GURU KASHI UNIVERSITY
PUNJAB - INDIA

# Program Syllabus Booklet

## Bachelor of Technology in Computer Science & Engineering

## (B.TECH CSE-102)

**Session: 2019-20**

**Guru Gobind Singh College of Engineering & Technology**
**Guru Kashi University, Talwandi Sabo**

GURU KASHI UNIVERSITY
PUNJAB - INDIA

## TABLE OF CONTENTS

**Annexure -1**

**Program Name: B. TECH CSE**

**Program Code: 102**

**The Program Outcomes (POs) for the program B.TECH CSE are as follows:**

| PO | Statement |
|---|---|
| PO1 | **Engineering knowledge:** To apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems |
| PO2 | **Problem analysis:** To identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO3 | **Design/development of solutions:** To design solutions for contemporary problems and design system components or processes that meet the specified needs with appropriate consideration to investigate, understand and propose integrated solutions using emerging technologies. |
| PO4 | **Conduct investigations of complex problems:** To use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO5 | **Modern tool usage:** To create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. |
| PO6 | **The engineer and society:** To apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |

| | |
|---|---|
| **PO7** | **Environment and sustainability:** To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO8** | **Ethics:** To apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO9** | **Individual and team work:** To function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO10** | **Communication:** To communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO11** | **Project management and finance:** To demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **PO12** | **Life-long learning:** To recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

**The Program Specific Outcomes (PSOs) for the program B. TECH CSE are as follows:**

| PSO | Statement |
|---|---|
| **PSO1** | To develop real-time software projects using open-source programming environment or commercial environment to deliver quality products for organizational success. |
| **PSO2** | To Design and develop computer programs in the areas related to algorithm, networking, web design and cloud computing to understand, analyze, develop and efficiently solve problems related to computer-based systems of varying complexity. |
| **PSO3** | Acquire knowledge and understanding of the engineering and management principles and apply these as a member or a leader in a team and to manage projects in a multidisciplinary environment. |

**Annexure-2**

| Semester: 1st (Physics Group) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Internal Marks | External Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | A103101 | Basic Electrical Engineering | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 2 | 102103 | Physics (semiconductor Physics) | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 3 | 102104 | Mathematics1 (Calculus &Linear Algebra) | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 4 | 105105 | Engineering Graphics & Design | T/P | 1 | 0 | 4 | 3 | 60 | 40 | 100 |
| 5 | 102105 | Physics (semiconductor Physics) Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 6 | A103102 | Basic Electrical Engineering Lab | P | 0 | 0 | 2 | 1 | 30 | 20 | 50 |
| Total No. of Credits | | | | 18 | | | | | | |

| Semester: 2nd (Chemistry Group) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Marks | Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | A100102 | Engineering Chemistry | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 2 | 102201 | Mathematics-II (Probability and Statistics) | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 3 | 102202 | Programming for Problem Solving | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | 100108 | English | T | 2 | 0 | 0 | 2 | 40 | 60 | 100 |
| 5 | 105202 | Workshop /Manufacturing Practices | T/P | 1 | 0 | 4 | 3 | 60 | 40 | 100 |
| 6 | A100106 | Engineering Chemistry Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 7 | 102203 | Programming for Problem Solving Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 8 | 100109 | English Lab | P | 0 | 0 | 2 | 1 | 30 | 20 | 50 |
| 9 | 100304 | Constitution of India | T | 3 | 0 | 0 | NC | NA | NA | NA |
| Total No. of Credits | | | | 21 | | | | | | |

| Semester: 3rd | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Internal Marks | External Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | A102301 | Programming with C++ | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | A102302 | Data structure & Algorithms | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | A102303 | Digital Electronics | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | A102304 | IT Workshop | T | 2 | 0 | 0 | 2 | 40 | 60 | 100 |
| 5 | A102305 | Mathematics-III (Differential Calculus) | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 6 | A102306 | Human Values & Ethics | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 7 | A102307 | Programming with C++ Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 8 | A102308 | Data structure & Algorithms Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 9 | A102309 | Digital Electronics Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 10 | A102310 | IT Workshop Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 11 | A102311 | Summer/Institutional Training | NA | NA | NA | NA | S/US* | NA | NA | NA |
| Total No. of Credits | | | | 26 | | | | | | |

Note: Institutional Training will be imparted in the Institute at the end of 2nd Semester for 6-weeks duration. However this Subject is not applicable to LEET Students.

* (S/US) Satisfactory/Unsatisfactory

| Semester: 4th | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Internal Marks | External Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | A102401 | Discrete Mathematics | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 2 | A102402 | Computer Organization & Architecture | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | A102403 | Operating System | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | A102404 | Design & Analysis of Algorithms | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | A102405 | Organizational Behavior | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 6 | A100302 | Environmental Studies | T | 3 | 0 | 0 | NC | NA | NA | NA |
| 7 | A102406 | Computer Organization & Architecture Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 8 | A102407 | Operating System Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 9 | A102408 | Design & Analysis of Algorithms Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 10 | 100306 | Mentoring and Professiona Development of Students | P | 0 | 0 | 2 | S/US* | NA | NA | NA |
| Total No. of Credits | | | | 22 | | | | | | |

| Semester: 5th | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Internal Marks | External Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | A102504 | Software Engineering | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | 102510 | Database Management System | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | 102511 | Formal Language and Automata Theory | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | A102501 | Computer Graphics | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | | Humanities Elective-I | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 6 | | Elective-I | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 7 | 100305 | Essence of Indian Traditional Knowledge | T | 3 | 0 | 0 | NC | NA | NA | NA |
| 8 | 102512 | Database Management Systems Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 9 | A102506 | Computer Graphics Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 10 | | Elective-I Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| Total No. of Credits | | | | 24 | | | | | | |

| Elective-I and Elective-I Lab (Select one subject with its lab. | | |
|---|---|---|
| S.No. | Course Code | Course Name |
| 1 | 102513 | Mobile Application Development |
| | 102514 | Mobile Application Development Lab |
| 2 | A102502 | Programming Using C#. Net |
| | A102507 | Programming Using C#. Net Lab |
| Humanities Elective-I (Select one of the following subjects) | | |
| 1 | 100307 | Human relations at work |
| 2 | 100308 | Education, Technology and Society |

| Semester: 6th | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Internal Marks | External Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | A102603 | Java Programming | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | 102610 | Compiler Design | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | 102611 | Computer Network | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | | Elective-II | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | | Elective-III | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 6 | | Open Elective -I | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 7 | 102612 | Computer Network Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 8 | A102605 | Java Programming Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 9 | | Elective-II Lab | P | 0 | 0 | 2 | 1 | 30 | 20 | 50 |
| 10 | 102613 | Project-I | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| Total No. of Credits | | | | 25 | | | | | | |

| Elective-II and Elective-II Lab (Select one subject with its lab.) | | |
|---|---|---|
| Sr | Course Code | Course Name |
| 1 | 102614 | Computer Programming Using Python |
| | 102616 | Computer Programming Using Python Lab |
| 2 | A102607 | Multimedia and Applications |
| | 102615 | Multimedia and Applications lab |
| Elective-III (Select one of the following subjects) | | |
| 1 | 102617 | Dataware housing & Data Mining |
| 2 | 102618 | Cloud Computing |
| 3 | 102619 | Parallel Processing |

| Open Elective -I (Select one of the following subjects) | | |
|---|---|---|
| 1 | 100309 | Soft Skills and Interpersonal Communication |
| 2 | A102602 | Human Resource Management |

| Semester: 7th | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Internal Marks | External Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | | Elective-IV | T | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 2 | | Elective-V | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | | Open Elective -II | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | A102707 | Artificial Intelligence | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | 102710 | Network Security | T | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 6 | | Elective-IV Lab | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 7 | | Elective-V Lab | P | 0 | 0 | 2 | 1 | 30 | 20 | 50 |
| 8 | 102717 | Project-II | P | 0 | 0 | 4 | 2 | 30 | 20 | 50 |
| 9 | 102718 | Industrial Training | NA | NA | NA | NA | 4 | 60 | 40 | 100 |
| Total No. of Credits | | | | 25 | | | | | | |

| Elective-IV and Elective-IV Lab (Select one subject with its lab) | | |
|---|---|---|
| S No | Course Code | Course Name |
| 1 | A102702 | Web Designing and Development |
| | A102705 | Web Designing and Development Lab |
| 2 | 102709 | Programming using ASP.NET |
| | 102712 | Programming using ASP. NET Lab |

| Elective-V and Elective-V Lab (Select one subject with its lab) | | |
|---|---|---|
| S.No. | Course Code | Course Name |
| 1 | A102703 | Management Information System |
| | A102704 | Management Information System Lab |
| 2 | 102711 | Real time system |
| | 102714 | Real time system Lab |

| Open Elective-II(Select one of the following subjects) | | |
|---|---|---|
| 1 | 102715 | Cyber Law and Ethics |
| 2 | 102716 | Image Processing |

Note:-The students will take 6-8 weeks summer training/ internship in industry after semester 6th

| Semester: 8th | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr. | Course Code | Course Name | Type of Subject T/P | (Hours Per Week) | | | No. of Credits | Internal Marks | External Marks | Total Marks |
| | | | | L | T | P | | | | |
| 1 | | Elective-VI | T | 4 | 0 | 0 | 4 | 40 | 60 | 100 |
| 2 | | Open Elective-III | T | 4 | 0 | 0 | 4 | 40 | 60 | 100 |
| 3 | | Open Elective-IV | T | 4 | 0 | 0 | 4 | 40 | 60 | 100 |
| 4 | 102808 | Project-III | P | 0 | 0 | 8 | 4 | 60 | 40 | 100 |
| Total No of Credits | | | | | | | 16 | | | |

| Elective-VI (Select one of the following subjects) | | |
|---|---|---|
| 1 | 102802 | E-Commerce |
| 2 | 102803 | Machine Learning |

| Open Elective-III(Select one of the following subjects) | | |
|---|---|---|
| 1 | 102804 | Big Data |
| 2 | 102805 | Advanced Computer Architecture |

| | | |
|---|---|---|
| Open Elective-IV(Select one of the following subjects) | | |
| 1 | 102806 | Software Project Management |
| 2 | 102807 | Adhoc & Sensor Network |

**Annexure-3**

**Course Name: Basic Electrical Engineering**

**Course Code: A103101**

**Semester: 1st**

| | L | T | P |
|---|---|---|---|
| **Credits: 04** | **3** | **1** | **0** |

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Discuss the DC and AC electrical circuit elements with RLC in detail. |
| CO2 | Analysis of simple circuits with dc excitation. Superposition, The venin and Norton Theorems. |
| CO3 | Analyze Single Phase AC Circuits and representation of alternating quantities and determining the power in these circuits. |
| CO4 | Classify the different types of Electrical machines. |
| CO5 | Understand the different type of electrical installation devices. |

**Course Contents**

**Unit-I**

**DC Circuits :** Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, the venin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

**Unit- II**

**AC Circuits** : Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

**Unit-III**

**Transformers :** Magnetic materials, BH characteristics, ideal and Practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**Unit-IV**

**Electrical Machines :** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and

speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**Unit-V**

**Power Converters :** DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

**Unit-VI**

**Electrical Installations :** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

**Reference Book:**

1. Kothari, D. P. and Nagrath, I. J. (2010). *Basic Electrical Engineering*. Tata McGraw Hill.
2. Kulshreshtha, D. C. (2009). *Basic Electrical Engineering*. McGraw Hill.
3. Bobrow, L. S. (2011). *Fundamentals of Electrical Engineering*. Oxford University Press.
4. Hughes, E. (2010). *Electrical and Electronics Technology*. Pearson,

**Correlation of COs to the Program Outcomes (POs) and Program Specific Outcomes (PSOs) for Basic Electrical Engineering**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| CO2 | 1 | 2 | 2 | 2 | - | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 3 | 3 | 2 |
| CO3 | 2 | 3 | - | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | - |
| CO4 | 3 | 2 | 2 | 2 | 2 | 2 | - | 1 | 1 | 2 | - | 2 | 3 | 2 | 2 |
| CO5 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| **AVERAGE** | **1.8** | **2.2** | **2** | **2.4** | **2** | **1.2** | **1.2** | **1.6** | **1.2** | **1.8** | **1.2** | **1.8** | **2.4** | **2.2** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Physics (Semiconductor Physics)**

**Course Code: 102103**

**Semester: 1st**

**Credits -4** **L T P**
**3 1 0**

**Course outcomes:** On successful completion of this course, the students will be able to:

| CO | Statement |
|---|---|
| CO1 | Describe various properties of semiconductor materials using mathematical equations. |
| CO2 | Analyse the characteristics and theories in semiconductor materials in terms of crystal structures, charge carriers and energy bands. |
| CO3 | Describe the physical characteristics such as electronic structure and optical and transport properties, and current-voltage characteristics of semiconductors. |
| CO4 | Explain how to find the fermi energy level and carrier density in n-type and p-type semiconductors. |
| CO5 | Demonstrate the switching and amplification application of the semiconductor devices |

**Course Contents**

**Unit-I**

Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

**Unit-II**

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

**Unit-III**

Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

**Unit-IV**

Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter

extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.
D

**Unit-V**

Density of states in 2D, 1d and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band-diagrams.

**References:**

1. J. Singh (1995), *Semiconductor Optoelectronics: Physics and Technology*, McGraw-Hill Inc.
2. B. E. A. Saleh and M. C. Teich( 2007), *Fundamentals of Photonics*, John Wiley & Sons, Inc., .
3. S. M. Sze,(2008).*Semiconductor Devices: Physics and Technology*, Wiley.
4. A. Yariv and P. Yeh,(2007), Photonics*: Optical Electronics in Modern Communications*, Oxford University Press, New York.
5. P. Bhattacharya, (1997), *Semiconductor Optoelectronic Devices*, Prentice Hall of India.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PS0 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 1 | 1 |
| CO2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 |
| CO3 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO4 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO5 | 1 | 2 | 3 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| Average | **1.5** | **2.25** | **1.25** | **2** | **1** | **1.25** | **1.5** | **1.5** | **2.5** | **1.25** | **1.75** | **1.25** | **1.5** | **1.5** | **1.25** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course name : Mathematics –I (Calculus and Linear Algebra)**
**Course code: 102104**
**Semester: 1st**

**Credits -4**

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Perform matrix operations and solve the matrix equation using elementary matrix operations |
| CO2 | Use systems of linear equations and matrix equations to determine linear dependency or independency and Evaluate the eigen values and corresponding eigenvectors for a linear transformation |
| CO3 | Set up and evaluate multiple integrals for regions in the plane to find area of the region bounded by curves and volume, surface area, Mass, C.G and M.I of solid geometric figures. |
| CO4 | Demonstrate the fundamental theorem of calculus and use it for evaluating definite integrals and derivatives of integrals with variable limits of integration |
| CO5 | Distinguish between the concepts of *sequence and series* and determine limits of sequences and convergence and approximate sums |

**Course Contents**

**Unit-I**

**Calculus:** Evolutes and involutes; Evaluation of definite and improper integrals, Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

**Unit-II**

**Calculus** Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders, indeterminate forms and L'Hospital's rule, Maxima and minima.

**Unit-III**

**Sequences and series:** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

**Unit-IV**

**Multivariable Calculus (Differentiation):** Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal Line, Maxima, minima and saddle points, Method of Lagrange multipliers, Gradient, curl and divergence.

**Unit-V**

**Matrices :** Inverse and rank of a matrix, rank-nullity theorem; System of linear equations, Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigen values and eigenvectors, Diagonalization of matrices, Cayley-Hamilton Theorem, and Orthogonal transformation.

**Suggested Text/Reference Books**

1. Thomas, G.B. & Finney, R.L. (2002). *Calculus and Analytic geometry*, 9th Edition, Pearson, Reprint.
2. Kreyszig, Erwin. (2006). *Advanced Engineering Mathematics*. 9th Edition, John Wiley & Sons.
3. Veerarajan, T. (2008). *Engineering Mathematics for first year*. Tata McGraw-Hill, New Delhi.
4. Ramana, B.V. (2010). *Higher Engineering Mathematics*, Tata McGraw Hill New Delhi, 11th Reprint.
5. Poole, D. (2005). *Linear Algebra*: *A Modern Introduction*, 2nd Edition, Brooks/Cole.
6. Bali, N.P. & Goyal, Manish. (2008). *A text book of Engineering Mathematics*. Laxmi Publications, Reprint.
7. Grewal, B.S. (2010). *Higher Engineering Mathematics*. Khanna Publishers, 36th Edition.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO2 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | - | 2 | 3 | 2 | 2 | 2 | 1 | 1 |
| CO3 | 3 | 2 | 2 | 2 | 1 | - | 2 | 1 | - | - | 2 | 3 | 1 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | 2 | 2 | - | 2 | 2 | 3 | 1 | 3 | 2 | 2 | 3 |
| CO5 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | - | 2 | 1 | 1 | 2 | 1 | 3 | 2 |
| Average | **2.4** | **2.2** | **2.4** | **2.2** | **1.4** | **1.2** | **1.7** | **1.3** | **1.7** | **2** | **1.6** | **2.4** | **1.6** | **2** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

**Course Name: Engineering Graphics & Design**

**Course Code: 105105**

**Semester: 1st**

**Credits -3**

| L | T | P |
|---|---|---|
| 1 | 0 | 4 |

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Understand about engineering drawing applications and its importance in society. |
| CO2 | Learn about the visual aspects of engineering design. |
| CO3 | Understand the engineering graphics standards. |
| CO4 | Understand the concept of solid modeling techniques. |
| CO5 | Apply the computer-aided geometric design in engineering |

**Course Contents**

**Unit-I**

Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only), Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

**Unit-II**

Orthographic Projections covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes.

**Unit-III**

Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views. Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

**Unit-IV**

Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Unit-V**

Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

**Unit-VI**

Overview of Computer Graphics covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids.

**Unit-VII**

Customization& CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance, Orthographic constraints, Snap to objects manually and automatically, Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.

**Unit-VIII**

Annotations, layering & other functions covering applying dimensions to objects, applying annotations to drawings, Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques, Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface, Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerance techniques; dimensioning and scale multi views of dwelling.

**Unit-IX**

Demonstration of a simple team design project that illustrates Geometry and topology of engineered components, creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids, meshed topologies for engineering analysis and tool-path generation for component manufacture, geometric dimensioning and tolerance, Use of solid-modeling software for creating associative models at the component and assembly levels, floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying color coding according to building drawing practice, Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modeling (BIM).

**References Books:**

1. Gill, P.S.(2001).*Engineering Drawing*. S.K; Kataria and Sons ,Ludhiana.
2. Bhatt, N.D.(2012).*Engineering Drawing*. Charotar Book Stall, Tulsi Sadan, Anand.
3. French, T.E. and Vierck. C.J.(1993).*Graphic Science*. McGraw-Hill, New York.
4. Zozzora, F.(1958).*Engineering Drawing*.McGraw Hill, NewYork.

(Corresponding set of) CAD Software Theory and User Manuals

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO 11 | PO 12 | PSO1 | PSO 2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| CO2 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 2 |
| CO3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | - | 1 | 2 | 1 | 1 |
| CO4 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 |
| CO5 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 |
| Average | **1.75** | **1.75** | **1.75** | **1.75** | **1.25** | **1.5** | **1.25** | **2** | **2** | **1.25** | **1** | **1** | **1.5** | **1.5** | **1.5** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course name: Physics (Semiconductor Physics) Lab**

**Course Code: 102105**

**Semester: 1st**

**L T P**

**Credits: 02** **0 0 4**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Analyze the suitability of a given Zener diode as a power regulator. |
| CO2 | Study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters. |
| CO3 | Distinguish between Diamagnetic material, Paramagnetic and ferromagnetic material. |
| CO4 | Describe the working and design considerations for the various photonic devices like photodetectors, solar-cells and LEDs |
| CO5 | Verify the design of combinational logic using AND, OR, NOT, NAND and XOR gates. |

**Detailed syllabus:**

1. To study the characteristic of different PN junction diode-Ge andSi.
2. To analyze the suitability of a given Zener diode as a powerregulator.
3. To find out the intensity response of a solar cell/Photodiode.
4. To find out the intensity response of aLED.
5. To determine the band gap of a semiconductor.
6. To determine the resistivity of a semiconductor by four probemethod.
7. To confirm the de Broglie equation forelectrons.
8. To study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters.
9. To study the magnetic field of a circular coil carryingcurrent.
10. To find out polarizability of a dielectricsubstance.
11. To study B-H curve of a ferro-magnatic material usingCRO.
12. To find out the frequency of AC mains usingelectric-vibrator.
13. To find the velocity of ultrasound inliquid.
14. To study the Hall effect for the determination of charge currentdensities.
15. Distinguish between Diamagnetic material, Paramagnetic and ferromagneticmaterial.

16. Measurement of susceptibility of a liquid or a solution by Quincke'smethod:
17. AFM experiment to study the sample with the nano-scale objects and measure surface topography with different scales, width and height of nano objects, and force-distancecurves.
18. To study the temperature coefficient of Resistance ofcopper.
19. To determine the ratio k/e Using atransistor.
20. To compare various capacitance and verify the law of addition ofcapacitance.
21. To determine dipole moment of an organic moleculeacetone.
22. To measure the temperature dependence of a ceramiccapacitor.
23. Verification of the curie Weiss law for the electrical susceptibility of a ferromagneticmaterial.
24. To draw the static current-voltage (I-V) characteristics of a junctiondiode.
25. To plot the characteristics of thermistor and hence find the temperature coefficient ofresistance.
26. To determine the resistivity of semiconductors by Four ProbeMethod.
27. To study Zener diode voltage as regulator and measure its line and loadregulation.
28. To study the B-H Curve.
29. To study the Hall effect experiment to determine the charge carrierdensity.
30. To determine the magnetic susceptibilities of paramagnetic liquids by Quincke'sMethod.
31. Tostudythephenomenaofmagnetichysteresisandcalculatetheretentivity,coercivityandsaturation magnetization of a material using a hysteresis looptracer.
32. Verification and design of combinational logic using AND, OR, NOT, NAND and XORgates.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO 11 | PO 12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | - | 2 | 3 | 2 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 3 | 3 | 2 | 2 | - | 2 | 1 | - | - | 2 | 3 | 1 | 2 | 2 |
| CO3 | 2 | 3 | 3 | 2 | 2 | 2 | - | 2 | 2 | 3 | 1 | 3 | 2 | 2 | 3 |
| CO4 | 2 | 3 | 2 | 3 | 1 | 1 | 1 | - | 2 | 1 | 1 | 2 | 1 | 3 | 2 |
| CO5 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| Average | **2.4** | **2.6** | **2.4** | **2.4** | **1.8** | **1.2** | **1.7** | **1.3** | **1.7** | **2** | **1.6** | **2.4** | **1.6** | **2** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course name : Basic Electrical Engineering Lab**
**Course code : A103102**
**Semester: 1st**

**Credits -1**

| L | T | P |
|---|---|---|
| 0 | 0 | 2 |

**List of experiments/demonstrations:**

- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (non- sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super- synchronous speed.
- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
- Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

**Correlation of COs to the Program Outcomes (POs) and Program Specific Outcomes (PSOs) for Basic Electrical Engineering Lab**

| CO/PO/PSO | PO 1 | PO 2 | PO 3 | PO 4 | PO5 | PO6 | PO7 | PO8 | PO 9 | PO10 | PO11 | PO12 | PSO1 | PSO 2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 2 | 2 |
| CO2 | 2 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | - | 1 | 2 | 2 | 2 |
| CO3 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | - | 2 | 3 | 2 | 2 |
| CO4 | 2 | 1 | 3 | 2 | 2 | 1 | 1 | 2 | - | 1 | 1 | 2 | 2 | 2 | 3 |
| CO5 | 3 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 1 | 3 | 3 |
| Average | **2.4** | **2** | **2.4** | **1.8** | **1.8** | **1.4** | **1.2** | **1.6** | **1.75** | **1.6** | **2.3** | **2** | **2** | **2.2** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course name: Engineering Chemistry**

**Course Code: A100102**

**Semester: 2nd**

**Credits: 04**

**L T P**

**3 1 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Demonstrate Schrodinger equation, Particle in a box solution and their applications for conjugated molecules and Nanoparticles, |
| CO2 | Evaluate band structure of solids and the role of doping on band structures. |
| CO3 | Distinguish the ranges of Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging |
| CO4 | Rationalize periodic properties such as ionization potential, electro-negativity, Oxidation states and electro-negativity. |
| CO5 | List the Thermodynamic functions: energy, entropy and free energy and also Estimations of entropy and free energies. |

**Course Contents**

**Unit-I**

**Atomic and molecular structure :** Schrodinger equation, Particle in a box solution and their applications for conjugated molecules and Nanoparticles, Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

**Unit-II**

**Spectroscopic techniques and applications :** Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques, Diffraction and scattering.

**Unit-III**

**Intermolecular forces and potential energy surfaces :** Ionic, Dipolar and Vander Waals interactions, Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

**Unit-IV**

**Use of free energy in chemical equilibria :** Thermodynamic functions, energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria, Water chemistry, Corrosion ,Use of free energy considerations in metallurgy through Ellingham diagrams.

**Unit-V**

**Periodic properties :** Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

**Unit-VI**

**Stereochemistry:** Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

**Unit-VII**

**Organic reactions and synthesis of a drug molecule:** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

**Suggested Text Books**

1. Mahan, B. H. (1987). University chemistry.
2. Sienko, M. J. & Plane, R. A. *Chemistry. (1979): Principles and* Applications. New York: McGraw-Hill.
3. Banwell, C. N. (1966). *Fundamentals of Molecular Spectroscop.* New York, McGraw-Hill.
4. Tembe, B. L., Kamaluddin & Krishnan, (2008). M. S. *Engineering Chemistry (NPTEL Web-book).*

**The mapping of PO/PSO/CO attainment is as follows:**

| CO/PO/PSO | PO 1 | PO 2 | PO 3 | PO 4 | PO5 | PO6 | PO7 | PO8 | PO 9 | PO10 | PO11 | PO12 | PSO1 | PSO 2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO2 | 3 | 3 | 3 | 2 | 2 | 1 | - | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | - | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 3 | 2 | 3 | 1 | - | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 1 | 3 |
| CO5 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | - | 3 | - | 3 | 2 | 2 | 2 |
| Average | **2.4** | **2.6** | **2.4** | **2.4** | **1.8** | **1.5** | **1.5** | **1.6** | **2.2** | **2.6** | **2.2** | **2.6** | **2.2** | **2.2** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course name: Mathematics-II (Probability and Statistics)**

**Course Code: 102201**

**Semester: 2nd**

**Credits -4**

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Describe the Probability and its distributions such as binomial distributions, poisson distribution and basic laws of total probability and compound probability in statistics. |
| CO2 | Categorize appropriate sampling processes such as random sampling, large sample tests of means and proportion. *t*-student, (chi square) and *F* distributions (without derivation) and testing of hypothesis based on them. $2\chi$ |
| CO3 | Recall the methods of classifying and analyzing data relative to single variable and multiple variables. |
| CO4 | Distinguish between the practical purposes of a large and a small sample and Understand that correlation coefficient is independent of the change of origin and scale |
| CO5 | Use different kinds of distribution of probability and statistics to solve real life problems like Discrete uniform, binomial, geometric, negative binomial, hyper geometric, Poisson. |

**Unit-I**

**Basic Probability**

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

**Unit-II**

**Continuous Probability Distributions**

Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities.

**Unit-III**

**Bivariate Distributions**

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

**Unit-IV**

**Basic Statistics**

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and

regression – Rank correlation

**Unit-V**

**Applied Statistics**

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

**Unit-VI**

**Small samples**

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

**Suggested Text/Reference Books**

1. Rohatgi, V.K.,Saleh, A.K. Md. E.(2008 ).*An Introduction to Probability and Statistics(2nd Edition)*. Wiley and sons.
2. Milton, J.S., Arnold J.C.( 2017).*Introduction to Probability and Statistics(4th Edition).* McGraw Hill Education.
3. Larson,H.J.(1969 ).*Introduction to Probability Theory and Statistical Inference(3rd Edition).*
4. Ross,S.M.( 2013).*A First Course in Probability (9th Edition).* Pearson Education India.

**The mapping of PO/PSO/CO attainment is as follows:**

| CO/PO/PSO | PO 1 | PO 2 | PO 3 | PO 4 | PO5 | PO6 | PO7 | PO8 | PO 9 | PO10 | PO11 | PO12 | PSO1 | PSO 2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO2 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | - | 2 | 3 | 2 | 2 | 2 | 1 | 1 |
| CO3 | 3 | 2 | 2 | 2 | 1 | - | 2 | 1 | - | - | 2 | 3 | 1 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | 2 | 2 | - | 2 | 2 | 3 | 1 | 3 | 2 | 2 | 3 |
| CO5 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | - | 2 | 1 | 1 | 2 | 1 | 3 | 2 |
| Average | **2.4** | **2.2** | **2.4** | **2.2** | **1.4** | **1.2** | **1.7** | **1.3** | **1.7** | **2** | **1.6** | **2.4** | **1.6** | **2** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming for Problem Solving**

**Course Code: 102202**

**Semester: 2nd**

**Credits- 03** **L T P**

**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Design the algorithms to write programs. |
| CO2 | Apply arrays, pointers and structures to formulate algorithms and programs |
| CO3 | Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration |
| CO4 | To implement conditional branching, iteration and recursion |
| CO5 | Test and execute the programs and correct syntax and logical errors |

**Course Contents**

**Unit-I**

**Introduction to Programming :** Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)
**Idea of Algorithm:** steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples.
**From algorithms to programs:** source code, variables (with data types) variables and memory Locations, Syntax and Logical Errors in compilation, object and executable code.

**Unit-II**

**Arithmetic expressions and precedence**

**Unit-III**

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching Iteration and loops.

**Unit-IV**

**Arrays** Arrays (1-D, 2-D), Character arrays and Strings

**Unit-V**

**Basic Algorithms :** Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding

roots of Equations, notion of order of complexity through example programs (no formal definition required)

**Unit-VI**

**Function :** Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference.

**Unit-VII**

**Recursion :** Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Unit-VIII**

**Structure :** Structures, Defining structures and Array of Structures

**Unit-IX**

**Pointers :** Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Unit-X**

**File handling:** (only if time is available, otherwise should be done as part of the lab)

**Text/Reference Books**

1. Byron Gottfried, Schaum's (1995), *Outline of Programming with C*, McGraw-Hill
2. E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO2 | 3 | 2 | 2 | 2 | 3 | 1 | - | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 3 |
| CO3 | 3 | 2 | 3 | 3 | 2 | 2 | - | - | 2 | 2 | 1 | 2 | 2 | 2 | 3 |
| CO4 | 3 | 2 | 2 | 2 | 2 | 3 | - | - | 3 | 3 | 3 | 3 | 3 | 1 | 2 |
| CO5 | 3 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 3 |
| **Average** | **2.8** | **2.0** | **1.8** | **2.4** | **2.4** | **1.8** | **1** | **1** | **2.0** | **2.2** | **2.0** | **2.4** | **2.2** | **2.0** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: English**
**Course Code: 100108**
**Semester: 2nd**

**Credit:- 02**

| L | T | P |
|---|---|---|
| 2 | 0 | 0 |

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Develop vocabulary and improve the accuracy in Grammar. |
| CO2 | Apply the concepts of accurate English while writing and become equally ease at using good vocabulary and language skills. |
| CO3 | Develop and Expand writing skills through Controlled and guided activities. |
| CO4 | Compose articles and compositions in English. |
| CO5 | Become autonomous and self-directed English language learners. |

**Course Contents**

**Unit-I**

**Vocabulary Building:** The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.

**Unit-II**

**Basic Writing Skills:** Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

**Unit-III**

**Identifying Common Errors in Writing:** Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

**Unit-IV**

**Nature and Style of sensible Writing:** Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

**Unit-V**

**Writing Practices:** Comprehension, Précis Writing, Essay Writing

**Suggested Readings:**

1. Swan, Michael. (1995). *Practical English*. OUP.
2. Wood, F.T. (2007). *Remedial English Grammar*. Macmillan.
3. Zinsser, W. (2001). *On Writing Well*. Harper Resource Book.
4. Lyons, L. H. & Heasly, B. (2006). *Study Writing*. Cambridge University Press.
5. Kumar, S & Lata, P. (2011). *Communication Skills*. Oxford University Press.
6. CIEFL, Hyderabad. *Exercises in Spoken English. Parts. I-III*. Oxford University Press.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 1 | - | - | - | 3 | - | 1 | 1 | 2 | - |
| CO2 | - | - | - | - | - | 1 | - | - | - | 3 | - | 1 | 1 | 1 | - |
| CO3 | - | - | - | - | - | 1 | - | - | - | 3 | - | 1 | - | 1 | - |
| CO4 | - | - | - | - | - | 1 | - | - | - | 3 | - | 2 | 1 | 1 | - |
| CO5 | - | - | - | - | - | 1 | - | - | - | 3 | - | 2 | 1 | 2 | - |
| Average | | | | | | 1 | | | | 3 | | 1.4 | 0.8 | 1.4 | |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Workshop / Manufacturing Practices**

**Course Code: 105202**

**Semester: 2nd**

**L T P**

**Credits: 03** **1 0 4**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Apply the various manufacturing methods in different fields of engineering. |
| CO2 | Learn about the different fabrication techniques. |
| CO3 | Learn about the practices in manufacturing of simple components using different materials. |
| CO4 | Understand the advanced and latest manufacturing techniques being used in Engineering industry. |
| CO5 | Prepare different sand molds for various parts |

**Course Contents**

**Unit-I**

Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods

**Unit-II**

CNC machining, Additive manufacturing

**Unit-III**

Fitting operations & power tools

**Unit-IV**

Electrical & Electronics

**Unit-V**

Carpentry

**Unit-VI**

Plastic moulding, glass cutting

**Unit-VII**

Metal casting

**Unit-VIII**

Welding (arc welding & gas welding), brazing [More hours can be given to Welding for Civil Engineering students as they may have to deal with Steel structures fabrication and erection; 3D Printing is an evolving manufacturing technology and merits some lectures and hands-on training.]

**Workshop Practice: (60 hours)**

1. Machine shop - 10 hours
2. Fitting shop - 8 hours
3. Carpentry - 6 hours
4. Electrical & Electronics - 8 hours
5. Welding shop - 8 hours (Arc welding 4 hrs + gas welding 4 hrs)
6. Casting - 8 hours
7. Smithy - 6 hours
8. Plastic moulding & Glass Cutting -6 hours

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

**References Books:-**

1. Raghuwanshi, B.S.(2009*). A Course in Workshop Technology, Vol 1 & II*.Dhanpat Rai &Sons.
2. Jain, R.K.(2010*).Production Technology*.Khanna Publishers.
3. Singh, S.(2003).*Manufacturing Practice*.S.K. Kataria &Sons.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 3 |
| CO2 | 2 | 1 | 2 | 2 | 3 | 1 | 3 | 2 | 2 | 3 | 1 | 2 | 2 | 2 | 2 |
| CO3 | 2 | 1 | 3 | 1 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 2 |
| CO4 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | 1 | 3 | 2 | 1 | 2 | 1 | 2 | 3 |
| CO5 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 |
| Average | **2.4** | **2.6** | **2.6** | **2.6** | **2.4** | **2.6** | **2.8** | **3** | **2.6** | **2.4** | **2.4** | **2.4** | **2.8** | **2.2** | **2.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course name: Engineering Chemistry Lab**
**Course Code: A100106**
**Semester: 2nd**

**L T P**
**Credits: 02** **0 0 4**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Estimate rate constants of reactions from concentration of reactants/products as a function of time |
| CO2 | Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc |
| CO3 | Apply the theoretical concepts for result analysis and interpret data obtained from experimentation |
| CO4 | Identify the compound using a combination of qualitative test and analytical methods |

**Course Contents**

**Choice of 10-12 experiments from the following:**

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

**The mapping of PO/PSO/CO attainment is as follows**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO2 | 3 | 3 | 3 | 2 | 2 | 1 | - | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | - | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 3 | 2 | 3 | 1 | - | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 1 | 3 |
| CO5 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | - | 3 | 2 | 3 | 2 | 2 | 2 |
| Average | **2.2** | **2.6** | **2.2** | **2.2** | **1.8** | **1.5** | **1.5** | **1.6** | **1.7** | **2.6** | **1.8** | **2.6** | **2.2** | **2.2** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming for Problem Solving Lab**

**Course Code: 102203**

**Semester: 2nd**

**Credits- 02** **L T P**

**0 0 4**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Create, read and write to and from simple text files. |
| CO2 | Identify and correct logical errors encountered at run time |
| CO3 | Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration |
| CO4 | Represent data in arrays, strings and structures and manipulate them through a program |
| CO5 | Test and execute the programs and correct syntax and logical errors |

**Course Contents**

**Tutorial 1:** Problem solving using computers
**Lab1:** Familiarization with programming Environment

**Tutorial 2:** Variable types and type conversions
**Lab 2:** Simple computational problems using arithmetic expressions

**Tutorial 3:** Branching and logical expressions
**Lab 3:** Problems involving if-then-else structures

**Tutorial 4:** Loops, while and for loops
**Lab 4:** Iterative problems e.g., sum of series

**Tutorial 5:** 1D Arrays: searching, sorting
**Lab 5:** 1D Array manipulation

**Tutorial 6:** 2D arrays and Strings, memory structure
**Lab 6:** Matrix problems, String operations

**Tutorial 7:** Functions, call by value
**Lab 7:** Simple functions

**Tutorial 8 &9**: Numerical methods (Root finding, numerical differentiation, numerical integration)
**Lab 8 and 9:** Numerical methods problems

**Tutorial 10:** Recursion, structure of recursive calls
**Lab 10:** Recursive functions

**Tutorial 11:** Pointers, structures and dynamic memory allocation
**Lab 11:** Pointers and structures

**Tutorial 12:** File handling
**Lab 12:** File operations

**Text/Reference Books**


1. Byron Gottfried, Schaum's (1995), *Outline of Programming with C*, McGraw-Hill
2. E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill.


**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO2 | 2 | 1 | 2 | 2 | 3 | 2 | - | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 3 |
| CO3 | 2 | 2 | 2 | 2 | 3 | 2 | - | - | 2 | 2 | 1 | 2 | 2 | 2 | 3 |
| CO4 | 1 | 1 | 1 | 2 | 2 | 2 | - | - | 3 | 2 | 2 | 3 | 2 | 1 | 2 |
| CO5 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| **Average** | **1.8** | **1.6** | **1.6** | **2** | **2.6** | **1.8** | **1** | **1** | **2** | **1.8** | **1.8** | **2.4** | **1.6** | **1.8** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : English Lab**
**Course Code : 100109**
**Semester: 2nd**

**Credit :- 01**

**L T P**
**0 0 2**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Illustrate the importance of pronunciation and apply the same day to day conversation |
| CO2 | Apply verbal and non-verbal communication techniques in the Professional Environment |
| CO3 | Develop coherence, cohesion and competence in Oral discourse. |
| CO4 | Handle the interview process confidently. |
| CO5 | Communicate contextually in specific personal and professional situations with courtesy. |

**Course Contents**

**Oral Communication**
(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 1 | - | - | - | 3 | - | 1 | 1 | 2 | - |
| CO2 | - | - | - | - | - | 1 | - | - | - | 3 | - | 1 | 1 | 1 | - |
| CO3 | - | - | - | - | - | 1 | - | - | - | 3 | - | 1 | - | 1 | - |
| CO4 | - | - | - | - | - | 2 | - | - | - | 3 | - | 2 | 1 | 1 | - |
| CO5 | - | - | - | - | - | 1 | - | - | - | 3 | - | 1 | 1 | 2 | - |
| **Average** | | | | | | **1.2** | | | | **3** | | **1.2** | **0.8** | **1.4** | |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Constitution of India**
**Course Code : 100304**
**Semester: 2nd**

**Credit :- 01** **L T P**
**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Explain the various dimensions of Indian political system. |
| CO2 | Access to the constitutional developments, composition, working of the constituent assembly and draft of the Indian constitution. |
| CO3 | Illustrate fundamental rights, duties and directive principles of state policies. |
| CO4 | Synthesize functioning of Indian government such as legislature, executives and judiciary. |
| CO5 | Synthesize mechanism of human development through various agencies like women empowerment commission, CST commission, human rights commission etc. |

## Course Contents

### UNIT-I

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution.
Preamble to the Indian Constitution Fundamental Rights & its limitations.

### UNIT-II

Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties.
Union Executives – President, Prime Minister Parliament Supreme Court of India.

### UNIT-III

State Executives – Governor Chief Minister, State Legislature High Court of State.
Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th & 91st Amendments.

### UNIT-IV

Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions. Human Rights –Meaning and Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India.
Powers and functions of Municipalities, Panchyats and Co – Operative Societies.

### UNIT-V

Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.

**Text Books:**


1. Basu, Durga Das. (2012). *Introduction to the Constitution on India (Students Edn.)*. Prentice – Hall EEE
2. Haries, C.E., Pritchard, M.S. & Robins, M.J. (2003). *Engineering Ethics*. Thompson Asia.


**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 1 | - | 1 | 2 | 2 | 1 | - | 1 | 1 | 1 | 1 | 2 |
| CO2 | 1 | 1 | - | 1 | - | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 |
| CO3 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | - | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 |
| CO5 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| **Average** | **1.4** | **1.6** | **1.5** | **1.4** | **1** | **1.2** | **2** | **1.8** | **1** | **1.25** | **1.8** | **1.6** | **1** | **1.6** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming with C++**

**Course Code: A102301**

**Semester: 3rd**

**Credit-3** **L T P**

**3 0 0**

**Course Outcomes: On completion of this course, the successful students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects. |
| CO2 | Illustrate dynamic memory management techniques using pointers, constructors, destructors, etc. |
| CO3 | Construct the concept of function overloading, operator overloading, virtual functions and polymorphism. |
| CO4 | Classify inheritance with the understanding of early and late binding, usage of exception handling and generic programming. |
| CO5 | Demonstrate the use of various OOPs concepts with the help of programs. |

**Course Contents**

**Unit-I**

**Object-Oriented Programming Concepts:** Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism,messaging.

**Unit-II**

**Standard Input/output:** Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ions class functions and flags, formatting using manipulators.

**Unit-III**

**Classes and Objects:** Specifying a class, creating class objects, accessing class members, access specifies, and static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

**Unit-IV**

**Pointers and Dynamic Memory Management:** Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic),

dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

**Unit-V**

**Constructors/Destructors and Operator Overloading and Type Conversion:** Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists. Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

**Unit-VI**

**Inheritance and Virtual functions & Polymorphism:** Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors. Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.

**Text/References:**

1. Lafore R.( 1992).*Object Oriented Programming in C++*. WaiteGroup.
2. BjarneStroustrup.(1985).*The C++ Programming Language*. AddisonWesley.
3. Herbert Schildt.(1994).*The Complete Reference to C++ Language*. McGrawHill-Osborne.
4. Lippman F. B.*(*1997).*C++ Primer*. AddisonWesley.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 3 | 2 | - | 1 | - | 3 | - | 1 | 1 | 3 | 3 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 3 | - | - | - | 2 | 1 | - | - | 1 | 2 | 3 |
| CO3 | 1 | 3 | 3 | 2 | 2 | - | - | - | 3 | 1 | 1 | 1 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | - | - | - | 1 | - | 2 | - | 2 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 3 | 2 |
| **Average** | **1.6** | **2.4** | **2.4** | **2** | **2.2** | **1** | **1** | **1** | **2.4** | **1** | **1.25** | **1** | **2** | **2.4** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Data Structure & Algorithms**

**Course Code: A102302**

**Semester: 3rd**

**Credit-3** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Describe how arrays, records, linked structures, stacks, queues, trees and graphs are represented in memory and used by algorithms |
| CO2 | Write programs that use arrays, records, linked structures, stacks, queues and trees |
| CO3 | Develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching and sorting of each data structure. |
| CO4 | Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack |
| CO5 | Solve problems involving graphs, trees and heaps. |

**Course Contents**

**Unit-I**

**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

**Unit-II**

**Stacks and ADT Stack and its operations:** Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each Types of Queues: Algorithms and their analysis.

**Unit-III**

**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, doubly linked list: operations on it and algorithmic analysis; Circular **Linked Lists:** all operations their algorithms and the complexity analysis.

**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

**Unit-IV**

**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods,Hashing. Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

**Reference books:**

1. Mark Allen Weiss.*(1995). Algorithms, Data Structures, and Problem Solving with C++ Algorithms.*Addison-Wesley.
2. R. G Dromey(2006*). How to Solve it by Computer*. Pearson Education.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 3 | 2 | 1 | - | 1 | - | 1 | - | 2 | 3 | 3 | 1 |
| CO2 | 1 | 2 | 1 | 1 | 3 | - | - | - | 2 | - | 2 | 1 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | 1 | - | 1 | 2 | 2 | - | 2 | 3 | 2 |
| CO4 | 1 | 2 | 1 | 2 | 2 | - | - | - | 1 | 1 | - | - | 1 | 1 | 3 |
| CO5 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 2 |
| **Average** | **1.6** | **2.0** | **2.2** | **2.0** | **2.0** | **1.0** | **1.0** | **1.0** | **1.3** | **1.5** | **1.7** | **1.3** | **1.8** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Digital Electronics**

**Course code: A102303**

**Semester: 3rd**

**Credit-3** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will able to:**

| CO | **Statement** |
|---|---|
| CO1 | Examine the fundamentals concepts and techniques used in digital electronics |
| CO2 | Examine the structure of various number systems and its application in digital design. |
| CO3 | Analyze and design various combinational and sequential circuits. |
| CO4 | Categorize a digital logic and apply it to solve real life problems. |
| CO5 | Recommend to solve the real world problems. |

**Course Contents**

**Unit-I**

**Fundamentals of Digital Systems and logic families :**Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples officiates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lcs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

**Unit-II**

**Combinational Digital Circuits:** Standard representation for logic functions, K-map representation and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer/Decoders, Adders, Sub-tractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

**Unit-III**

**Sequential circuits and systems :**A 1-bit memory, the circuit properties of Bus table latch, the clocked SR flip flop, J- K-T and D- Types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

**Unit-IV**

**A/D and D/Converters :** Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, Specifications for D/A converters, examples of D/A converter lcs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converters.

**Unit-V**

**Semiconductor memories and Programmable logic devices:** Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array(FPGA).

**Text/References:**

1. R. P. Jain.(2009*). Modern Digital Electronics*. McGraw HillEducation.
2. M. M. Mano.(2016). *Digital logic and Computer design*. Pearson EducationIndia.
3. A. Kumar.(2016*). Fundamentals of Digital Circuits*. Prentice HallIndia.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 2 | 2 | - | - | - | 1 | - | - | 3 | 3 | 3 | 1 |
| CO2 | 2 | 3 | 2 | 2 | 3 | - | - | - | - | 2 | - | 2 | 1 | 2 | 3 |
| CO3 | 3 | 2 | 1 | 2 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | - | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 3 |
| CO5 | 1 | 2 | 3 | 2 | 2 | - | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1.6** | **2** | **2** | **2.4** | **2.2** | **1.6** | **2** | **2** | **2.4** | **2.2** | **1.6** | **2** | **2** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: IT Workshop**
**Course Code: A102304**
**Semester: 3rd**

**Credits: 02**

**L T P**
**2 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Define and appropriately use information technology terms. |
| CO2 | Identify computer hardware components and describe their functions. |
| CO3 | Describe the essential elements of the computer's architecture and it's functions. |
| CO4 | Describe the characteristics of operating systems and compare different operating systems. |
| CO5 | Study the various input & output devices their troubleshooting and performance strategies. |

**Course Contents**

**Unit-I**

Introduction to Computer Terms like Hardware, Software

**Unit-II**

**Computer languages**: Machine language, assembly language, higher level language,4GL. Introduction to Compiler, Interpreter, Assembler, Assembling, System Software, Application Software.

**Unit-III**

**Input Devices:** Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Speech Recognition Devices, Optical Recognition devices – OMR, OBR, OCR

**Unit-IV**

**Output Devices:** Monitors, Printer and its Types

**Unit-V**

**Memories:** Units of Memory, Main Memories - RAM, ROM and Secondary Storage Devices - Hard Disk, Compact Disk, DVD.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 1 | 2 | 1 | - | 1 | - | - | 2 | - | 3 | 3 | 1 |
| CO2 | 2 | 2 | 2 | 2 | 1 | 1 | - | - | 2 | 1 | - | 2 | 1 | 2 | 3 |
| CO3 | 1 | 1 | 3 | 2 | 2 | - | 1 | - | - | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 3 | 2 | 1 | 2 | 2 | - | - | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 1 | - | - | - | - | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **2** | **2.2** | **2.4** | **1.8** | **1.6** | **1** | **1** | **1** | **1.5** | **1.5** | **1.5** | **1.75** | **2** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Mathematics-III (Differential Calculus)**

**Course Code: A102305**

**Semester: 3rd**

**Credits: 04** **L T P**

**3 1 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Apply the fundamental concepts of Ordinary Differential Equations and Partial Differential Equations and the basic numerical methods for their resolution |
| CO2 | Solve the problems choosing the most suitable method |
| CO3 | Analyse the difficulty of solving problems analytically and the need to use numerical approximations for their resolution. |
| CO4 | Use computational tools to solve problems and applications of Ordinary Differential Equations and Partial Differential Equations |
| CO5 | Formulate and solve differential equation problems in the field of Industrial Organization Engineering. |

## Course Contents

### Unit-I

**Partial Differential Equations**

Exact, linear and Bernoulli's equations, Euler's equations, Equations not offirstdegree: equations solvable forp, equations solvable fory, equations solvable for x and Claimant's type.First order partial differential equations, solutions of first order linear and non-linear pdes. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation.

### Unit-II

**Numerical Methods**

Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method.Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae. Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1
/3rd and 3/8rules.

Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods.

Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

### Unit-III

**Transform Calculus**

Polynomials – Orthogonal Polynomials – Lagrange's, Chebysev Polynomials; Trigonometric

Polynomials.

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving odes and pdes by Laplace Transform method.

Fourier transforms, Z-transform and Wavelet transforms, properties, methods, inverses and their applications

**Reference Books**


1. G.B. Thomas and R.L. Finney. (2002). *Calculus and Analytic geometry*. 9th Edition, Pearson, Reprint.
2. Erwin Kreyszig. (2006*). Advanced Engineering Mathematics*.9th Edition, John Wiley &Sons.
3. D. Poole. (2005*). Linear Algebra: A Modern Introduction*. 2nd Edition,Brooks/Cole.
4. Veerarajan T. (2008).*Engineering Mathematics* for first year. Tata McGraw-Hill, NewDelhi.
5. RamanaB.V. (2010*). HigherEngineeringMathematics*. TataMcGraw-HillNewDelhi, 11thReprint.


**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | - | 1 | 2 | 3 |
| CO3 | 2 | 1 | 3 | 2 | 2 | - | 2 | - | 3 | - | 1 | 2 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 2 | 2 | - | 1 | 1 | 1 | - | 1 | 2 | 1 | 3 |
| CO5 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | - | 2 | 1 | - | 2 | 3 | 2 |
| **Average** | **1.2** | **1.6** | **2.4** | **2.0** | **2.2** | **1.5** | **1.7** | **2.0** | **2.0** | **1.7** | **1.3** | **2.0** | **2.0** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Human Values & Ethics**

**Course Code: A102306**

**Semester: 3rd**

**Credits: 03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will able:**

| CO | Statement |
|---|---|
| CO1 | Develop the ability to distinguish between what is of value and what is superficial in life |
| CO2 | Develop the ability to face difficult situations in life boldly and resolve them confidently. |
| CO3 | Implement the code of ethics in professional life. |
| CO4 | Create Ethical reason and achieve harmony in life |
| CO5 | Develop moral responsibility and mould themselves as good professionals |

**Course Contents**

**Unit-I**

**Human Values:** Morals, Values and Ethics - Integrity - Work Ethic - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment - Empathy - Self-Confidence - Character – Spirituality.

**Unit-II**

**Engineering Ethics:** Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

**Unit-III**

**Engineering As Social Experimentation:** Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

**Unit-IV**

**Safety, Responsibilities and Rights:** Safety and risk - assessment of safety and risk – risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty - respect fo authority - collective bargaining - confidentiality - conflicts of interest – occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) – discrimination.

**Reference Books**

1. B L Bajpai, (2004), *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, (1990*), Science and Humanism*, Commonwealth Purblishers.
3. Sussan George, (1976), *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, (1974), *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | - | - | - | 1 | 1 | 3 | 3 | 3 | 2 | 3 | 1 | 1 | 1 |
| CO2 | 1 | - | 2 | - | 3 | 1 | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| CO3 | - | 2 | 1 | 2 | - | 1 | - | 3 | 3 | 2 | 1 | 3 | 1 | 1 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 3 | 1 | 1 | 2 | 3 | 2 | 2 | 3 |
| CO5 | 1 | 2 | - | 2 | - | 2 | - | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 2 |
| **Average** | **1.3** | **1.5** | **1.3** | **1.7** | **2.5** | **1.4** | **1.0** | **2.8** | **2.4** | **2.0** | **1.6** | **2.8** | **1.6** | **1.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming with C++ Lab**
**Course Code: A102307**
**Semester: 3rd**

**Credits: 02**

| L | T | P |
|---|---|---|
| 0 | 0 | 4 |

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Develop solutions for a range of problems using objects and classes. |
| CO2 | Implement the concept of constructors, destructors and operator overloading. |
| CO3 | Apply algorithmic problems including type casting, inheritance, and polymorphism. |
| CO4 | Understand generic programming, templates, file handling |
| CO5 | Demonstrate the use of various OOPs concepts with the help of programs. |

**Course Contents**

Practical 1 Program to show the of use cin, cout Practical 2 Program to implement the operators

Practical 3 Program based on decision making statement (if else) Practical 4 Program based on the loops(while, do while)

Practical 5 Program based on loops(for),switch statement

Practical 6 Program based on structures and enumerated data types

Practical 7 Program based functions, overloaded functions Practical 8 Program to show usage of storage classes.

Practical 9 Program to show usage of function overloading, default arguments

Practical 10 Program to show usage of classes, objects

Practical 11 Program to show usage of constructors, destructors

Practical 12 Program to manipulate arrays and array of objects

Practical 13 Program to manipulate strings.

Practical 14 Program to show usage of inheritance of various type (multiple, multilevel etc.)

Practical 15 Program to show usage of unary operator overloading

Practical 16 Program to show usage of binary operator overloading

Practical 17 Program for conversion from basic to user defined data type

Practical 18 Program for conversion from user defined to basic

Practical 19 Program to show usage of basics of pointers

Practical 20 Program to show usage of pointers and arrays.

Practical 21 Program to show usage of pointers, function arguments

Practical 22 Program to show usage of new, delete, memory management

Practical 23 Program to show usage of virtual function

Practical 24 Program to show usage of friend, static function

Practical 25 Program to show usage of overloaded assignment operator, this pointer

Practical 26 Program to read & write contents of a text file

Practical 27 Program to show usage of file pointers.

Practical 28 Program to show usage of command line arguments

Practical 29 Program to show usage of overloading of right & left shift operators.

Practical 30 Program to show usage of exception handling mechanism

Practical 31 Program to show usage of uncaught_exception(), the exception and bad exception classes

Practical 32 Program to show usage of templates

Practical 33 Program to show usage of generic classes

Practical 34 Implementation of File handling

Practical 35 Implementation of Wrapper classes

Practical 36 Implementation of container classes

.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 2 | 2 | 1 | - | - | 1 | 1 | - | 3 | 3 | 3 | 1 |
| CO2 | 2 | 3 | 2 | 2 | 3 | 1 | 1 | 2 | 1 | - | 1 | 2 | 1 | 2 | 3 |
| CO3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 3 | 1 | 3 | - | 1 | 1 | 1 | 1 | - | 1 | 2 | 1 | 3 |
| CO5 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | - | - | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **2.2** | **2.0** | **2.6** | **2.2** | **2.4** | **1.0** | **1.3** | **1.5** | **1.0** | **1.3** | **1.0** | **2.0** | **2.0** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Data Structure & Algorithm Lab**

**Course Code: A102308**

**Semester: 3rd**

**Credits: 02** **L T P**
**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Develop C program for Linear data structure operations and its applications |
| CO2 | Design and Implement basic operations such as insertion, deletion, search on stacks, queues, linked list , Circular Queue etc. |
| CO3 | Implement Breadth First Search Techniques and Depth First Search Techniques |
| CO4 | Implement the binary search tree. |
| CO5 | Implement Dijkstra and warshall's algorithms to find shortest path. |

**Course Contents**

1. Write a program to insert an element into an array.
2. Write a program to delete an element from an array.
3. Write a program to implement linear search algorithm.
4. Write a program to implement binary search algorithm.
5. Write a program to implement bubble sort algorithm.
6. Write a program to implement selection sort algorithm.
7. Write a program to implement PUSH operation in stacks.
8. Write a program to implement POP operation in stacks.
9. Write a program to implement Queues.
10. Write a program to insert an element in the beginning of the linklist.
11. Write a program to insert an element in the middle of the linklist.

12. Write a program to insert an element in the end of the linklist.
13. Write a program to delete an element from the beginning of the linklist.
14. Write a program to delete an element from the end of the linklist.
15. Write a program for implementation of a graph.
16. Write a program for implementation of binary searchtree.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 3 | 1 | 2 | - | 2 | - | 1 | 1 | 1 | 3 | 3 | 3 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | - | - | 1 | - | 2 | 1 | 2 | 3 |
| CO3 | 2 | 1 | 3 | 2 | 2 | - | 2 | 3 | 1 | - | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 3 | 1 | 2 | - | 2 | 1 | 1 | 1 | - | 1 | 2 | 1 | 3 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | - | - | - | - | 2 | 2 | 3 | 2 |
| **Average** | **1.6** | **2.2** | **1.8** | **1.75** | **2.2** | **1.6** | **9** | **2.4** | **2.25** | **2** | **1.6** | **2** | **2** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Digital Electronics Lab**
**Course Code: A102309**

**Semester: 3rd**

**Credits:02**

| L | T | P |
|---|---|---|
| 0 | 0 | 4 |

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Classify the design combinational circuit and sequential circuit. |
| CO2 | Examine half adder using XOR and NAND gates and verification of their operation. |
| CO3 | Design and implement 4bit adder, 2's complement subtractor circuit using a 4 bit adder IC. |
| CO4 | Relate Boolean laws to simplify the digital circuits. |
| CO5 | Compare and contrast various hazards and timing problems in a digital design. |

**Course Contents**

1. A) Verification of the truth tables of TTL gates, e.g., 7400, 7402, 7404, 7408, 7432, 7486.
   b) Design, fabrication and testing of low frequency TTL clocks using NAND gates.
2. A) Verification of the truth table of the Multiplexer 74150.
   B) Verification of the truth table of the De-Multiplexer 74154.
4. Design and verification of the truth tables of half adder and full adder circuits using gates 7843.
5. Study and verification of the operations of ALU 74181 with regard to addition / subtraction /comparison.
6. Design, fabricate and test a switch denounce using 7400.
7. Design and test of an S-R flip-flop using NOR/NANDgates.
8. Verify the truth table of a J-K flip-flop(7476)
9. Verify the truth table of a D flip-flop (7474) and study its operation in the toggle and asynchronous modes.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 1 | 2 | 1 | - | - | 1 | 1 | 1 | 2 | 1 | 3 | 2 |
| CO2 | 3 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | - | 2 | 1 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 1 | - | 2 | - | 3 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 3 | 1 | 2 | 1 | 2 | 2 | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| CO5 | 2 | 2 | 3 | 2 | 1 | - | 2 | - | 1 | 2 | 1 | 1 | 2 | 3 | 2 |
| **Average** | **2.4** | **1.8** | **2.4** | **1.6** | **1.8** | **1.3** | **1.7** | **1.5** | **1.6** | **1.3** | **1.2** | **1.4** | **1.4** | **2.4** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: IT Workshop Lab**
**Course Code: A102310**
**Semester: 3rd**

**Credits:02** **L T P**
**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Use various networking devices, |
| CO2 | Assemble and dissemble Computer systems |
| CO3 | Create connection between computer systems. |
| CO4 | Install and examine the various storage devices. |
| CO5 | Install Various kinds of operating systems. |

**Course Contents**

**Part A – Computer Servicing Practical**

1. Identification of System Layout.
   a) Front panel indicators & switches and Front side & rearside connectors.
   b) Familiarize the computer system Layout: Marking positions of SMPS,Motherboard, FDD, HDD, CD, DVD and addonwards.
   c) Configure BIOS setup program and troubleshoot the typical problemsusing BIOS utility.
2. HARDDISK
   a) InstallHard Disk.
   b) Partition and FormatHard Disk.
   c) Identify Master /Slave /IDEDevices.
   d) Practice with scan disk, disk cleanup, disk De-fragmented, Virus Detectingand RectifyingSoftware.

3. DVDWriter

   a) Install and Configure a DVD Writer and a Blu-rayDiscwriter.

   b) Recording a Blank DVD and Blu-rayDisc.

4. Printer Installationand Servicing:

   a) Head Cleaning inmatrixprinter

   b) Install and configure eprinter

   c) Troubleshoot the aboveprinters.

   d) Check and connect the datacable connectivity

5. Install and configure Scanner, Cell phone Troubleshootthe problems.

6. Install OS.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 2 | 2 | 1 | - | - | 1 | - | 2 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 2 | 2 | 2 | 3 | - | - | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 1 | 2 | 3 | - | - | - | - | - | 1 | 2 | 2 | 1 | 2 |
| CO4 | 1 | 2 | 1 | 1 | 2 | - | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO5 | 2 | 3 | 3 | 2 | 3 | - | - | - | - | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.8** | **2** | **1.6** | **1.75** | **2.2** | **1.6** | **9** | **2.4** | **2.25** | **2** | **1.6** | **2** | **2** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Discrete Mathematics**
**Course Code A102401**

**Semester: 4th**

**Credits: 04** **L T P**

**3 1 0**

**Course Outcomes: On completion of this course, the successful students will be able to**:

| CO | **Statement** |
|---|---|
| CO1 | Use mathematically correct terminology and notations |
| CO2 | Construct correct direct and indirect proofs. |
| CO3 | Use division into cases in a proof. |
| CO4 | Use counter examples. |
| CO5 | Apply logical reasoning to solve a variety of problems |

**Course Contents**

**Unit-I**

**Sets, Relation and Function:** Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernsteintheorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem ofArithmetic.

**Unit-II**

**Basic counting techniques**- Inclusion and exclusion, pigeon-hole principle, permutation and combination.

## Unit-III

**Propositional Logic:** Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

## Unit-IV

**Algebraic Structures and Morphism:** Algebraic Structures with one Binary Operation, Semi-Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

## Unit-V

**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Aurelian and Hamiltonian Walks, Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi- connected component and Articulation Points, Shortest distances.

**Reference books:**

i. J.P. Tremblay and R. Manohar. (1997). *Discrete Mathematical Structure and Its Application to Computer Science"*. TMG Edition,Tatamcgraw-Hill.

ii. Norman L. Biggs. (2010). *Discrete Mathematics*. 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, MarcLipson.

iii. Mott,AbrahamKandel.(2011). *Discrete Mathematic.* TataMcGraw-Hill.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 3 | 2 | 1 | - | 1 | 2 | 1 | 2 | - | 3 | 2 | 1 |
| CO2 | 3 | 2 | 2 | 2 | 3 | 1 | 1 | - | 2 | - | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 2 | 3 | 2 | 2 | - | - | - | 3 | - | 1 | 2 | 2 | 2 | 2 |
| CO4 | 3 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | - | 2 | 1 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **2.4** | **1.8** | **2.4** | **2.4** | **2.0** | **1.5** | **1.3** | **1.0** | **2.0** | **1.0** | **1.6** | **1.8** | **2.0** | **2.0** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Computer Organization and Architecture**

**Course Code A102402**

**Semester: 4th**

**Credits: 03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statements** |
|---|---|
| CO1 | Discuss basic structure of computer systems. |
| CO2 | Perform computer arithmetic operations. |
| CO3 | Justify control unit operations. |
| CO4 | Examine memory organization that uses banks for different word size operations. |
| CO5 | Categorize the concept of cache mapping techniques. |

**Course Contents**

**Unit-I**

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL0interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some commoncpus.

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. Multiplication – shift-andadd, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

## Unit-II

**Introduction to x86 architecture**

**CPU control unit design:** hardwired and micro-program design approaches, Case study – design of a simple hypothetical CPU.

**Memory system design:** semiconductor memory technologies, memory organization.

**Peripheral devices and their characteristics:** Input-output subsystems, I/O device interface, I/O transfers-program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

## Unit-III

**Pipelining:** Basic concepts of pipelining, through put and speedup, pipeline hazards.
Parallel Processors: Introduction to parallel-processors, Concurrent access to memory and cache coherency.

## Unit-IV

**Memory organization:** Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. Block size, mapping functions, replacement algorithms, write policies.

**Reference books:**

1. John P. Hayes. (1988). *Computer Architecture and Organization.* 3rd Edition, WCB/McGraw- Hill.
2. William Stallings. (2016). *Computer Organization and Architecture. Designing for Performance.* 10th Edition, PearsonEducation.
3. VincentP.HeuringandHarry F. Jordan. (2004). *ComputerSystemDesignandArchitecture*, 2nd EditionbyPearson Education.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 3 | 2 | 1 | - | - | 1 | 1 | 1 | 1 | 2 | 2 | 1 |
| CO2 | 3 | 2 | 2 | 2 | 3 | 1 | 1 | - | - | 2 | - | 2 | 1 | 1 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 2 | - | - | 1 | - | 2 | 1 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 3 |
| CO5 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **2.6** | **2.4** | **2.4** | **2.0** | **2.2** | **1.3** | **1.5** | **1.0** | **1.0** | **1.6** | **1.3** | **1.6** | **1.6** | **1.8** | **2.0** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Operating System**

**Course Code: A102403**

**Semester: 4th**

**Credits:03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Examine the different services provided by Operating System at different levels. |
| CO2 | Outline real life applications of Operating System in various fields. |
| CO3 | Discuss the use of different process scheduling algorithm and synchronization techniques to avoid deadlock. |
| CO4 | Construct different memory management techniques like paging, segmentation and demand paging. |
| CO5 | Investigate Disk Structure and Scheduling, File systems and operating system support for distributed systems, Protection and Security related issues, Case studies of contemporary operating systems. |

**Course Contents**

**Unit-I**

**Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

**Unit-II**

**Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

**Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

**Unit-III**

**Inter-process Communication:** Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problematic.

**Unit-IV**

**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

**Unit-V**

**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation– Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation –Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used(LRU).

**Unit-VI**

**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

**File Management:** Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

**Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Badblocks

**Reference books:**

1. Charles Crowley. (1996). Operating System; *A Design-oriented Approach.* 1st Edition, Irwin Publishing.
2. Gary J.Nutt,Addison. (2002) .*Operating Systems: A Modern Perspective*. 2nd Edition Wesley.
3. Maurice Bach, Prentice-Hall of India (1986).*Design of the Unix Operation Systems.* 8th Edition.
4. Daniel P. Bovet, Marco Cesati, O'Reilly and Associates.(2005).*Understanding the Linux Kernel.* 3rd Edition

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 |
| CO5 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 3 | 2 |
| Average | 1 | 2 | 2.4 | 2 | 2.2 | 1.6 | 1.8 | 2.4 | 2.4 | 2 | 1.6 | 2 | 2 | 2.4 | 2.2 |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Design and analysis of algorithm**

**Course Code: A102404**

**Semester: 4th**

**Credits: 03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO | Describe the greedy paradigm and develop the greedy algorithms. |
| CO1 | Implement and examine the divide-and-conquer paradigm. |
| CO2 | Develop the dynamic programming algorithms and evaluate their computational complexity. |
| CO3 | Implement the graphs to find shortest path. |
| CO4 | Synthesize efficient algorithms in common engineering design situations. |
| CO5 | Analyze real world problems and provide appropriate solutions. |

**Course Contents**

**Unit-I**

**Introduction:** Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

**Unit-II**

**Fundamental Algorithmic Strategies:** Brute-Force, Greedy, Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; IllustrationsofthesetechniquesforProblem-Solving,BinPacking,KnapSackTSP Heuristics – characteristics and their application domains.

**Unit-III**

**Graph and Tree Algorithms:** Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

**Unit-IV**

**Tractable and Intractable Problems:** Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

**Unit-V**

**Advanced Topics:** Approximation algorithms, Randomized algorithms, Class of problems beyond NP – PSPACE

**Reference Books**

1. Jon Kleinberg and évatardos. (2014).*Algorithm Design*. 1ST Edition, Pearson.
2. Michael T Goodrich and Roberto Tamassia Wiley. (2009). *Algorithm Design: Foundations, Analysis, and Internet Examples.* Second Edition.
3. Udimanber,Addison- Wesley, Reading, MA. (2008). *Algorithms --A Creative Approach*.3RDEdition.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 2 | 1 | 2 | 1 | - | 1 | 1 | - | - | 1 | 2 | 1 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | - | - | - | 2 | 1 | - | 1 | 1 | 2 | 2 |
| CO3 | 1 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 2 | 1 | 2 |
| CO4 | 1 | 3 | 3 | 1 | 2 | - | 1 | 1 | - | 1 | 2 | 1 | 1 | 2 | 1 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1.4** | **2.6** | **2.4** | **1.6** | **2.2** | **1.0** | **1.0** | **1.0** | **1.7** | **1.3** | **1.3** | **1.4** | **1.6** | **1.8** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

**Course Name: Organizational Behavior**

**Course Code: A102405**

**Semester: 4th**

**Credits:03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Analyze the complexities associated with management of individual behavior in the organization. |
| CO2 | Examine and compare different models used to explain individual behavior related to motivation and rewards. |
| CO3 | Identify personal dimensions of personality. Job satisfaction, Perception and learning. |
| CO4 | Explain group dynamics and demonstrate skills required for working in groups. |
| CO5 | Categorize the various leadership styles and the roles of the leaders in decision a decision making process. |

**Course Contents**

**Unit-I**

**Organizational Behavior:** What managers do, Definition of OB, contributing disciplines to OB, challenges and opportunities for OB. Foundations of Individual behavior- biographical characteristics, ability, and learning. Values, Attitudes, Personality and Emotions, Perception

**Unit-II**

**Motivation:** Concept, Theories of Maslow, Herzberg, mcclelland, Porter & Lawler Model, Application of Motivation Concept. Job Satisfaction Foundations of Group Behavior: Group formation, development and structure, Group Processes, Group Decision- making Techniques, Work Teams.

**Unit-III**

**Interpersonal Skill-** Transactional analysis, Life Positions, Johari Window. Leadership: Concept, theories, styles and their application. Power and Politics in Organization

Conflict Management, Stress Management, Crisis Management, Organizational Change & Development, Innovation, Creating a learning Organization, Organizational Culture, Organizational Effectiveness.

**Reference Books:**

1. Nelson, Debra L and James C Quick. (2009).*Organizational Behavior*. Thomson Learning
2. Pareek, Udai. (2007). *Understanding Organizational Behavior*. Oxford University Press, New Delhi.
3. Robbins, S.P. (2012). *Organizational Behavior*. Prentice Hall of India, New Delhi.
4. Hellgiegel, D & J.W. Slocum. (2009). *Organizational Behavior*. Thomson Learning
5. Mcschane. (2014) . Organization Behavior. TMH, New Delhi.
6. Luthans, Fred. (2010).*Organizational Behavior*. Mcgraw Hill, New York.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 1 | 2 | 1 | - | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 1 |
| CO2 | 1 | 2 | 2 | 2 | - | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | 1 | 3 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | - | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| CO5 | 1 | - | 1 | 2 | - | - | 1 | 1 | 3 | 2 | 1 | 2 | 2 | 2 | 2 |
| **Average** | **1.6** | **1.3** | **1.3** | **1.6** | **1.7** | **1.0** | **1.0** | **1.0** | **2.6** | **2.2** | **1.6** | **1.8** | **1.4** | **1.4** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Environmental studies**

**Course Code: A100302**

**Semester: 4th**

**Credits:00** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Examine all aspects of environmental issues and apply understanding from disciplines such as history, economics, psychology, law, literature, politics, sociology, philosophy, and religion to create informed opinions about how to interact with the environment on both a personal and a social level. |
| CO2 | Recognize the physical, chemical, and biological components of the earth's systems and show how they function. |
| CO3 | Learn lessons from various field experiences and case studies |
| CO4 | Implement the independent research on human interactions with the environment. |
| CO5 | Study the various disaster factors related to the environment. |

**Course Contents**

**Unit-I**

**Introduction:** Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness.

**Natural Resources:** Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

**Ecosystems:** Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

## Unit-II

**Environmental Pollution:** Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies.

**Disaster Management:** Floods, earthquake, cyclone and landslides.

## Unit-III

**Social Issues and the Environment:** From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act.Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation Public awareness.

## Unit-IV

**Human Population and the Environment:** Population growth, variation among nations. Population explosion – Family Welfare Program. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies.

**Reference Books**

1. Agarwal, K.C. (2001). *Environmental Biology*. Nidi Publ. Ltd. Bikaner.
2. Jadhav, H &Bhosale.(1995). *V.M. Environment Protection and Laws.* Himalaya Pub House,Delhi.
3. Rao M. N. &Datta A.K.(2017). *Waste Water Treatment*. Oxford & IBH Publ. Co. Pvt.Ltd.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | 1 | - | 1 | 3 | 2 | 1 | 1 | 3 | 2 | 2 | 1 | 2 | 1 |
| CO2 | - | - | 1 | 1 | - | 1 | 3 | - | - | 2 | 2 | 1 | 1 | 2 | 2 |
| CO3 | 1 | 3 | - | - | 1 | 2 | 3 | - | 2 | 2 | 1 | 1 | 2 | 1 | 2 |
| CO4 | 1 | 1 | 1 | 1 | - | 2 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO5 | - | - | 1 | - | 1 | 2 | 2 | - | - | 2 | - | 1 | 2 | 2 | 2 |
| **Average** | **1.0** | **2.0** | **1.0** | **1.0** | **1.0** | **2.0** | **2.7** | **1.0** | **1.5** | **1.7** | **1.5** | **1.0** | **1.7** | **1.7** | **1.7** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Computer Organization & Architecture Lab**

**Course Code: A102406**

**Semester: 4th**

**Credits: 02** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Describe the external behavior of various components i.e the data and the control signals that it exchanges with other components |
| CO2 | Describe the basic concepts and structure of computers. |
| CO3 | Assemble different parts of computers. |
| CO4 | Install different operating systems like Windows, Linux etc. |
| CO5 | Understand different network topologies and their configuration. |

**Course Contents**

1. Introduction of Hardware and Software/components of computer.
2. Mother boards, Chipsets & Microprocessor concept & latest available in market.
3. Basics &Types of Floppy drive/HDD/DVD/RAM /SMPS//BIOS.
4. Assembling of different parts of computers.
5. Knowing ports, wires attached in the Computer.
6. Installation of OS(Linux/Windows).
7. Installation of application and utility software.
8. Networking Basics: Different types of Topologies and their configuration.
9. Types of Switches, I/O Sockets.

10. Creation of Cross Wires and Direct Cables.

11. IP & Setting up a computer on LAN.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 3 | 2 | 1 | - | - | 1 | - | 2 | 1 | 1 | 2 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | - | 1 | - | - | 2 | - | 1 | 1 | 2 | 3 |
| CO3 | 3 | 2 | 3 | 1 | 2 | - | 1 | - | 1 | - | 1 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | 1 | - | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 3 |
| CO5 | 2 | 2 | 3 | 2 | 2 | - | - | - | 2 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **2.0** | **1.6** | **2.6** | **1.8** | **2.2** | **1.0** | **1.0** | **1.0** | **1.3** | **1.7** | **1.5** | **1.4** | **1.4** | **2.0** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Operating System lab**

**Course Code: A102407**

**Semester: 4th**

**Credits: 02** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Install Linux operating system. |
| CO2 | Develop and debug the various Linux commands. |
| CO3 | Perform various shell commands. |
| CO4 | Develop shell programming & its concepts. |
| CO5 | Appreciate the advantages of Linux OS. |

**Course Contents**

1. Installation Process of various operating systems
2. Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in Linux, connecting processes with pipes, background processing, managing multiple processes. Manual help. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, Cal, banner, touch, file. File related commands ws, sat, cut, grep.
3. Shell Programming: Basic of shell programming, various types of shell, Shell Programming in bash, conditional & looping statement, case Statement, parameter passing and arguments, shell variables, shell keywords, creating shell programs for automate system tasks, report printing.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 1 | 2 | 1 | - | - | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| CO2 | 2 | 2 | 2 | 2 | 1 | - | 1 | - | 2 | 1 | 2 | 1 | 2 | 2 | 1 |
| CO3 | 2 | 3 | 3 | 1 | 2 | - | - | - | 1 | 2 | 1 | 2 | 1 | 3 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 1 | - | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 |
| CO5 | 3 | 2 | 1 | 2 | 2 | - | - | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 1 |
| **Average** | **2.0** | **1.8** | **2.3** | **1.3** | **1.5** | **1.0** | **1.0** | **1.0** | **1.5** | **1.5** | **1.5** | **1.5** | **1.5** | **2.0** | **1.5** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Design & Analysis Algorithm lab**

**Course Code: A102408**

**Semester: 4th**

**Credits: 02** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO2 | Examine randomized algorithms. |
| CO1 | Analyze the performance of algorithms. |
| CO3 | Describe and implement the dynamic-programming paradigm. |
| CO4 | Describe and implement the greedy paradigm. |
| CO5 | Analyze worst case running times of algorithms using asymptotic analysis. |

**Course Contents**

1. Write a program to implement bubble sort algorithm by comparing its complexity.
2. Write a program to implement linear search algorithm by comparing it complexity.
3. Write a program to implement binary search algorithm by comparing its complexity.
4. Write a program to implement PUSH operation in stacks.
5. Write a program to implement POP operation in stacks.
6. Write a program to implement Queues.
7. Write a program to insert an element in the beginning of the linklist.
8. Write a program to delete an element from the middle of the linklist.
9. Write a program to implement the concept of queen's problem.

**The mapping of PO/PSO/CO attainment is as follows**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 3 | 2 | 1 | - | - | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO2 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | - | 1 | 2 | 1 | 2 | 1 |
| CO3 | 1 | 3 | 2 | 3 | 2 | 1 | 1 | - | - | 2 | 1 | 1 | 2 | 1 | 2 |
| CO4 | 2 | 2 | 1 | 2 | 1 | - | - | - | 1 | 1 | - | 1 | 1 | 2 | 1 |
| CO5 | 1 | 2 | 1 | 3 | 2 | - | - | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.4** | **2.4** | **1.4** | **2.6** | **1.6** | **1.0** | **1.0** | **1.0** | **1.3** | **1.5** | **1.3** | **1.4** | **1.4** | **1.6** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Software Engineering**

**Course Code: A102504**

**Semester: 5th**

**Credits: 03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Work as an individual and as part of a multidisciplinary team to develop and deliver quality software. |
| CO2 | Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle. |
| CO3 | Examine the format and cost of source code using LOC (line of code). |
| CO4 | Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions |
| CO5 | Apply the software engineering lifecycle by demonstrating competence. |

**Course Contents**

**Unit-I**

**Introduction:** The software engineering, Discipline-Evolution and impact, Why study software Engineering? , Emergence of software Engineering.

**Unit-II**

**Software Life Cycle Models:** Why use a lifecycle model? Classical waterfall Model, Iterative, Prototype, Evolutionary, Spiral Models & their Comparison.

**Unit-III**

**Software Project Management:** Project Planning, Metrics for Project Size estimation- LOC and Function- Point & Feature Point, Project Estimation Techniques, COCOMO Model, Team Structure, Software Configuration Management.

**Unit-IV**

**Requirements Analysis and Specification:** Software Requirement Specifications (SRS),Software project management, Project planning and control, cost estimation, project schedulingusing PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management

**Unit-V**

**Software Design:** Issues in software Design, Function oriented design, Object oriented Design, Object Modeling Using UML, and User interface Design.

**Unit-VI**

**Coding and Testing:** Code review, Verification and validation, Unit testing, Black Box Testing, Integration and System Testing. Verification and validation, Integration testing, Validation testing, alpha and beta testing, System testing: Recovery testing, security testing, stress testing, performance testing; The art of debugging, process debugging approaches. Software re-engineering: Reverse engineering, restructuring, forward engineering

**Unit-VII**

**Software Reliability and Quality Assurance:** Quality concepts, Software quality assurance, SQA activities, Software reviews, cost impact of software defects, defect amplification and removal, formal technical reviews, The review meeting, review reporting record keeping, review guidelines, Formal approaches to SQA, Software Maintenance, Characteristics of Software maintenance.

**References:**

1. Ghezzi C., Jazayeri M. And MandrioliD. (1991). *Fundamentals of Software Engineering*. Prentice Hall, N. J.
2. Pfleedger S. L. (1991). *Software Engineering: The Production of Quality software*. Second Edition, Macmillan PublishingCompany.
3. Oehm B. W. (1998). *A Spiral Model of Software Development and Enhancement*. IEEE Computer, 21.pp61-72.
4. Fairley R. (1985). *Software Engineering Concepts*. McGraw Hill, NewYork.

**The mapping of PO/PSO/CO attainment is as follows**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 2 | 3 | 2 | - | 1 | - | 2 | 1 | 3 | 1 | 2 | 2 | 1 |
| CO2 | 1 | 2 | 3 | 2 | 1 | 1 | - | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | - | - | 1 | 2 | 3 | 2 | 2 | 2 | 2 |
| CO4 | 1 | 2 | 2 | 1 | 1 | - | - | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 |
| CO5 | 2 | 3 | 3 | 2 | 2 | - | 1 | - | 1 | 2 | 3 | 2 | 2 | 2 | 2 |
| **Average** | **1.6** | **2.6** | **2.6** | **2** | **1.6** | **1** | **1** | **1** | **1.6** | **1.6** | **2.6** | **1.6** | **2.2** | **1.6** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Database Management System**

**Course Code: 102510**

**Semester: 5th**

**Credits: 03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Formulate query, using SQL, solutions to a broad range of query and data update problems. |
| CO2 | Describe various database concepts and database management system software. |
| CO3 | Have high-level understanding of major DBMS components and their function. |
| CO4 | Design a model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model. |
| CO5 | Categorize SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS. |

**Course Contents**

**Unit-I**

**Database Management:** Introduction, Types of DBMS and their advantages and disadvantages, Characteristics of Database Approach, Data Models, Data Abstraction and Knowledge Representation, Database Language.

DBMS Architecture and Data Independence: Attributes and Keys, Relationships, Relationship Types, Roles, ER Diagrams, Relational Model concepts, functional dependence.

**Unit-II**

SQL, PL SQL, SQL *PLUS, Managing Database and Queries: Creating, Defining and Modifying Table

structure, Update Operations and Dealing With Constraint Violations, Basic Relational Algebra Operations, Example of Queries in Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus, granting and revoking privileges.

**Unit-III**

**Normalization:** Overview of Recovery and Backup, Normalization & its forms.

**Unit-IV**

Transaction processing Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes. Database recovery.

**Unit-V**

**Database Security**

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusiondetection, Integrity in Data Base. Types of Integrity, SQL injection.

**Unit-VI**

**SQL Server:** Introduction to SQL Server and Oracle Server, Indexes, Views, Cursors, Packages, Triggers, Stored Procedures.

**Reference Books:**

1. J. D. Ullman,Computer Science Press. (2016). *Principles of Database and Knowledge–Base Systems.* Vol1
2. R. Elmasri and S. Navathe,Pearson Education. *(1905). Fundamentals of Database System.*5th Edition
3. Serge Abiteboul, Richard Hull, Victor Vianu,Addison-Wesley. *(1995). Foundations of Databases* Reprint.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 3 | 2 | - | 1 | - | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | - | - | - | - | - | 2 | 2 | 1 | 2 | 2 |
| CO3 | 2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 2 | - | - | 1 | - | 1 | 2 | 1 | 1 | 1 | 3 |
| CO5 | 1 | 2 | 3 | 2 | 2 | - | - | - | - | 1 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1.4** | **1.8** | **2.4** | **2** | **2.2** | **1** | **1** | **1** | **2** | **1** | **1.4** | **1.4** | **1.6** | **1.8** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Formal Language & Automata Theory**

**Course Code: 102511**

**Semester: 5th**

**Credit-3** **L T P**

` **3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Write a formal notation for strings, languages and machines. |
| CO2 | Design finite automata to accept a set of strings of a language. |
| CO3 | Design context free grammars to generate strings of context free language. |
| CO4 | Determine equivalence of languages accepted by Push Down Automata and languages |
| CO5 | Construct context free grammars |

**Course Contents**

**Unit-I**

Introduction Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of Languages.

**Unit-II**

**Regular languages and finite automata:**

Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.

**Unit-III**

**Context-free languages and pushdown automata**

Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal

forms,nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguityin CFG, pumping lemma for context-free languages, deterministic pushdown automata, closureproperties of CFL.

**Unit-IV**

**Context-sensitive languages**

Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

**Unit-V**

**Turing machines**

The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) andTuring-decidable (recursive) languages and their closure properties, variants of Turingmachines, nondeterministic TMs and equivalence with deterministic TMs, unrestrictedgrammars and equivalence with Turing machines, TMs as enumerators.

**Unit-VI**

**Undecidability & Intractability:** Church-Turing thesis, universal Turing machine, the universal Anddiagonalizationlanguages,reduction between languages and Rice s theorem, undecidable problems about languages.

**Intractability:** Notion of tractability/feasibility. The classes NP and co-NP, their importance.Polynomial time many-one reduction.Completeness under this reduction. Cook-Levin theorem: NP-completeness of propositional satisfiability, other variants of satisfiability. NP-complete problems from other domains: graphs (clique, vertex cover, independent sets, Hamiltonian cycle), number problem (partition), set cover.

**Reference Books:**

1. Harry R. Lewis and Christos H. Papadimitriou. (1998). *Elements of the Theory of Computation.* Pearson Education Asia.
2. Dexter C. Kozen. (1997). *Automata and Computability. Undergraduate Texts in Computer Science*, Springer.
3. Michael Sipser. *(1997). Introduction to the Theory of Computation.*PWS Publishing.
4. John Martin. (2007). *Introduction to Languages and The Theory of Computation.* Tata McGraw Hill.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 2 | - | 1 | - | 3 | - | 2 | 1 | 1 | 1 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | - | - | 1 | - | 2 | 2 | 2 | 1 | 2 | 1 |
| CO3 | 2 | 2 | 3 | 2 | 2 | 1 | - | - | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| CO4 | 3 | 1 | 1 | 3 | 3 | - | - | 1 | 2 | 1 | - | 1 | 2 | 2 | 1 |
| CO5 | 2 | 3 | 3 | 3 | 2 | 1 | - | - | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **2** | **2.2** | **2.4** | **2** | **2.2** | **1.6** | **1.8** | **2.4** | **2.4** | **2** | **1.6** | **2** | **2** | **2.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Computer Graphics**

**Course Code: A102501**

**Semester: 5th**

**Credit-3** **L T P**

` **3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Construct the basics of computer graphics, different graphics systems and applications of computer graphics. |
| CO2 | Implement 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations |
| CO3 | Solve geometric transformations on graphics objects and their application in composite form. |
| CO4 | Examine the geometrical transformations and 3D viewing. |
| CO5 | Outline clipping methods and its transformation to graphics display device. |

**Course Contents**

**Unit-I**

**Introduction:** What is Computer Graphics, Elements of a Graphics, Applications and Components, working of Interactive Graphics, Display Processors; Graphic Devices: Raster scan and Random Scan displays, Resolution, Aspect Ratio, Refresh CRT, Color CRT monitors, Lookup tables, Plasma Panel and LCD monitors, interlacing, grey shades; Interactive Input Devices: keyboard, mouse, trackball, joystick, light pen, digitizing tablet, image scanners, voice system; Hard Copy Devices: printers, plotters.

**Unit-II**

**Basic Raster Graphics:** Scan conversion &Drawing Geometry: Coordinate Systems; Output Primitives: symmetrical and simple DDA line drawing algorithm, Bresenham's line drawing, loading frame buffer; symmetrical DDA for drawing circle, Polynomial method for circle drawing; circle drawing using polar coordinates, Bresenham's circle drawing, Filling: Stack-based seed fill algorithm, Scan-line seed fill algorithm.

**Unit-III**

**Geometric Manipulation:** 2D Transformations: Translation, Rotation, Scaling, Matrix representations and Homogeneous coordinate Transformations Matrices, Homogeneous Co-ordinates. 2-DViewing: Windowing, Viewport. Clipping operations: Point and Line clipping, Cohen-Sutherland line clipping, Mid-point Sub Division line clipping, Sutherland-Hodgman polygon clipping.

**Unit-IV**

**Elementary 3-D Graphics:** 3-D Graphics, 3-D modeling of objects, 3-D transformation matrices for Translation, Scaling and Rotation, Parallel Projection: Orthographic and Oblique Projection, Perspective projection. Hidden surface removal /Visibility: Image and object precision, Z- buffer algorithms, area based algorithms, floating horizon.

**Unit-V**

**Advanced Issues:** Curves and surfaces, Parametric Representation, Bezier and B-Spline curves, Rendering, Raytracing, Antialiasing, fractals, Gourard and Phong shading.

**References:**

1. D.Rogers and J. Adams.(1976). *Mathematical Elements for Computer Graphics*.McGraw -Hill International Edition.
2. David F. Rogers.(1997). *Procedural Elements for Computer Graphics*. McGraw Hill Book Company.
3. Newmann&Sproull.(1979). *Principles of Interactive Computer Graphics.*McGraw Hill International Edition.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 1 | 3 | 2 | - | - | - | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | - | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | - | 1 | - | 2 | 1 | 1 | 2 | 3 | 2 |
| CO4 | 2 | 2 | 1 | 1 | 3 | 1 | - | 1 | 1 | 3 | - | 1 | 2 | 1 | 1 |
| CO5 | 3 | 2 | 3 | 2 | 3 | - | 1 | - | - | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **2.0** | **2.4** | **2.0** | **2.0** | **2.6** | **1.0** | **1.0** | **1.0** | **1.7** | **2.2** | **1.5** | **1.4** | **1.8** | **1.8** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Mobile Application Development**

**Course Code: 102513**

**Semester: 5th**

**Credits: 03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Install and configure Android application development tools. |
| CO2 | Design and develop user Interfaces for the Android platform. |
| CO3 | Save state information across important operating system events. |
| CO4 | Apply Java programming concepts to Android application development. |
| CO5 | Investigate Apple IOS development, Android development, Shell Development, |

**Course Contents**

**Unit-I**

**Introduction:** Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features.

**Unit-II**

Introduction to Mobile development IDE's, Introduction to Work light basics, Optimization, pages and fragments , Writing a basic program- in Work light Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Work light Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova, Offline access, Encrypted cache deprecated, Using JSON Store

**Unit-III**

Understanding Apple IOS development, Android development, Shell Development,

Creating Java ME application, Exploring the Work light Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization, Web View overlay , Creating Authentication application: development for Apple iOS by using a login Unit, Device Analytics, Work light Server Administration

**Unit-IV**

**Android:** Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment. Case Study: Design and development of Application using mobile application development platforms e.g. Work Light, Kendo, Appcon, Xcode, Xpages

**Unit-V**

**IOS**: Introduction to iOS, Architecture, memory management, communication protocols, application development methods, deployment. Case Study: Design and development of Application using mobile application development platforms e.g. Work Light, Kendo, Appcon, Xcode, Xpages

**References:**


1. AnubhavPradhan, Anil V Deshpande. (2014). *Mobile Apps Development*. Edition: I
2. Jeff McWherter, Scott Gowell. (2012). *Professional Mobile Application Development*.John Wiley & Sons.
3. Barry Burd. (2015). *Android Application Development All in one for Dummies*. Edition: I
4. SAMS. (2010). *Teach Yourself Android Application Development In 24 Hour*. Edition: I, Publication.
5. Neal Goldstein, Tony Bove. (2011). *iPhone Application Development All-In-One for Dummies*. John Wiley & Sons.
6. Henry Lee, Eugene Chuvyrov. (2012). *Beginning Windows Phone App Development.*Apress
7. JochenSchiller. (2004).*Mobile Communications.* Addison-Wesley, 2nd edition,
8. Stojmenovic and Cacute. (2002). *Handbook of Wireless Networks and Mobile Computing*.Wiley, ISBN 0471419028.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 3 | 2 | - | - | 1 | - | 3 | 2 | 3 | 3 | 2 | 2 |
| CO2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | - | 1 | 2 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 2 | 3 | 2 | 2 | - | 1 | - | - | 2 | 3 | 2 | 3 | 3 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | - | - | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 2 | - | - | - | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| **Average** | **1.8** | **1.8** | **2.4** | **2.0** | **1.8** | **1.0** | **1.0** | **1.0** | **1.3** | **2.0** | **2.4** | **2.0** | **2.2** | **2.2** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming using C#.net**

**Course Code: A102502**

**Semester: 5th**

**Credits:03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Outline object-oriented concepts Design user experience and functional requirements C#.NET application. |
| CO2 | Complete, implement and creating Applications with C#. |
| CO3 | Prioritize use of C# basics, Objects and Types, Inheritance. |
| CO4 | Implement string manipulation, events and exception handling within .NET application environment. |
| CO5 | Evaluate user requirements for software functionality required to decide whether the programming language C # can meet user requirements. |

**Course Contents**

**Unit-I**

**Introducing C#:** Evolution of C#, Characteristics of C#, Applications of C#, difference between C# and C+ +, C# andJava.Overview of C#: C# programs, namespaces, adding comments, main returning a value using aliases, passing String objects to Write Line-method, command line arguments, providing interactive input using mathematical functions, Multiple Main Methods, compile time errors, program structure, program coding style.

**Unit-II**

**Variables and Data Types:** Literals, variables, data types, pointers, declaration/initialization of variables, default values, constant variables, scope of variables, boxing and unboxing.

**Operators and Expressions:** Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operator, bitwise operators, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversions, operator precedence and associatively, mathematical functions.

**Unit-III**

**Decision Making and Branching:** Decision making with if statement, the if-else statement, nesting of if-else Statement, the else if ladder, the switch statement, the? : Operator. Decision Making and Looping: the while statement, the do statement, the for statement, the for each statement, Jumps in loops.

**Methods in C#:** Declaring methods, the main method, invoking methods, nesting of methods, method parameters, pass by value, pass by reference, the output parameters, variable argument lists, methods overloading.

**Unit-IV**

**Handling Arrays:** One-dimensional arrays, creating an array, two-dimensional arrays, variable-size arrays, System.Array class, ArrayList class.

**Manipulating Strings:** Creating strings, string methods, inserting strings using system, comparing strings, finding substrings, mutable strings, arrays of strings, regular expressions.

**Structure and Enumerations:** Structures, structs with methods, nested structs, differences between classes and structs, enumerations, enumerator initialization, enumerator base types, enumerator type conversion.

**Unit-V**

**Classes and Objects:** Principles of OOP, Definition of a class, adding variables, adding methods, member access modifiers, creating objects, accessing class members,

constructors, overloaded constructors, static members, static constructors, private constructors, copy constructors, destructors, member initialization, the this reference, nesting of classes, constant members, read only members, properties, indexers.

**Inheritance and Polymorphism:** Classical inheritance, containment inheritance, defining a subclass, visibility control, defining subclass constructors, multilevel inheritance, hierarchical inheritance, overriding methods, hiding methods, abstract classes, abstract methods, sealed classes, sealed methods, polymorphism.

**Unit-VI**

**Interfaces:** Multiple Inheritances: Defining an interface, extending an interface, implementing interfaces, interfaces and inheritance, explicit interface implementation, abstract class and interfaces.

**Operator Overloading:** Operator overloading, need of operator overloading, unary operators, overloading binary operators, comparison operators.

**Delegates and Events:** Delegates, delegate declaration, delegate methods, delegate instantiation, delegate invocation, using delegates, multicast delegates, events.

**Managing Console I/O Operations:** Console class, console input, console output, formatted output, numeric formatting, standard numeric format, custom numeric format.

**Managing Error's and Exceptions:** Types of errors, exceptions, syntax of exception handling code, multiple catch Statement, the exception hierarchy, general catch handler, using finally statement, nested try blocks, throwing our own exceptions, checked and unchecked operators, using exceptions for debugging.

**Text/References:**

1. E Balagurusamy. (*2010).Programming in C#.* Tata McGraw-Hill Publishing CompanyLtd.
2. Stephen Randy Davis and Chuck Sphar. (2019). *C# 2005 for DUMMIES.* WileyPublishing.
3. Jeff Ferguson, Brian Patterson, Jason Beres, Pierre Boutquin, and Meeta Gupta. (*2014). C#Bible.* Wiley Publishing.
4. Inc.Robin A. Reynolds-Heartle. (2001).*OOP with Microsoft VisualBasic .NET and Microsoft Visual C# Step by Step*. MicrosoftPress

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 3 | 2 | - | 2 | - | - | 3 | 2 | 2 | 3 | 2 | 1 |
| CO2 | 1 | 3 | 2 | 2 | 3 | - | 1 | - | 2 | - | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 1 | 2 | 2 | 2 | - | - | - | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | - | - | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 3 |
| CO5 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | - | 3 | - | 1 | 2 | 3 | 1 | 2 |
| **Average** | **1.6** | **2.4** | **2.2** | **2.0** | **2.2** | **2.0** | **1.7** | **1.0** | **2.0** | **2.0** | **1.6** | **1.8** | **2.4** | **1.8** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Essence of Indian Traditional Knowledge**

**Course Code: 100305**

**Semester: 5th**

**Credits: 00**

**L T P**
**0 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Examine the concept up and explain basics of Indian traditional knowledge in Modern scientific perspective. |
| CO2 | Justify Indian perspective of modern scientific world -view and basis principal of Yoga and holistic health care system. |
| CO3 | Restate Indian philosophical traditions |
| CO4 | Relate Indian Artistic Tradition |
| CO5 | Compare and Contract Yoga and Holistic HealthCare |

**Course Contents**

**Unit-I**

**Part-1**

The course aims at imparting basis principals of thought process. Reasoning and inferencing Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit Literature are also important in modern society with rapid technological advancements and societal disruptions Part-1 focuses on introduction to

Indian Knowledge System. Indian perspective of modern scientific world -view and basis principal of Yoga and holistic health care system.

**Course Contents**

i. Basic Structure of Indian Knowledge system
ii. Modern Science and Indian Knowledge system
iii. Yoga and Holistic Healthcare
iv. Case studies

**References**

1. Fritzof Capra TooofPhysics
2. Fritzof Capra The Waveoflife
3. Yoga Sutra of Patanjali. RamakrishnaMission.Kolkata.
4. RN Jha Science of Consciousness Psychotherapy andYoga Practices.VidyanidhiPrakashan.Delhi2016
5. PB Sharma (Englishtranslation)ShodashangHridayam

**Pedagogy:** Problem based learning, group discussion, collaborative mini projects
Outcome: Ability to understand connect up and explain basics of Indian traditional Knowledge in Modern scientific perspective.

**Unit-II**

The course aims at imparting basis principals of thought process. Reasoning and inferencing Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit Literature are also important in modern society with rapid technological advancements and societal disruptions Part-2 focuses on Indian philosophical traditions. Indian linguistic Tradition, and Indian artistic tradition.

**References**

1. V.Sivaramakrishnan (Ed.) (2014). *Cultural Heritage of India-Coursematerial*. BhartiyaVaidyaBhawan Mumbai5th Edition.
2. S.C Chaterjeev&D.M .Datta. (1984). *An introduction to IndianPhilosophy*. Universityof Calcutta.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 1 | - | - | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO2 | - | - | 2 | - | - | 3 | 1 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| CO3 | - | 3 | - | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 1 | - | 1 | - | - | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 1 |
| CO5 | - | 3 | - | - | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1** | **3** | **1** | **1** | **2** | **2.5** | **2** | **2.5** | **1.5** | **2** | **1.5** | **1.5** | **1.5** | **2.5** | **1.5** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Database Management System Lab**

**Course Code: 102512**

**Semester: 5th**

**Credits: 02** **L T P**
**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Explain the features of database management systems and Relational database. |
| CO2 | Design conceptual models of a database using ER modeling or real life Applications and also construct queries In Relational Algebra. |
| CO3 | Create and populate a RDBMS for a real life application, with constraints and keys, using SQL. |
| CO4 | Retrieve any type of information from a data base by formulating complex queries in SQL. |
| CO5 | Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database. |

**Course Contents**

**List of Experiments:**

**Task 1:** Introduction to SQL and installation of SQL Server / Oracle.

**Task 2:** Data Types, Creating Tables and Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statement.

**Task 3:** Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statement.

**Task 4:** Set Operators, Nested Queries, Joins, Sequences.

**Task 5:** Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.

**Task 6:** PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-

SQL parameters.

**Task 7:** Stored Procedures and Exception Handling.

**Task 8:** Triggers and Cursor Management in PL/SQL.

Suggested Tools – My SQL, DB2, Oracle, SQL Server 2012

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 2 | 3 | 2 | - | - | - | 1 | 1 | 2 | 1 | 2 | 2 | 1 |
| CO2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | - | 2 | 1 | 1 | 2 | 1 | 1 | 2 |
| CO3 | 1 | 3 | 3 | 2 | 2 | - | - | - | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 3 | 1 | 1 | 1 | - | - | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 3 |
| CO5 | 2 | 3 | 2 | 2 | 2 | - | - | - | 1 | 2 | 1 | 2 | 2 | 2 | 3 |
| **Average** | **1.8** | **2.8** | **2** | **1.8** | **1.6** | **1** | **1** | **1** | **1.4** | **1.4** | **1.4** | **1.6** | **1.6** | **1.6** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

**Course Name: Computer Graphics Lab**

**Course Code: A102506**

**Semester: 5th**

**Credits:02** **L T P**
**0 0 4**

**Course Outcomes: On successful completion of this course, the students will able to:**

| CO | **Statement** |
|---|---|
| CO1 | Examine the basic concepts of computer graphics. |
| CO2 | Design scans conversion problems using C++ programming. |
| CO3 | Explain clipping and filling techniques for modifying an object. |
| CO4 | Identify the concepts of different type of geometric transformation of objects in 2D and 3D. |
| CO5 | To understand the Practical implementation of modeling, rendering, viewing of objects in 2D. |

**Course Contents**

**List of Experiments:**

**Task 1:** WAP to draw different geometric structures using different functions.

**Task 2:** Implement DDA line generating algorithm.

**Task 3:** Implement Bresenham's line generating algorithm.

**Task 4:** Implement Mid-point circle line generating algorithm.

**Task 5:** Implementation of Bresenham's circle drawingalgorithm.

**Task 6:** Implementation of mid-point circle generating Algorithm.

**Task 7:** Implementation of ellipse generating Algorithm.

**Task 8:** WAP of color filling the polygon using Boundary fill and Flood fill algorithm.

**Task 9:** To translate an object with translation parameters in X and Y directions.

**Task 10:** To scale an object with scaling factors along X and Y directions.

**Task 11:** Program of line clipping using Cohen-Sutherland algorithm.

**Task 12:** To perform composite transformations of an object.

**Task 13:** To perform the reflection of an object about major.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 3 | 2 | - | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | - | - | 2 | 1 | 3 | 2 | 3 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | - | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | - | 1 | - | 1 | 1 | 2 | 3 | 2 | 1 | 3 |
| CO5 | 1 | 3 | 3 | 2 | 2 | - | 1 | - | 2 | 2 | 1 | 2 | 1 | 2 | 2 |
| **Average** | **1.6** | **2** | **2.4** | **2** | **2.2** | **1** | **1** | **1** | **1.6** | **1.6** | **1.8** | **2.4** | **2** | **1.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

**Course Name: Mobile Application Development lab**

**Course Code: 102514**

**Semester: 5th**

**Credits: 02** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will able to:**

| CO | **Statement** |
|---|---|
| CO1 | Install and configure Android application development tools. |
| CO2 | Design and develop user Interfaces for the Android platform. |
| CO3 | Save state information across important operating system events. |
| CO4 | Apply Java programming concepts to Android application development. |
| CO5 | Learn apple iOS development, Android development, Shell Development. |

**Course Contents**

**List of Lab Experiments:**

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and eventlisteners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. An application that makes use of RSS Feed.
7. Implement an application Develop on that implements Multithreading.
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 1 | 2 | - | 1 | - | 1 | 1 | 2 | 2 | 3 | 1 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | - | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | 1 | - | 1 | 1 | 1 | 2 | 3 | 3 | 2 |
| CO4 | 2 | 1 | 3 | 1 | 3 | - | - | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 |
| CO5 | 1 | 2 | 2 | 2 | 2 | - | - | - | - | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.6** | **1.8** | **2.4** | **1.6** | **2.4** | **1** | **1** | **1** | **1.25** | **1.4** | **1.6** | **1.8** | **2.2** | **1.6** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming using C#.net Lab**

**Course Code: A102507**

**Semester: 5th**

**Credits: 02** **L T P**
**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statements** |
|---|---|
| CO1 | Understand object-oriented concepts and functional requirements C#.NET application. |
| CO2 | Develop, implement and create web Applications with C#. |
| CO3 | Use C# basics such as Classes, Objects ,Inheritance and Polymorphism |
| CO4 | Implement string manipulation, events and exception handling within .NET application environment. |
| CO5 | Analyze user requirements to decide whether the programming language (C #) can meet user requirements. |

**Course Contents**

1. Console based Programming.
2. Introducing form oriented programming.
3. Implement the concept of Classes and Objects
4. Implement the concept of Inheritance and Polymorphism
5. Implement the concept of Interfaces
6. Implement the concept of Operator Overloading
7. Implement the concept of Delegates and Events
8. Implement the concept of Managing Console I/O Operations
9. Implement the concept of Managing Errors 'and Exceptions.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 3 | 2 | - | 1 | - | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | - | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 |
| CO3 | 2 | 3 | 1 | 2 | 2 | - | - | - | 2 | 1 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 2 | 2 | 2 | 3 | 3 | - | - | - | 1 | 1 | 2 | 1 | 2 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 2 | - | 1 | 1 | 1 | 3 | 1 | 2 | 3 | 2 | 3 |
| **Average** | **1.8** | **2.6** | **2.2** | **2.4** | **2.4** | **1** | **1** | **1** | **1.2** | **1.6** | **1.6** | **1.8** | **2** | **1.6** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Humanities-II (Human Relations at Work)**

**Course Code: 100307**

**Semester: 5th**

**Credits: 03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Build and maintain successful relationships in the home, community, and workplace |
| CO2 | Justify human Relations and the key to personal growth and career success |
| CO3 | Learn Soft-Skills in the Business Environment |
| CO4 | Improve Personal, Organizational, and Cross-cultural Communications |
| CO5 | Resolving Conflict and Achieving Emotional Balance |

**Course Contents**

1. Human Relations and the key to personal growth and career success
2. Career success begins with knowing yourself
3. Personal strategies for improving human relations
4. If we all work together
5. Resolving Conflict and Achieving Emotional Balance
6. Self-Assessment
7. Soft-Skills in the Business Environment
8. Ethics
9. Motivation
10. Decision Making.
11. Improving Personal, Organizational, and Cross-cultural Communications.

12. Stress Management.
13. Leadership
14. Review and Reflection

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | - | 1 | - | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 |
| CO2 | - | - | 1 | - | - | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 |
| CO3 | 1 | - | - | 1 | 1 | 3 | 2 | 3 | 1 | 3 | 2 | 1 | 2 | 2 | 2 |
| CO4 | - | - | 1 | - | - | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 1 |
| CO5 | 1 | 1 | - | 1 | - | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| **Average** | **1** | **1** | **1** | **1** | **1** | **2.4** | **1.8** | **2.2** | **1.6** | **2.4** | **1.8** | **1.4** | **1.6** | **1.6** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Humanities-II (Education, Technology and Society)**

**Course Code: 100308**

**Semester: 5th**

**Credits: 03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Maintain successful relationships in the home, community, and workplace |
| CO2 | Justify Human Relations and the key to personal growth and career success |
| CO3 | Create an interface between Society, Education and Technology |
| CO4 | Aware people regarding child labor, gender disparity and various environmental issues |
| CO5 | Resolving Conflict and Achieve Emotional Balance |

**Course Contents**

1. The Meaning, Nature and Scope of Humanities in the field of Society, Educationand Technology.
2. The interface between Society, Education andTechnology.
3. Conceptual understanding of society behavior: State development, Social change,Hierarchy,Democracy,Urbanization, Industrialism,Rural-Urban interface, Globalization
4. Society, Politics andDevelopment.
5. The importance of Technological development in Society andEducation.
6. The impact of Industrial technological revolutions on Global order: Challenges before Indian Society, Casteism, Communalism, Regionalism ,Nation building ,Genderdisparity,
7. Child labor, Unemployment, Demographic and EnvironmentalIssues.
8. Technological innovation between Society andEducation.
9. Good Governance and Technologicalchange.
10. The Role of Society, Educational and Technology in making ModernIndia.

**11.** Aims of Education in Today's Indian Society.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | - | - | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 |
| CO2 | - | - | 2 | - | - | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 |
| CO3 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 2 |
| CO4 | 1 | 1 | 1 | - | - | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 1 |
| CO5 | 1 | - | - | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.3** | **1.3** | **1.3** | **1.0** | **1.0** | **2.4** | **2.4** | **2.2** | **2.2** | **1.6** | **2.0** | **1.6** | **1.4** | **1.6** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Java Programming**

**Course Code: A102603**

**Semester: 6th**

**Credits: 03**

**L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Discuss the basic concepts of java like if-else, control structures, array and strings. |
| CO2 | Outline the structure and model of the Java programming language |
| CO3 | Synthesize Java programming language for various programming technologies |
| CO4 | Develop software in the Java programming language on different platforms. |
| CO5 | Invent software applications using applet classes in java programming language. |

**Course Contents**

**Unit-I**

**An overview of Java:**

Object oriented programming, Two paradigms, abstraction, the OOP principles, Java class libraries

Date types, variables and arrays:-Integers, floating-point types, characters, Boolean, Iterates, Variable, Data types and casting, array operators.

**Operators:** -Arithmetic operators, bit wise operators, relational operators, Boolean logical operators, assignment operators, operator precedence

**Control Statement:** -Java's selection Statement, iteration Statement, jump Statement.

**Unit-II**

**Introduction to classes:** Class fundamentals, declaring object reference variable, Introducing methods, constructors, the keywords, garbage collection, the finalize () method.

**Methods and Classes:-** Overloading methods, using objects as parameters, recursion.

**Inheritance:** Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract Classes, Using final with inheritance, Package and Interfaces, Package asses protection, importing packages

**Unit-III**

**Exception handling:** Exception handling fundamentals, Exception types, Uncaught Exceptions, Using try and catch, multiple catch clauses, nested try Statement throw, and finally Java built in exception creating your own exception, sub classes, using exceptions.

**Unit-IV**

**Multithreaded Programming:** The Java thread model, the main thread, creating thread, creating multiple thread, using is alive () and join (). Thread priorities, synchronization, Inter thread communications, suspending resuming and stopping thread using multithreading.

String handling: The string constructor, string length, special string operator character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, string buffer.

**Unit-V**

**Networking:** Networking basics, Java and the Internet Address, TCP/IP client Sockets URL, URL connection, TCP/IP server Sockets, the Applet Class.

**Unit-VI**

**The Applet Class:** its architecture displays method, The HTML APPLET, Passing parameters to Applet. The get Documentation Base () and get Code Base () methods Applet Context and Show Document ().

**References:**

1. McGrawHill. (1999). *Java 2 Computer Reference*. Tata McGraw Hill.
2. Horstmann. *(2018) . Core Java-I.* Addison Wesley.
3. E Balagurusami. (2006). *Programming with JAVA.* Tata McGraw-Hill Education.
4. Bruce Eckel. (2007). *Thinking in Java.* Prentice Hall.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 3 | 2 | - | 1 | - | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | - | 1 | 2 | 2 | 2 | 3 | 2 | 2 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | - | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | - | - | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 2 | - | - | - | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| **Average** | **1.8** | **2** | **2.6** | **2** | **2.2** | **1** | **1** | **1** | **1.2** | **1.6** | **1.4** | **1.4** | **2.4** | **1.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Compiler Design**

**Course Code: 102610**

**Semester: 6th**

**Credits: 03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Categorize the various phases of compiler. |
| CO2 | Restate various parsing techniques. |
| CO3 | Identify intermediate code generation and run-time environment. |
| CO4 | Classify and implement front-end of the compiler. |
| CO5 | Implement various intermediate code generation techniques. |

## Course Contents

### Unit-I

**Introduction and Lexical Analysis**

Introduction to Compilers, Analysis of the source program, the phases of a compiler, grouping of phases, The role of the lexical analyzer, Specification of tokens, Recognition of tokens, A language for specifying lexical analyzer, Scanning Process, Regular Expressions, Finite Automaton (NFA and DFA),LEX.

### Unit-II

**Syntax analysis:**

CFG's, Ambiguity, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.

Syntax directed definitions: Inherited and Synthesized Attributes, Dependency Graph, Bottom up & Top down evaluation of attributes, L- and S-attributed definitions.

**Unit-III**

**Type Checking:** Type Systems, Specification of a simple type checker.

**Run time system:** Storage organization, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.

**Unit-IV**

**Intermediate Code Generation:** Intermediate representation translation of declarations, assignments, control flow, Boolean expressions and procedure calls. Code Generation and Optimization: issues, basic blocks and flow graphs, register allocation, code generation, DAG representation of programs, and code generation from DAG, Peep-hole optimization, and code generators. CASE Study of Gcc Compiler.

**Reference Books:**

1. Aho, Lam, Sethi, and Ullman. (2014). *Compilers: Principles, Techniques and Tools*. Second Edition, Pearson.
2. Aho, Sethi, and Ullman. (1986). *Compilers: Principles, Techniques and Tools*. Addison-Wesley.
3. Allen I. Holub. (1992). *Compiler Design in C*. Prentice-Hall/Pearson.
4. Muchnick. (1998). *Advanced Compiler Design and Implementation*. Morgan and Kaufmann.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 3 | 2 | - | 2 | - | - | 1 | 1 | 3 | 2 | 1 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | - | - | 1 | - | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | - | 3 | - | 1 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | - | - | 1 | 1 | - | 1 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | - | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| **Average** | **1.6** | **2.4** | **2.4** | **2** | **2.2** | **1.5** | **2** | **2** | **1** | **1** | **1.2** | **2** | **1.8** | **1.6** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Computer Network**

**Course Code: 102611**

**Semester: 6th**

**Credits:03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Understand the fundamentals of computer networking. |
| CO2 | Learn the basic taxonomy and terminology of the computer networking area. |
| CO3 | Get acquainted with various congestion control algorithms. |
| CO4 | Describe the functions of the different layer of the OSI Protocol. |
| CO5 | Identify the different types of network topologies and protocols. |

**Course Contents**

**Unit-I**

**Data Communication Components**

Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

**Unit-II**

**Data Link Layer and Medium Access Sub Layer**

Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CDCDMA/CA

**Unit-III**

**Network Layer**

Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

**Unit-IV**

**Transport Layer**

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm

**Unit-V**

**Application Layer**

Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

**Reference Books:**

1. Andrew S. Tanenbaum, PearsonNewInternationalEdition.(2013). *Computer Networks.* 8th Edition.
2. Prentice Hallof India.(2015).*Internetworking with TCP/IP Volume 1.* 6th Edition Douglas Comer.
3. W. Richard Stevens, Addison-Wesley, United Statesof America..*(2005). TCP/IPIllustrated.* Volume1.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 1 | 2 | 1 | 1 | - | 1 | 3 | 2 | 1 | 2 | 1 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 1 | - | - | - | 2 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO3 | 2 | 2 | 1 | 2 | 2 | - | 1 | - | 1 | 2 | 1 | 1 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 1 | - | - | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 3 |
| CO5 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.8** | **1.4** | **2** | **1.6** | **1.6** | **1** | **1** | **1** | **1.4** | **2** | **1.6** | **1.6** | **1.6** | **1.6** | **1.8** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Computer Programming using Python**

**Course Code: 102614**

**Semester: 6th**

**Credits: 03**

**L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will able to:**

| CO | **Statement** |
|---|---|
| CO1 | Acquire programming skills in core Python. |
| CO2 | Implement Object Oriented concepts to develop live projects. |
| CO3 | Design Graphical user Interfaces in Python |
| CO4 | Create database connectivity to create, search and sort the information. |
| CO5 | Implement class inheritance in Python for reusability. |

**Course Contents**

**Unit-I**

Introduction to Python Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks

Python Data Types Declaring and using Numeric data types: int, float, complex, using string data type and string operations, Defining list and list slicing, Use of Tuple data type

Python Program Flow Control Conditional blocks using if, else and elif, simple for loops in python, for loop using ranges, string, list and dictionaries Use of while loops in python, Loop manipulation using pass, continue, break and else Programming using Python conditional and loops block

**Unit-II**

Python Functions, Units and Packages Organizing python codes using functions, organizing python projects into Units, importing own Unit as well as external Units, Understanding Packages, Powerful Lambda function in python Programming using functions, Units and external packages

**Unit-III**

Python String, List and Dictionary Manipulations Building blocks of python programs, understanding string in build methods, List manipulation using in build methods, Dictionary manipulation, Programming using string, list and dictionary in build functions.

**Unit-IV**

Python File Operation Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(),Understanding write functions, write() and writelines(),Manipulating file pointer using seek, Programming using file operations.

**Unit-V**

Python Object Oriented Programming – Oops Concept of class, object and instances Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support.

**Unit-VI**

Python Regular Expression Powerful pattern matching and searching Power of pattern searching using regex in python, Real time parsing of networking or system data using regex, Password, email, URL validation using regular expression, Pattern finding programs using regular expression

**Unit-VII**

Python Exception Handling Avoiding code break using exception handling, safe guarding file operation using exception handling, Handling and helping developer with error code, Programming using Exception handling

Python Database Interaction SQL Database connection using python, creating and searching tables, Reading and storing configure information on database, Programming using database connections

Python Multithreading Understanding threads, forking threads, synchronizing the threads.

**References:**

1. John V Guttag. (2013). *Introduction to Computation and Programming Using Python Revised and expanded Edition.* MITPress
2. Robert Sedgewick, Kevin Wayne, Robert Dondero. (2016). *Introduction to Programming in Python: An Inter-disciplinary Approach.* Pearson India Education Services Pvt.Ltd.
3. Timothy A. Budd. (2015). *Exploring Python.* ,Mc-GrawHillEducation (India)PrivateLtd.
4. Kenneth A. Lambert. (2012). *Fundamentals of PythonFirstPrograms.*,CENGAGE Learning.
5. Charles Dierbach. (2013). *Introduction to Computer Science using Python. A ComputationalProblem-Solving Focus*. Wiley India Edition.
6. Paul Gries, Jennifer Campbell and Jason Montojo. (2013). *Practical Programming: An Introduction to Computer Science using Python 3*.Second edition, Pragmatic Programs, LLC.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 3 | 2 | 1 | - | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| CO2 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | - | 2 | 1 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 2 | 2 | 1 | 2 |
| CO4 | 3 | 2 | 2 | 1 | 2 | - | - | - | 1 | 1 | 2 | 1 | 1 | 2 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 2 | - | 1 | - | - | 2 | 1 | 2 | 2 | 1 | 1 |
| **Average** | **2.0** | **2.4** | **2.6** | **2.0** | **2.2** | **1.0** | **1.0** | **1.0** | **1.7** | **1.6** | **2.0** | **1.8** | **1.4** | **1.4** | **2.0** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Multimedia and Applications**
**Course Code : A102607**
**Semester : 6th**

**Credits: 03** **L T P**
**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Learn the technical aspects of multimedia system. |
| CO2 | Get knowledge of image animations. |
| CO3 | Understand the various audio and video formats. |
| CO4 | Apply different coding techniques for solving problems. |
| CO5 | Analyze multimedia tools for WWW. |

## Course Contents

### Unit-I

**Introduction To Multimedia Technology** - computers, communication and entertainment framework for multimedia system, features of multimedia system, Multimedia Hardware devices& software development tools, M/M devices, presentation devices and the user interface, M/M presentation and authoring.

### Unit-II

**Digital Representation Of Sound And Image**:-Digital representation of sound and transmission, Basics of Video, ,Types of Video Signals, Analog Video, Digital Video, brief survey of speech recognition and generation, digital video and image compression, JPEG image compression standard, MPEG motion video compression, DVI technology, timbered media representation and delivery.

### Unit-III

**M/M Software**:-M/M software environments, limitations of workstation operating systems, M/M system services, OS support for continuous media applications, media stream protocol, M/M file system and information representation system, and data models for M/M and hypermedia information.

**Application of M/M**:-Application of M/M, intelligent M/M system.

### Unit-IV

**Virtual Reality System**: Desktop VR, virtual reality OS, distributed virtual environment system, virtual environmental displays and orientation tracking, visually coupled systems requirements, intelligent VR software systems.

### Unit-V

**Multimedia Communication:** Building Communication network, Application Subsystem, Transport Subsystem, QOS, Resource Management, Distributed Multimedia Systems.

**Uses:** Applications of environments in various fields such as medical entertainment, manufacturing, business, education etc.

**Text/References:**

1. **Stephen McGloughlim**, "Multimedia on the Web", PHI.
2. **Villamil-Casanova & Nolina**, "Multimedia production, planning & Delivery", PHI.
3. **Lozano,** "Multimedia sound & video", PHI.
4. **J. Jeefcoate,** "Multimedia in Practice Tech & application".

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 3 | 2 | 1 | 3 | 1 | - | 1 | 3 | 2 | 2 | 1 | 2 | 2 |
| CO2 | 3 | 3 | 1 | 1 | 2 | 1 | - | 3 | 3 | 2 | 1 | 1 | 2 | 3 | 1 |
| CO3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO5 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | - | 1 | - | 3 | 1 | 3 | 2 |
| Average | **1.8** | **1.6** | **1.8** | **1.6** | **1.6** | **1.8** | **2** | **1.75** | **1.5** | **1.8** | **1.75** | **1.8** | **1.8** | **2** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Dataware Housing & Data Mining**
**Course Code : 102617**
**Semester : 6th**

**Credits: 03** **L T P**
**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Design and deploy appropriate classification techniques |
| CO2 | Cluster the high dimensional data for better organization of the data |
| CO3 | Discover the knowledge imbibed in the high dimensional system |
| CO4 | Evolve Multidimensional Intelligent model from typical system |
| CO5 | Evaluate various mining techniques on complex data objects |

**Course Contents**

**Unit-I**

Need for strategic information, difference between operational and Informational data stores Data warehouse definition, characteristics, Data warehouse role and structure, OLAP Operations, Data mart, Different between data mart and data warehouse, Approaches to build a data warehouse, Building a data warehouse, Metadata & its types.

**Unit-II**

**Data Pre-processing:** Need, Data Summarization, Methods. Denormalization, Multidimensional data model, Schemas for multidimensional data (Star schema, Snowflake Schema, Fact Constellation Schema, Difference between different schemas. Data warehouse architecture, OLAP servers, Indexing OLAP Data, OLAP query processing, Data cube computation

**Unit-III**

**Data Mining:** Definition, Data Mining process, Data mining methodology, Data mining tasks, Mining various Data types & issues. Attribute-Oriented Induction, Association rule mining, Frequent itemset mining, The Apriori Algorithm, Mining multilevel association rules.

**Unit-IV**

Overview of classification, Classification process, Decision tree, Decision Tree Induction, Attribute Selection Measures. Overview of classifier's accuracy, Evaluating classifier's accuracy, Techniques for accuracy estimation, Increasing the accuracy of classifier. Introduction to Clustering, Types of clusters, Clustering methods, Data visualization & various data visualization tools

**Text Books:**

1. Data Warehousing, Data Mining & Olap by Berson, Tata Mcgraw- Hill.
2. Han J., Kamber M. and Pei J., Data mining concepts and techniques, Morgan Kaufmann Publishers (2011) 3rd ed.
3. Pudi V., Krishana P.R., Data Mining, Oxford University press, (2009) 1st ed.
4. Adriaans P., Zantinge D., Data mining, Pearson education press (1996), 1st ed.
5. Pooniah P., Data Warehousing Fundamentals, Willey interscience Publication, (2001)

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 2 | 2 | 1 | - | - | 3 | 2 | 1 | 3 | 2 | 1 | 2 |
| CO2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 2 | 1 | 3 | 2 | 3 |
| CO3 | 3 | 1 | 3 | 3 | 1 | 2 | - | - | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO4 | 2 | 2 | 2 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 3 | 2 | 1 | 2 |
| CO5 | 3 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 3 | 2 | 2 |
| Average | **2.2** | **1.6** | **1.8** | **1.8** | **1.8** | **1.6** | **2** | **2** | **2** | **1.6** | **1.8** | **1.8** | **2.4** | **1.4** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Cloud Computing**
**Course Code : 102618**
**Semester : 6th**

**Credits: 03** **L T P**
**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Design Vision, Reference Model, Benefits, Limitations, Open Challenges, Grid and Utility Computing. |
| CO2 | Demonstrate Service Models, Deployment Models, Cloud Entities, Cloud Clients, Cloud Programming Models. |
| CO3 | Describe Cloud Security: Infrastructure Security, Data Security, Identity and Access Management, Privacy Management, Security as a Service on Cloud |
| CO4 | Resource Provisioning, Bill Management, Multitenancy and Isolation, Service Level Agreement (SLA) and Quality of Service (QoS) |
| CO5 | Infrastructure Security, Data Security, Identity and Access Management, Privacy Management, Security as a Service on Cloud. |

**Course Contents**
**Unit-I**

**Cloud Computing:** Overview, Applications, Intranet and the Cloud, First Movers on the cloud, the need for Cloud Computing, Benefits of cloud Computing, Limitations of the
Cloud Computing, security concerns and regulatory issues, over view of different cloud computing applications which are implemented, Business case for implementing a Cloud.

**Unit-II**

**Cloud computing and Service Models:** Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure-as- a- Service (IaaS), Platform- and Software-as-a-Service (Paas, SaaS). Architectural Design of Compute and Storage Clouds: A Generic Cloud architecture Design, Layered Cloud Architectural development, Architectural Design Challenges. Cloud Standards: Applications, Client, Infrastructure, Services.

## Unit-III

**Cloud Computing Mechanisms:** Software as a service: Overview, Driving Forces, Company offerings, Industries, Software services, Overview Mobile Device Integration, Providers, Microsoft Online Application development, Google, Microsoft, Intuit Quick base, Cast Iron Cloud, Bungee Connect, Development Platforms: Google, Sales Force, Azure, Trouble shooting, Application management

## Unit-IV

**Local Clouds**: Virtualization, server solutions, Thin Clients

**Migrating to the clouds**: Cloud services for individuals, Mid-market, and Enterprise wide, Migration, best practices, analysing the service.

**Text Books:**

1. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, Tata McGraw Hill, ISBN-13: 978-1-25-902995-0, New Delhi, India,Feb 2013.

2. Cloud Computing Bible, Barrie Sosinsky, Wiley India Pvt. Ltd, ISBN-13: 978- 81-265-2980-3, New Delhi, India, 2011.

3. Cloud Computing: Principles and paradigms, Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, Wiley India Pvt. Ltd, ISBN-13: 978-81-265- 4125-6,New Delhi, India, 2011.

**Reference Books:**

1. Cloud Computing for Dummies, Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Wiley India Pvt. Ltd, ISBN-13: 978-0-47-0597422, New Delhi, India, 2011.
2. Dr. Saurabh Kumar, Cloud Computing: Insights into New-Era Infrastructure, Wiley India Pvt. Ltd, ISBN-13: 978-8-12-6528837, New Delhi, India, 2011.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 3 | 3 | 2 | - | - | 2 | 2 | 3 | 2 | 3 | 2 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 2 | - | - | 3 | 1 | 3 | 3 | 2 | 3 | 3 |
| CO3 | 2 | 2 | 3 | 3 | 2 | 3 | - | - | 2 | 2 | 2 | 2 | 3 | 1 | 3 |
| CO4 | 3 | 1 | 3 | 1 | 3 | 2 | 1 | - | 3 | 1 | 3 | 3 | 3 | 2 | 3 |
| CO5 | 1 | 2 | 1 | 3 | 1 | 2 | - | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 2 |
| **Average** | **1.8** | **1.6** | **2** | **2.4** | **2.4** | **2.2** | **1** | **1** | **2.4** | **1.8** | **2.6** | **2.4** | **2.8** | **2.2** | **2.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Parallel Processing**
**Course Code : 102619**
**Semester : 6th**

**Credits: 03** **L T P**
**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Explain the organization of basic computer, its design and the design of control unit. |
| CO2 | Provide communicate effectively with a range of audiences |
| CO3 | Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization. |
| CO4 | Describe the operations and language f the register transfer, micro operations and input-output organization |
| CO5 | Apply new knowledge as needed, using appropriate learning strategies. |

**Course Contents**

**Unit-I**

**Introduction:** Paradigms of parallel computing: Synchronous - vector/array, SIMD, Systolic; Asynchronous- MIMD, reduction paradigm. Hardware taxonomy: Flynn's classifications, Handler's classifications. Software taxonomy: Kung's taxonomy, SPMD.

**Unit-II**

**Abstract parallel computational models:** Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one, Sorting network, Interconnection RAMs. Parallelism approaches - data parallelism, control parallelism.

**Unit-III**

**Performance Metrics:** Laws governing performance measurements. Metrics - speedups, efficiency, utilization, communication overheads, single/multiple program performances,

benchmarks. Parallel Processors: Taxonomy and topology - shared memory multiprocessors, distributed memory networks. Processor organization - Static and dynamic interconnections. Embeddings and simulations.

**Unit-IV**

**Parallel Programming:** Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming. Scheduling and Parallelization: Scheduling parallel programs. Loop scheduling. Parallelization of sequential programs. Parallel programming support environments.

**References:**

**1.** M. J. Quinn. Parallel Computing: Theory and Practice , McGraw Hill, New York, 1994.

**2.** T. G. Lewis and H. El-Rewini. Introduction to Parallel Computing , Prentice Hall, New Jersey, 1992

**3.** T. G. Lewis. Parallel Programming: A Machine-Independent Approach , IEEE Computer Society Press, Los Alamitos, 1994.

**4.** S.G. Akl, “Design and Analysis of Parallel Algorithms”

**5.** S.G. Akl, ”Parallel Sorting Algorithm” by Academic Press

**The mapping of PO/PSO/CO attainment is as follows :**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 2 | 1 | - | - | - | 2 | 2 | 1 | 1 | 1 | 1 | 2 |
| CO2 | 1 | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 1 | 2 | 3 |
| CO3 | 2 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 1 | 1 |
| CO4 | 1 | 1 | 2 | 1 | 1 | - | - | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 3 |
| CO5 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| **Average** | **1.8** | **1.6** | **1.6** | **1.8** | **1.2** | **1.5** | **2** | **2** | **1.6** | **1.6** | **1.6** | **2** | **1.6** | **1.4** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Soft Skills and Interpersonal Communication**
**Course Code : 100309**
**Semester : 6th**

**Credits: 03** **L T P**
**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Develop and expand writing skills through controlled and guided activities. |
| CO2 | To develop Coherence, Cohesion and Competence in Oral Discourse through intelligible Pronunciation. |
| CO3 | Write correctly and properly with special reference to letter writing. |
| CO4 | Adopt strategies for effective reading and writing skills. |
| CO5 | Give effective presentations and gain confidence in facing job interviews. |

**Course Contents**

**Unit-I**

**Soft Skills:** An Introduction – Definition and Significance of Soft Skills, Process, Importance and Measurement of Soft Skill Development.
**Self-Discovery:** Discovering the Self; Setting Goals, Beliefs, Values, Attitude, Virtue. 3. **Positivity and Motivation:** Developing Positive Thinking and Attitude, Driving out Negativity, Meaning and Theories of Motivation, Enhancing Motivation Levels.

**Unit-II**

**Interpersonal Communication:** Interpersonal relations, communication models, process and barriers, team communication, developing interpersonal relationships 7 through effective communication, listening skills, essential formal writing skills, corporate communication styles – assertion, persuasion, negotiation.
**Public Speaking:** Skills, Methods, Strategies and Essential tips for effective public speaking. .
**Group Discussion:** Importance, Planning, Elements, Skills assessed, effectively disagreeing, Initiating, Summarizing and Attaining the Objective.
**Non-Verbal Communication:** Importance and Elements, Body Language, Teamwork and **Leadership Skills:** Concept of Teams, Building effective teams, Concept of Leadership and honing Leadership skills.

**Unit-III**

**Interview Skills:** Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success.
**Presentation Skills:** Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness.
**Etiquette and Manners**: Social and Business.
**Time Management:** Concept, Essentials, Tips.
**Personality Development:** Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

**Unit-IV**

**Decision-Making and Problem-Solving Skills:** Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.

**Conflict Management:** Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution.

**Stress Management:** Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress, Measurement and Management of Stress .

**Leadership and Assertiveness Skills:** A Good Leader; Leaders and Managers, Leadership Theories, Types of Leaders, Leadership Behavior, Assertiveness Skills.

**Emotional Intelligence:** Meaning, History, Features, Components, Intrapersonal and Management Excellence, Strategies to enhance Emotional Intelligence.

**Reference Books**

1. B L Bajpai, (2004), *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, (1990*), Science and Humanism*, Commonwealth Purblishers.
3. Sussan George, (1976), *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, (1974), *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 1 | - | - | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO2 | - | - | 2 | - | - | 3 | 1 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| CO3 | - | 3 | - | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 1 | - | 1 | - | - | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 1 |
| CO5 | - | 3 | - | - | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1** | **3** | **1** | **1** | **2** | **2.5** | **2** | **2.5** | **1.5** | **2** | **1.5** | **1.5** | **1.5** | **2.5** | **1.5** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates th correlation.

**Course Name : Human Resource Management**
**Course Code : A102602**
**Semester : 6th**

**Credits: 03** **L T P**
**3 0 0**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Develop the understanding of the concept of human resource management and to understand its relevance in organizations. |
| CO2 | Develop necessary skill set for application of various HR issues. |
| CO3 | Analyse the strategic issues and strategies required to select and develop manpower resources. |
| CO4 | Integrate the knowledge of HR concepts to take correct decisions. |
| CO5 | Develop better Personnel Management skills. |

**Course Contents**

**Unit-I**

**Introduction:** Meaning, scope, objectives and importance of Human Resource Management, Personnel Management, its functions, policies & roles, Organizing the Human Resource Management department in the organization, Human Resource Management practices in India, HR audit.

**Procurement and Placement:** Need for Human Resource Planning; Process of Human Resource Planning; Methods of Recruitment; Psychological tests and interviewing, Meaning and Importance of Placement and Induction, Employment Exchanges (Compulsory Notification of vacancies) Act 1959, The Contract Labor (Regulation & Abolition) Act 1970.

**Unit-II**

**Training & Development:** Principles of Training and Development; Difference between Training and Development; Promotion: Promotion-Merit v/s seniority wise; Performance Appraisal, Career Development & Planning.

**Job analysis & Design:** Job Analysis and its Principle: Job Specification & Job Description, Difference between Job Specification Job Description

Job Satisfaction: Meaning, objectives and importance Job satisfaction.

**UNIT-III**

**Motivation:** Factors affecting motivation, Motivation Theory, Maslow's Motivation Theory, Hertzberg Hygiene Theory, Workers ' Participation in the organization, Quality of work life.

**Bonus and Incentives:** Meaning, objectives and importance of Bonus and Incentives.

**The Wage Act and Compensation Function:** Basic concepts in wage administration, company"s wage policy, Issues in wage administration, Payment of Wages Act-1936, Minimum Wages Act-1961.

**UNIT-IV**

**Integration and Human Relation:** Meaning, objectives and importance of Integration in industry. Human Relations and Industrial Relations; Difference between Human. Relations and Industrial Relations, Factors required for good Human Relation Policy in Industry;

**Employees Grievances:** Employee Employer relationship Causes and Effects of Industrial disputes;, Administration of Discipline, Absenteeism, Labor Turnover, Changing face of the Indian work force and their environment, Importance of collective Bargaining; Role of trade unions in maintaining cordial Industrial Relations.

**UNIT-V**

**Welfare of Employees:** Welfare of Employees and its Importance; Fringe & retirement terminal benefits, administration of welfare amenities, Meaning and Importance of Employee Safety, Accidents-Causes & their Prevention, Safety Previsions under the Factories Act 1948;, Social security, Family Pension Scheme, ESI act 1948, Future challenges for Human Resource Management.

Text Books: 1. T.N.Chhabra," Human Resource Management", Dhanpat Rai & Co.

**Reference Books:**

1. Lowin B. Flippo, "Principles of personnel Management", Mc Graw-Hill.
2. R.C. Saxena ,"Labour Problems and social welfare", K.Math & Co.
3. A Minappa and M. S. Saiyada, "Personnel Management", Tata Mc. Graw-Hill.
4. C.B. Mamoria , " Personnel Management", Himalaya Publishing House, Bombay.
5. T.N. Bhagotiwal, "Economics of Labour and Industrial Relations", Sahitya Bhawan Agra.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 1 | - | - | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO2 | 2 | 1 | 1 | - | - | 3 | 1 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| CO3 | - | 3 | - | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 1 | - | 3 | - | - | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 1 |
| CO5 | - | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1.5** | **2** | **2** | **1** | **2** | **2.4** | **1.8** | **2.4** | **1.6** | **1.6** | **1.4** | **1.6** | **1.4** | **2.4** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Computer Programming Using Python Lab**
**Course Code : 102616**
**Semester : 6th**

**Credits: 01** **L T P**
**0 0 2**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Apply the basic principles of python programming |
| CO2 | Create applications using python programming |
| CO3 | Develop looping functions using python programming. |
| CO4 | Understand the methods to manipulate python programs by utilizing the data structures like lists. |
| CO5 | Develop and use Web Services using python. |

**Course Contents**

**List Of Programs:**

**1.** Compute the GCD of two numbers.

**2.** Find the square root of a number (Newton‘s method)

**3.** Exponentiation (power of a number)

**4.** Find the maximum of a list of numbers

**5.** Linear search and Binary search

**6.** Selection sort, Insertion sort

**7.** Merge sort

**8.** First n prime numbers

**9.** Multiply matrices

**10.** Programs that take command line arguments (word count)

**11.** Find the most frequent words in a text read from a file

**12.** Simulate elliptical orbits in Pygame

**13.** Simulate bouncing ball using Pygame

**The mapping of PO/PSO/CO attainment is as follows :**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 1 | 2 | 3 | 2 | - | - | 2 | 2 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 2 | 2 | 3 | - | - | 3 | 2 | 3 | 1 | 1 | 3 | 2 |
| CO3 | 1 | 3 | 1 | 2 | 3 | 1 | - | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 |
| CO4 | 2 | 1 | 3 | 2 | 1 | 2 | 1 | - | 3 | 2 | 3 | 3 | 3 | 2 | 2 |
| CO5 | 1 | 3 | 1 | 2 | 2 | 3 | - | - | 2 | 2 | 2 | 3 | 3 | 3 | 2 |
| Average | **1.8** | **2.4** | **1.8** | **2.0** | **2.2** | **2.2** | **1** | **1** | **2.4** | **2.0** | **2.4** | **2.4** | **2.4** | **2.2** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Computer Network Lab**
**Course Code : 102612**
**Semester : 6th**

**Credits: 02** **L T P**
**0 0 4**

**Course outcomes: On successful completion of this course, students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Learn about the layers of the OSI model and TCP/IP. |
| CO2 | Compare and Identify various network topologies. |
| CO3 | Identify the types of application process protocols. |
| CO4 | Understand the various data link layer and network protocols. |
| CO5 | Classify the working of the Internet |

**Course Contents**

**List of Experiments:**

**Task 1:** To study the different types of Network cables and network topologies.
**Task 2:** Practically implement and test the cross-wired cable and straight through cable using clamping tool and network lab cable tester.
**Task 3:** Study and familiarization with various network devices.
**Task 4:** Familiarization with Packet Tracer Simulation tool/any other related tool.
**Task 5:** Study and Implementation of IP Addressing Schemes
**Task 6:** Creation of Simple Networking topologies using hubs and switches
**Task 7:** Simulation of web traffic in Packet Tracer
**Task 8:** Study and implementation of various router configuration commands
**Task 9:** Creation of Networks using routers.
**Task 10:**Configuring networks using the concept of subnetting
**Task 11:**Practical implementation of basic network command and Network configuration commands like ping, ipconfig, netstat, tracert etc. for troubleshooting network related problems.
**Task 12:**Configuration of networks using static and default routes.
The students will be able to:
***Suggested Tools* - NS2/3, Cisco packet tracer, Netsim etc.**.

**The mapping of PO/PSO/CO attainment is as follows :**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 1 | - | - | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 |
| CO2 | 2 | - | 2 | - | - | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 |
| CO3 | - | 2 | - | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 2 | - | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 |
| CO5 | - | 2 | - | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| Average | **1.5** | **1.5** | **2** | **1.5** | **1.5** | **1.6** | **1.8** | **1.6** | **1.5** | **1.6** | **1.4** | **1.4** | **1.6** | **2.4** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Java Programming lab**
**Course Code : A102605**
**Semester : 6th**

**Credits: 02** **L T P**
**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Solve the computational problems using basic statements like if-else, control structures, array, and strings. |
| CO2 | Learn about the user requirements for software functionality in Java programming language. |
| CO3 | Run a software applications using java programming language. |
| CO4 | Know about basic principles of creating Java applications with Applet programming. |
| CO5 | Develop a given program using the basic elements like Control and Conditional statements. |

**Students are required to write a code snippet that covers the following objectives.**

1 Introduction to JAVA, its features & basic program
2 Write a program for Operators in JAVA
3 Write a program to show use of IF-Else Statements in JAVA
4 Write a program use switch case in JAVA
5 Write a program to use looping in JAVA
6 Write a program to use methods in JAVA
7 Write a program to create class and objects
8 Write a program to use Method Overloading and Method Overriding
9 Write a program to use Final Keyword
10 Write a program to show Implementation of Array
11 Write a program to show Implementation of Inheritance
12 Write a program to show creation and use of package
13 Write a program to show use of Interface
14 Write a program to apply replace, concate methods on String
15 Write a program to sort strings of array
16 Write a program to Show Implementation of Threads
17 Write a program to create applet
18 Write a program to create applet with passing parameters
19 Write a program to show use of Exception Handling
20 Write a program to make usage of JAVA lang.awt package and design GUI.
21 Usage of event handling in Java GUI (Graphical user interface) programs

**The mapping of PO/PSO/CO attainment is as follows :**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 3 | 2 | - | 2 | 1 | - | 3 | 2 | 2 | 3 | 2 | 1 |
| CO2 | 1 | 3 | 2 | 2 | 3 | - | 1 | 1 | 2 | - | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 1 | 2 | 2 | 2 | - | 2 | - | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | - | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 3 |
| CO5 | 1 | 3 | 3 | 1 | 2 | 2 | 2 | 1 | 3 | - | 1 | 2 | 3 | 1 | 2 |
| Average | **1.6** | **2.4** | **2.2** | **1.8** | **2.2** | **2** | **1.5** | **1.2** | **2** | **2** | **1.6** | **1.8** | **2.4** | **1.8** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name : Multimedia and applications Lab**
**Course Code : 102615**
**Semester : 6th**

**Credits: 01** **L T P**
**0 0 2**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | Statement |
|---|---|
| CO1 | Learn about the different tools for multimedia processing. |
| CO2 | Draw the image with proper animation. |
| CO3 | Design the images with appropriate tools from the toolbox. |
| CO4 | Gain the practical knowledge of image animations. |
| CO5 | Implement the experiments with graphics and text information. |

**Course Contents**

**List of Practical's**

1. Installation of various multimedia software like Photoshop, Flash, Director or any open source software.
2. Installing and use of various multimedia devices:
   - Scanner
   - Digital camera, web camera
   - Mike and speakers
   - Touch screen
   - Plotter and printers
   - DVD
   - Audio CD and Video CD
3. Reading and writing of different format on CD/DVD.
4. Transporting audio and video files.
5. Using various features of Flash.
6. Using various features of Photo-shop.
7. Making multimedia presentations combining, Flash, Photo-shop, such as department profile, lesson presentation, games and project presentations.

**The mapping of PO/PSO/CO attainment is as follows :**

| PO/PSO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 3 | 1 | 1 | 2 | 1 | 2 | 1 |
| CO2 | 1 | 3 | 2 | 3 | 1 | 1 | 2 | 1 | 2 | 2 | - | 2 | 2 | 1 | 2 |
| CO3 | 3 | 1 | 1 | 2 | 2 | 2 | 1 | - | 1 | 1 | 1 | 1 | 3 | 3 | 1 |
| CO4 | 1 | 2 | 2 | 1 | 3 | 2 | - | 1 | 1 | - | 2 | 2 | 2 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 3 | 1 | - | 2 | 2 | - | 2 | 1 | 1 | 3 | 1 | 1 |
| **Average** | **1.6** | **1.6** | **1.4** | **2.2** | **1.6** | **1.5** | **1.5** | **1.75** | **1.75** | **1.5** | **1.25** | **1.6** | **2.2** | **1.8** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Project-I**

**Course Code: 102613**

**Semester: 6th**

**Credits: 02** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Use latest multimedia devices and programming software. |
| CO2 | Design and construct a hardware and software system, component or process to meet desired needs. |
| CO3 | Do work on multidisciplinary Problems. |
| CO4 | Work as professionals, with portfolio ranging from data management, network configuration, designing hardware, database and software design to management and administration of entire systems. |

**Course Contents**

1. Project should include following phases: System Analysis and Design.
2. Coding - Implementation Testing
3. It should be a working project Must have a future perspective
4. The Domain of project can be from Database
5. Application software
6. System software
7. Multimedia
8. Web Applications etc.
9. A complete project report must be submitted along with softcopy of project. Project report may include Requirements of Project, Flow Chart, DFD's, Coding and Test Results

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 3 | 2 | 3 | - | - | - | - | 1 | 1 | 3 | 3 | 3 | 3 |
| CO2 | 2 | 3 | 1 | 2 | 1 | - | - | - | 1 | - | 2 | 2 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 3 | 1 | 2 | - | - | - | 2 | - | 1 | 2 | 2 | 1 | 3 |
| CO4 | 1 | 3 | 1 | 1 | 1 | | - | - | 1 | 1 | 2 | 1 | 3 | 2 | 2 |
| CO5 | 2 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| **Average** | **2.0** | **2.0** | **2.2** | **1.6** | **1.8** | **1.0** | **1.0** | **1.0** | **1.3** | **1.3** | **1.4** | **2.0** | **2.4** | **2.0** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

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**Course Name: Artificial Intelligence**

**Course Code: A102707**

**Semester: 7th**

**Credits: 03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Design expert system by using AI tools. |
| CO2 | Compare and develop expert system with the help of Neural Networks |
| CO3 | Justify expert system using Machine Learning. |
| CO4 | Restate expert system using Fuzzy Logic. |
| CO5 | Explain expert system using Deep Learning. |

**Course Contents**

**Unit-I**

**Introduction:** What is AI, Importance of AI, Early work in AI, Applications of AI,

**Unit-II**

**Knowledge and its definition** : Knowledge Representation: Prepositional logic, FOPL, Properties of Well-formed formulas, Conversion to Clausal form, Inference rules, Resolution principle.

**Unit-III**

**Structured Knowledge:** Introduction, Associate frame structures, Conceptual dependencies and scripts.

**Unit-IV**

**Knowledge Organization and Manipulation:** Concepts, Uninformed or Blind search, Informed search, Searching- And-OR graphs, Pattern Recognition, Recognition Classification process,

Classification patterns, Recognizing and understanding speech.

**Unit-V**

**Planning:** Planning as search, partial order planning, construction and use of planning graphs. Decision-Making basics of utility theory, decision theory, sequential decision problems, elementary game theory and sample applications.

**Unit-VI**

**Expert System:** Definition, Rule based architecture, dealing with uncertainty, Knowledge acquisition and validation, knowledge system building tools.

**Unit-VII**

**Knowledge Acquisition:** Types of learning, General Learning model, Performance measures. Learning nearest neighbor, naive Bayes, and decision tree classifiers,

**Text Books/References**


1. Dan W. Patterson. (1990). *Introduction to Artificial Intelligence and Expert Systems.*PHI Publication.

2. Peter Jackson. (1998*). Introduction to Expert System.* Addison Wesley.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 3 | 2 | - | - | - | - | 2 | 2 | 1 | 1 | 2 | 1 |
| CO2 | 1 | 2 | 2 | 3 | 1 | - | 1 | - | 2 | 2 | - | 2 | 2 | 1 | 2 |
| CO3 | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 2 | 2 | 1 | 1 | - | - | - | 2 | 2 | 1 | 1 | 2 | 1 |
| CO5 | 1 | 3 | 3 | 2 | 2 | - | - | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.6** | **1.8** | **2.6** | **2.4** | **1.6** | **1.0** | **1.0** | **1.0** | **1.3** | **1.8** | **1.5** | **1.6** | **1.6** | **1.8** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Management Information System**

**Course Code: A102703**

**Semester: 7th**

**Credits:03** **L T P**

**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Describe the role of information technology and systems in business |
| CO2 | Analyze how information technology impacts a firm and interpret how to use information technology to solve business problems |
| CO3 | Identity the role played by the six major types of information systems in organizations and their relationship to each other. |
| CO4 | Define the types of information systems supporting the major functional areas of the business. |
| CO5 | Recognize the relationship between information systems and organizations. |

**Course Contents**

**Unit-I**

**Management Information Systems A Framework**

Importance of MIS; Management Information System: A Concept (Management, Information, And System); MIS: A Definition (Information Technology and MIS); Nature and Scope of MIS (MIS Characteristics, MIS Functions).

**Unit-II**

**Structure and Classification of MIS:** Structure of MIS, MIS classification, Functional Information System, Conceptual and Physical Structure of MIS.

**Unit-III**

**Decision Making System:** Simon's Model, Characteristics of DSS, Structure of DSS, DSSusers, Classes, Types, Decision Tree. GDSS Model, Characteristics of GDSS, users and classes of GDSS, difference between DSS and GDSS.

**Unit-IV**

**Information and System Concept:** Definition of information, Quality of Information, information parameters, types and dimension of Information, Classification of information system maintenance. Definition of system, kinds of system, elements of system.

**Unit-V**

**Organization concept:** Definition of Organization, Database Hierarchy and Files used in Organization. Introduction to ERP : Definition and Significance of ERP, Benefits of ERP, ERP Implementation, ERP life Cycle Model, Role of users, Vendors and Consultants in ERP, Marketing of ERP, Future Scope of ERP Application.

**Text Books:**

1. D.P Goyel, Macmillan.(2006 *). Management Information Systems Managerial Perspectives*.
2. CVS Murthy.(1993). *Management Information Systems.* Himalaya Publishing House
3. Vinod Kumar Garg, N. K. Venkitakrishnan.(2003*). Enterprise Resource Planning: Conceptsand Practice* Phi Learning Pvt.Ltd.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 2 | 1 | - | - | 3 | 3 | 2 | 1 | 1 | 3 | 1 |
| CO2 | 2 | - | 2 | - | 3 | 1 | - | - | 2 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO3 | 1 | 2 | 2 | 1 | 2 | - | 1 | 1 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| CO4 | 1 | - | 1 | - | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 1 |
| CO5 | 2 | 2 | 3 | 2 | 1 | - | - | - | 3 | 2 | 3 | 2 | 1 | 3 | 2 |
| **Average** | **1.4** | **1.7** | **1.8** | **1.3** | **2.0** | **1.0** | **1.0** | **1.0** | **2.6** | **2.0** | **2.4** | **1.6** | **1.4** | **2.6** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Web Designing & Development**

**Course Code: A102702**

**Semester: 7th**

**Credits: 04** **L T P**
**3 1 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Design web pages by JavaScript in HTML. |
| CO2 | Get fundamental skills to maintain web server services required to host a website. |
| CO3 | Restate scripting languages and web services to transfer data and add interactive components to web pages. |
| CO4 | Manipulate web media objects using editing software |
| CO5 | Use CSS in HTML to enhance the quality of web pages. |

**Course Contents**

**Unit-I**

**Introduction to HTML:** HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to JavaScript: Scripts, Objects in Java Script, Dynamic HTML with Java Script XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

**Unit-II**

**Java Beans:** Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, and Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, SecurityIssues

## Unit-III

**Introduction to JSP:** The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server &TestingTomcat

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Databetween JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

## Unit-IV

**Database Access:** Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework. One android applicationdevelopment.

**References:**

I. WILEY Dreamtech.(2010). *Web Programming, building internet application*s. Chris Bates 2nd edition.
II. Hans Bergsten.(2000). *Java Server Pages.* SPDO'Reilly.
III. Dietel and Nieto.(2001). *Internet and World Wide Web.* PHI/Pearson EducationAsia.
IV. JoclSklar.*(2009). Web Warrier guide to web design technologies.* Cengage Learning, New Delhi.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 3 | 1 | - | - | - | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| CO2 | 2 | 2 | 2 | 3 | 3 | - | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 1 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 1 | - | - | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 2 | 3 | 2 | - | - | - | 1 | 1 | 2 | 1 | 1 | 2 | 2 |
| CO5 | 3 | 2 | 3 | 2 | 1 | - | - | - | 2 | 2 | 1 | 2 | 2 | 3 | 1 |
| **Average** | **2** | **1.6** | **2.6** | **2.6** | **1.6** | **1** | **1** | **1** | **1.6** | **1.6** | **1.4** | **1.6** | **1.6** | **2.4** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming Using ASP.NET**

**Course Code: 102709**

**Semester: 7th**

**Credits: 04** **L T P**
**3 1 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Create a Web form with server controls. |
| CO2 | Separate page code from content by using code-behind pages, page controls and components. |
| CO3 | Display dynamic data from a data source by using Microsoft ADO.NET and data binding technique. |
| CO4 | Debug ASP.NET pages by using trace. |
| CO5 | Create Database connectivity. |

**Course Contents**

**Unit-I**

**Introduction To .Net 9** What is .NET, Why .NET, Advantages of .NET, Architecture of .NET, Introduction to CLR, CLR architecture, Just-in-time compiler(JIT), Microsoft Intermediate Language(MSIL), Understanding IL with ILDASM, .NET Framework, common class library, common type system(CTS), common language specifications(CLS), Languages under .NET, Working with Microsoft Visual studio IDE.

**Unit-II**

**OBJECT ORIENTED PROGRAMMING USING C#** Explain features and phases of the object-oriented approach, Write and execute C# programs, Use decision-making constructs and loop constructs, Implement structures, enumerations, arrays, and collections, Implement polymorphism and overload functions and operators, Explain and use delegates and events , Use various stream classes to implement file handling.

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## Unit-III

**GUI APPLICATIONS DEVELOPMENT USING .NET FRAMEWORK** Work with the Windows Forms and controls, Perform validation of controls using classes and controls , Work with Dialog Boxes, Menus and MDI Application, Implement Printing and Reporting Functionality in a Windows Forms Application, Package and deploy applications.

## Unit-IV

**Developing Database Applications Using** ADO.NET 9 Create and manage connections using ADO.NET, Identify the disconnected and connected environment in ADO.NET, Create datasets and data tables, Retrieve and store large binary data, Perform bulk copy operations , Execute SQL notification maintain and update a cache, Read, write, validate, and modify XML data using XML reader and writer classes.

## Unit-V

**Developing Web Applications Using Asp.NET9** Create a Web Application, Program a Web Application, Add and Configure Server Controls, Create a Common Layout by Using Master Pages, Manage State for a Web Application , Access and Display Data, Control Access to a Web Application , Deploy a Web Application, Build Dynamic Web Applications, Create Controls for Web Applications.

**Reference Books**

1. AndrewTroelsen. (2010). *Pro C#10andthe.NET4 Platform*, 5th Edition, Apress.
2. Bill Evjen, Scott Hanselman, Devin Rader. (2008). *Professional ASP.NET, C# and VBProgramrtoProgramr*. WroxPublications.
3. Eric Butow and Tommy Ryan. (2001). *C# Your Visual Blueprint for building .NETApplications*. VisualPublications.
4. Danny Ryan and Tommy Ryan. (2001). *ASP.NET Your Visual Blueprint for building Webonthe.NETFramework*. VisualPublisher.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 3 | 2 | 1 | - | 1 | 1 | 1 | 2 | 3 | 2 | 1 | 2 |
| CO2 | 2 | 1 | 2 | 3 | 3 | - | 1 | - | - | 2 | 3 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 3 | 3 | 1 | 2 | - | - | - | 2 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 2 | 2 | 3 | - | - | - | 1 | - | 2 | 1 | 2 | 2 | 3 |
| CO5 | 2 | 2 | 3 | 2 | 2 | - | - | - | 1 | 1 | 3 | 2 | 2 | 3 | 2 |
| **Average** | **1.6** | **1.8** | **2.6** | **2.2** | **2.4** | **1** | **1** | **1** | **1.25** | **1.25** | **2.2** | **2** | **1.8** | **2.2** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Cyber Law & Ethics**

**Course Code: 102715**

**Semester: 7th**

**Credits:03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Discuss present cyber laws |
| CO2 | Get acquainted with various cyber-crimes. |
| CO3 | Outline Cyber Security |
| CO4 | Relate Criminal Liability |
| CO5 | Identify Corporate policies |

**Course Contents**

**Course Objective:** This syllabus presents the meaning and definition of cybercrime, the legislation in India dealing with offences relating to the use of or concerned with the abuse of computers or other electronic gadgets. The Information Technology Act 2000 and the I.T. Amendment Act 2008 have been dealt with in detail and other legislations dealing with electronic offences have been discussed in brief.

Learning Outcomes: Upon successful completion of this course, students will be aware of present cyber laws, Cyber Crimes, Cyber Security, Criminal Liability, Corporate policies.

**Unit-I**

**Cyber Laws:** Introduction to the Cyber World and Cyber Law, Information Technology Act, 2000 –Digital Signature; E-Governance; Regulation of Certifying Authorities; Duties of pub scribers; Penalties and Adjudications; Offences under the Act; Making of Rules and Regulations etc. Cyber Crimes Introduction–computer crime and cybercrimes; Classification of cybercrimes. Cyber forensic, Cyber criminals and their objectives Kinds of cybercrimes – cyber stalking; cyber pornography; forgery and fraud; crime related to IPRs; Cyber terrorism; computer vandalism.

**Unit-II**

**Cyber Security:** Cyber Security and its problem-Intervention Strategies: Redundancy,

Diversity and Autarchy. Private ordering solutions, Regulation and Jurisdiction for global Cyber security, Copy Right-source of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Losing

**Unit-III**

**Copy Right:** Source of risks, Pirates, Internet Infringement, air Use, postings, Criminal Liability, First Amendments, Losing Data, Trademarks, Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity, Technology expanding privacy rights. Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts & Digital Signatures, Misappropriation of information, Civil Rights, Tax, Evidence. Information security policies and procedures: Corporate policies-Tier 1, Tier 2 andTier3 policies -process management-planning and preparation-developing policies-asset classification policy developing standards.

**Unit-IV**

**Corporate Policies-**Tier 1, Tier 2 and Tier3 policies -process management-planning and preparation-developing policies-asset classification policy developing standards.

**References:**


I. Rosenoer, Jonathan. (1997*). Cyber Law: The law of the Internet*.Springer.

II. Grady,Mark.AndPeltier, F FransescoParisi Thomas R.(2005).*The Law and Economics of Cyber*Security. Cambridge UniversityPress

III. Knapp,Kenneth J. (2009). *Cyber Security and Global Information Assurance.* Threat Analysis and Response Solutions.IGIGlobal.

IV. Peltier,Thomas R Justin Peltier, blackley,John.(1996*).Information Security Fundamentals*. 2nd Edition, PrenticeHall.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 1 | - | 2 | 1 | 3 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO2 | 1 | 1 | - | - | 1 | 3 | - | 2 | - | 1 | 1 | 2 | 1 | 2 | 1 |
| CO3 | - | - | - | - | 1 | 2 | - | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO4 | - | - | 1 | - | - | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO5 | - | - | - | - | - | 3 | 1 | 3 | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.0** | **1.0** | **1.0** | **1.0** | **1.0** | **2.8** | **1.0** | **2.5** | **1.3** | **1.5** | **1.3** | **1.8** | **1.5** | **1.3** | **1.5** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Real Time System**

**Course Code: 102711**

**Semester: 7th**

**Credits: 03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Understand fundamental principles for programming of real time systems with time and resource limitations. |
| CO2 | Describe the foundation for programming languages developed for real time programming. |
| CO3 | Account for how real time operating systems are designed and functions. |
| CO4 | Describe what a real time network is. |
| CO5 | Use real time system programming languages and real time operating systems for realtime applications. |

**Course Contents**

**Unit-I**

**Introduction –** Issues in Real Time Computing, Structure of a Real Time System, Task Classes, Performance Measures for Real Time Systems, Estimating Program Run Times. Task Assignment and Scheduling – Classical Uniprocessor scheduling algorithms, Uniprocessor scheduling of IRIS tasks, Task assignment, Mode changes, and Fault Tolerant Scheduling.

**Unit-II**

**Programming Languages and Tools –** Desired language characteristics, Data typing, Control structures, Facilitating Hierarchical Decomposition, Packages, Run – time (Exception) Error handling, Overloading and Generics, Multitasking, Low level programming, Task Scheduling, Timing Specifications, Programming Environments, Run – timesupport.

**Unit-III**

**Real time Databases –** Basic Definition, Real time vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two – phase Approach to improve Predictability, Maintaining Serialization Consistency, and Databases for Hard Real Time Systems.

**Unit-IV**

**Real – Time Communication –** Communications media, Network Topologies Protocols, Fault Tolerant Routing. Fault Tolerance Techniques – Fault Types, Fault Detection. Fault Error containment Redundancy, Data Diversity, Reversal Checks, Integrated Failurehandling.

**Unit-V**

**Reliability Evaluation Techniques –** Obtaining parameter values, Reliability models For Hardware Redundancy, Software error models. Clock Synchronization – Clock, A Non-fault Tolerant Synchronization Algorithm, and Impact of faults, Fault Tolerant Synchronization in Hardware, and Fault Tolerant Synchronization in software

**References:**

1. C.M. Krishna, Kang G. Shin.(1997). *Real Time Systems*. McGraw - Hill International Editions.
2. Albert M. K. Cheng.(2000).*Real-time systems: scheduling, analysis, and verification*. Wiley.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | 1 | 2 | 1 | - | - | 3 | - | 1 | 2 | 1 | 1 | 3 |
| CO2 | 1 | 1 | 2 | 2 | 1 | - | - | - | 2 | 2 | 1 | 2 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 3 | 1 | 1 | - | - | - | 3 | 2 | 1 | 2 | 1 | 2 | 2 |
| CO4 | 1 | 1 | 2 | 1 | 2 | - | - | - | 1 | - | 2 | 1 | 2 | 1 | 1 |
| CO5 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1.6** | **1.6** | **2.2** | **1.4** | **1.6** | **1** | **1** | **1** | **2.4** | **2** | **1.2** | **1.8** | **1.6** | **1.8** | **2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Image Processing**

**Course Code: 102716**

**Semester: 7th**

**Credits: 03** **L T P**
**3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Examine various types of image processing techniques. |
| CO2 | Develop image processing applications. |
| CO3 | Understand the rapid advances in Machine vision. |
| CO4 | Learn different techniques employed to enhance the images. |
| CO5 | Learn different causes for image degradation and overview of image restoration techniques. |

**Course Contents**

**Unit-I**

**Introduction:** Digital Image- Steps of Digital Image Processing Systems-Elements of Visual Perception -Connectivity and Relations between Pixels. Simple Operations- Arithmetic, Logical, Geometric Operations. 2D Linear Space Invariant Systems - 2D Convolution - Correlation 2D Random Sequence - 2D Spectrum.

Image Transforms: 2D Orthogonal and Unitary Transforms-Properties and Examples. 2D DFT-FFT – DCT, Histogram Equalization Technique- Point Processing-Spatial Filtering-In Space and Frequency -Nonlinear Filtering-Use of Different Masks.

**Unit-II**

**Image Restoration:** Image Observation And Degradation Model, Circulant And Block Circulant Matrices and Its Application In Degradation Model - Algebraic Approach to Restoration- Inverse By Wiener Filtering – Generalized Inverse-SVD And Interactive Methods - Blind Deconvolution-Image Reconstruction From Projections.

Image Compression: Redundancy and Compression Models -Loss Less and Lossy. Loss Less-

Variable-Length, Huffman, Arithmetic Coding - Bit-Plane Coding, Loss Less Predictive Coding Lossy Transform (DCT) Based Coding, JPEG Standard - Sub Band Coding.

**Unit-III**

**Image Segmentation:** Edge Detection - Line Detection - Curve Detection - Edge Linking and Boundary Extraction, Boundary Representation, Region Representation and Segmentation, Morphology-Dilation, Erosion, Opening and Closing. Hit and Miss Algorithms Feature Analysis

**Unit-IV**

**Colour and multispectral image processing:** Colour Image-Processing Fundamentals, RGB Models, HSI Models, Relationship Between Different Models.

**References:**

i. Rafael C.Gonzales , Richard E. Woods. (2010). *Digital Image Processing* .PearsonEducation.
ii. Sonka, Hlavac, Boyle CengageLearning. (2008.) *Digital Image Processing and Computer Vision*.
iii. Jain. (2010).*Fundamentals of Digital Image Processing*.Pearson Education.
iv. Chanda&Majmuder. (2003). *Digital Image Processing and Analysis*.PHI.
v. W. K. Pratt, John Wiley. (2006). *Digital Image Processing*.
vi. Duda, R.D. and Hart, P.E., Stork, D.G. (1997) .*Pattern Classification*.
vii. Richard O. Duda, Peter E. Hart and David G. Stork. (2001). *PatternClassification*.John Wiley& Sons.
viii. EarlGose, Richard Johsonbaugh and Steve Jost, Prentice Hall. (1999*). Pattern Recognition and Image Analysis.*

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 3 | 2 | - | - | - | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO2 | 2 | 1 | 2 | 2 | 3 | - | - | - | 2 | 1 | 2 | 2 | 1 | 2 | 2 |
| CO3 | 1 | 2 | 1 | 2 | 3 | - | - | - | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 2 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO5 | 1 | 2 | 2 | 2 | 3 | - | - | - | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.4** | **1.4** | **1.6** | **2.4** | **2.6** | **1** | **1** | **1** | **1.2** | **1.4** | **1.6** | **1.6** | **1.4** | **1.6** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Network Security**

**Course Code: 102710**

**Semester: 7th**

**L T P**

**Credits: 03** **3 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Analyze and evaluate the cyber security needs of an organization. |
| CO2 | Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation. |
| CO3 | Measure the performance and troubleshoot cyber security systems. |
| CO4 | Implement cyber security solutions and use of cyber security, information assurance and cyber/computer forensics software/tools |
| CO5 | Comprehend and execute risk management processes and methods and key risk &performance indicators |

**Course Contents**

**Unit-I**

**Attacks on Computers and Computer Security:** Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

**Cryptography:** Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

**Unit-II**

**Symmetric key Ciphers:** Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Crypt analysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution.

**Asymmetric key Ciphers:** Principles of public key cryp to systems, Algorithms (RSA, Diffie- Hellman, ECC), Key Distribution.

**Unit-III**

**Message Authentication Algorithms and Hash Functions:** Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsackalgorithm

**Authentication Applications:** Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

**Unit-IV**

**E-Mail Security:** Pretty Good Privacy, S/MIME
**IP Security:** IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, key management.

**Unit-V**

**Web Security:** Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

**Intruders, virus and Firewalls:** Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls

**Case Studies on Cryptography and security:** Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

**Reference Books**

1. C K Shyamala, N Harini, Dr T RPadmanabhan.(2013). *Cryptography and NetworkSecurity.*Wiley India.
2. ForouzanMukhopadhyay.(2010). *Cryptography and Network Security*. 2"" EditionMCGraw Hill.
3. Mark Stamp. (2011). *Information Security, Principles and Practice*. Wiley India.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 1 | 2 | - | - | - | 1 | 3 | 1 | 2 | 1 | 2 | 1 |
| CO2 | 2 | 1 | 2 | 2 | 3 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | 2 |
| CO3 | 2 | 2 | 1 | 2 | 2 | - | - | - | 2 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 3 | 2 | 1 |
| CO5 | 2 | 2 | 1 | 2 | 2 | - | - | - | 2 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.6** | **1.6** | **1.4** | **1.6** | **2.4** | **1** | **1** | **1** | **1.5** | **2** | **1.4** | **1.6** | **1.8** | **1.6** | **1.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Web Designing& Development Lab**

**Course Code: A102705**

**Semester: 7th**

**Credits: 02**

| L | T | P |
|---|---|---|
| 0 | 0 | 4 |

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statements** |
|---|---|
| CO1 | Develop a dynamic webpage by the use of java script. |
| CO2 | Connect a java program to a DBMS. |
| CO3 | Design a well formed and valid and XML and DHTML document. |
| CO4 | Examine a server side java application called Servlet to update and delete operations on DBMS table. |
| CO5 | Design a page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page. |

**Course Contents**

1. Create a basic web page to show use of head, title, and bodytag.
2. Create a web page to show use heading and text formattingtags.
3. Create a web page to show use img, ul, olandanchors.
4. Create a web page to show use tables and divtags.
5. Create a web page using class, id and inlinestyles.
6. Create a web page to create aform.
7. Create a web page to show an alert using javascript.
8. Show the use of get Element by Id in javascript.
9. Create a web page using variables, loop and Conditions in javascript.
10. Create a web page using Switch in javascript.
11. Create a web page to show use of jquery.
12. Create a web page to implement get & post in Ajax.
13. Create a web page to print your name using PHP.
14. Create a web page to show use of all data types in PHP
15. Create a web page to show use loops &Conditional Statement.
16. Create a web page to show use arrays in PHP.

17. Create database and tables in MySQL.
18. Fetch and display data from MySQL table in a web page using PHP.
19. File upload to server using PHP.
20. Working with cookies and sessions.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 1 | 2 | - | 1 | - | 1 | 2 | 2 | 1 | 2 | 1 | 2 |
| CO2 | 1 | 2 | 3 | 3 | 3 | - | - | - | 2 | 1 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 2 | 2 | 2 | 2 | - | - | - | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| CO4 | 2 | 3 | 3 | 1 | 2 | - | - | - | 2 | 1 | 2 | 1 | 2 | 2 | 3 |
| CO5 | 2 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |
| **Average** | **1.8** | **2** | **2.6** | **1.8** | **2.2** | **1** | **1** | **1** | **1.4** | **1.6** | **1.6** | **1.6** | **1.4** | **1.6** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Programming Using ASP.NET Lab**

**Course Code: 102712**

**Semester: 7th**

**Credits: 02** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Create user interactive web pages using ASP.Net. |
| CO2 | Determine simple data binding applications using ADO.Net connectivity. |
| CO3 | Performing Database operations for Windows Form and web applications. |
| CO4 | Examine the concept of class, constructor and access modifiers |
| CO5 | Understand the exception handling mechanism. |

**Course Contents**

1. Familiarization with IDE
2. Programming Console applications using VB.NET covering all aspects ofVB.NET Fundamentals
3. Object oriented programming using VB.NET covering objects, Inheritance, Polymorphism, Constructors, Static Classes, Interfaces
4. Programs to illustrate Exception Handling concepts
5. Programs to illustrate use of Collections
6. Programs to perform File I/O Operations
7. Programming Windows applications using VB.NET covering all major controls and components, Menus, MDI, Event Handling

8. Creating windows installer

9. Programs to interact with Database from a Windows Desktop Application

10. Programming to Build web applications using web controls, maintaining state

11. Deploying ASP.NET web application

12. Programs to interact with Database from a Web Application using appropriate controls
13. Programs to create and consume a WebService.

**The mapping of PO/PSO/CO attainment is as follows**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 3 | 2 | - | 1 | - | 1 | 3 | 2 | 1 | 1 | 3 | 1 |
| CO2 | 1 | 3 | 2 | 3 | 3 | - | - | - | 2 | 2 | 3 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 2 | 1 | 2 | 2 | - | - | - | 3 | 1 | 2 | 2 | 2 | 1 | 3 |
| CO4 | 1 | 2 | 2 | 1 | 2 | - | - | - | 1 | 2 | 2 | 1 | 2 | 2 | 2 |
| CO5 | 2 | 2 | 3 | 2 | 2 | 1 | - | 1 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| **Average** | **1.6** | **2** | **2** | **2.2** | **2.2** | **1** | **1** | **1** | **2** | **2** | **2.4** | **1.6** | **1.6** | **2.2** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Management Information System Lab**

**Course Code: A102704**

**Semester: 7th**

**Credits: 01** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Describe The Role of Information Technology and Information Systems in Business. |
| CO2 | Analyze how information technology impacts a firm and interpret how to use information technology to solve business problems |
| CO3 | Identity the role played by the six major types of information systems in organizations and their relationship to each other. |
| CO4 | Define the types of information systems supporting the major functional areas of the business. |

**Course Contents**

**Students have to perform case studies and give seminars on the following topics:**

1. Study of MIS and its concept in details.

2. Study of Physical and conceptual structure of MIS.

3. Study of DSS, its user and classes with Simon's Model

. 4. Study of GDSS, its users and classes.

5. Study of Information System and its types.

6. Study of System and its Kinds.

7. To discuss the concept of organization.

8. Study of ERP and implementation.

9. ERP life cycle model and scope of ERP in Marketing.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 1 | 2 | - | 1 | 1 | 3 | 3 | 2 | 1 | 1 | 3 | 1 |
| CO2 | 1 | - | 1 | 2 | 1 | - | - | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO3 | 1 | - | 2 | 1 | 2 | 1 | - | 2 | 3 | 2 | 2 | 1 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 1 | 2 | 1 | - | - | 1 | 3 | 3 | 3 | 1 | 1 | 1 | 1 |
| CO5 | 1 | 1 | 2 | 2 | 2 | - | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 2 |
| **Average** | **1.2** | **1** | **1.6** | **1.6** | **1.6** | **1** | **1** | **1.4** | **2.8** | **2.4** | **2.4** | **1.4** | **1.4** | **2.4** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Real Time System Lab**
**Course Code: 102714**

**Semester: 7th**

**Credits: 01** **L T P**

**0 0 4**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Understand fundamental principles for programming of real time systems with time and resource limitations. |
| CO2 | Describe the foundation of programming languages developed for real time System. |
| CO3 | Describe how real time operating systems are designed and functions. |
| CO4 | Distributed real time systems |
| CO5 | Detects the faults in real time system. |

**Course Contents**

1. Programming languages intended for real time systems, support in ordinary programming languages, e.g. "Ada tasking"
2. Real time operating system (RTOS).
3. System support: scheduling, resource handling. Design and analysis of real time system software.

   Modeling and verification of real time systems. Reliability and fault tolerance.

4. Interrupts. Fault recovery.

5. Distributed real time systems. Real time communication.

6. Real time systems for multiprocessor systems

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |
| CO3 | 2 | - | 1 | 2 | 2 | - | - | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 |
| CO4 | 1 | 1 | 2 | 1 | 1 | - | - | - | 2 | 1 | 2 | 1 | 1 | 2 | 2 |
| CO5 | 2 | 1 | 2 | 2 | 2 | - | - | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 |
| **Average** | **1.6** | **1.3** | **1.6** | **1.6** | **1.6** | **1.0** | **1.0** | **1.0** | **1.4** | **1.4** | **1.6** | **2.0** | **1.6** | **1.6** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Project II**

**Course Code: 102717**

**Semester: 7th**

**Credits: 02** **L T P**

**0 0 6**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Use latest multimedia devices and programming software. |
| CO2 | Design and construct a hardware and software system, component or process to meet desired needs. |
| CO3 | Do work on multidisciplinary Problems. |
| CO4 | Work as professionals, with portfolio ranging from data management, network configuration, designing hardware, database and software design to management and administration of entire systems. |

**Course Contents**

1.Project should include following phases: System Analysis and Design

2.Coding - Implementation Testing

3.It should be a working project Must have a future perspective

4.The Domain of project can be from: Databases

5.Application software

6.System software

7.Multimedia

8.Web Applications, etc.

A complete project report must be submitted along with softcopy of project. Project report may include Requirements of Project, Flow Chart, DFD's, Coding and Test Results

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 3 | 2 | 3 | - | - | - | - | 1 | 1 | 3 | 3 | 3 | 3 |
| CO2 | 2 | 3 | 1 | 2 | 1 | - | - | - | 1 | - | 2 | 2 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 3 | 1 | 2 | - | - | - | 2 | - | 1 | 2 | 2 | 1 | 3 |
| CO4 | 1 | 3 | 1 | 1 | 1 | | - | - | 1 | 1 | 2 | 1 | 3 | 2 | 2 |
| CO5 | 2 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| **Average** | **2.0** | **2.0** | **2.2** | **1.6** | **1.8** | **1.0** | **1.0** | **1.0** | **1.3** | **1.3** | **1.4** | **2.0** | **2.4** | **2.0** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Software Project Management**

**Course Code: 102806**

**Semester: 8th**

**Credits: 04** **L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Identify the different project contexts and suggest an appropriate management strategy. |
| CO2 | Practice the role of professional ethics in successful software development. |
| CO3 | Identify and describe the key phases of project management. |
| CO4 | Determine an appropriate project management approach through an evaluation of the business context and scope of the project. |
| CO5 | Assess life cycle phases to develop a project |

**Course Contents**

**Unit-I**

**Conventional Software Management:** The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation. Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

**Unit-II**

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, Transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective

and technical perspective. Work Flows of the process: Software process workflows, Iteration workflows, Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.

**Unit-III**

**Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment. Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates.

**Unit-IV**

**Standards:** Introduction to standards - ISO 9002 and ISO 9003 - Quality system development, ISO 9000 standard for software, Understanding ISO 900-3 clauses, SEI model –

capability Maturity model - Five levels Bootstrap method, Implementing ISO 9000, Analysis the Quality system, Documenting & Auditing quality system, ISO 9000 registration process & Accreditation System, Total Quality Management Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions. Department of Computer Science and Engineering

**Case Study:** The command Center Processing and Display system- Replacement (CCPDS-

**References:**

1. Walker Royce. (2005). *Software Project Management.*Pearson Education.
2. Somerville. (2013). *Software Engineering*.Addison Wesley.
3. Bob Hughes and Mike Cotterell. (2012). *Software ProjectManagement.* Tata McGraw-Hill Edition.
4. Joel Henry. (2004). *Software Project Management*. Pearson Education.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 2 | 2 | - | - | - | 3 | 1 | 2 | 1 | 3 | 1 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 2 | 3 | 2 | 3 | - | - | - | 3 | 3 | 1 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 1 | 2 | 3 | 2 | - | - | - | 1 | 2 | 2 | 1 | 2 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 3 | - | - | - | 3 | 2 | 2 | 2 | 3 | 2 | 3 |
| **Average** | **1.8** | **1.8** | **2.6** | **2.2** | **2.6** | **1** | **1** | **3** | **2.4** | **2** | **1.8** | **1.6** | **2.2** | **1.6** | **2.6** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Adhoc & Sensor Network**

**Course Code: 102807**

**Semester: 8th**

**Credits: 04** **L T P**
**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Demonstrate the knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand and hybrid. |
| CO2 | Identify the issues and challenges in providing QoS |
| CO3 | Explain about the energy management in adhoc networks. |
| CO4 | Examine various types of mesh networks. |
| CO5 | Compare and contract information about sensor networks |

**Course Contents**

**Unit-I**

**Introduction to Ad Hoc Wireless Networks:** Characteristics of MANETs, Applications of MANETs, Challenges. Routing in MANETs: Topology-based versus Position-based approaches, Topology based routing protocols, Position based routing, Other Routing Protocols.

**Unit-II**

**Data Transmission in MANET's:** The Broadcast Storm, Multicasting, Geocasting TCP over Ad Hoc Networks: TCP Protocol overview, TOP and MANETs, Solutions for TOP over Ad Hoc. Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing-

**Unit-III**

**Basics of Wireless Sensors and Applications:** The Mica Mote, Sensing and Communication Range, Design issues, Energy consumption, Clustering of Sensors, Applications. Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

## Unit-IV

**Data Retrieval in Sensor Networks:** Classification of WSNs, MAC layer, Routing layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

**Reference Books**

1. C Siva Ram Murthy, B.S.Murthy. (2004). *Adhoc Wireless Networks Architecturesand Protocols.* Pearson Education.
2. Fei Hu, XiaojunCao,AnAuerbach book, CRC Press. (2010*). WirelessSensor Networks — Principles andPractice.*Taylor &Francis Group.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 1 | 2 | - | 1 | - | 1 | 1 | 2 | 3 | 3 | 1 | 1 |
| CO2 | 3 | 2 | 3 | 2 | 3 | - | - | - | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 1 | 2 | 2 | 1 | - | - | - | 3 | 2 | 1 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 2 | 1 | 1 | 2 | - | - | - | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| CO5 | 2 | 3 | 2 | 2 | 3 | 1 | - | 1 | 3 | 2 | 1 | 2 | 3 | 2 | 3 |
| **Average** | **2.2** | **1.8** | **2** | **1.6** | **2.2** | **1** | **1** | **1** | **2** | **1.6** | **1.6** | **2.2** | **2.2** | **1.6** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Advanced Computer Architecture**

**Course Code: 102805**

**Semester: 8th**

**Credits: 04** **L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Examine pipelining, instruction set architectures and memory addressing. |
| CO2 | describe the performance metrics of microprocessors, memory, networks and disks |
| CO3 | Use various techniques to enhance processors ability to exploit Instruction-level parallelism (ILP) and its challenges. |
| CO4 | Illustrate exploiting ILP using dynamic scheduling, multiple issue and speculation. |
| CO5 | Assess multithreading by using ILP and supporting thread-level parallelism (TLP). |

**Course Contents**

**Unit-I**

**Review of Pipelining**: Examples of some pipeline in modern processors, pipeline hazards, data hazards, control hazards. Techniques to handle hazards, performance improvement with pipelines and effect of hazards on the performance.

**Unit-II**

**Vector processors-** Use and effectiveness, memory to memory vector architectures, vector register architecture, vector length and stride issues, compiler effectiveness in vector processors.

**Unit-III**

**SISD:-** MISD, MIMD, Single instruction multiple data stream (SIMD) architectures. Array processors, comparison with vector processors, and example of array processors such as MMX Technology.

**Memory hierarchy:-** Cache Introduction, Techniques to reduce cache misses, techniques to reduce cache penalties, technique to reduce cache hit times. Effect of main memory bandwidth,

effect of bus-width, memory access time, virtual memory, etc.

**Unit-IV**

**RISC architectures**: addressing modes, instructions formats, effect of simplification on the performance, example processors such as MIPS, PA-RISC, SPARC, Power PC,etc.

**Unit-V**

**MIMID :-**Multiprocessors, Centralized shared architectures, distributed shared memory architectures, synchronization and memory consistency models, message passing architectures, comelier issues. Data flow architectures, Interconnection networks.

**Reference:**

1. Hwang, K. (1993). *Advanced Computer architecture with parallel programming*. McGraw Hill.
2. Carter. (2017). *Computer Architecture Schaum Series.* TMH.
3. Patterson D.A. and Hennessy, J.L.(1996). *Computer architecture a quantitative approach*. 2nd ed., Morga Kaufman.
4. Hwang & Briggs.(1993). *Computer Architecture & Parallel Processing*. TMH

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 3 | 1 | - | - | - | 1 | 1 | 2 | 1 | 3 | 1 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 1 | - | - | - | 2 | 1 | 2 | 2 | 1 | 2 | 3 |
| CO3 | 2 | 1 | 1 | 2 | 2 | - | - | - | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 2 | 1 | 1 | 2 | 2 | - | - | - | 1 | 1 | 2 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 2 | 2 | 2 | 1 | - | - | - | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| **Average** | **1.6** | **1.4** | **1.4** | **2.2** | **1.4** | **0** | **0** | **0** | **1.2** | **1.4** | **1.6** | **1.6** | **2** | **1.4** | **2.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: E-Commerce**
**Course Code: 102802**

**Semester: 8th**

**Credits: 04** **L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Demonstrate and understand the foundations and importance of E-commerce |
| CO2 | Analyze branding and pricing strategies of E-commerce |
| CO3 | Describe Internet trading relationships such as Business to Consumer, Business-to-Business and Intra-organizational. |
| CO4 | Restate the infrastructure for E-commerce. |
| CO5 | Describe the key features of Internet, Intranets and Extranets and their relation to each other. |

## Course Contents

### Unit-I

**Introduction to E-Commerce :** Definition, Scope of E-Commerce, Hardware requirements, Ecommerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.

### Unit-II

**Business to Business E-Commerce:** Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce.

**Unit-III**

**Legal issues:** Risks, Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable onlinecontract.

**Unit-IV**

**Security Issues:** Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic Cash over internet, Internet Security.

**Unit-V**

**Business to Consumer E-Commerce:** Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.

**Unit-VI**

**E-business:** Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E- Diversity, Case studies through internet.

**References**

1. David Whitley.(2017). *E-Commerce-Strategy, Technologies & Applications*. TMH.

2. Kamlesh K. Bajaj.(2017). *E-Commerce- The cutting edge of business.* TMH.

3. W Clarke-BPB.(2018). *E-Commerce through ASP*.

4. Mathew Reynolds, WroxPublishers Beginning. (2000). *E-Commerce with VB, ASP, SQL Server 7.0 & MTS.*

5. J. Christopher Westland and Theodore H. K Clark. (1999).*Global Electronic Commerce-Theory and Case Studies*. University Press.

**The mapping of PO/PSO/CO attainment is as follows**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 1 | 1 | - | - | - | 1 | 1 | 2 | 1 | 2 | 1 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 1 | 1 | - | - | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| CO3 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 1 |
| CO4 | 1 | 2 | 2 | 1 | 1 | - | - | - | 2 | 1 | 2 | 1 | 1 | 1 | 3 |
| CO5 | 2 | 1 | 3 | 2 | 1 | - | - | - | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| **Average** | **1.6** | **1.4** | **2.6** | **1.6** | **1** | **1** | **1** | **2** | **1.4** | **1.6** | **2.2** | **1.6** | **1.6** | **1** | **1.8** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Machine Learning**

**Course Code: 102803**

**Semester: 8th**

**Credits: 04** **L T P**
**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Gain knowledge about basic concepts of Machine Learning. |
| CO2 | Implement machine learning techniques suitable for a given problem |
| CO3 | Solve the problems using various machine learning techniques |
| CO4 | Apply Dimensionality reduction techniques. |
| CO5 | Design application using machine learning techniques. |

**Course Contents**

**Unit-I**

**Supervised Learning (Regression/Classification) Basic methods:** Distance-based methods, Nearest-Neighbors', Decision Trees. Naive Bayes Linear models: Linear Regression, Logistic Regression, Generalized Linear.Models Support Vector Machines, Nonlinearity and Kernel Methods. Beyond Binary Classification: Multi-class/Structured Outputs, Ranking

**Unit-II**

**Unsupervised Learning Clustering:** K-means/Kernel K-means.Dimensionality Reduction: PCA and kernel PCA. Matrix Factorization and Matrix Completion Generative Models (mixture models and latent factor models)

**Unit-III**

**Evaluating Machine Learning algorithms**: Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests).

**Unit-IV**

**Sparse Modeling and Estimation**:- Modeling Sequence/Time-Series Data, Deep Learning

and Feature Representation Learning.

**Unit-V**

**Scalable Machine Learning (Online and Distributed Learning)** A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference.

**Unit-VI**

**Recent trends** in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications.

**References:**

1. Kevin Murphy. (2012). *Machine Learning: A Probabilistic Perspective*. MITPress.

2. Trevor Hastie, Robert Tibshirani, Jerome Friedman. (2009*). The Elements of Statistical Learning.* Springer.

3. Christopher Bishop. (2007). *Pattern Recognition and Machine Learning*. Springer.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 3 | 2 | 3 | 2 | - | - | - | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| CO2 | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | 1 | 2 | 3 | 1 | 3 |
| CO3 | 2 | 3 | 1 | 2 | 2 | - | - | - | 1 | - | 1 | 2 | 3 | 1 | 2 |
| CO4 | 1 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 1 | 3 | 1 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 2 | - | - | - | 1 | 1 | - | 2 | 1 | 2 | 2 |
| **Average** | **1.6** | **2.6** | **2** | **2.4** | **2.2** | **0** | **0** | **0** | **1** | **1** | **1** | **1.6** | **2.2** | **1.4** | **2.2** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

**Course Name: Big Data**

**Course Code: 102804**

**Semester: 8th**

**Credits: 04** **L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

| CO | **Statement** |
|---|---|
| CO1 | Develop a dynamic webpage by using java script. |
| CO2 | Connect a java program to a DBMS. |
| CO3 | Design a well formed and valid XML and DHTML document. |
| CO4 | Write a server side java application called Servlet to update and delete operations on DBMS table. |
| CO5 | Design a page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page. |

**Course Contents**

**Unit-I**

**Introduction to Big Data:** Overview of Big Data, Stages of analytical evolution, Challenges of Conventional Systems, Intelligent data analysis, Nature of Data, Analytic Processes and Tools, Analysis vs. Reporting, Modern Data Analytic Tools, Statistical Concepts: Sampling Distributions - Re-Sampling, Statistical Inference - Prediction Error

**Unit-II**

**Mining Data Streams:** Introduction To Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Oneness in a Window, Decaying Window, Real time Analytics Platform(RTAP) Applications

**Unit-III**

**Hadoop:** History of Hadoop, The Hadoop Distributed File System, Components of Hadoop, Analyzing the Data with Hadoop, Scaling Out- Hadoop Streaming, Design of HDFS-Java

interfaces to HDFSBasics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run-Failures, Job Scheduling-Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features

**Unit-IV**

**Frameworks:** Applications on Big Data Using Pig and Hive, Data processing operators in Pig Hive services, HiveQL, Querying Data in Hive, Fundamentals of HBase and Zookeeper, Visualizations: Visual data analysis techniques, interaction techniques. Systems and applications

**References:**

1. Michael Berthold, David J. Hand. (2007*). Intelligent Data Analysis. Springer.*
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos.(2012).*Understanding Big Data: Analytics for Enterprise ClassHadoop and* Tom White, Hadoop.(2012). *The Definitive Guide Third Edition. O'reillyMedia*.
3. AnandRajaraman and Jeffrey David Ullman. (2012). *Mining of Massive Datasets.* Cambridge UniversityPress.
4. Bill Franks. (2012*). Taming the Big Data Tidal Wave: Finding Opportunitiesin Huge Data Streams with AdvancedAnalytics.* JohnWiley&sons.

**The mapping of PO/PSO/CO attainment is as follows:**

| PO/PSO/ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 3 | 3 | - | - | - | 1 | 1 | 2 | 1 | 2 | 3 | 1 |
| CO2 | 1 | 3 | 2 | 2 | 2 | - | - | - | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO3 | 2 | 2 | 3 | 3 | 2 | - | - | - | 2 | 2 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 3 | 2 | 2 | 2 | - | - | - | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO5 | 2 | 2 | 3 | 3 | 3 | - | - | - | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| **Average** | **1.8** | **2.2** | **2.6** | **2.6** | **2.4** | **0** | **0** | **0** | **1.2** | **1.6** | **1.6** | **1.6** | **1.6** | **2.4** | **1.4** |

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

| | |
|---|---|
| Total Number of Course | 85 |
| Number of Theory Course | 50 |
| Number of Practical Course | 27 |
| Number of Non Credits | 5 |
| Number of Theory as well as Practical Course | 2 |
| Number of neither Theory nor Practical Course | 1 |
| Total Number of Credits | 177 |

**Annexure-4**

## ACADEMIC INSTURCTIONS

### Attendance Requirements

A student shall have to attend 75% of the scheduled periods in each course in a semester; otherwise he / she shall not be allowed to appear in that course in the University examination and shall be detained in the course(s). The University may condone attendance shortage in special circumstances (as specified by the Guru Kashi University authorities). A student detained in the course(s) would be allowed to appear in the subsequent university examination(s) only on having completed the attendance in the program, when the program is offered in a regular semester(s) or otherwise as per the rules.

### Assessment of a course

Each course shall be assessed out of 100 marks. The distribution of these 100 marks is given in subsequent sub sections (as applicable).

| | Internal (40) | | | | | | External (60) | Total |
|---|---|---|---|---|---|---|---|---|
| **Components** | **Attendance** | **Assignment** | | | **MST 1** | **MST2** | **ETE** | |
| | | A1 | A2 | A3 | | | | |
| | | | | | | | | |
| Weightage | 10 | 10 | 10 | 10 | 30 | 30 | 60 | |
| Average Weightage | 5 | 5 | | | 30 | | 40 | 100 |

### Passing Criteria

The students have to pass both in internal and external examinations. The minimum passing marks to clear in examination is 40% of the total marks.