# COURSE STRUCTURE

## For

# B.Tech.

## Information Technology

(*from 2024 Admitted batch onwards*)



Learning is Supreme Deity

# PRAGATI ENGINEERING COLLEGE

**(An Autonomous Institution)**
ADB Road, Surampalem, Kakinada District, A.P.-533 437
**(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada)**
**(Recognized by UGC under sections 2 (f) and 12 (b) of UGC act, 1956)**

## OURSE STRUCTURE

## INDUCTIONPROGRAMME

| S.No. | Course Name | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | Physical Activities--Sports, Yoga and Meditation, Plantation | MC | 0 | 0 | 6 | 0 |
| 2 | Career Counseling | MC | 2 | 0 | 2 | 0 |
| 3 | Orientation to all branches--career options, tools, etc. | MC | 3 | 0 | 0 | 0 |
| 4 | Orientation on admitted Branch--corresponding labs, tools and platforms | EC | 2 | 0 | 3 | 0 |
| 5 | Proficiency Modules & Productivity Tools | ES | 2 | 1 | 2 | 0 |
| 6 | Assessment on basic aptitude and mathematical skills | MC | 2 | 0 | 3 | 0 |
| 7 | Remedial Training in Foundation Courses | MC | 2 | 1 | 2 | 0 |
| 8 | Human Values &Professional Ethics | MC | 3 | 0 | 0 | 0 |
| 9 | Communication Skills –focus on Listening, Speaking, Reading, Writing skills | BS | 2 | 1 | 2 | 0 |
| 10 | Concepts of Programming | ES | 2 | 0 | 2 | 0 |

## Department of Information Technology
**2024-2025 Admitted Batch**
COURSE STRUCTURE
**I YEAR – I SEMESTER**

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | 24BE101T | Communicative English | 2 | 0 | 0 | 2 |
| 2 | BS&H | 24BM101T | Linear Algebra and Calculus | 3 | 0 | 0 | 3 |
| 3 | BS&H | 24BC101T | Chemistry | 3 | 0 | 0 | 3 |
| 4 | Engineering Science | 24CM101T | Basic Civil and Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5 | Engineering Science | 24CS101T | Introduction to Programming | 3 | 0 | 0 | 3 |
| 6 | Engineering Science | 24ME102P | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 7 | BS&H | 24BE101P | Communicative English Laboratory | 0 | 0 | 2 | 1 |
| 8 | Engineering Science | 24CS101P | Computer Programming Laboratory | 0 | 0 | 3 | 1.5 |
| 9 | BS&H | 24BC101P | Chemistry Laboratory | 0 | 0 | 2 | 1 |
| 10 | BS&H | 24MH101P | Health and wellness, Yoga and sports | 0 | 0 | 1 | 0.5 |
| **Total Credits** | | | | | | | **19.5** |

**I YEAR – II SEMESTER**

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | 24BP201T | Engineering Physics | 3 | 0 | 0 | 3 |
| 2 | BS&H | 24BM201T | Differential equations and Vector Calculus | 3 | 0 | 0 | 3 |
| 3 | Engineering Science | 24EE201T | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 |
| 4 | Engineering Science | 24ME201T | Engineering Graphics | 1 | 0 | 4 | 3 |
| 5 | Professional Core | 24CS201T | Data Structures | 3 | 0 | 0 | 3 |
| 6 | BS&H | 24BP201P | Engineering Physics Laboratory | 0 | 0 | 2 | 1 |
| 7 | Engineering Science | 24EE201P | Electrical and Electronics Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 8 | Professional Core | 24CS201P | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | Engineering Science | 24IT201P | IT Workshop | 0 | 0 | 2 | 1 |
| 10 | BS&H | 24MH202P | NSS/NCC/Scouts and Guides/Community Service | 0 | 0 | 1 | 0.5 |
| **Total Credits** | | | | | | | **20.5** |

## II YEAR – I SEMESTER

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | 24BM304T | Discrete Mathematics & Graph Theory | 3 | 0 | 0 | 3 |
| 2 | BS&H | 24HM301T | Universal Human Values– Understanding Harmony | 2 | 1 | 0 | 3 |
| 3 | Engineering Science | 24EC305T | Digital Logic & Computer Organization | 3 | 0 | 0 | 3 |
| 4 | Professional Core | 24CS301T | Advanced Data Structures & Algorithm Analysis | 3 | 0 | 0 | 3 |
| 5 | Professional Core | 24CS302T | Object Oriented Programming Through Java | 3 | 0 | 0 | 3 |
| 6 | Professional Core | 24CS301P | Advanced Data Structures and Algorithm Analysis Laboratory | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | 24CS302P | Object Oriented Programming Through Java Laboratory | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement Course | 24AI301S | Python Programming | 0 | 1 | 2 | 2 |
| 9 | Audit Course | 24BC301T | Environmental Science | 2 | 0 | 0 | - |
| **Total Credits** | | | | **16** | **2** | **8** | **20** |

## II YEAR – II SEMESTER

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | Management Course- I | 24ME405T | Optimization Techniques | 2 | 0 | 0 | 2 |
| 2 | Engineering Science/ Basic Science | 24BM402T | Probability & Statistics | 3 | 0 | 0 | 3 |
| 3 | Professional Core | 24CS401T | Operating Systems | 3 | 0 | 0 | 3 |
| 4 | Professional Core | 24IT401T | Database Management Systems | 3 | 0 | 0 | 3 |
| 5 | Professional Core | 24CS402T | Software Engineering | 2 | 1 | 0 | 3 |
| 6 | Professional Core | 24CS402P | Operating Systems & Software Engineering Laboratory | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | 24IT401P | Database Management Systems Laboratory | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement Course | 24IT401S | Python with DJango | 0 | 1 | 2 | 2 |
| 9 | BS&H | 24HM401P | Design Thinking & Innovation | 1 | 0 | 2 | 2 |
| **Total Credits** | | | | **14** | **2** | **10** | **21** |
| Mandatory Community Service Project Internship of 08 weeks  duration during summer vacation | | | | | | | |

**I Year I Semester**
**COMMUNICATIVE ENGLISH**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)**

| Course Category | Humanities | | Course Code | 24BE101T |
|---|---|---|---|---|
| Course Type | Theory | | **L-T-P-C** | 2-0-0-2 |
| Prerequisites | LSRW Skills. | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. |
| 2 | It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. |
| 3 | This course helps the students to make them effective in speaking and writing skills and to make them industry ready. |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| CO1 | Understand the context, topic, and pieces of specific information from social or Transactional dialogues. | K2 |
| CO2 | Apply grammatical structures to formulate sentences and correct word forms. | K3 |
| CO3 | Analyze discourse markers to speak clearly on a specific topic in informal discussions. | K4 |
| CO4 | Evaluate reading/listening texts and to write summaries based on glob | K5 |
| CO5 | Create a coherent paragraph, essay, and resume. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 2 | - | - |

**COURSE CONTENT**

**UNIT I**
**Lesson: HUMAN VALUES: Gift of Magi (Short Story)**
**Listening:** Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
**Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
**Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.
**Writing:** Mechanics of Writing- Capitalization, Spellings, Punctuation-Parts of Sentences.
**Grammar:** Parts of Speech, Basic Sentence Structures- forming questions.
**Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

**UNIT II**
**Lesson: NATURE:  The Brook by Alfred Tennyson (Poem)**
**Listening:** Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
**Speaking:** Discussion in pairs/ small groups on specific topics followed by short structure talks.
**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
**Writing:** Structure of a paragraph - Paragraph writing (specific topics)
**Grammar:** Cohesive devices – linkers, use of articles and zero article; Prepositions.
**Vocabulary:** Homonyms ,Homophones, Homographs.

**UNIT III**
**Lesson: BIOGRAPHY: ElonMusk**
**Listening:** Listening for global comprehension and summarizing what is listened to.
**Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed.
**Reading:** Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
**Writing:** Summarizing, Note-making, paraphrasing.
**Grammar:** Verbs-tenses; subject-verb agreement; Compound words, Collocations.
**Vocabulary:** Compound words, Collocations.

**UNIT IV**
**Lesson: INSPIRATION: The Toys o f Peace by Saki**
**Listening :** Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
**Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
**Reading :** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
**Writing:** Letter Writing: Official Letters, Resumes
**Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice
**Vocabulary :** Words often confused, Jargons.

**UNIT V**
**Lesson: MOTIVATION : The Power of Intrapersonal Communication (An Essay)**
**Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
**Speaking:** Formal oral presentations on topics from academic contexts.
**Reading:** Reading comprehension.
**Writing:** Writing structured essays on specific topics.
**Grammar:** Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
**Vocabulary :** Technical Jargons.

**TEXT BOOKS**
1. Path finder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023. (Units1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023(Units4 &5).

**REFERENCE BOOKS**
1. Dubey, ShamJi & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press,2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

**WEB RESOURCES**
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

**VOCABULARY**
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

**I Year I Semester**
**LINEAR ALGEBRA AND CALCULUS**
**(Common to All Branches)**

| **Course Category** | Basic Sciences | | **Course Code** | 24BM101T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | Matrix Algebra, Limits, Continuity, Differentiability and inerrability | **Continuous Internal Assessment** **Semester End Examination** **Total Marks** | | 30 70 100 |

| COURSE OBJECTIVES |
|---|
| To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Developanduseofmatrixalgebratechniquesthatareneededbyengineersforpractical applications. | K3 |
| **CO2** | Find the Eigen values and Eigen vectors and able to reduce the given quadratic form into canonical form by orthogonal transformation. | K3 |
| **CO3** | Utilize mean value theorems to real life problems. | K3 |
| **CO4** | Familiarize with functions of several variables which is useful in optimization & learn important tools of calculus in higher dimensions | K3 |
| **CO5** | Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| **Contribution of Course Outcomes towards achievement of Program Outcomes** **(1 – Low, 2 - Medium, 3 – High)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO3** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO4** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO5** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |

## COURSE CONTENT
### UNIT I - Matrices:
Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, **System of linear equations**: Solving system of Homogeneous linear equations and solving Non-Homo generous linear equations by Gauss elimination method, Gauss Jacobi and Gauss Seidel Iteration Methods.

### UNIT II - Eigen values, Eigenvectors and Orthogonal Transformation:
Eigen values, Eigenvectors and their properties, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Diagonalization of a matrix, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT III - Calculus:
Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems. Taylor's and Maclaurin series.

### UNIT IV - Partial differentiation and Applications (Multi variable calculus):
**Functions of several variables**: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

### UNIT V - Multiple Integrals (Multi variable Calculus):
Double integrals, change of order of integration, triple integrals, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

## TEXT BOOKS
1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

## REFERENCE BOOKS
1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition.
5. Higher Engineering Mathematics, H. K Das, Er. RajnishVerma, S. Chand Publications,2014, Third Edition (Reprint 2021)
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22nd Edition(Reprint 2022).

## WEB RESOURCES
1. https://en.wikipedia.org/wiki/System_of_linear_equations
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://www.math.hmc.edu/calculus/tutorials/eigenstuff/
4. https://en.wikipedia.org/wiki/Quadratic_form
5. https://en.wikipedia.org/wiki/Calculus
6. https://en.wikipedia.org/wiki/Partial_derivative
7. https://www.whitman.edu/mathematics/calculus_online/section14.03.html
8. https://en.wikipedia.org/wiki/Multiple_integral
9. http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx

**I Year I Semester**
**BASIC CIVIL AND MECHANICAL ENGINEERING**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Engineering Science | Course Code | 24CM101T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| **Prerequisites** | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

**PART-A : BASIC CIVIL ENGINEERING**

| COURSE OBJECTIVES | |
|---|---|
| 1 | Get familiarized with the scope and importance of Civil Engineering sub-divisions |
| 2 | Introduce the preliminary concepts of surveying. |
| 3 | Acquire preliminary knowledge on Transportation and its importance in nation's economy. |
| 4 | Get familiarized with the importance of quality, conveyance and storage of water. |
| 5 | Introduction to basic civil engineering materials and construction techniques. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Enlist various basic characteristics and sub-divisions of Civil Engineering, pre-fabricated materials and technology to appreciate their role in ensuring better society. | K2 |
| CO2 | Illustrate the concepts of surveying and basics of Foundation Engineering. | K3 |
| CO3 | Know the significance of various domains in transportation engineering and be acquitted with types of pavements. Get an overview about Environmental Engineering and Water Resource Engineering. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| **Contribution of Course Outcomes towards achievement of Program Outcomes** **(1 – Low, 2 - Medium, 3 – High)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 |
| CO3 | 1 | 1 | 1 | - | - | 2 | - | - | 1 | - | - | 1 |

**COURSE CONTENT**

**UNIT I**
**Basics of Civil Engineering:** Role of Civil Engineers in Society- Various Disciplines of Civil Engineering-Structural Engineering- Geo-technical Engineering- Transportation Engineering -Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning-Construction Materials-Cement- Aggregate -Bricks-Stones-Sand-Cement Concrete-Steel-Timber. Introduction to Prefabricated construction Techniques.

**UNIT II**
**Surveying :** Objectives of Surveying- Horizontal Measurements- Angular MeasurementsIntroduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.
**Foundations:** Types of foundations — Bearing capacity and settlement — Requirement of good foundations.

**UNIT III**
**Transportation Engineering:** Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.
**Water Resources and Environmental Engineering**: Introduction, Sources of water- Quality of water-Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

**TEXT BOOKS**
1. Basic Civil Engineering, M.S.Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, SatheeshGopi, Pearson Publications, 2009, First Edition.

**REFERENCE BOOKS**
1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

**WEB RESOURCES**
1. https://nptel.ac.in/courses/105101087
2. https://nptel.ac.in/courses/105104101
3. https://nptel.ac.in/courses/105104103

## PART – B: BASIC MECHANICAL ENGINEERING

| COURSE OBJECTIVES | |
|---|---|
| 1 | Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries. |
| 2 | Explain different engineering materials and different manufacturing processes. |
| 3 | Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Understand the different manufacturing processes. | K2 |
| CO2 | Explain the basics of thermal engineering and its applications. | K3 |
| CO3 | Describe the working of different mechanical power transmission systems, power plants and basics of robotics and its applications. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes  (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | 2 | - |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | 2 | - |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | 2 | - |

**COURSE CONTENT**
**UNIT –I -**
**Introduction to Mechanical Engineering:**  Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.
**Engineering Materials -** Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.
**UNIT - II**
**Manufacturing Processes:** Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.
**Thermal Engineering** – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.
**UNIT - III**
**Power plants** – working principle of Steam, Diesel, Hydro, Nuclear power plants.
**Mechanical Power Transmission -** Belt Drives, Chain, Rope drives, Gear Drives and their applications.
**Introduction to Robotics -** Joints & links, configurations, and applications of robotics.
(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)
**Textbooks:**
1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.
**Reference Books:**
1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I.
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
**Web References:**
1. https://ocw.mit.edu/courses/2-000-how-and-why-machines-work-spring-2002/
2. https://ocw.mit.edu/courses/2-008-design-and-manufacturing-ii-spring-2004/
3. https://ocw.mit.edu/courses/2-12-introduction-to-robotics-fall-2005/

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous) (Autonomous)
## Department of Information Technology

**R23**

### I Year I Semester
### INTRODUCTIONTOPROGRAMMING
### (Common to All Branches)

| Course Category | Engineering Science | Course Code | 24CS101T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| **Prerequisites** | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| COURSEOBJECTIVES | |
|---|---|
| 1 | To introduce students to the fundamentals of computer programming. |
| 2 | To provide hands-on experience with coding and debugging. |
| 3 | To foster logical thinking and problem-solving skills using programming. |
| 4 | Tofamiliarizestudentswithprogrammingconceptssuchasdatatypes,control structures, functions and arrays. |
| 5 | To encourage collaborative e learning and team work in coding projects. |

| COURSEOUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be ableto :** | | **Cognitive Level** |
| CO1 | Understand basics of computers, the concept of algorithm and algorithmic thinking. | K3 |
| CO2 | Analyze a problem and develop an algorithm to solve it. | K4 |
| CO3 | Implement various algorithms using the C programming language. | K5 |
| CO4 | Understand more advanced features of C language. | K3 |
| CO5 | Developproblem-solvingskillsandtheabilitytodebugandoptimizethecode. | K4 |

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

| ContributionofCourseOutcomestowardsachievementofProgramOutcomes(1– Low, 2 - Medium, 3– High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - |
| CO4 | 2 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |

## COURSE CONTENT

### UNIT-I
### Introduction to Programming and Problem Solving
History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operations, Type Conversion and Casting.
Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

### UNIT-II
### Control Structures
Simple sequential programs, Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue, Programming Examples.

### UNIT-III
### Arrays and Strings
Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Arrays Applications , Introduction to Strings, String input and output functions, String handling functions.

### UNIT-IV
### Pointers & User Defined Data types
Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

### UNIT-V
### Functions& File Handling
Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Life time of Variables, Storage Classes, Basics of File Handling.
**Note:** The syllabus is designed with C Language as the fundamental language of implementation.

### TEXTBOOKS
1. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall,2005, 2$^{nd}$ Edition
2. Schaum's Outline of Programming with C,Byron S Gottfried, McGraw-Hill Education,4$^{th}$ edition, 2018

### REFERENCEBOOKS
**1.** Computing fundamentals and C Programming, Balaguruswamy,E., Mc Graw-Hill Education, 7$^{th}$ Edition, 2017
**2.** Programming in C, Rema Theraja, Oxford,2016,2$^{nd}$edition
**3.** C Programming, A ProblemSolvingApproach,Forouzan,Gilberg,Prasad,CENGAGE,3$^{rd}$edition, 2009

### WEB RESOURCES
**1.** http://nptel.ac.in/courses/106104128/
**2.** http://students.iitk.ac.in/programmingclub/course/#notes
**3.** http://c-faq.com/~scs/cclass/cclass.html

**I Year I Semester**
**ENGINEERING WORKSHOP**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Engineering Science | Course Code | 24ME102P |
|---|---|---|---|
| **Course Type** | Laboratory | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

| COURSE OBJECTIVES |
|---|
| To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills |

**COURSE OUTCOMES**

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| **CO1** | Identify workshop tools and their operational capabilities. | K2 |
| **CO2** | Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding. | K3 |
| **CO3** | Apply knowledge in preparation of pipe joints and practice of Plumbing tools. | K3 |
| **CO4** | Apply basic electrical engineering knowledge for House Wiring Practice | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

1. **Demonstration**: Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tire

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
**Note:** Minimum of 12 Experiments to be conducted from the above covering all the trades.

**Textbooks:**
1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, DhanpathRai& Co., 2015 & 2017.

**Reference Books:**
1. Elements of Workshop Technology, Vol. I by S. K. HajraChoudhury& Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. &Upadhyay P.A.; AtulPrakashan, 2021-22.

**I Year I Semester**
**COMMUNICATIVE ENGLISH LABORATORY**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Humanities | | Course Code | 24BE101P |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-0-2-1 |
| **Prerequisites** | LSRW Skills | **Continuous Internal Assessment** | 30 | |
| | | **Semester End Examination** | 70 | |
| | | **Total Marks** | 100 | |

| COURSE OBJECTIVES | |
|---|---|
| 1 | The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. |
| 2 | The students will get trained in basic communication skills and also make them ready to face job interviews. |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| CO1 | Understand the different aspects of the English language proficiency with emphasis on LSRW skills. | K2 |
| CO2 | Apply communication skills through various language learning activities. | K3 |
| CO3 | Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. | K4 |
| CO4 | Evaluate and exhibit professionalism in participating in debates and group discussions. | K5 |
| CO5 | Able to present ideas effectively and manage interviews confidently. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 2 | - | - |

**COURSE CONTENT**

**UNIT - I**
Vowels & Consonants.
Neutralization/Accent Rules.

**UNIT - II**
Communication Skills & JAM.
Role Play or Conversational Practice.

**UNIT - III**
E-mail Writing.
Resume Writing, Cover letter, SOP.

**UNIT - IV**
Group Discussions-methods & practice.
Debates-Methods &Practice.

**UNIT - V**
PPT Presentations/ Poster Presentation.
Interviews Skills.

**Laboratory Manual Lab Book**
1. Strengthen Your Steps: A Multi-Model Course in Communication Skills published by Maruti Publications

**REFERENCE BOOKS**
1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw- Hill Education India,2016
3. Hewing's, Martin. Cambridge Academic English (B2).CUP,2012.
4. J.Sethi & P.V.Dhamija. A Course in Phonetics and Spoken English,($2^{nd}$Ed),Kindle, 2013

**WEB RESOURCES**
**Spoken English:**
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw
**Voice & Accent:**
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA
**Suggested Software:**
1. Walden Infotech
2. Young India Films

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous) (Autonomous)
## Department of Information Technology

**I Year I Semester**
**COMPUTER PROGRAMMING LABORATORY**
**(Common to All Branches)**

| Course Category | Engineering Science | Course Code | 24CS101P |
|---|---|---|---|
| Course Type | Laboratory | L-T-P-C | 0-0-3-1.5 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| COURSE OBJECTIVES |
|---|
| The course aims to give students hands–on experience and train the month e concepts of the C-programming language. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Read, understand, and trace the execution of programs written in C language. | K3 |
| CO2 | Select the right control structure for solving the problem. | K3 |
| CO3 | Develop C programs which utilize memory efficiently using programming Constructs like pointers. | K3 |
| CO4 | Develop, Debug and Execute programs to demonstrate the Applications of arrays, functions, basic concepts of pointer sin C. | K5 |

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1– Low,2 -Medium, 3– High)**

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

**COURSE CONTENT**

**WEEK 1**

**Objective:** Getting familiar with the programming environment on the computer and writing the first program.

**Suggested Experiments/Activities:**

**Tutorial 1 :**Problem-solving using Computers.

**Lab1:**Familiarization with programming environment

    i.    Basic Linux environment and its editors likeVi,Vim & Emacsetc.

    ii.    Exposure to Turbo C, gcc

    iii.    Writing simple programs using printf(),scanf()

**WEEK 2**

**Objective:** Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

**Suggested Experiments/Activities:**

**Tutorial 2:**Problem-solving using Algorithms and Flowcharts.

**Lab 2:**Converting algorithms /flowcharts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

    i)    Sum and average of 3numbers

    ii)    Conversion of Fahrenheit to Celsius and vice versa

    iii)    Simple interest calculation

**WEEK 3**

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

**Suggested Experiments/Activities:**

**Tutorial 3:**Variable types and type conversions:

**Lab3:**Simple computational problems using arithmetic expressions.

    i)    Finding the square root of a given number

    ii)    Finding compound interest

    iii)    Area of a triangle using heron's formulae

    iv)    Distance travelled by an object

**WEEK4**

**Objective :** Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

**Suggested Experiments/Activities:**

**Tutorial 4:** Operators and the precedence and as associatively:

**Lab 4:**Simple computational problems using the operator' precedence and associatively

    i)    Evaluate the following expressions.

        a.    A+B*C+(D*E)+F*G

        b.    A/B*C-B+A*D/3

        c.    A+++B---A

        d.    J=(i++)+(++i)

    ii)    Find the maximum of three numbers using conditional operator

    iii)    Takemarksof5subjectsinintegers, and find the total, average in float

**WEEK5**

**Objective:** Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

    **Suggested    Experiments/Activities:**

**Tutorial 5:** Branching and logical expressions:

**Lab 5**: Problems involving if-then-else structures.

    i)    Write a C program to find them axandm in off our numbers using if-else.

    ii)    Write a C program to generate electricity bill.

    iii)    Find the roots of the quadratic equation.

    iv)    Write a C program to simulate a calculator using switch case.

    v)    Write a C program to find the given year is a leap year or not.

**WEEK6**

**Objective :** Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

**Suggested Experiments/Activities:**

**Tutorial 6:** Loops, while and for loops

**Lab 6:**Iterativeproblemse.g.,the sum of series

    i)   Find the factorial of given number using any loop.

    ii)  Find the given number is a prime or not.

    iii) Computes in e and cos series

    iv) Checking a number palindrome

    v)  Construct a pyramid of numbers.

**WEEK7**

**Objective:** Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-Dand more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-Darrays,explore search solution linear search.

**Suggested Experiments/Activities:**

**Tutorial 7:**1DArrays: searching.

**Lab 7:** 1D Array manipulation, linear search

    i)   Find the min and max of a1-D integer array.

    ii)  Perform linear search on 1 D array.

    iii) There verse of a 1 D integer array

    iv) Find 2's complement of the given binary number.

    v)  Eliminate duplicate elements in an array.

**WEEK8**

**Objective:** Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

**Suggested Experiments/Activities:**

**Tutorial 8:** 2 D arrays, sorting and Strings.

**Lab8:** Matrix problems, String operations, Bubble sort

    i)   Addition of two matrices

    ii)  Multiplication two matrices

    iii) Sort array elements using bubble sort

    iv) Concatenate two strings without built-in functions

    v)  Reverse a string using built-in and without built-in string functions

**WEEK9**

**Objective:** Explore pointers to manage a dynamic array of integers, including memory allocation & amp; value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

**Suggested Experiments/Activities:**

**Tutorial 9:**Pointers, structures and dynamic memory allocation

**Lab 9:**Pointers and structures, memory dereference.

    i)   Write a C program to find the sum of a1Darrayusingmalloc()

    ii)  Write a C program to find the total, average of n students using structures

    iii) Entern students data using calloc() and display failed students list

    iv) Readstudentnameandmarksfromthecommandlineanddisplaythestudentdetailsalongwith the total.

    v)  Write a C program to implement realloc ()

**WEEK10**

**Objective :** Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

**Suggested Experiments/Activities:**

**Tutorial 10:** Bit fields, Self-Referential Structures, Linked lists

**Lab 10:** Bit fields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields

    i)   Create and display a singly linked list using self-referential structure.

    ii)  Demonstrate the differences between structures and unions using a C program.

    iii) Write a C program to shift/rotate using bit fields.

iv) Write a C program to copy one structure variable to another structure of the same type.

## WEEK 11
**Objective:** Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration
**Suggested Experiments/Activities:**
**Tutorial 11:** Functions, call by value, scope and extent,
**Lab 11:** Simple functions using call by value, solving differential equations using Eulers theorem.
  i) Write a C function to calculate NCR value.
  ii) Write a C function to find the length of a string.
  iii) Write a C function to transpose of a matrix.
  iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

## WEEK 12
**Objective:** Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.
**Suggested Experiments/Activities:**
**Tutorial 12:** Recursion, the structure of recursive calls
**Lab12:** Recursive functions
  i) Write a recursive function to generate Fibonacci series.
  ii) Write a recursive function to find the lcm of two numbers.
  iii) Write a recursive function to find the factorial of a number.
  iv) Write a C Program to implement Ackermann function using recursion.
  v) Write a recursive function to find the sum of series.

## WEEK13
**Objective:** Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers
**Suggested Experiments/Activities:**
**Tutorial 13:** Call by reference, dangling pointers
**Lab 13:** Simple functions using Call by reference, Dangling pointers.
  i) Write a C program to swap two numbers using call by reference.
  ii) Demonstrate Dangling pointer problem using a C program.
  iii) Write a C program to copy one string into another using pointer.
  iv) Write a C program to find no of lower case, uppercase, digits and other characters using pointers.

## WEEK14
**Objective :** To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.
**Suggested Experiments/Activities:**
**Tutorial 14:** File handling
**Lab 14:** File operations
  i) Write a C program to write and read text into a file.
  ii) Write a C program to write and read text into a binary file usingf read() and f write()
  iii) Copy the contents of one file to another file.
  iv) Write a C program to merge two files into the third file using command-line arguments.
  v) Find no.of lines, words and characters in a file
  vi) Write a C program to print last n characters of a given file.

**TEXT BOOKS**
  1. Ajay Mittal, Programming in C: A practical approach, Pearson.
  2. Byron Gottfried, Schaum &#39;s Outline of Programming with C, McGrawHill

**REFERENCEBOOKS**
  1. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Prentice-Hall of India
  2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

**WEB RESOURCES**
  1.    https://www.researchgate.net/publication/322908864_C_Programming_Lab_Manual
  2.    https://www.javatpoint.com/c-programs

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous) (Autonomous)
## Department of Information Technology

R23

**I Year I Semester**
**CHEMISTRY LABORATORY**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)**

| Course Category | Basic Sciences | Course Code | 24BC102P |
|---|---|---|---|
| Course Type | Laboratory | L-T-P-C | 0-0-2-1 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

### COURSE OBJECTIVES
Verify the fundamental concepts with experiments.

### COURSE OUTCOMES

| | Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|---|
| CO1 | Determine the cell constant and conductance of solutions. | K3 |
| CO2 | Prepare advanced polymer Bakelite materials. | K2 |
| CO3 | Estimate the given amount of dissolved compounds in a solution by using volumetric analysis and preparation of Nano particles | K3 |
| CO4 | Analyze the IR spectra of some organic compounds. | K4 |
| CO5 | Determine the concentration of different metal ions present in water by complex metric titrations. | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**List of Experiments:**
1. Determination of Hardness of a groundwater sample
2. Conduct metric titration of strong acid vs. strong base
3. Conduct metric titration of weak acid vs. strong base
4. Preparation of Nano particles. (Cu/Zn)
5. Determination of Vitamin-C
6. Estimation of $KMnO_4$ by using standard oxalic acid solution
7. Preparation of Phenol-formaldehyde resin (Bakelite)
8. Determination of total alkalinity of given sample of water
9. Wave length measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nano materials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

**Reference:**
"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publicationsby J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

**I Year I Semester**
**HEALTH AND WELLNESS, YOGA AND SPORTS**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Humanities | Course Code | 24MH101P |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 0-0-1-0.5 |
| Prerequisites | | Continuous Evaluation | 90 |
| | | Viva Voce | 10 |
| | | Total Marks | 100 |

**COURSE OBJECTIVES**

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

**COURSE OUTCOMES**

| Upon successful completion of the course, the student will be able to: | |
|---|---|
| CO1 | Understandtheimportanceofyogaandsportsfor Physical fitness and sound health. |
| CO2 | Demonstrate an understanding of health-related fitness components. |
| CO3 | Compare and contrast various activities that help enhance their health. |
| CO4 | Assess current personal fitness levels. |
| CO5 | Develop Positive Personality |

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

## COURSE CONTENT

**UNIT – I:** Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

**Activities:**
  i)   Organizing health awareness programmes in community
  ii)  Preparation of health profile
  iii) Preparation of chart for balance diet for all age groups

**UNIT – II:** Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asan as- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

**Activities:**
       Yoga practices Asana, Kriya, Mudra, Bandha, Dhyana, SuryaNamaskar

**UNIT – III:** Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Common wealth games.

**Activities:**
  i)  Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
      Practicing general and specific warm up, aerobics
  ii) Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

**Reference Books:**
  1. Gordon Edlin, Eric Golanty. Health and Wellness,14th Edn. Jones & Bartlett Learning, 2022
  2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
  3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company,1993
  4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks,2014
  5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics,Inc.2014

**General Guidelines:**
  1. Institutes must assign slots in the Time table for the activities of Health/Sports/Yoga.
  2. Institutes must provide field /facility and offer the minimum of five choices of as many as Games/Sports.
  3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

**Evaluation Guidelines:**
  • Evaluated for a total of 100 marks.
  • A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
  • A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

**I Year II Semester**
**ENGINEERING PHYSICS**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Basic Sciences | | Course Code | 24BP201T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 3-0-0-3 |
| Prerequisites | Intermediate Physics | | Continuous Internal Assessment | 30 |
| | | | Semester End Examination | 70 |
| | | | Total Marks | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization required to design instruments with higher resolution. |
| 2 | Impart the knowledge of Dielectric& Magnetic materials for engineering Applications. |
| 3 | Understand the basics of Semiconductors and their working mechanism for their utility in Engineering applications. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Analyzetheintensityvariationoflightduetopolarization,interferenceanddiffraction | K4 |
| CO2 | Familiarize with the basics of crystals and their structures. | K2 |
| CO3 | Applying the concepts of quantum mechanics for calculation of free quantum particle energies and phenomenon of electrical & thermal conductivities to sub microscopic particles | K3 |
| CO4 | Apply the basics of phenomenon related to dielectric materials and Magnetic Materials to study their dependence on temperature and frequency response. | K3 |
| CO5 | Understand the Band formation, electrical conductivities in semiconductors and study the types of semiconductors using Hall Effect. | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

## COURSE CONTENT

### UNIT – I -WAVE OPTICS
Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.
Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

### UNIT - II - CRYSTALLOGRAPHY AND X-RAY DIFFRACTION
Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.
**X - ray diffraction**: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

### UNIT – III - DIELECTRIC AND MAGNETIC MATERIALS
Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss
Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro&Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

### UNIT – IV - QUANTUM MECHANICS AND FREE ELECTRON THEORY
Quantum Mechanics: Introduction-Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.
Free Electron Theory: Introduction-Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

### UNIT - V - BAND THEORY OF SOLIDS  & SEMICONDUCTOR PHYSICS
### BAND THEORY OF SOLIDS
Bloch's Theorem (Qualitative) - Kronig Penny Model(Qualitative)-E vs K diagram-V vs K diagram, Effective mass of electron- Classification of Crystalline Solids-Concept of hole

### SEMICONDUCTOR PHYSICS
Semiconductors: Introduction-Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

**TEXT BOOKS**
"A Text book of Engineering Physics" by M.N.Avadhanulu, P.G.Kshir sagar -S.Chand Publications,
"Engineering Physics" by Tirupati Naidu &Veeranjaneyalu, V G S Publishers
"Engineering Physics" by P.K Palanisamy,Sci Tech Publication

**REFERENCE BOOKS**
Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition
Solid State Physics ,AJ Dekker, I Edition,Macmillan Publishers India Private Limited
"Engineering Physics" by M.R.Srinivasan, New Age international publishers.
"Solid State Physics" by SO Pilai., - New age International Publishers

**WEB RESOURCES**
Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html
Unit I:https://nptel.ac.in/courses/122/107/122107035/#
Unit II: https://nptel.ac.in/courses/113/104/113104014/
Unit III: https://nptel.ac.in/courses/113/104/113104090/
        https://youtu.be/DDLljK1ODeg
Unit IV :https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html
        https://nptel.ac.in/courses/115/101/115101107/
        https://nptel.ac.in/courses/115/105/115105122/
Unit V :https://www.electronics-tutorials.ws/diode/diode_1.html
        https://nptel.ac.in/courses/115/105/115105099/
        https://nptel.ac.in/courses/108/108/108108122/

**I Year II Semester**
**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**
**(Common to All Branches)**

| Course Category | Basic Sciences | Course Code | 24BM201T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | Differentiation, Integration and Partial Differentiation. Differential Equations (Variable Separable) | Continuous Internal Assessment<br>Semester End Examination<br>Total Marks | 30<br>70<br>100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To enlighten the learners in the concept of differential equations and multi variable calculus |
| 2 | To familiarize the students with the foundations of line, surface and volume integrals. |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| CO1 | Solve the first order differential equations related to various engineering fields. | K3 |
| CO2 | Solve the higher order differential equations to various engineering fields. | K3 |
| CO3 | Identify solution methods for partial differential equations that model physical processes. | K3 |
| CO4 | Interpret the physical meaning of different operators such as gradient, curl and divergence. | K3 |
| CO5 | Estimate the work done against a field, circulation and flux using vector calculus. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes<br>(1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |

## COURSE CONTENT

### UNIT I
**Differential equations of first order and first degree:**
Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. **Applications**: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

### UNIT II
**Linear differential equations of higher order (Constant Coefficients):**
Definitions, homogenous and non-homogenous differential equations, complimentary function, particular integral, general solution, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to         L-C-R Circuit problems and Simple Harmonic motion.

### UNIT III
**Partial Differential Equations:**
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients

### UNIT IV
**Vector differentiation:**
Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient and applications, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

### UNIT V
**Vector integration:**
Line integral-circulation-work done by the force, Scalar potential, surface integral-flux, Green's theorem in a plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

**TEXT BOOKS**
1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

**REFERENCE BOOKS**
1. Thomas Calculus, George B.Thomas, Maurice D.Weir and JoelHass, Pearson Publishers,2018, 14th Edition.
2. Advanced Engineering Mathematics, DennisG.Zill andWarrenS.Wright, Jones and Bartlett,2018.
3. Advanced Modern Engineering Mathematics,GlynJames, Pearson publishers, 2018,5th Edition.
4. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 2021 5the Edition (9th reprint)
5. Higher Engineering Mathematics, B.V.Ramana,, McGraw HillEducation,2017
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22$^{nd}$ Edition(Reprint 2022).

**WEB RESOURCES**
1. https://mathworld.wolfram.com/First-OrderOrdinaryDifferentialEquation.html
2. https://en.wikipedia.org/wiki/Differential_equation
3. https://en.wikipedia.org/wiki/Partial_differential_equation
4. https://en.wikipedia.org/wiki/Vector_calculus
5. https://en.wikipedia.org/wiki/Vector_calculus

R23

**I Year II Semester**
**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Engineering Science | Course Code | 24EE201T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks 100 | |

**PART-A: BASIC ELECTRICAL ENGINEERING**

| COURSE OBJECTIVES |
|---|
| To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field. |

**COURSE OUTCOMES**

| | Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|---|
| CO1 | Know the fundamental laws, operating principles of motors, generators, MC and MI instruments | K2 |
| CO2 | Apply the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. | K3 |
| CO3 | Apply the mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

**UNIT - I**
**DC Circuits:** Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.
**AC Circuits:** A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

**UNIT - II**
**Machines and Measuring Instruments**
**Machines:** Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.
**Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

**UNIT – III**
**Energy Resources, Electricity Bill & Safety Measures**
**Energy Resources:** Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.
**Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.
**Equipment Safety Measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

**Textbooks:**
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

**Reference Books:**
1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

**Web Resources:**
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

**PART-B : BASIC ELECTRONICS ENGINEERING**

| COURSE OBJECTIVES | |
|---|---|
| 1 | To impart knowledge on semiconductor devices. |
| 2 | To introduce concepts of biasing and applications of diodes and transistors. |
| 3 | To introduce fundamentals of digital electronics. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | Cognitive Level |
| CO1 | Understand the basic concepts of diodes and transistors | K2 |
| CO2 | Understand the working principles of semiconductor devices and applications | K2 |
| CO3 | Understand number system, Boolean algebra, basics of combinational and sequential circuits | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

**UNIT – I - SEMICONDUCTORDEVICES**

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

**UNIT -II - BASICELECTRONICCIRCUITSANDINSTRUMENTTAION**

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Block diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

**UNIT – III - DIGITAL ELECTRONICS**

Overview of Number Systems, BCD codes, Functionality of Logic Gates–NOT,OR,AND,NOR,NAND,XOR and XNOR. Excess-3code, Graycode, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

**Textbooks:**
1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation,2021.
2. Digital Design by Morris Mano, 3E, Prentice Hall, India, 2001
**Reference Books:**
1. R.S.Sedha, A Text book of Electronic Devices and Circuits, S.Chand&Co,2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.
**Web References:**
1. NPTEL- https://archive.nptel.ac.in/courses/108/108/108108122/
2. Neso Academy- https://www.nesoacademy.org/ec/05-digital-electronics

**I Year II Semester**
**ENGINEERING GRAPHICS**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)**

| Course Category | Engineering Science | | Course Code | 24ME201T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 1-0-4-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing. |
| 2 | To impart knowledge on the projection of points, lines and plane surfaces. |
| 3 | To improve the visualization skills for better understanding of projection of solids. |
| 4 | To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces. |
| 5 | To make the students understand the viewing perception of a solid object in Isometric and Perspective projections. |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| CO1 | Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. | K2 |
| CO2 | Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. | K3 |
| CO3 | Understand and draw projection of solids in various positions in first quadrant. | K3 |
| CO4 | Explain principles behind development of surfaces. | K2 |
| CO5 | Prepare isometric and perspective sections of simple solids. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO4 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO5 | 3 | 2 | 2 | - | 3 | - | - | - | - | - | 1 | - |

## COURSE CONTENT

### UNIT - I
**Introduction:** Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.
**Curves:** construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.
**Scales:** Plain scales, diagonal scales and vernier scales.

### UNIT - II
**Orthographic Projections**: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.
**Projections of Straight Lines:** Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes
**Projections of Planes:** regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

### UNIT - III
**Projections of Solids:** Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

### UNIT - IV
**Sections of Solids:** Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.
**Development of Surfaces:** Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

### UNIT - V
**Conversion of Views**: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
**Computer graphics**: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

**Textbook:**
1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

**Reference Books:**
1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, DhananjayJolhe, Tata McGraw Hill, 2017.

**Web References:**
1. http://nptel.ac.in/courses/112103019/
2. https://www.cadtutor.net/tutorials/autocad/

**I Year II Semester**

**DATA STRUCTURES**

**(Common to CSE, IT, CSE (AIML), CSE(AI), CSE(DS) and CSE(CS))**

| Course Category | Professional Core | | Course Code | 24CS201T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To provide the knowledge of basic data structures and their implementations. |
| 2 | To understand importance of data structures in context of writing efficient programs. |
| 3 | To develop skills to apply appropriate data structures in problem solving. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. | K2 |
| **CO2** | Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation | K5 |
| **CO3** | Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. | K3 |
| **CO4** | Apply queue-based algorithms for efficient task scheduling and breadth-firsttraversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges | K3 |
| **CO5** | Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees,Graphs | K5 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes(1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| **CO1** | 3 | 3 | 2 | 2 | 1 | 1 | - | - | - | - | - | - |
| **CO2** | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **CO3** | 2 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - |
| **CO4** | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **CO5** | 3 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - |

**COURSE CONTENT**

**UNIT - I**

**Introduction to Linear Data Structures**: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion sort, Quick and Merge sort.

**UNIT - II**

**Linked Lists:** Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

**UNIT - III**

**Stacks:** Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

**UNIT - IV**

**Queues:** Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

**Deques:** Introduction to deques (double-ended queues), Operations on deques and their applications.

**UNIT - V**

**Trees:** Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

**Hashing:** Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

**Graphs:** Introduction, Graph Representation, Traversal techniques

**TEXT BOOKS**

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2$^{nd}$ Edition.2020
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson- Freed, Silicon Press, 2$^{nd}$Edition ,2014

**REFERENCE BOOKS**

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders.
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft.
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum.
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, andClifford Stein. 3$^{rd}$ Edition 2009
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedge wick.

**WEB RESOURCES**

1. https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf
2. https://www.geeksforgeeks.org/data-structures/

**I Year II Semester**
**ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Engineering Science | | Course Code | 24EE201P |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

### PART-A: ELECTRICAL ENGINEERING WORKSHOP

**COURSE OBJECTIVES**

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

**COURSE OUTCOMES**

| | Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|---|
| **CO1** | Know the Electrical circuit design concepts; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. | K2 |
| **CO2** | Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. | K3 |
| **CO3** | Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. | K3 |
| **CO4** | Analyse various characteristics of electrical circuits, electrical machines and measuring instruments. | K4 |
| **CO5** | Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**List of experiments:**
1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Measurement of Three- phase power in Three-phase induction motor using two wattmeter method
5. Speed control of DC shunt motor
6. Measurement of Power and Power factor using Single-phase wattmeter
7. Measurement of Earth Resistance using Megger
8. Calculation of Electrical Energy for Domestic Premises

**Reference Books:**
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

**Note:** Minimum Six Experiments to be performed.

**PART B: ELECTRONICS ENGINEERING LABORATORY**

| COURSE OBJECTIVES |
|---|
| Toimpartknowledgeontheprinciplesofdigitalelectronicsandfundamentalsofelectrondevices&  its  applications. |

**COURSE OUTCOMES**

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| **CO6** | Identify & testing of  various electronic components. | K3 |
| **CO7** | Understand the usage of electronic measuring instruments. | K3 |
| **CO8** | Plot and discuss the characteristics of various electron devices. | K3 |
| **CO9** | Explain the operation of a digital circuit. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO6** | 2 | 2 | | 2 | 2 | | | | | | | |
| **CO7** | 2 | 2 | | 2 | 2 | | | | | | | |
| **CO8** | 2 | 2 | | 2 | 2 | | | | | | | |
| **CO9** | 2 | 2 | | 2 | 2 | | | | | | | |

**List of experiments:**
1. Introduction to Active and Passive devices must be experiment-1 (includes Resistors, Capacitors, Inductors, Diodes, Transistors, Power supplies, Ammeter(s), Voltmeter(s), necessary devices)
2. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
3. Plot V– I characteristics of Zener Diode and its application as voltage Regulator.
4. Determine ripple factor of full wave rectifier.
5. Plot Input & Output characteristics of BJT in CE and CB configurations.
6. Determining CE Amplifier input and output impedance with and without bypass capacitor.
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R,J-K & D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Mult imeters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices. Multi sim /PSPICE software for Simulation.

**References:**
 1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation,  2021.
 2. R.P.Jain,  Modern Digital Electronics, 4th Edition, Tata McGraw Hill,2009
 3. R.T.Paynter,IntroductoryElectronicDevices&Circuits–
    ConventionalFlowVersion,PearsonEducation,2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

**I Year II Semester**
**DATA STRUCTURES LABORATORY**
**(Common to CSE, IT, CSE(AIML), CSE(AI), CSE(DS) and CSE(CS))**

| Course Category | Professional Core | Course Code | 24CS201P |
|---|---|---|---|
| **Course Type** | Laboratory | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

**COURSE OBJECTIVES**

The course aims to strengthen the ability of the students to identify and apply the suitable datastructure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures

**COURSE OUTCOMES**

| | Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|---|
| **CO1** | Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. | K3 |
| **CO2** | Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. | K3 |
| **CO3** | Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. | K3 |
| **CO4** | Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges. | K3 |
| **CO5** | Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| **CO1** | 3 | 3 | 2 | 2 | 1 | 1 | - | - | - | - | - | - |
| **CO2** | 2 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - |
| **CO3** | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **CO4** | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - |
| **CO5** | 2 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - |

## COURSE CONTENT

**Exercise 1: Array Manipulation**
    i) Write a program to reverse an array.
    ii) C Programs to implement the Searching Techniques – Linear & Binary Search
    iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

**Exercise 2: Linked List Implementation**
    i) Implement a singly linked list and perform insertion and deletion operations.
    ii) Develop a program to reverse a linked list iteratively and recursively.
    iii) Solve problems involving linked list traversal and manipulation.

**Exercise 3: Linked List Applications**
    i) Create a program to detect and remove duplicates from a linked list.
    ii) Implement a linked list to represent polynomials and perform addition.
    iii) Implement a double-ended queue (deque) with essential operations.

**Exercise 4: Double Linked List Implementation**
    i) Implement a doubly linked list and perform various operations to understand itsproperties and applications.
    ii) Implement a circular linked list and perform insertion, deletion, and traversal.

**Exercise 5: Stack Operations**
    i) Implement a stack using arrays and linked lists.
    ii) Write a program to evaluate a postfix expression using a stack.
    iii) Implement a program to check for balanced parentheses using a stack.

**Exercise 6: Queue Operations**
    i) Implement a queue using arrays and linked lists.
    ii) Develop a program to simulate a simple printer queue system.
    iii) Solve problems involving circular queues.

**Exercise 7: Stack and Queue Applications**
    i) Use a stack to evaluate an infix expression and convert it to postfix.
    ii) Create a program to determine whether a given string is a palindrome or not.
    iii) Implement a stack or queue to perform comparison and check for symmetry.

**Exercise 8: Binary Search Tree**
    i) Implementing a BST using Linked List.
    ii) Traversing of BST.

**Exercise 9: Hashing**
    i) Implement a hash table with collision resolution techniques.
    ii) Write a program to implement a simple cache using hashing.

## TEXT BOOKS

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson- Freed,Silicon Press, 2008

## REFERENCE BOOKS

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and PeterSanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E.Hopcroft

**I Year II Semester**
**IT WORKSHOP**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)**

| Course Category | Engineering Science | | Course Code | 24IT201P |
|---|---|---|---|---|
| Course Type | Laboratory | | **L-T-P-C** | 0-0-2-1 |
| Prerequisites | | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OBJECTIVES |
|---|
| 1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables. |
| 2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS. |
| 3. To teach basic command line interface commands on Linux. |
| 4. To teach the usage of Internet for productivity and self-paced life-long learning. |
| 5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools. |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| CO1 | Perform Hardware trouble shooting. | K3 |
| CO2 | Understand Hardware components and inter dependencies. | K3 |
| CO3 | Safe guard computer systems from viruses/worms. | K3 |
| CO4 | Document/ Presentation preparation. | K3 |
| CO5 | Perform calculations using spreadsheets. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | - | - | 1 | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | - | - | 1 | - | - | - | - | - | - | - |
| CO3 | 2 | 2 | - | - | 2 | 2 | 1 | 2 | - | - | - | - |
| CO4 | 1 | - | - | - | 3 | 1 | - | - | - | 2 | - | - |
| CO5 | 2 | - | - | - | 3 | 1 | - | - | - | - | - | - |

**COURSE CONTENT**

**PC Hardware & Software Installation**
**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task2:**Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3**: Every student should individually install MS windows, Linux / BOSS on the personal computer. This computer should have windows installed. The system should be configured as dual boot (VM Ware) with both Windows and Linux / BOSS Lab instructor should verify the installation and follow it up with a Viva.

**Internet & World Wide Web**
**Task1:** Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Task2:**Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, book marks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task3**: Search Engines & Net iquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4:** Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block popup, lock active x downloads to avoid viruses and/or worms.

**WORD**
**Task 1:** Word Orientation: The mentor needs to give an overview of Microsoft (MS) office or equivalent (FOSS) tool word : Importance of MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using word–Accessing, over view of tool bars, saving files, Using help and resources, rulers, format painter in word.

**Task 2:** Using Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

**Task 3:** Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Foot note, Hyperlink, Symbols, Spell Check, Track Changes.

**Task4:** Creating a Newsletter: Features to be covered:-Table of Content, News paper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Text boxes, Paragraphs and Mail Merge in word.

**EXCEL**
**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel–Accessing, overview of tool bars, saving excel files, Using help and resources.

**Task 1:** Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**Task 2:** Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.

### POWERPOINT

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, WordArt, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power Point.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting– Back ground, textures, Design Templates, Hidden slides.

### AI TOOLS –ChatGPT

**Task1:** Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are acknowledgeable AI. Please answer the following question: What is the capital of France?"

**Task2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

**Task 3:** Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

**Reference Books:**

1. Comdex Information Technology course toolkit, Vikas Gupta, WILEY Dreamtech,2--3.
2. The Complete Computer upgrade and repair book, Chery lAS chmidt, WILEY Dreamtech, 2-13, 3rd edition.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2-12, 2$^{nd}$edition.
4. PC Hardware- A Handbook, Kate J.Chase, PHI (Microsoft).
5. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme.– CISCO Press, Pearson Education,3$^{rd}$ edition.
6. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.

**Web References:**

1. PC Hardware & Software Installation: Peripheral Devices: Computer Peripherals - Wikipedia
   Components in a CPU: CPU Components and Their Functions - Guru99
2. Internet & World Wide Web: TCP/IP and Networking Basics: TCP/IP Explained - Lifewire
   Internet Browsing and Configuration: How Web Browsing Works - HowStuffWorks
3. Word: Microsoft Word Tutorials: Microsoft Word Basics - GCFGlobal
4. Excel: Excel Tutorial and Functions: Excel Tutorial - Microsoft
5. AI Tools - ChatGPT: GPT-3.5 and ChatGPT Information: GPT-3.5 Guide - OpenAI

**I Year II Semester**
**NSS / NCC / SCOUTS AND GUIDES / COMMUNITY SERVICE**
**(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)**

| Course Category | Humanities | Course Code | 24MH202P |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 0-0-1-0.5 |
| Prerequisites | | Continuous Evaluation | 90 |
| | | Viva Voce | 10 |
| | | Total Marks | 100 |

**COURSE OBJECTIVES**

Theobjectiveofintroducingthiscourseistoimpartdiscipline,character,fraternity,teamwork, socialconsciousnessamongthestudentsandengagingtheminselflessservice.

**COURSE OUTCOMES**

| Upon successful completion of the course, the student will be able to: | |
|---|---|
| CO1 | Understand the importance of discipline, character and service motto. |
| CO2 | Solvesomesocietalissuesbyapplyingacquiredknowledge,facts,andtechniques. |
| CO3 | Explore human relationships by analyzing social problems. |
| CO4 | Determine to extend their help for the fellow beings and downtrodden people. |
| CO5 | Develop leadership skills and civic responsibilities. |

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

**UNIT – I - Orientation**
General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.
Activities:
   i) Conducting   ice breaking sessions-expectations from the course-knowing personal talents and skills
   ii) Conducting orientations programs for the students future plans-activities-releasing road map etc.
   iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
   iv) Conductingtalentshowinsingingpatrioticsongs-paintings-anyothercontribution.

**UNIT – II - Nature &Care**
**Activities:**
   i) Best out of waste competition.
   ii) Poster and signs making competition to spread environmental awareness.
   iii) Recycling and environmental pollution article writing competition.
   iv) Organising Zero-waste day.
   v) Digital Environmental awareness activity via various social media platforms.
   vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
   vii) Write a summary on any book related to environmental issues.

**UNIT – III - Community Service**
**Activities:**
   i) Conducting One Day Special Camp in a village contacting village- are a leaders-Survey in the village, identification of problems-helping them to solve via media-authorities- experts-etc.
   ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
   iii) Conducting consumer Awareness. Explaining various legal provisions etc.
   iv) Women Empowerment Programmes-Sexual Abuse, Adolescent Health and Population Education.
   v) Any other programmes in collaboration with local charities, NGOs etc.

**Reference Books:**
   1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 ( ISBN 978-81-952368-8-6)
   2. Red Book - National Cadet Corps        Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defense,  NewDelhi
   3. Davis M. L. and cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
   4. Masters G. M. Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
   5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

**General Guidelines:**
   1. Institutes must assign slots in the Timetable for the activities.
   2. Institutes are required to provide instructor to mentor the students.

**Evaluation Guidelines:**
   • Evaluated for a total of 100 marks.
   • A student can select 6 activities of his/her choice with a minimum of 01 activity per unit.Eachactivityshallbeevaluatedbytheconcernedteacherfor15marks, totaling to 90marks.
   • Astudentshallbeevaluatedbytheconcernedteacherfor10marksbyconductingviva voce on the subject.

**II Year I Semester**
**Discrete Mathematics and Graph Theory**
**(Common to CSE, CSE-AI&ML, CSE-AI, CSE-DS, CSE-CS and IT)**

| Course Category | Basic Sciences | | Course Code | 24BM304T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 3-0-0-3 |
| Prerequisites | Mathematical Logic, Set Theory. | Continuous Internal Assessment | 30 | |
| | | Semester End Examination | 70 | |
| | | Total Marks | 100 | |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning |
| 2 | To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science. |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| CO1 | Apply mathematical logic to solve problems | K3 |
| CO2 | Understand the concepts and perform the operations related to sets, relations and functions. | K3 |
| CO3 | Apply basic counting techniques to solve combinatorial problems and recurrence relations | K3 |
| CO4 | Apply Graph Theory in solving computer science problems | K3 |
| CO5 | Apply different theorems and algorithms to find BFS and DFS of spanning trees | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |

**COURSE CONTENT**

**UNIT I**
**Mathematical Logic:**
Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

**UNIT II**
**Set Theory:**
Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

**UNIT III**
**Combinatorics and Recurrence Relations:**
Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems.
Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving In homogeneous Recurrence Relations

**UNIT IV**
**Graph Theory**:
Basic Concepts, Graph Theory and its Applications, Sub graphs, Graph Representations : Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs,

**UNIT V**
**Multi Graphs:**
Multi graphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

**TEXT BOOKS**
1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and P.Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics – A Computer Oriented Approach, C.L.Liu and D.P.Mohapatra, 3rd Edition,Tata McGraw Hill.
3. Mathematical Foundations of Computer Science, Dr. D.S.C, Prism Books Pvt Ltd.

**REFERENCE BOOKS**
1. Discrete Mathematics for Computer Scientists and Mathematicians, J.L.Mott, A.Kandel and T.P.Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C.Busby and Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S.K.Chakraborthy and B.K.Sarkar ,Oxford, 2011.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K.H.Rosen,7th Edition,Tata McGraw Hill.
5. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill.

**WEB RESOURCES**
6. https://onlinecourses.nptel.ac.in/noc24_ma42/preview
7. https://en.wikipedia.org/wiki/Set_theory
8. https://www.geeksforgeeks.org/discrete-mathematics-types-of-recurrence-relations-set-2/
9. https://nptel.ac.in/courses/111106102
10. https://en.wikipedia.org/wiki/Multigraph

**II Year I Semester**
**UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY**
**and ETHICAL HUMAN CONDUCT**
**(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and**
**CSE(CYBER SECURITY)**

| Course Category | HSMC | | Course Code | 24HM301T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 2-1-0-3 |
| **Prerequisites** | | **Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Blooms Taxonomy Level** |
| **CO1** | Understand the significance of value inputs in a classroom and start applying them in their life and profession | K1 |
| **CO2** | Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. | K2 |
| **CO3** | Understand the role of a human being in ensuring harmony in Family And Society. | K1 |
| **CO4** | Appraise the role of a human being in ensuring harmony in Nature/Existence. | K2 |
| **CO5** | Distinguish between ethical and unethical practices to actualize a harmonious environment wherever they work. | K2 |

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | | | | | | 3 | | | | | | |
| **CO2** | | | | | | 3 | | | 3 | 3 | | 3 |
| **CO3** | | | | | | 3 | | 2 | | | | 3 |
| **CO4** | | | | | | 3 | 3 | | | | | |
| **CO5** | | | | | | 3 | | 3 | | | | |

**COURSE CONTENT**

**UNIT – I Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the basic human aspirations, Happiness and Prosperity- Current Scenario, Method to Fulfill the Basic Human Aspirations.
**Practice Sessions:** PS1 Sharing about Oneself , PS2 Exploring Human Consciousness, PS3 Exploring Natural Acceptance

**UNIT – II Harmony in Human Being:** Understanding Human being as the Co-existence of the self and the body, Distinguishing between the Needs of the self and the body, The body as an Instrument of the self, Understanding Harmony in the self, Harmony of the self with the body, Programme to ensure self - regulation and Health
**Practice Sessions:** PS4 Exploring the difference of Needs of self and body, PS5 Exploring Sources of Imagination in the self, PS6 Exploring Harmony of self with the body

**UNIT – III Harmony in the Family and Society:** Harmony in the family - the Basic Unit of Human Interaction, 'Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation, Other Feelings, Justice in Human – to - Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.
**Practice Sessions:** PS7 Exploring the Feeling of Trust, PS8 Exploring the Feeling of Respect,
PS9 Exploring Systems to fulfil Human Goal

**UNIT – IV Harmony in the Nature/Existence:** Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual fulfillment among the Four Orders of Nature, Realizing Existence as Co- existence at All Levels, The Holistic Perception of Harmony in Existence
**Practice Sessions:** PS10 Exploring the Four Orders of Nature, PS11 Exploring Co-existence in Existence

**UNIT – V Implications of the Holistic Understanding - a Look at Professional Ethics:** Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value- based Life and Profession.
**Practice Sessions:** PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education, PS14 Exploring Steps of Transition towards Universal Human Order

**Text books and Teachers Manual**
1. A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 - R R Gaur, R Asthana, G P Bagaria
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2 - R R Gaur, R Asthana, G P Bagaria

**Reference Books**
1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth- by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal

**Web References:**
1. https://fdp-si.aicte-india.org
2. https://www.youtube.com/playlist?list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz

**II Year I Semester**
**Digital Logic & Computer Organization**

| Course Category | Professional Core | | Course Code | 24EC305T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | Basics of Number Systems | **Continuous Internal Assessment** **Semester End Examination** **Total Marks** | | 30 70 100 |

| COURSEOBJECTIVES | |
|---|---|
| **The student will learn:** | |
| 1 | Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals |
| 2 | Describe memory hierarchy concepts |
| 3 | Explain input /output (I/O) systems and their interaction with the CPU, memory, and peripheral devices |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Understanding the data representation of a digital computer system. Relate Postulates of Boolean algebra and minimize combinational functions and analyze combinational circuits. | |
| **CO2** | Design and analyze sequential circuits and study the basic structure of computers | |
| **CO3** | Understand the basic concepts of computer arithmetic, organization. | |
| **CO4** | Understand the concepts of memory organization. | |
| **CO5** | Understand the concepts of I/O Organization. | |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | 2 | 2 | 2 |
| CO2 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | 2 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | 2 | 2 | 2 |
| CO5 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | 2 | 2 | 2 |

**COURSE CONTENT**

**UNIT–I:**
**Data Representation :** Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes.
**Digital Logic Circuits-I :** Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.

**UNIT–II:**
**Digital Logic Circuits-II**: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters.
**Basic Structure of Computers :** Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von-Neumann Architecture.

**UNIT–III:**
**Computer Arithmetic** : Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed - operand Multiplication, Fast Multiplication, Integer Division, Floating- Point Numbers and Operations.
**Processor Organization:** Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control.

**UNIT–IV:**
**The Memory Organization :** Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

**UNIT–V:**
**Input/ Output Organization:**  Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces **.**

**Textbooks:**
1.  Computer Organization, Carl Hamacher, ZvonkoVranesic, Safwat Zaky,6th edition, McGraw Hill
2.  Digital Design ,6th Edition, M.Morris Mano, Pearson Education.
3.  Computer Organization and Architecture,William Stallings, 11th Edition, Pearson.

**Reference Books:**
1.  Computer Systems Architecture, M.Moris Mano, 3rd Edition, Pearson
2.  Computer Organization and Design, David A.Paterson, JohnL. Hennessy, Elsevier
3.  Fundamentals of Logic Design, Roth, 5th Edition, Thomson

**Online Learning Resources:**
1.  https://nptel.ac.in/courses/106/103/106103068

**II Year I Semester**
**Advanced Data Structures & Algorithm Analysis**
(Common to CSE, CSE (AI&ML), CSE (AI), CSE (DS), CSE (Cyber Security), IT)

| Course Category | Professional Core | Course Code | 24CS301T |
|---|---|---|---|
| **Course Type** | Theory | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

| COURSE OBJECTIVES | |
|---|---|
| The main objectives of the course is to | |
| 1 | Provide knowledge on advance data structures frequently used in Computer Science domain |
| 2 | Develop skills in algorithm design techniques popularly used |
| 3 | Understand the use of various data structures in the algorithm design |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Analyze algorithms for Height balanced trees such as AVL trees, B-Trees | K1 |
| **CO2** | Analyze algorithms for Priority queues, Graph Traversals, Sortings | K2 |
| **CO3** | List and describe various algorithmic approaches and Solve problems using divide and conquer &greedy Method | K3 |
| **CO4** | Analyze design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches | K4 |
| **CO5** | Demonstrate NP-Hard and NP-Complete problems, Cook's theorem | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution Of Course Outcomes Towards Achievement Of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| **CO1** | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| **CO2** | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| **CO3** | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| **CO4** | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| **CO5** | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |

## COURSE CONTENT

**UNIT – I:**

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, Deletion operations and Applications

**UNIT – II:**

Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications
Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

**UNIT – III:**

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

**UNIT – IV:**

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

**UNIT – V:**

NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP) NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

**Textbooks:**

1. Fundamentals of Data Structures in C++, Ellis Horowitz; Sartaj Sahni; Dinesh Mehta
   2nd Edition, ISBN: 9788173716065 ,Year: 2008, Universities Press.
2. Computer Algorithms in C++, Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran, 2nd Edition ISBN:9788173716119, University Press.

**Reference Books:**

1. Data Structures and program design in C, Robert Kruse, Pearson Education, Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill,2nd Edition, Published on 1 July 2017.
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 31 August 2019 First Edition.
5. Algorithms + Data Structures & Programs:, N.Wirth, PHI, January 1988
6. Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub, January 2008
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

**Online Learning Resources:**

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html
3. Abdul Bari,Introduction to Algorithms (youtube.com)

**II Year I Semester**

**Object Oriented Programming Through Java**

**(Common to CSE, CSE (AI&ML), CSE (AI), CSE (DS), CSE (Cyber Security), IT)**

| Course Category | Professional Core | | Course Code | 24CS302T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| The learning objectives of this course are to: | |
| 1 | Identify Java language components and how they work together in applications |
| 2 | Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries. |
| 3 | Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications |
| 4 | Understand how to design applications with threads in Java |
| 5 | Understand how to use Java APIs for program development |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Apply the fundamentals of Java to solve problems | K3 |
| **CO2** | Differentiate the application of decision and iteration control structures | K2 |
| **CO3** | Implement classes and method overloading concepts | K3 |
| **CO4** | Apply the concepts of inheritance and packages | K3 |
| **CO5** | Implement Java programs using exceptions and multithreading | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| **CO1** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - |
| **CO2** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - |
| **CO3** | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - |
| **CO4** | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - |
| **CO5** | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - |

## COURSE CONTENT

### UNIT I

Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

**Data Types**, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator ( = ), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators,
Boolean Logical Operators, Bitwise Logical Operators.

**Control Statements**: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

### UNIT II

**Classes and Objects:** Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

**Methods:** Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

### UNIT III

**Arrays:** Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

**Inheritance:** Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

**Interfaces:** Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

### UNIT IV

**Packages and Java Library:** Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java. Time .Instant),
Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

**Exception Handling:** Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throw able, Unchecked Exceptions, Checked Exceptions.

**Java I/O and File:** Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

**UNIT V**
**String Handling in Java:** Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.
**Multithreaded Programming:** Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads. **Java Database Connectivity:** Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set Interface
**Java FX GUI:** Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events

**Text Books:**
1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2) Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3) JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

**References Books:**
1) The complete Reference Java, 11th edition, Herbert Schildt,TMH
2) Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

**Online Resources:**
1. https://nptel.ac.in/courses/106/105/106105191/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

**II Year I Semester**
**Advanced Data Structures & Algorithm Analysis Laboratory**
**(Common to CSE, CSE (AI&ML), CSE (AI), CSE (Cyber Security), IT)**

| Course Category | Professional Core | Course Code | 24CS301P |
|---|---|---|---|
| **Course Type** | Laboratory | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

| COURSE OBJECTIVES | |
|---|---|
| The objectives of the course is to | |
| 1 | Acquire practical skills in constructing and managing Data structures |
| 2 | Apply the popular algorithm design methods in problem-solving scenarios |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| CO1 | Describe, implement, analyze, and apply data structures such as self-balancing trees and heaps | K3 |
| CO2 | Implement graph traversal algorithms | K3 |
| CO3 | Apply Greedy, divide and conquer algorithms. | K3 |
| CO4 | Identify and apply strategies such as brute force, greedy, back tracking, divide and conquer, and dynamic programming in algorithm analysis and design | K5 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |

**Experiments covering the Topics:**
- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Minimum cost spanning trees
- Shortest path algorithms
- 0/1 Knapsack Problem
- Travelling Salesperson problem
- Optimal Binary Search Trees
- N-Queens Problem
- Job Sequencing

**Sample Programs:**
1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
   a) Adjacency Matrix        b) Adjacency Lists
5. Write a program for finding the biconnected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.

**Reference Books:**
1. Fundamentals of Data Structures in C++, Horowitz Ellis, SahniSartaj, Mehta, Dinesh, 2$^{nd}$Edition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, 2$^{nd}$Edition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill

**Online Learning Resources:**
1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

**II Year I Semester**
**Object Oriented Programming Through Java Laboratory**
**(Common to CSE, CSE (AI&ML), CSE (AI), CSE (DS), CSE (Cyber Security), IT)**

| Course Category | Professional Core | Course Code | 24CS302P |
|---|---|---|---|
| **Course Type** | Laboratory | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

| COURSE OBJECTIVES | |
|---|---|
| The aim of this course is to | |
| 1 | Practice object oriented programming in the Java programming language |
| 2 | Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism |
| 3 | Illustrate inheritance, Exception handling mechanism, JDBC connectivity |
| 4 | Construct Threads, Event Handling, implement packages, Java FX GUI |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Implement object oriented concepts using Java | K3 |
| **CO2** | Apply the concepts of inheritance and packages. | K3 |
| **CO3** | Implement Java programs using exceptions and multithreading. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |

**Experiments covering the Topics:**
- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

**Sample Experiments:**

**Exercise – 1**:
a) Write a JAVA program to display default value of all primitive data type of JAVA
b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

**Exercise - 2**
a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
c) Write a JAVA program using StringBuffer to delete, remove character.

**Exercise - 3**
    a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
b) Write a JAVA program implement method overloading.
c) Write a JAVA program to implement constructor.
d) Write a JAVA program to implement constructor overloading.

**Exercise - 4**
a) Write a JAVA program to implement Single Inheritance
b) Write a JAVA program to implement multi level Inheritance
c) Write a JAVA program for abstract class to find areas of different shapes

**Exercise - 5**
a) Write a JAVA program give example for "super" keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
c) Write a JAVA program that implements Runtime polymorphism

**Exercise - 6**
a) Write a JAVA program that describes exception handling mechanism
b) Write a JAVA program Illustrating Multiple catch clauses
c) Write a JAVA program for creation of Java Built-in Exceptions
d) Write a JAVA program for creation of User Defined Exception

**Exercise - 7**
a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds,(Repeat the same by implementing Runnable)
b) Write a program illustrating **is Alive** and **join ()**
c) Write a Program illustrating Daemon Threads.
d) Write a JAVA program Producer Consumer Problem

**Exercise – 8**
a) Write a JAVA program that import and use the user defined packages
b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

**Exercise – 9**
a) Write a java program that connects to a database using JDBC
b) Write a java program to connect to a database using JDBC and insert values into it.
c) Write a java program to connect to a database using JDBC and delete values from it

**II Year I Semester**
**Python Programming**
**Common to CSE,IT, CSE (AI&ML),CSE (AI), CSE (DS),CSE(Cyber Security)**

| Course Category | Skill Enhanced Course | | Course Code | 24AI301S |
|---|---|---|---|---|
| **Course Type** | | | **L-T-P-C** | 0-1-2-2 |
| **Prerequisites** | | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | Introduce core programming concepts of Python programming language |
| 2 | Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries |
| 3 | Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to : | | Cognitive Level |
| **CO1** | Develop essential programming skills in computer programming concepts like data types, control statements. | K3 |
| **CO2** | Apply the basics of programming in the Python language. | K3 |
| **CO3** | Solve coding tasks related Dictionaries, tuples and sets. | K3 |
| **CO4** | Solve coding tasks related to the fundamental notions and techniques used in object- oriented programming. | K3 |
| **CO5** | Apply the basics of Numpy and pandas related to the Data Science | K3 |

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 3 | 3 | 2 |
| **CO2** | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 3 | 3 | 2 |
| **CO4** | 3 | 2 | 2 | 3 | 3 | - | - | - | - | - | - | 1 | 3 | 3 | 2 |
| **CO5** | 3 | 2 | 2 | 3 | 3 | - | - | - | - | - | - | 1 | 3 | 3 | 2 |

# COURSE CONTENT

**UNTI-I**:
Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.
**Parts of Python Programming Language:** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.
**Control Flow Statements:** if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

**Sample Experiments:**
1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Write a program to add and multiply complex numbers
5. Write a program to print multiplication table of a given number.

**UNIT – II**
**Functions:** Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.
**Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.
**Lists:** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

**Sample Experiments:**
1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
i. Addition ii. Insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.

**UNIT – III**
**Dictionaries:** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.
**Tuples and Sets:** Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

**Sample Experiments:**
1. Write a program to create tuples (name, age, address, college) for at least two
members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.

**UNIT – IV**
**Files:** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.
**Object-Oriented Programming:** Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

**Sample Experiments:**
1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

**UNIT – V**
**Introduction to Data Science:** Functional Programming, JSON and XML with Python, NumPy with Python, Pandas.

Visual Aids for EDA(Exploratory Data Analysis): Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar chart, Histogram, Choosing the best chart

**Sample Experiments:**
1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
a) Apply head () function to the pandas data frame
b) Perform various data selection operations on Data Frame
6. Apply different visualization techniques using sample dataset
a) Line Chart b) Bar Chart c) Scatter Plots d)Bubble Plot
7. Generate Scatter Plot using seaborn library for iris dataset
8. Apply following visualization Techniques for a sample dataset
a) Area Plot b) Stacked Plot c) Pie chart d) Table Chart

**Reference Books:**
1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.
4. Python : The Complete Reference, by Martin C Brown, McGraw Hill India.

**Online Learning Resources/Virtual Labs:**
1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

**II Year I Semester**
**Environmental Science**
(Common to all branches)

| Course Category | BASIC SCIENCES | | **Course Code** | 24BC301T |
|---|---|---|---|---|
| | | | **L-T-P-C** | 2 -0-0--0 |
| Course Type prerequisites | Theory | | **Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| S.No. | Course Objectives |
|---|---|
| 1 | To make the students to get awareness on environment |
| 2 | To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life |
| 3 | To save earth from the inventions by the engineers. |

| COURSE OUTCOMES | | Cognitive Level |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| CO1 | Grasp multi disciplinary nature of environmental studies and various renewable and non-renewable resources. | K2 |
| CO2 | Understand flow and bio-geo- chemical cycles and ecological pyramids. | K2 |
| CO3 | Understand various causes of pollution and solid waste management and related preventive measures. | K2 |
| CO4 | Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation. | K2 |
| CO5 | Illustrate the casus of population explosion, value education and welfare programmes. | K3 |

| Contribution of Course Outcomes towards achievement of Program | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| **CO1** | 1 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 |
| **CO2** | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **CO3** | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **CO4** | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 |
| **CO5** | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 |

**COURSE CONTENT**

### UNIT – I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies, Energy resources- Renewable and non-renewable resources (Biomass).

### UNIT – II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a)Forest ecosystem, b)Grassland ecosystem, c)Desert ecosystem, e)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)(Primary Treatment)

Biodiversity and Its Conservation : Introduction and Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hotspots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### UNIT – III

Environmental Pollution: Definition, Cause, effects and control measures of: a)Air Pollution, b)Water pollution, c)Soil pollution, d)Marine pollution, e)Noise pollution, f)Thermal pollution, g)Nuclear hazards (Primarytreatment)

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

### UNIT – IV

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 – V**

Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Viral infections -Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

**Textbooks:**
1. Erach Bharucha,Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.
2. Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
3. S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

**Reference Books:**
1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.
2. M.Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
6. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

**Online Learning Resources:**
- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science++Part+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science
- http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdf
- https://www.youtube.com/watch?v=5QxxaVfgQ3k

**II Year II Semester**
**OPTIMIZATION TECHNIQUES**
**(Common to IT, CSE(AIML), CSE(AI), CSE(DS))**

| Course Category | Management Course – I | | Course Code | 24ME405T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 2-0-0-2 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 | |
| | | **Semester End Examination** | 70 | |
| | | **Total Marks** | 100 | |

| | **COURSE OBJECTIVES** |
|---|---|
| 1 | To define an objective function and constraint functions in terms of design variables, and then state the optimization problem. |
| 2 | To state single variable and multi variable optimization problems, without and with constraints. |
| 3 | To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method. |
| 4 | To state transportation and assignment problem as a linear programming problem to determine Simplex method. |
| 5 | To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems. |

| | **COURSE OUTCOMES** | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem. | K2 |
| **CO2** | Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution. | K3 |
| **CO3** | Apply and Solve transportation and assignment problem by using Linear programming Simplex method. | K3 |
| **CO4** | Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions. | K3 |
| **CO5** | Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| **Contribution of Course Outcomes towards achievement of Program Outcomes** <br> **(1 – Low, 2 - Medium, 3 – High)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | 3 | - |
| **CO2** | 3 | 3 | 3 | 1 | 3 | - | - | - | - | - | 3 | - |
| **CO3** | 3 | 3 | 3 | 1 | 3 | - | - | - | - | - | 3 | - |
| **CO4** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | 3 | - |
| **CO5** | 3 | 3 | 3 | 1 | 3 | - | - | - | - | - | 3 | - |

**COURSE CONTENT**

**UNIT I**

**Introduction:** Statement of an Optimization problem, design vector, design constraints, constraint surface, objective function, objective function surfaces, classification of Optimization problems.

**Classical Optimization Techniques:** Single variable Optimization, multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum, multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers, multivariable Optimization with inequality constraints, Kuhn – Tucker conditions

**UNIT II**

**Linear Programming:** Standard form of a linear programming problem, geometry of linear programming problems, definitions and theorems, solution of a system of linear simultaneous equations, pivotal reduction of a general system of equations, motivation to the simplex method, simplex algorithm.

**UNIT III**

**Transportation Problem:** Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method, testing for optimality of balanced transportation problems, Special cases in transportation problem.

**UNIT IV**

**Nonlinear Programming:** Unconstrained cases, One – dimensional minimization methods: Classification, Fibonacci method, Univariate method, steepest descent method. Constrained cases– Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method, Basic approaches of Interior and Exterior penalty function methods,

**UNIT V**

**Dynamic Programming:** Dynamic programming multistage decision processes, types, concept of sub optimization and the principle of optimality, computational procedure in dynamic programming, examples illustrating the calculus method of solution, examples illustrating the tabular method of solution.

**Textbooks:**
1. Engineering optimization: Theory and practice, S. S. Rao, New Age International (P) Limited, 3rd edition, 1998.
2. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt. Ltd.

**Reference Books:**
1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research, Dr. S. D. Sharma, Kedarnath, Ramnath& Co.

**Online Learning Resources:**
1. http://www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html
2. https://nptel.ac.in/courses/110106062
3. https://nptel.ac.in/courses/111/105/111105039/
4. https://nptel.ac.in/courses/106/108/106108056/
5. https://nptel.ac.in/courses/112/105/112105235/
6. https://onlinecourses.nptel.ac.in/noc21_me43/preview
7. https://www.nptel.ac.in/content/syllabus_pdf/112103301.pdf

**II Year II Semester**
**Probability and Statistics**
**(Common to CSE, CSE-AI&ML, CSE-AI and IT)**

| Course Category | Basic Sciences | | Course Code | 24BM402T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 3-0-0-3 |
| Prerequisites | Basic knowledge of Probability, Permutation & Combinations | Continuous Internal Assessment | | 30 |
| | | Semester End Examination | | 70 |
| | | Total Marks | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To familiarize the students with the foundations of probability and statistical methods |
| 2 | To impart probability concepts and statistical methods in various applications Engineering |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Classify the concepts of data science and its importance | K3 |
| CO2 | Interpret the association of characteristics and through correlation and regression tools | K3 |
| CO3 | Apply discrete and continuous probability distributions | K3 |
| CO4 | Design the components of a classical hypothesis test | K3 |
| CO5 | Infer the statistical inferential methods based on small and large sampling tests | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |

**COURSE CONTENT**

**UNIT I**
**Descriptive statistics and methods for data science:**
Data science – Statistics Introduction –Populations Sample –Collection of data – primary and secondary data–Type of variable: dependent and independent Categorical and Continuous variables –Data visualization – Measures of Central tendency – Measures of Variability–Skewness –Kurtosis.

**UNIT II**
**Correlation and Regression:**
Correlation–Correlation coefficient – Rank correlation.
Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and properties **–** Curvilinear Regression: Parabola–Exponential–Power curves.

**UNIT III**
**Probability and Distributions:**
Probability– Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution functions– Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

**UNIT IV**
**Sampling Theory:**
Introduction – Population and samples–Sampling distribution of Means and Variance (definition only) – Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof)– Estimation using, and F-distributions.
$$\chi^2$$

**UNIT V**
**Tests of Hypothesis:**
Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests –Test of significance for large samples and Small Samples : Single and difference means – Single and two proportions – Student's t-test ,F-test-test.
$$\chi^2$$

**TEXT BOOKS**
1. **Miller and Freund's**, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. **S.C.Gupta and V.K.Kapoor** ,Fundamentals of Mathematical Statistics, 11/e,S ultan Chand & Sons Publications, 2012.

**REFERENCE BOOKS**
1. **Shron L.Myers, KeyingYe, RonaldE Walpole,** Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
2. **Jayl.Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M.Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V.Hogg**, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

**WEB RESOURCES**
1. https://www.geeksforgeeks.org/descriptive-statistic/
2. https://www.cuemath.com/data/correlation-and-regression/
3. https://en.wikipedia.org/wiki/Probability_distribution
4. https://en.wikipedia.org/wiki/Sampling_(statistics)
5. https://en.wikipedia.org/wiki/Statistical_hypothesis_test

**II Year II Semester**
**Operating Systems**
**(Common to CSE, CSE (Cyber Security), IT)**

| Course Category | Professional Core | | Course Code | 24CS401T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 | |
| | | **Semester End Examination** | 70 | |
| | | **Total Marks** | 100 | |

| COURSE OBJECTIVES | |
|---|---|
| The main objectives of the course is to make student | |
| 1 | Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection |
| 2 | Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. |
| 3 | Illustrate different conditions for deadlock and their possible solutions |

| COURSE OUTCOMES | | |
|---|---|---|
| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
| **CO1** | Describe various generations of Operating System and functions of Operating System | K2 |
| **CO2** | Comprehend the concept of program, process and thread andcompare various CPU Scheduling Algorithms and Inter Process Communication problems | K2 |
| **CO3** | Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques | K2 |
| **CO4** | Apply process synchronization techniques to avoid deadlocks | K3 |
| **CO5** | Outline File Systems in Operating System like UNIX/Linux and Windows | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 2 | - | - | 1 | - | - | - | - | - | - | - |
| **CO2** | 3 | 3 | 3 | 2 | 1 | - | - | - | - | - | - | 2 |
| **CO3** | 3 | 3 | 2 | - | 1 | - | - | - | - | - | - | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | 2 |
| **CO5** | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | 2 |

**COURSE CONTENT**

**UNIT - I**
Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems
System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

**UNIT - II**
Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.
Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.
CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

**UNIT – III**
Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.
Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

**UNIT - IV**
Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.
Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing
Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

**NIT - V**
File System: File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.
Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

**Text Books:**
1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

**Reference Books:**
1. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
2. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

**Online Learning Resources:**
1. https://nptel.ac.in/courses/106/106/106106144/
2. http://peterindia.net/OperatingSystems.html

**II Year II Semester**
**Database Management Systems**
**Common to AI, CSE(CS),CSE, DS, IT**

| Course Category | Professional Core | | Course Code | 24IT401T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3–0 –0–3 |
| **Prerequisites** | | | **Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| | COURSEOBJECTIVES |
|---|---|
| 1 | To introduce Data models and Entity Relationship Model Representation |
| 2 | To give a good formal foundation on the relational model of data and usage of Relational Algebra |
| 3 | To introduce the concepts of basic SQL as a universal Database language |
| 4 | To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization |
| 5 | To provide an overview of concurrent execution ,deadlocks and indexing techniques |

| | COURSEOUTCOMES | |
|---|---|---|
| | **Upon successful completion of the course, the student will be able to:** | **Cognitive Level** |
| **CO1** | Implementing E-R Models on different examples | K3 |
| **CO2** | Describe a relational database and object-oriented database | K3 |
| **CO3** | Create, maintain and manipulate a relational database using SQL | K3 |
| **CO4** | Design a database with understanding on Normalization. | K2 |
| **CO5** | Determining and describing the concurrent execution ,deadlocks | K3 |

K1:Remember,K2:Understand,K3:Apply,K4:Analyze,K5:Evaluate,K6: Create

| Contribution of Course Outcomes towards achievement of Program Outcomes(1–Low,2-Medium,3–High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 3 | 1 | 3 | - | - | - | - | - | - | - | - | - | 2 | 3 | - |
| **CO2** | 3 | 3 | 3 | - | - | - | - | - | 1 | - | - | - | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 3 | 2 | - | - | - | - | 1 | - | 2 | - | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 3 | - | - | - | - | - | 1 | - | 3 | - | 2 | 2 | 2 |
| **CO5** | 3 | 2 | 1 | - | - | - | - | - | 1 | - | - | - | 2 | - | 2 |

## COURSECONTENT

### UNIT-I
Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database. Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

### UNIT-II
Relational Model: Introduction to relational model, concepts of domain, attribute, Tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

### UNIT-III
SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

### UNIT-IV
Schema Refinement (Normalization):Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

### UNIT-V
Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm. Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing:

### TEXT BOOKS
1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

### REFERENCEBOOKS
1. Introduction to Database Systems,8/e CJDate, PEA.
2. Database Management System,6/e Ramez Elmasri, Shamkant B.Navathe, PEA
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

### WEB RESOURCES
1. https://nptel.ac.in/courses/106/105/106105175/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview

**II Year II Semester**
**Software Engineering**
**(Common to CSE & IT)**

| Course Category | Professional Core | Course Code | 24CS402T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| COURSE OBJECTIVES | |
|---|---|
| The objectives of this course are to introduce | |
| 1 | Software life cycle models, Software requirements and SRS document. |
| 2 | Project Planning, quality control and ensuring good quality software. |
| 3 | Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Ability to transform an Object-Oriented Design into high quality, executable code | K3 |
| CO2 | Skills to design, implement, and execute test cases at the Unit and Integration level | K3 |
| CO3 | Compare conventional and agile software methods | K4 |
| CO4 | Skills to design Software Architectural components. | K3 |
| CO5 | Analyze the interface analysis and Testing strategies. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 2 | - | 3 | - | - | - | - | - | - | 1 |
| CO2 | 3 | 3 | 2 | - | 2 | - | - | - | - | - | - | 1 |
| CO3 | 3 | 2 | 1 | 3 | 2 | - | - | - | 2 | - | - | 2 |
| CO4 | 3 | 2 | 3 | 2 | 3 | - | - | - | 2 | - | - | 2 |
| CO5 | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | - | - | 3 |

**COURSE CONTENT**

**UNIT I:**
**Introduction:** Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.
**Software Life Cycle Models:** Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

**UNIT II:**
**Software Project Management:** Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.
**Requirements Analysis And Specification:** Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

**UNIT III:**
**Software Design:** Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling.approaches to software design.
**Agility:** Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)
**Function-Oriented Software Design:** Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.
**User Interface Design:** Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

**UNIT IV:**
**Coding And Testing:** Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing**,** Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.
**Software Reliability And Quality Management:** Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000.SEI Capability maturity model. Few other important quality standards, and Six Sigma**.**

**UNIT V:**
**Computer-Aided Software Engineering (Case):** CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.
**Software Maintenance:** Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.
**Software Reuse:** reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

**Text Books:**
1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition,PHI.
2. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition.

**Reference Books:**
1. Software Engineering, Ian Sommerville,10thEdition, Pearson,
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

**e-Resources:**
1. https://nptel.ac.in/courses/106/105/106105182/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous) (Autonomous)
## Department of Information Technology

<div align="right">R23</div>

## II Year II Semester
## Operating Systems & Software Engineering Laboratory

| Course Category | Professional Core | | Course Code | 24CS402P |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | | **Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| COURSE OBJECTIVES |
|---|
| **The objective of the course is to** |
| **1**    Learn to implement scheduling, page replacement ,Bankers algorithm and s/w development through UML diagrams |

| COURSEOUTCOMES | | Cognitive level |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| **CO1** | Implementing algorithms of CPU, page replacement algorithms, Bankers algorithm | K4 |
| **CO2** | Estimating the efforts of different software models | K3 |
| **CO3** | Generating different tests cases for software testing | K4 |

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| **CO1** | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - |
| **CO2** | 1 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - |
| **CO3** | 2 | 2 | 2 | 2 | 3 | - | - | - | - | - | - | - |

**LIST OF EXPERIMENTS**
**Note:** Learn to implement scheduling, page replacement , Bankers algorithm and s/w development through UML diagrams

**Experiments in Operating Systems:**

1   Practicing of Basic UNIX Commands.

2   Write programs using the following UNIX operating system calls
    fork, exec, get pid, exit, wait, close, stat, open dir and read dir

3   Simulate UNIX commands like cp, ls, grep, etc.,

4   Simulate the following CPU scheduling algorithms
        a) FCFS b) SJF c) Priority d) Round Robin

5   Control the number of ports opened by the operating system with
        a) Semaphore b) Monitors.

6   Write a program to illustrate concurrent execution of threads using p threads library.

7   Write a program to solve producer-consumer problem using Semaphores

8   Implement the following memory allocation methods for fixed partition
            a) First fit b) Worst fit c) Best fit

9   Simulate the following page replacement algorithms
        a) FIFO b) LRU c) LFU

10  Simulate Paging Technique of memory management.

11  Implement Bankers Algorithm for Dead Lock avoidance and prevention

12  Simulate the following file allocation strategies
            a) Sequential b) Indexed c) Linked

13  Download and install nachos operating system and experiment with it

**Experiments in Software Engineering:**

1   Perform the following, for the following experiments:
        i.  Do the Requirement Analysis and Prepare SRS
        ii. Draw E-R diagrams, DFD, CFD and structured charts for the project.
            a.  Course Registration System
            b.  Students Marks Analyzing System
            c.  Online Ticket Reservation System
            d.  Stock Maintenance.

2   Consider any application, using COCOMO model, estimate the effort

3   Consider any application, Calculate effort using FP oriented estimation model

4   Draw the UML Diagrams for the problem a, b, c, d.

5   Design the test cases for e-Commerce application (Flip cart, Amazon)

6   Design the test cases for a Mobile Application (Consider any example from App store)

7   Design and Implement ATM system through UML Diagrams

**TEXT BOOKS/ SUGGESTED READING:**

1   Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition.

2   Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

3   Operating System Concepts, Silbers chat z A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.

4   Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018

**II Year II Semester**
**Database Management Systems Laboratory**
**Common to AI,CSE(CS),CSE, DS ,IT**

| Course Category | Professional Core | Course Code | 24IT401P |
|---|---|---|---|
| **Course Type** | Laboratory | **L-T-P-C** | 0–0 –3–1.5 |
| **Prerequisites** | | **Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

| | COURSEOBJECTIVES |
|---|---|
| 1 | Populate and query a data base using SQL DDL/DML Commands |
| 2 | Declare and enforce integrity constraints on a database |
| 3 | Writing Queries using advanced concepts of SQL |
| 4 | Programming  PL/SQL including procedures, functions, cursors, triggers and JDBC connection |

| COURSEOUTCOMES | | |
|---|---|---|
| **Up on successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Create data base tables and perform various operations | K3 |
| CO2 | Implement PL/SQL programs | K3 |
| CO3 | Create stored packages for variables, cursors and JDBC connection | K3 |

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

| **Contribution of Course Out comes to wards achievement of Program:** Outcomes (1 – Low, 2 -Medium, 3 –High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 2 | 1 |
| **CO2** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 2 | 1 |
| **CO3** | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | 1 | 2 | 3 | 2 |

**LISTOFEXPERIMENTS**

**Note:** For performing the experiments consider any case study(ATM/ Banking/Library/Hospital management systems)

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

3. Queries using Aggregate functions(COUNT, SUM, AVG, MAX and MIN),GROUP BY, HAVING and Creation and dropping of Views.

4. Queries using Conversion functions (to_ char, to_ number and to_ date),string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, in it cap, length, substr and instr), date functions (Sys date, next_ day, add_ months, last_ day, months_ between, least, greatest, trunc, round, to_ char, to_ date)

5. i. Create a simple PL/SQL program which includes declaration section, executable section, and exception handling section (Ex. Student mark scan be selected from the table and printed for those who secured first class and an exception can be raised if nore cords were found)
   ii. Insert data into student table and use COMMIT,ROLL BACK and SAVEPOINT in PL/SQL block.

6. Develop program that includes the features NESTEDIF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

8. Programs development using creation of procedures, passing     parameters I N and OUT of PROCEDURES.

9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

12. Create a table and perform the search operation on table using indexing and non-indexing techniques.

13. Write a Java program that connects to a database using JDBC

14. Write a Java program to connect to a database using JDBC and insert values into it

15. Write a Java program to connect to a database using JDBC and delete values from it

**TEXTBOOKS/SUGGESTEDREADING:**

1. Oracle: The Complete Reference by Oracle Press

2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007

3. RickFVanderLans,"IntroductiontoSQL",FourthEdition,PearsonEducation,2007

**II Year II Semester**
**Python with D Jango**

| Course Category | Skill Enhancement Course | | Course Code | 241T401S |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-1-2-2 |
| **Prerequisites** | | | **Total Marks** | |

| COURSEOBJECTIVES |
|---|
| The objective of the course is to |

| 1 | Learn how to construct dynamic web pages and interactive web-based applications using Django |
|---|---|

| COURSEOUTCOMES | | Cognitive level |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| **CO1** | Create frame work and web development using python | K3 |
| **CO2** | Create a registration page using Authentication System and connecting to database | K4 |
| **CO3** | Creating a functional website in Django | K4 |

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

| Contribution of Course Outcomes towards achievement of Program: Outcomes (1 – Low, 2 -Medium, 3 –High) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 2 | 2 | 3 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 2 | 1 |
| **CO2** | 2 | 2 | 3 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 2 | 1 |
| **CO3** | 2 | 2 | 3 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 2 | 1 |

**LIST OF EXPERIMENTS**

**Note:** Learn how to construct dynamic web pages and interactive web-based applications using Django

**Unit-1**

1. Write a Python program that designs a simple login form with labels and Entry widgets, arranging them in a grid using the Grid geometry manager.

3. Write a program using BeautifulSoup4 library for web scraping for a given URL

4. Develop a sample Hello World page using Flask framework

5. Develop a sample web page using Cherry Py / Web2Py / Bottle Framework

**Unit-2**

1. Create a Login and Registration Page using MVC architecture in Django Framework

2. Create a sample page in Django by integrating Boot Strap.

3. Create an application with Tables, grids in Django

5. Create a Django App with Carousels feature

**Unit - 3**

1. Create a registration page using Authentication System

2. Create an application in Django to send emails using email settings and Grid Layout

3. Create an application in Django using page restriction / authentication with Login and Logout Functionality

4. Create a sample form using Django Forms

**Unit - 4**

1. Create an app in Django which fetches data from database and show as list and also save objects in database

2. Create an app in Django for performing CRUD operations on records in a database

3. Create an app in Django which uses session management and cookies to store and manage user sessions.

**Unit -5**

1. Create a website in Django with login, and registration page.

2. Register on GitHub, and Heroku and deploy the website on Heroku with all the functionalities developed.

3. Configure Django to handle static files.

**TEXTBOOKS/SUGGESTEDREADING:**

1. Martin C.Brown, "Python: The Complete Reference Paper back", 4th Edition 2018, McGraw Hill Education.

2. Tom Aratyn, "Building D jango 2.0 Web Applications: Create enterprise-grade, scalable Python web applications easily with Django 2.0",2nd Edition 2018, Packet Publishing

3. Daniel Rubio, Apress, "Beginning Django Web Application Development and Deployment with Python", 2nd Edition 2017,Apress.

**Reference Books:**

1. Reema Thareja, "Python Programming: Using Problem Solving Approach", 3rd Edition 2017, Oxford.

2. Harry Percival, "Test-Driven Development with Python: Obey the Testing Goat: Using D jango, Selenium and JavaScript",2nd Edition 2019, Kindle Edition.

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous) (Autonomous)
## Department of Information Technology

R23

**II Year II Semester**
**DESIGN THINKING & INNOVATION**
**(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY)**

| Course Category | BS&H | Course Code | 24HM401P |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 1 -0 -2-2 |
| Prerequisites | | Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| Course Outcomes | | Blooms Taxonomy Level |
|---|---|---|
| **Upon successful completion of the course, the student will be able to** | | |
| CO 1 | Define the concepts related to design thinking. | K1 |
| CO 2 | Explain the fundamentals of Design Thinking and innovation. | K2 |
| CO 3 | Apply the design thinking techniques for solving problems in various sectors. | K3 |
| CO 4 | Analyze to work in a multidisciplinary environment. | K4 |
| CO 5 | Evaluate the value of creativity. | K5 |

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 1 | 1 | 3 | | 1 | 3 | | | | | 1 | 1 |
| CO2 | | | 3 | | 2 | 3 | | | | | | |
| CO3 | | 1 | 3 | | | 3 | | | 1 | | | 1 |
| CO4 | | | 3 | | | 3 | | | | | | |
| CO5 | | | 3 | | | 3 | | | | | 3 | 2 |

**COURSE CONTENT**

**UNIT – I        Introduction to Design Thinking**
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

**UNIT - II        Design Thinking Process**
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development
**Activity:** Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

**UNIT - III        Innovation**
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.
**Activity:** Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

**UNIT - IV        Product Design**
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.
**Activity:** Importance of modeling, how to set specifications, Explaining their own product design.

**UNIT – V        Design Thinking in Business Processes**
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.
**Activity:** How to market our own product, about maintenance, Reliability and plan for startup.

**Textbooks:**
1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

**Reference Books:**
1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

**Web Resources:**
- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview