRM and Marketing. |
| | CO4 | The Learner will acquire the knowledge to prepare Financial Statements and the techniques of project management. |
| | CO5 | The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making. |

**Engineering Economics an**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | - | - | - | - | 1 | - | 1 | 1 | 2 | - | - | 1 |
| CO2 | 1 | 2 | - | - | - | 1 | 1 | - | 1 | - | 2 | - | - | 1 |
| CO3 | - | - | - | - | - | 1 | 1 | 1 | 1 | 1 | 2 | - | - | 1 |
| CO4 | 1 | 2 | - | 3 | - | - | 1 | - | 1 | 2 | 2 | - | - | 1 |
| CO5 | 1 | 2 | - | 3 | - | - | 1 | 1 | 1 | 2 | 2 | - | - | 1 |

**Design and Analysis of Algorithms**

| | |
|---|---|
| CO1 | Infer the divide-and-conquer paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems. |
| CO2 | Examine the greedy paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.(K3) |
| CO3 | Demonstrate the dynamic-programming paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for |
| CO4 | Demonstrate the backtracking paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt |
| CO5 | Explore the branch and bound paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO2 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO4 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO5 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |

| | |
|---|---|
| CO1 | Annotate Compilers, Grammars, Scanners, Types & structures of Compilers.(K2) |
| CO2 | Infer and Articulate different Parsers - can generate language & recognize it.(K2) |

**Compiler Design**

| | |
|---|---|
| CO3 | Exemplify semantic analyzer without the aid of automatic generators translation schemes.(K3) |
| CO4 | Outline storage allocation strategies, IR forms & Code generation form.(K2) |
| CO5 | Implement how source code for a novel language converted into machine code for a novel computer.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO3 | 1 | - | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO4 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO5 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 2 |

**Object Oriented Analysis and Design using UML**

| | |
|---|---|
| CO1 | Explore solutions to the complex problems using object-oriented approach.(K2) |
| CO2 | Build classes, responsibilities and states using UML notation.(K3) |
| CO3 | Identify basic Interactions, Use cases of the problem domain.(K2) |
| CO4 | Summarize advanced behavioral modeling using UML notation.(K2) |
| CO5 | Summarize components of the problem domain.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 2 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |
| CO2 | - | 3 | 2 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |
| CO3 | - | 3 | 2 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |
| CO4 | - | 3 | 2 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |
| CO5 | - | 3 | 2 | 3 | 3 | - | - | - | - | - | 2 | - | 2 | - |

**Cryptography and Network Security**

| | |
|---|---|
| CO1 | Classify various security attacks, services mechanisms and classical cryptographic techniques.(K2) |
| CO2 | Analyze the design principles of block ciphers and their implementation. (K4) |
| CO3 | Compute and Analyze various Asymmetric Key Cryptographic techniques.(K4) |
| CO4 | Evaluate Authentication, Hash Codes and verify the digital signatures.(K4) |
| CO5 | Impart the knowledge on Network security concepts.(K2) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | 2 | - | - | - | 2 | - | - | 2 | - | 1 | - |
| CO2 | 2 | 2 | 1 | - | 2 | - | 1 | - | - | 2 | 2 | - | 2 | - |
| CO3 | 3 | 2 | 1 | - | 1 | - | - | 3 | - | - | - | - | - | 3 |
| CO4 | 2 | 1 | - | - | 1 | - | - | 2 | 1 | 1 | 2 | 1 | 2 | 1 |
| CO5 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 2 |

**Design and Analysis of Algorithms Lab**

| | |
|---|---|
| CO1 | Implement the suitable algorithm for the given problem. (K3) |
| CO2 | Optimize algorithms as per the application. (K4) |
| CO3 | Implement Graph based application & case studies.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | 1 | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | 1 |

**Unified Modelling Language Lab**

| | |
|---|---|
| CO1 | Utilize UML Tools effectively for modeling.(K3) |
| CO2 | Develop structural model of a given system.(K4) |
| CO3 | Develop behavioral model of a given system.(K4) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 2 | 3 | 3 | - | - | - | - | 2 | 2 | - | 2 | - |
| CO2 | - | 3 | 2 | 3 | 3 | - | - | - | - | 2 | 2 | - | 2 | - |
| CO3 | - | 3 | 2 | 3 | 3 | - | - | - | - | 2 | 2 | - | 2 | - |

**Secure Coding Lab**

| | |
|---|---|
| CO1 | Build Codes for Symmetric Key encryption.(K3) |
| CO2 | Address popular public key encryption techniques.(K3) |
| CO3 | Use Java security tools.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 3 | 3 | - | - | - | - | - | 3 | - | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 3 | - | - | - | - | - | 3 | - | 3 | 2 |
| CO3 | 2 | 3 | 3 | 3 | 3 | - | - | - | - | - | 3 | - | 3 | 2 |

**kills**

| | |
|---|---|
| CO1 | master advanced nuances of both written and oral communication skills that are imperative for any professional to succeed coupled with being emphatic. |
| CO2 | confidently ace different competitive exams and develop writing skills. |
| CO3 | gain awareness of the industry expectations and craft CV / Résumé in lieu with desired job profiles. |
| CO4 | crack behavioral (HR) interview confidently and exhibit professional persona. |

| Softs | | PO1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO1 | - | - | - | - | - | - | - | - | 3 | 3 | - | 3 | - | - |
| | CO2 | - | - | - | - | - | - | - | - | 3 | 3 | - | 3 | - | - |
| | CO3 | - | - | - | - | - | - | - | - | 3 | 3 | - | 3 | - | - |
| | CO4 | - | - | - | - | - | - | - | - | 3 | 3 | - | 3 | - | - |

| Entrepreneurial Skill Development | | |
|---|---|---|
| | CO1 | Outline basics of entrepreneurship skills for better understanding of entrepreneurial scenario are understood.(K2) |
| | CO2 | Explore various components from I to E and promoting adaptability nature were made familiar.(K2) |
| | CO3 | Outline small scale ventures and registrations and patents related for entrepreneurship and startups was explained.(K2) |
| | CO4 | Examine of institutional support at various levels for determining the marketing strategies was explained.(K2) |
| | CO5 | Explore Strategic perspectives in entrepreneurship are made familiar.(K2) |

| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO1 | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 | 3 | - | - |
| | CO2 | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 | 3 | - | - |
| | CO3 | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 | 3 | - | - |
| | CO4 | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 | 3 | - | - |
| | CO5 | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 | 3 | - | - |

## IV- I

| -II | | |
|---|---|---|
| | CO1 | Sensitize the need achieving continuous Happiness and Prosperity.(K1) |
| | CO2 | Develop clarity of the harmony among human and self.(K3) |
| | CO3 | Develop clarity of the harmony among the family members.(K3) |
| | CO4 | Develop clarity of the harmony in nature.(K3) |

**Universal Human Values**

| | |
|---|---|
| CO5 | Exercise various professional & ethical practices.(K4) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | - | 3 | - | 3 | - | - | - | 2 | - | - |
| CO2 | 2 | 2 | 2 | - | - | 3 | - | 3 | - | - | - | 2 | - | - |
| CO3 | 2 | 2 | 2 | - | - | 3 | - | 3 | - | - | - | 2 | - | - |
| CO4 | 2 | 2 | 2 | - | - | 3 | - | 3 | - | - | - | 2 | - | - |
| CO5 | 2 | 2 | 2 | - | - | 3 | - | 3 | - | - | - | 2 | - | - |

**Design Patterns**

| | |
|---|---|
| CO1 | Summarize various categories of design patterns.(K2) |
| CO2 | Illustrate common design patterns to incremental /iterative development via case study.(K2) |
| CO3 | Exploit well-known creational and structural design patterns (such as Iterator, Observer, Factory and Visitor). (K2) |
| CO4 | Choose appropriate behavioral patterns for design of given problem.(K3) |
| CO5 | Construct a design consisting of a collection of modules.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO2 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | 2 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO4 | 2 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO5 | 2 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 2 | 1 |

| | |
|---|---|
| CO1 | Summarize the concepts of Big Data Analytics, Master the concepts of Hadoop Distributed File System and Hadoop Architecture.(K2) |

**Big Data and Analytics**

| | |
|---|---|
| CO2 | Acquire knowledge on Map Reduce Framework.(K2) |
| CO3 | Summarize the concepts of Hadoop IO formats and methods.(K2) |
| CO4 | Apply Pig concepts for Data Processing. (K3) |
| CO5 | Apply Hive concepts for Data Processing. (K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO2 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 |
| CO3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO4 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO5 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |

**Machine Learning**

| | |
|---|---|
| CO1 | Summarize the characteristics of machine learning.(K2) |
| CO2 | Apply various supervised learning methods to appropriate problems.(K3) |
| CO3 | Identify and integrate more than one technique to enhance the performance of learning and create probabilistic models for handling unknown pattern. (K1) |
| CO4 | Apply unsupervised learning models e.g., clustering algorithms to handle the unknown data.(K3) |
| CO5 | Apply Ensemble models to any real-world problem to analyse its performance effectively.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | 2 | 2 |
| CO2 | 3 | 2 | 2 | 2 | 3 | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | 2 | 2 | 2 | 3 | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | 2 | 2 | 2 | 3 | - | - | - | - | - | - | - | 3 | 3 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO5 | 3 | 2 | 2 | 2 | 3 | - | - | - | - | - | - | - | 3 | 3 |

**Data Science**

| | |
|---|---|
| CO1 | Summarize knowledge in the basic concepts of Data Analysis.(K2) |
| CO2 | Acquire skills in data preparatory and preprocessing steps.(K2) |
| CO3 | Use the tools and packages in Python for data science.(K2) |
| CO4 | Analyse in classification and Regression Model.(K4) |
| CO5 | Infer knowledge in data interpretation and visualization techniques.(K2) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 2 | 1 |
| CO4 | 1 | 2 | 2 | 2 | | - | - | - | - | - | - | - | 2 | 1 |
| CO5 | 1 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 |

**Green Buildings**

| | |
|---|---|
| CO1 | Understand why buildings should be made energy efficient. |
| CO2 | Have a fuller grasp on Renewable Energy mechanisms such as Passive Solar heating and collection, Photovoltaics, and Ground source heat pumps, and their |
| CO3 | Understand the concepts of Site and Climate, Building Form, Building Fabric. |
| CO4 | Understand the concepts of Infiltration and ventilation, Lighting, Heating, Cooling, Energy Management and water conservation. |
| CO5 | Have the necessary skills to undertake an Environmental Impact Assessment study for Energy Efficient Buildings. They shall be equipped with the associated cutting- |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 1 | 1 | - | - | - | - | 1 | - | - |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | 1 | - | - | - | - | 1 | 2 | - | - | - | - | 1 | - | - |
| CO3 | 2 | - | - | - | - | 1 | 3 | - | - | - | - | 1 | - | - |
| CO4 | 1 | - | - | - | - | 1 | 2 | - | - | - | - | 1 | - | - |
| CO5 | 1 | - | - | - | - | 1 | 3 | - | - | - | - | 2 | - | - |

**Power BI**

| | |
|---|---|
| CO1 | Analyze power BI workflow.(K4) |
| CO2 | Summarize Power BI data visualization techniques.(K2) |
| CO3 | Summarize Power BI reporting approaches.(K2) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 2 | 2 | 2 | 3 | - | - | - | - | - | 3 | - | 2 | - |
| CO2 | - | 2 | 2 | 2 | 3 | - | - | - | - | - | 3 | - | 2 | - |
| CO3 | - | 2 | 2 | 2 | 3 | - | - | - | - | - | 3 | - | 2 | - |

**Research Internship**

| | |
|---|---|
| CO1 | Comprehend Engineering Knowledge.(K2) |
| CO2 | Comprehend new and contemporary technological skills.(K2) |
| CO3 | Use better implementation tools for advanced technologies.(K2) |

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO 6** | **PO 7** | **PO 8** | **PO9** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | - | 2 | 1 | 2 | 2 | 2 | 2 |
| CO2 | | 3 | 3 | 2 | 3 | 2 | 1 | - | 2 | 1 | 2 | 2 | 2 | 2 |
| CO3 | | 3 | 3 | 2 | 3 | 2 | 1 | - | 2 | 1 | 2 | 2 | 2 | 2 |

# IV-II

| | | |
|---|---|---|
| Project | CO1 | Articulate problem statement.(K2) |
| | CO2 | Apply technial knowledge.(K3) |
| | CO3 | Acquire contemporaray tools & technologies.(K2) |
| | CO4 | Communicate and present the entire SDLC.(K3) |
| | CO5 | Perform the role of a team member or lead in SDLC.(K3) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | | | 2 | 2 | 3 | | 2 | | | 1 | |
| CO2 | 2 | 2 | 3 | 2 | 2 | | 2 | 1 | 2 | 2 | 2 | 1 | 3 | 1 |
| CO3 | | 1 | 1 | 1 | 3 | | | | | | | 1 | 1 | |
| CO4 | 1 | | | | | | | | 3 | 3 | | | 1 | 1 |
| CO5 | | 1 | | | | | | 2 | 3 | 3 | 2 | | 1 | 2 |

**HOD,CSE**