## R20 COURSE STRUCTURE AND SYLLABUS

For

# B. Tech.

# CSE(AI & ML)

(*Applicable for batches admitted from 2020-21*)

# PRAGATI ENGINEERING COLLEGE

**(AUTONOMOUS)**

Permanently Affiliated to JNTUK, Kakinada, Accredited by NAAC with "A" Grade Recognized by UGC 2(f) and 12(b) under UGC act, 1956

# 1-378, ADB Road, Surampalem – 533 437 Near Peddapuram, E.G.Dist, Andhra Pradesh

**R20- B.Tech – CSE (AI&ML)**

## COURSE STRUCTURE

| **Semester- 0** |
|---|
| 3 Weeks Induction Program to be conducted at the beginning of First year |

**Zero Semester**

| **Induction program (mandatory)** | **3 weeks duration** |
|---|---|
| Induction program for students to be offered right at the start of the first year. | • Physical activity<br>• Creative Arts<br>• Universal Human Values<br>• Literary<br>• Proficiency Modules<br>• Lectures by Eminent People<br>• Visits to local Areas<br>• Familiarization to Dept./Branch and Innovations |

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days. We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.2 The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

| I-I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Category** | **Course Code** | **Course Title** | **Hours per week** | | | **Credits** |
| | | | | **L** | **T** | **P** | **C** |
| 1 | HS | | Professional Communicative English | 3 | 0 | 0 | 3 |
| 2 | BS | | Differential Equations and Numerical Methods | 3 | 0 | 0 | 3 |
| 3 | BS | | Applied Chemistry | 3 | 0 | 0 | 3 |
| 4 | ES | | Programming for Problem Solving using C | 3 | 0 | 0 | 3 |
| 5 | ES | | Computer Engineering Workshop | 1 | 0 | 4 | 3 |
| 6 | HS | | Professional Communicative English Lab | 0 | 0 | 3 | 1.5 |
| 7 | BS | | Applied Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 8 | ES | | Programming for Problem Solving using C Lab | 0 | 0 | 3 | 1.5 |
| 9 | MC | | Environmental Science | 2 | 0 | 0 | 0 |
| **Total Credits** | | | | **15** | **0** | **13** | **19.5** |

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**R20- B.Tech – CSE (AI&ML)**

| I-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Category** | **Course Code** | **Course Title** | **Hours per week** | | | **Credits** |
| | | | | **L** | **T** | **P** | **C** |
| 1 | BS | | Linear Algebra and Partial Differential Equations | 3 | 0 | 0 | 3 |
| 2 | BS | | Applied Physics | 3 | 0 | 0 | 3 |
| 3 | ES | | Digital Logic Design | 3 | 0 | 0 | 3 |
| 4 | ES | | Python Programming | 3 | 0 | 0 | 3 |
| 5 | ES | | Data Structures | 3 | 0 | 0 | 3 |
| 6 | BS | | Applied Physics Lab | 0 | 0 | 3 | 1.5 |
| 7 | ES | | Python Programming Lab | 0 | 0 | 3 | 1.5 |
| 8 | ES | | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | MC | | Constitution of India | 2 | 0 | 0 | 0 |
| **Total Credits** | | | | **17** | **0** | **9** | **19.5** |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

**Department of Basic Sciences & Humanities** **R20 syllabus.**

**<Professional Communicative English >**
**<Common to CE, EEE, MECH, ECE, CSE, CSE (DS), CSE (AI&ML), & IT >**

| S.NO | COURSE OUTCOME | | Cognitive Level |
|---|---|---|---|
| 1 | CO1 | Emphasizes that the ultimate aim of Education is to enhance wisdom and inspires the readers to serve their nation with their self-enrichment. | K2 |
| 2 | CO2 | Enables the learners to promote peaceful co-existence and universal harmony in society and empowers them to initiate innovation. | K2 |
| 3 | CO3 | Imparts the students to manage different cultural shock due to globalization and develop multiculturalism to appreciate diverse cultures and motivate them to contribute to their nation. | K3 |
| 4 | CO4 | Arouses the thought of life to lead in the right path by recognizing the importance of work besides enhancing their LSRW skills. | K2 |
| 5 | CO5 | Inspires the learners at the advancement of software by the eminent personalities and motivates the readers to think and tap their innate talents. | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K-4 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 | PO 10 | PO 11 | PO1 2 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 2 | - | - | | |
| CO2 | - | - | - | - | - | - | - | 2 | - | 3 | - | - | | |
| CO3 | - | - | - | - | - | 2 | - | - | - | 2 | - | - | | |
| CO4 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | | |
| CO5 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | | |

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

**UNIT 1:**

1. *'The Greatest Resource- Education' from Professional Communicative English.*
   Objective: Schumacher describes the education system by saying that it was mere training, something more than knowledge of facts.

   Outcome: Underscores that the ultimate aim of Education is to enhance wisdom.

2. *'War' from 'Panorama: A Course on Reading'*
   Objective: To develop extensive reading skill and comprehension for pleasure and profit.

   Outcome: Acquisition of LSRW skills

**UNIT 2:**

1. *' A Dilemma' from Professional Communicative English.*
   Objective: The lesson centres on the pros and cons of the development of science and technology.

   Outcome: Enables the students to promote peaceful co-existence and universal harmony among people in society.

2. *'The Verger' from 'Panorama: A Course on Reading'*
   Objective: To develop extensive reading skill and comprehension for pleasure and profit.

   Outcome: Acquisition of LSRW skills

**UNIT 3:**

1. *'Cultural Shock': Adjustments to new Cultural Environments from Professional Communicative English.*
   Objective: Depicts of the symptoms of Cultural Shock and the aftermath consequences
   Outcome: Enables the students to manage different cultural shocks due to globalization.

2. *' The Scarecrow' from Panorama: A Course on Reading*
   Objective: To develop extensive reading skill and comprehension for pleasure and profit.
   Outcome: Acquisition of LSRW skills

**R20- B.Tech – CSE (AI&ML)**

**UNIT 4:**

1. *'The Secret of Work'* from *Professional Communicative English.*
   Objective: Portrays the ways of living life in its real sense.
   Outcome: Arouses the thoughtto lead life in a right path by recognizing the importance of work.

2. *'A Village Lost to the Nation' from Panorama: A Course on Reading*
   Objective: To develop extensive reading skill and comprehension for pleasure and profit.

   Outcome: Acquisition of LSRW skills

**UNIT 5:**

1. *' The Chief Software Architect' from Professional Communicative English.*
   Objective: Supports the developments of technology for the betterment of human life.

   Outcome: Pupil gets inspired by eminent personalities who toiled for the present-day advancement of software development.

2. *'Martin Luther King and Africa' from Panorama: A Course on Reading*
   Objective: To develop extensive reading skill and comprehension for pleasure and profit.

   Outcome: Acquisition of LSRW skills

**DETAILED TEXTBOOK:**

- **PROFESSIONAL COMMUNICATIVE ENGLISH** *Published by Maruthi Publishers.*

**NON-DETAILED TEXTBOOK:**

- ***PANORAMA: A COURSE ON READING***, *Published by Oxford University Press India*
  The course content, along with the study material, is divided into six units.

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

**Differential Equations and Numerical Methods**
**(Common to CE, EEE, ME, ECE, CSE,CSE-DS, CSE-AI&ML& IT)**

**I B. Tech I Semester**

| | | | |
|---|---|---|---|
| **Course Category** | Basic Sciences | **Course Code** | |
| **Course Type** | Theory | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | Differentiation, Integration | **InternalAssessment** | 30 |
| | | **Semester EndExamination** | 70 |
| | | **Total Marks** | 100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course. |
| **2** | The skills derived from the course will help the student form a necessary base to develop analytic and design concepts. |

| **COURSE OUTCOMES** | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | solve first order differential equations and its applications | K3 |
| **CO2** | solve the linear differential equations with constant coefficients by appropriate method | K3 |
| **CO3** | apply Newton, Gauss and Lagrange interpolation formulae to find interpolating polynomials for the given data. | K3 |
| **CO4** | find the approximate roots of transcendental equations by using different numerical methods | K2 |
| **CO5** | solve initial value problems by using different numerical schemes | K3 |

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

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

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

| **COURSE CONTENT** | |
|---|---|
| **UNITI** | **Differential equations of first order and first degree**<br>Linear – Bernoulli – Exact – Reducible to exact.<br>**Applications:** Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories. |
| **UNITII** | **Linear differential equations of higher order**<br>Non-homogeneous equations of higher order with constant coefficients with non-homogeneous form $e^{ax}$, $\sin ax$, $\cos ax$ polynomials in $x^n, e^{ax}V(x), x^mV(x)$ - Method of Variation of parameters. |
| **UNITIII** | **Interpolation**<br>Introduction– Errors in polynomial interpolation – Finite differences – Forward differences– Backward differences –Central differences –properties – Differences of a polynomial- Newton's formulae for interpolation –Gauss formulae for interpolation- Interpolation with unequal intervals: Lagrange's interpolation formula. |
| **UNITIV** | **Solution of Algebraic and Transcendental Equations**<br>Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable). |
| **UNIT-V** | **Solution of Ordinary Differential equations**<br>Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method – Modified Euler's method - Runge-Kutta method (second and fourth order). |

| | |
|---|---|
| **TEXT BOOKS** | |
| **1.** | **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers. |
| **2.** | **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India |
| **REFERENCE BOOKS** | |
| **1.** | **Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn |
| **2.** | **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press |
| **3.** | **Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning. |
| **4.** | **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press. |
| **5.** | **T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications. |
| **WEB RESOURCES** | |
| **1.** | **UNIT I: Differential equations of first order and first degree**<br>https://en.wikipedia.org/wiki/Differential_equation<br>http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode<br>https://www.khanacademy.org/math/differential-equations/first-order-differential-equations |
| **2.** | **UNIT II: Linear differential equations of higher order**<br>https://en.wikipedia.org/wiki/Differential_equation<br>http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode<br>https://nptel.ac.in/courses/122107037/20 |
| **3.** | **UNIT III: Interpolation**<br>https://en.wikibooks.org/wiki/Introduction_to_Numerical_Methods/Interpolation |
| **4.** | **UNIT IV: Solution of Algebraic and Transcendental Equations**<br>https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving<br>https://www.slideshare.net/100005232690054/algebraic-and-transcendental-equations |
| **5.** | **UNIT V: Solution of Ordinary Differential Equations**<br>https://nptel.ac.in/courses/111107063/<br>https://www.facweb.iitkgp.ac.in/~rajas/cgen/page/nptlcrs |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## Applied Chemistry

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

| | | | |
|---|---|---|---|
| **Course Category** | Basic Sciences | **Course Code** | |
| **Course Type** | Theory | **L-T-P-C** | 3 – 0 – 3 – 4.5 |
| **Prerequisites** | Intermediate Chemistry | **Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 30<br>70<br>100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | To learn about Electrochemical cells, Batteries and Fuel cells |
| **2** | To learn about non conventional energy sources |
| **3** | To study about Nano materials, Super conductors and their preparation, applications and also about principles of green chemistry and green engineering applications |
| **4** | To know about Polymers, Plastics and Elastomers |
| **5** | To Understand the principles of different analytical instruments and their applications |

| **COURSE OUTCOMES** | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | To compare different types of batteries and explain the merits of fuel cell. | Understanding (K2) |
| **CO2** | List out different renewable sources of energy. | Applying (K3) |
| **CO3** | To explain the Green methods of Synthesis and applications of Green technologies and also Band theory applications. | Applying (K3) |
| **CO4** | Analyze the importance of Polymers in engineering applications. | Understanding (K2) |
| **CO5** | To Distinguish between Rotaxane and Catenane molecular machines | Analyzing (K4) |

**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 | 2 | 2 | 2 | | 2 | | | | 2 | | 1 | | **1** |
| **CO2** | 2 | 2 | 1 | | | 1 | 1 | | | | 1 | | | | |
| **CO3** | 1 | 1 | | 1 | 2 | | | | | | | 1 | | **1** | |
| **CO4** | 2 | 2 | | 1 | | | 1 | | | | | 1 | | | |
| **CO5** | **1** | 1 | 1 | | | | 1 | | | | 2 | 1 | 1 | | |

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

| **COURSE CONTENT** | **APPLIED CHEMISTRY SYLLABUS** |
|---|---|
| **UNIT I** | **ELECTROCHEMICAL ENERGY SYSTEMS** **9hrs**<br>Electrode Potential, Nernst Equation, EMF of the cell, Types of Electrodes - Hydrogen and Calomel Electrode, Electrochemical Cell, Galvanic Cell vs Electrolytic Cell, ***Concentration Cells***, Types of Ion Selective Electrodes- Glass Membrane Electro<br>**Batteries**- Characteristics, Classification and Important Applications. Classical batteries- Dry/Lechlanche cell, Modern batteries- Zinc air, Lithium cells : Li -$MnO_2$ cell.<br>**Fuel cells**- Introduction, $H_2$-$O_2$ fuel cell, Advantages of fuel cells.<br>**Learning Outcomes:**<br>At the end of this unit, the students will be able to<br>Apply Nernst Equation for Calculating Electrode Potentials (L3)<br>Compare different batteries and their applications (L2) |
| **UNIT II** | **ENERGY SOURCES AND APPLICATIONS** **8hrs**<br>Introduction- Sources of renewable energy<br>**Solar energy** – Introduction- Photo voltaic cell/ Solar cell – Construction and Working, Applications of Solar energy. Photo Galvanic Cells, Electrochemical Sensors.<br>**Non Conventional Energy Sources:** Hydropower, Geo Thermal Power, Tidal Power, Ocean Thermal Energy Conversion (OTEC).<br>**Learning outcomes** :After the completion of the Unit ,the student will able to<br>List different renewable sources of energy. ( L-1)<br>Explain how photovoltaic cells convert light into energy. ( L-2)<br>Illustrate the construction and working of PV cell. ( L-2) |
| **UNIT III** | **MATERIAL SCIENCE AND ENGINEERING** **7+5 hrs**<br>**III-A: Nanomaterials:** Introduction , Preparation of Carbon Nano Tubes(CNTs) by Arc discharge and Chemical Vapor Deposition Methods.<br>Fullerenes : Preparation, Properties and Applications;<br>Chemical Synthesis of Nanomaterials : Sol-gel method, Applications of Nano Materials in Wastewater treatment and Medicine.<br>**III-B: Green Chemistry:** Introduction, Principles of Green Chemistry and Engineering Applications with a **case *study***<br>**Band Theory of Solids:** Introduction –Explanation of Conductors, Semiconductors and Insulators by Band Theory. Super conductors: Types-Preparation, Properties and Applications**.**<br>**Learning Outcomes:** At the end of this unit, the students will be able to<br>Classify Nano materials. (L-2)<br>Explain the Synthesis and applications of Nano Materials. (L-2)<br>Explain the band theory of solids for conductors, semiconductors and insulators (L2) |
| **UNIT IV** | **POLYMER CHEMISTRY** **10hrs**<br>**Polymers**: Introduction, Functionality of monomers, Chain ( Addition) Polymerization, Step(Condensation) Polymerization, Co-Ordination Polymerization, Co - Polymerization with examples and Mechanism. Conducting polymers : Mechanism of Conduction in Poly acetylene, Poly aniline and their Applications.<br>**Plastics**: Thermoplastics and Thermo Setting resins; Preparation, Properties and Applications of Bakelite, Urea- formaldehyde Resin, Nylon – 6,6.<br>**Elastomers**: ***Vulcanization of rubber***, Preparation, Properties and Applications of Buna-S and Buna – N.<br>**Learning Outcomes:**<br>At the end of this unit, the students will be able to<br>Explain different types of polymers and their applications (L2)<br>Demonstrate the mechanism of conduction in conducting polymers (L2) |
| **UNIT V** | **Instrumental Methods & Molecular Machines and Switches** **9 hrs**<br>A) Spectroscopic Techniques: Electromagnetic Spectrum- Introduction, Absorption of radiation: Beer-Lambert's law. Principles of UV-Visible and IR Spectroscopic techniques and their Applications.<br>B) Molecular Machines: Rotaxanes and Catenanes as artificial Molecular Machines.<br>Molecular Switches: Introduction, Cyclodextrin based Switches.<br>**Learning Outcomes:** |

| | |
|---|---|
| | At the end of this unit, the students will be able to<br>Explain the concepts of artificial molecular machines and molecular switches. ( L-3)<br>Distinguish between rotaxane and catenane molecular machines . ( L-2)<br>Explain the different types of spectral series in electromagnetic spectrum (L2)<br>Understand the principles of different analytical instruments (L2)<br>Explain the different applications of analytical instruments (L2) |

| | |
|---|---|
| **TEXT BOOKS** | |
| **1** | P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014). |
| 2 | Engineering Chemistry by Shikha Agarwal: Cambridge University Press,2019 edition . |
| **REFERENCE BOOKS** | |
| 1 | Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003) |
| 2 | S.S. Dara, A Textbook of Engineering Chemistry, S.Chand& Co, (2010) |
| 3 | N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014) |
| **WEB RESOURCES** | |
| 1 | **Electrochemical Energy systems**<br>https://en.wikipedia.org/wiki/Electrochemical_cell |
| 2 | **Energy Sources and Applications**<br>https://en.wikipedia.org/wiki/Hydropower |
| 3 | **Material Science and Engineering**<br>https://en.wikipedia.org/wiki/Nanomaterials |
| 4 | **Polymer Chemistry**<br>https://en.wikipedia.org/wiki/Polymer_chemistry |
| 5 | **Instrumental Methods & Molecular Machines and Switches**<br>https://en.wikipedia.org/wiki/Spectroscopy |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

**Programming for Problem solving using C**

**(Common to CE, ME, EEE, ECE, CSE, CSE (AI&ML),CSE(DS), IT)**

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

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program |
| **2** | To gain knowledge of the operators, selection, control statements and repetition in C |
| **3** | To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage. |
| **4** | To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor. |
| **5** | To assimilate about File I/O and significance of functions |

| **COURSE OUTCOMES** | | **BTL** |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| **CO1** | Apply the fundamentals of C Programming for Problem solving. | K3 |
| **CO2** | Identify the appropriate Decision statement and Loops for a given Problem. | K2 |
| **CO3** | Make use of Arrays and Strings to solve the problems in C. | K3 |
| **CO4** | design and implement programs to analyze the different pointer applications | K3 |
| **CO5** | Develop solutions for problems using Files and Functions. | K3 |

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

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# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

| **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 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| **CO2** | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| **CO3** | 3 | 3 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 |
| **CO4** | 2 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| **CO5** | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |

| **COURSE CONTENT** | |
|---|---|
| **UNIT I** | **Introduction to Computers**: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers<br>**Introduction to the C Language:** Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.<br>**Structure of a C Program:** Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments. |
| **UNIT II** | **Bitwise Operators**: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators.<br>**Selection & Making Decisions**: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions.<br>**Repetition:** Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples. |
| **UNIT III** | **Arrays:** Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages<br>**Strings:** String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application. |
| **UNIT IV** | **Pointers:** Introduction, Pointers to pointers, Compatibility, L value and R value<br>Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application.<br>Processor Commands: Processor Commands. |
| **UNIT V** | **Functions:** Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Passing Array to Functions, Passing Pointers to Functions, Recursion<br>**Text Input / Output:** Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions<br>Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type. |

**R20- B.Tech – CSE (AI&ML)**

| | |
|---|---|
| **TEXT BOOKS** | |
| **1.** | Programming for Problem Solving, Beerhouse A. Forouzan, Richard F.Gilberg, CENGAGE. |
| **2.** | The C Programming Language, Brian W.Kernighan, Dennis M. Ritchie, 2e, Pearson. |
| **REFERENCE BOOKS** | |
| **1.** | Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill. |
| **2.** | Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson. |
| **3.** | Computer Fundamentals and Programming in C, Pradip Dey, Manas Ghosh, OXFORD. |
| **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 |
| **4.** | http://www.youtube.com/watch?v=b00HsZvg-V0&feature=relmfu |
| **5.** | http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/ |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## Computer Engineering Workshop

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

**COURSE OBJECTIVES70**

Skills and knowledge provided by this subject are the following:

| | |
|---|---|
| **1** | PC Hardware: Identification of basic peripherals, Assembling a PC, Installation of system software like MS Windows, device drivers, etc. Troubleshooting of PC Hardware and Software issues. |
| **2** | Internet & World Wide Web: Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber attacks. |
| **3** | Productivity Tools: Understanding and practical approach of professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite office tools. |

| **COURSE OUTCOMES**<br>**Upon successful completion of the course, the student will be able to:** | | **Cognitive level** |
|---|---|---|
| **CO1** | Identify, assemble and update the components of a computer | K2 |
| **CO2** | Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems | K3 |
| **CO3** | Make use of tools for converting pdf to word and vice versa | K2 |
| **CO4** | Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex | K3 |

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

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

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

| **COURSE CONTENT** | |
|---|---|
| **Task 1** | Identification of the peripherals of a computer - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage. |
| **Task 2** | Practicing disassembling and assembling components of a PC |
| **Task3** | Installation of Device Drivers, MS Windows, Linux Operating systems and Disk Partitioning, dual boating with Windows and Linux |
| **Task4** | Introduction to Memory and Storage Devices, I/O Port, Assemblers, Compilers, Interpreters, Linkers and Loaders. |
| **Task5** | Demonstration of Hardware and Software Troubleshooting |
| **Task6** | Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL, and Dialup Connection. |
| **Task7** | Surfing the Web using Web Browsers, Awareness of various threats on the Internet and its solutions, Search engines and usage of various search engines, Need of anti-virus, Installation of anti-virus, configuring personal firewall and windows update. (Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers) |
| **Productivity Tools:** | |
| **Task8** | Basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage, Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list. Features to be covered:- Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc., |

| | |
|---|---|
| **Task9** | Demonstration and Practice of various features of Microsoft Word Assignment: 1. Create a project certificate. 2. Creating a news letter Features to be covered:-Formatting Fonts, Paragraphs, Text effects, Spacing, Borders and Colors, Header and Footer, Date and Time option, tables, Images, Bullets and Numbering, Table of Content, Newspaper columns, Drawing toolbar and Word Art and Mail Merge in word etc., |
| **Task10** | Demonstration and Practice of various features Microsoft Excel Assignment:<br>1. Creating a scheduler<br>2. Calculating GPA<br>3. Calculating Total, average of marks in various subjects and ranks of students based on marks Features to be covered:- Format Cells, Summation, auto fill, Formatting Text, Cell Referencing, Formulae in excel, Charts, Renaming and Inserting worksheets, etc., |
| **Task11** | Demonstration and Practice of various features Microsoft Power Point Features to be covered:- Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Hyperlinks Tables and Charts, Master Layouts, Types of views, Inserting – Background, textures, Design Templates, etc., |
| **Task 12** | Demonstration and Practice of various features LaTeX – document preparation, presentation (Features covered in Task 9 and Task 11 need to be explored in LaTex) |
| **Task 13** | Tools for converting word to pdf and pdf to word |
| **Task 14** | Internet of Things (IoT): IoT fundamentals, applications, protocols, communication models, architecture, IoT devices |

Note: Faculty to consolidate the workshop manuals using the textbook and references

**Reference Books:**

1. Computer Fundamentals, Anita Goel, Pearson India Education, 2017

2. PC Hardware Trouble Shooting Made Easy, TMH

3. Introduction to Information Technology, ITL Education Solutions Limited, 2nd Edition, Perason, 2020

4. Upgrading and Repairing PCs, 18th Edition, Scott Mueller, QUE, Pearson, 2008

5. LaTeX Companion – Leslie Lamport, PHI/Pearson

6. Introducing HTML5, Bruce Lawson, Remy Sharp, 2nd Edition, Pearson, 2012

7. Teach yourself HTML in 24 hours, By Techmedia

8. HTML 5 and CSS 3.0 to the Real World by Alexis Goldstein, Sitepoint publication.

9. Internet of Things, Technologies, Applications, Challenges and Solutions, B K Tripathy, J Anuradha, CRC Press

10. Comdex Information Technology Course Tool Kit, Vikas Gupta, Wiley Dreamtech.

11. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme, CISCO Press, Pearson Education.

12. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu, S. Chand Publishers

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

**Subject Code:**

## DEPARTMENT OF ENGLISH

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

## Professional Communicative English Lab

**OBJECTIVES:** To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

**OUTCOME:** A study of the communicative items in the laboratory will help the students become successful in the competitive world.

## Course Outcomes

| CO | Description | COGNITIVE LEVEL |
|---|---|---|
| **CO1** | Understand different speech sounds and maintain proper pronunciation and rhythm in day to day conversations. | K2 |
| **CO2** | Interpret and respond appropriately in various day to day contexts and improves techniques in group discussions. | K5 |
| **CO3** | Develop the required communication skills to deliver effective presentations and interviews with clarity and impact. | K6 |

K1- Remembering, K2- Understanding, K3-Applying, K-4 Analyzing, K5- Evaluating, K6- Creating

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - |

**R20- B.Tech – CSE (AI&ML)**

The course content, along with the study material, is divided into six units.

**UNIT 1:**

Introduction
Consonant Sounds
Vowel Sounds

**UNIT 2:**

Rhythm and Pronunciation
Weak/strong and contrasted forms
Practice of Rhythm

**UNIT 3:**

Dialogues

**UNIT 4:**

Group Discussions

**UNIT 5:**

Presentations & Public Speaking

**UNIT-6:**Interviews

**PRESCRIBED LAB MANUAL FOR SEMESTER I:**

'**STRENGTHEN YOUR STEPS**: A Multimodal Course in Communication Skills' Published by Maruthi Publications.

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## Applied Chemistry

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

| | | | |
|---|---|---|---|
| **Course Category** | Basic Sciences | **Course Code** | |
| **Course Type** | Theory | **L-T-P-C** | 3 – 0 – 3 – 4.5 |
| **Prerequisites** | Intermediate Chemistry | **Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 30<br>70<br>100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | To learn about Electrochemical cells, Batteries and Fuel cells |
| **2** | To learn about non conventional energy sources |
| **3** | To study about Nano materials, Super conductors and their preparation, applications and also about principles of green chemistry and green engineering applications |
| **4** | To know about Polymers, Plastics and Elastomers |
| **5** | To Understand the principles of different analytical instruments and their applications |

| **COURSE OUTCOMES** | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | To compare different types of batteries and explain the merits of fuel cell. | Understanding (K2) |
| **CO2** | List out different renewable sources of energy. | Applying (K3) |
| **CO3** | To explain the Green methods of Synthesis and applications of Green technologies and also Band theory applications. | Applying (K3) |
| **CO4** | Analyze the importance of Polymers in engineering applications. | Understanding (K2) |
| **CO5** | To Distinguish between Rotaxane and Catenane molecular machines | Analyzing (K4) |

**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 | 2 | 2 | 2 | | 2 | | | | 2 | | 1 | | **1** |
| **CO2** | 2 | 2 | 1 | | | 1 | 1 | | | | 1 | | | | |
| **CO3** | 1 | 1 | | 1 | 2 | | | | | | | 1 | | **1** | |
| **CO4** | 2 | 2 | | 1 | | | 1 | | | | | 1 | | | |
| **CO5** | **1** | 1 | 1 | | | | 1 | | | | 2 | 1 | 1 | | |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

| COURSE CONTENT | APPLIED CHEMISTRY SYLLABUS |
|---|---|
| **UNIT I** | **ELECTROCHEMICAL ENERGY SYSTEMS** **9hrs**<br>Electrode Potential, Nernst Equation, EMF of the cell, Types of Electrodes - Hydrogen and Calomel Electrode, Electrochemical Cell, Galvanic Cell vs Electrolytic Cell, ***Concentration Cells***, Types of Ion Selective Electrodes- Glass Membrane Electro<br>**Batteries**- Characteristics, Classification and Important Applications. Classical batteries- Dry/Lechlanche cell, Modern batteries- Zinc air, Lithium cells : Li -$MnO_2$ cell.<br>**Fuel cells**- Introduction, $H_2$-$O_2$ fuel cell, Advantages of fuel cells.<br>**Learning Outcomes:**<br>At the end of this unit, the students will be able to<br>Apply Nernst Equation for Calculating Electrode Potentials (L3)<br>Compare different batteries and their applications (L2) |
| **UNIT II** | **ENERGY SOURCES AND APPLICATIONS** **8hrs**<br>Introduction- Sources of renewable energy<br>**Solar energy** – Introduction- Photo voltaic cell/ Solar cell – Construction and Working, Applications of Solar energy. Photo Galvanic Cells, Electrochemical Sensors.<br>**Non Conventional Energy Sources:** Hydropower, Geo Thermal Power, Tidal Power, Ocean Thermal Energy Conversion (OTEC).<br>**Learning outcomes** :After the completion of the Unit ,the student will able to<br>List different renewable sources of energy. ( L-1)<br>Explain how photovoltaic cells convert light into energy. ( L-2)<br>Illustrate the construction and working of PV cell. ( L-2) |
| **UNIT III** | **MATERIAL SCIENCE AND ENGINEERING** **7+5 hrs**<br>**III-A: Nanomaterials:** Introduction , Preparation of Carbon Nano Tubes(CNTs) by Arc discharge and Chemical Vapor Deposition Methods.<br>Fullerenes : Preparation, Properties and Applications;<br>Chemical Synthesis of Nanomaterials : Sol-gel method, Applications of Nano Materials in Wastewater treatment and Medicine.<br>**III-B: Green Chemistry:** Introduction, Principles of Green Chemistry and Engineering Applications with a **case *study***<br>**Band Theory of Solids:** Introduction –Explanation of Conductors, Semiconductors and Insulators by Band Theory. Super conductors: Types-Preparation, Properties and Applications**.**<br>**Learning Outcomes:** At the end of this unit, the students will be able to<br>Classify Nano materials. (L-2)<br>Explain the Synthesis and applications of Nano Materials. (L-2)<br>Explain the band theory of solids for conductors, semiconductors and insulators (L2) |
| **UNIT IV** | **POLYMER CHEMISTRY** **10hrs**<br>**Polymers**: Introduction, Functionality of monomers, Chain ( Addition) Polymerization, Step(Condensation) Polymerization, Co-Ordination Polymerization, Co - Polymerization with examples and Mechanism. Conducting polymers : Mechanism of Conduction in Poly acetylene, Poly aniline and their Applications.<br>**Plastics**: Thermoplastics and Thermo Setting resins; Preparation, Properties and Applications of Bakelite, Urea- formaldehyde Resin, Nylon – 6,6.<br>**Elastomers**: ***Vulcanization of rubber***, Preparation, Properties and Applications of Buna-S and Buna – N.<br>**Learning Outcomes:**<br>At the end of this unit, the students will be able to<br>Explain different types of polymers and their applications (L2)<br>Demonstrate the mechanism of conduction in conducting polymers (L2) |
| **UNIT V** | **Instrumental Methods & Molecular Machines and Switches** **9 hrs**<br>A) Spectroscopic Techniques: Electromagnetic Spectrum- Introduction, Absorption of radiation: Beer-Lambert's law. Principles of UV-Visible and IR Spectroscopic techniques and their Applications.<br>B) Molecular Machines: Rotaxanes and Catenanes as artificial Molecular Machines.<br>Molecular Switches: Introduction, Cyclodextrin based Switches.<br>**Learning Outcomes:** |

| | |
|---|---|
| | At the end of this unit, the students will be able to<br>Explain the concepts of artificial molecular machines and molecular switches. ( L-3)<br>Distinguish between rotaxane and catenane molecular machines . ( L-2)<br>Explain the different types of spectral series in electromagnetic spectrum (L2)<br>Understand the principles of different analytical instruments (L2)<br>Explain the different applications of analytical instruments (L2) |

| | |
|---|---|
| **TEXT BOOKS** | |
| **1** | P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014). |
| 2 | Engineering Chemistry by Shikha Agarwal: Cambridge University Press,2019 edition . |
| **REFERENCE BOOKS** | |
| 1 | Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003) |
| 2 | S.S. Dara, A Textbook of Engineering Chemistry, S.Chand& Co, (2010) |
| 3 | N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014) |
| **WEB RESOURCES** | |
| 1 | **Electrochemical Energy systems**<br>https://en.wikipedia.org/wiki/Electrochemical_cell |
| 2 | **Energy Sources and Applications**<br>https://en.wikipedia.org/wiki/Hydropower |
| 3 | **Material Science and Engineering**<br>https://en.wikipedia.org/wiki/Nanomaterials |
| 4 | **Polymer Chemistry**<br>https://en.wikipedia.org/wiki/Polymer_chemistry |
| 5 | **Instrumental Methods & Molecular Machines and Switches**<br>https://en.wikipedia.org/wiki/Spectroscopy |

| **COURSE OUTCOMES** | | |
|---|---|---|
| **Upon successful completion of this course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | estimate the given amount of dissolved compounds in a solution by using volumetric analysis and preparation of polymers and nano particles | Applying(K3) |
| **CO2** | determine the concentration of different metal ions present in water by complexometric titrations. | Understanding(K2) |
| **CO3** | evaluate the accurate value of $P^H$ and conductivity of given solutions and to estimate the viscosity and surface tension of given solutions. | Evaluating (K5) |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## APPLIED CHEMISTRY LAB

| | | | |
|---|---|---|---|
| **Course Category** | Basic sciences | **Credits:** | 1.5 |
| **Course Type** | Lab | **Lecture-Tutorial-Practice:** | 0 -0 -3 |
| **Prerequisites** | Basic Chemistry | **Continuous Evaluation:** | 30 |
| | | **Semester end Evaluation:** | 70 |
| | | **Total Marks:** | 100 |

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

| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PS01 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | | | | | | | | | | | |
| CO2 | 2 | 1 | | 1 | | | | | | | | | | |
| CO3 | 2 | 1 | | | | | | | | | | | | |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

## COURSE CONTENT
**(Any 10 of the following listed 13 experiments)**

**LIST OF EXPERIMENTS:**

Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis

1. Estimation of HCI using standard $Na_2CO_3$ solutions
2. Determination of alkalinity of a sample containing $Na_2CO_3$ and NaOH
3. Estimation of $KmnO_4$ using standard Oxalic acid solution.
4. Estimation of Ferrous iron using standard $K_2Cr_2O_7$ solution
5. Determination of Temporary and permanent Hardness of water using standard EDTA solution.
6. Determination of % moisture content in a coal sample.
7. Determination of $Mg^{2+}$ present in an antacid
8. *Estimation of HCl using standard NaOH Solution by Conductometric titration.*
9. Estimation of Vitamin – C
10. Preparation of Phenol – Formaldehyde Resin
11. Determination of viscosity of a liquid
12. Determination of surface tension of a liquid
13. Preparation of Nano particles.(Cu/Zn)

**TEXTBOOKS**

1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

**REFERENCEBOOKS**

Vogel's Textbook of Quantitative chemical analysis, J. Mendham et.al.
[1] College designed manual

**WEB-RESOURCES**

www.bsauniv.ac.in/UploadImages/Downloads/Estimation%20of%20Hardness
https://pubs.acs.org/doi/abs/10.1021/i560133a023
https://pdfs.semanticscholar.org/33d4/3b264bad212a14d660667298f12944ea11d5

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

**Programming for Problem solving using C Lab**

**(Common to CE, ME, EEE, ECE, CSE, CSE (AI&ML),CSE(DS), IT)**

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

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | Apply the principles of C language in problem solving. |
| **2** | To design flowcharts, algorithms and knowing how to debug programs. |
| **3** | To design & develop of C programs using arrays, strings pointers & functions. |
| **4** | To review the file operations, preprocessor commands. |

| **COURSE OUTCOMES** | | **BTL** |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| **CO1** | Knowledge on various concepts of a C language. | K3 |
| **CO2** | Draw flowcharts and write algorithms. | K3 |
| **CO3** | Design and development of C problem solving skills. | K3 |
| **CO4** | Design and develop modular programming skills. | 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** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| **CO2** | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| **CO3** | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

| **COURSE CONTENT** | |
|---|---|
| **1.** | **Exercise 1:**<br>1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.<br>2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.<br>3. Write a C program to display multiple variables. |
| **2.** | **Exercise 2:**<br>1. Write a C program to calculate the distance between the two points.<br>2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values". |
| **3.** | **Exercise 3:**<br>1. Write a C program to convert a string to a long integer.<br>2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.<br>3. Write a C program to calculate the factorial of a given number. |
| **4.** | **Exercise 4:**<br>1. Write a program in C to display the n terms of even natural number and their sum.<br>2. Write a program in C to display the n terms of harmonic series and their sum. 1+ 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.<br>3. Write a C program to check whether a given number is an Armstrong number or not. |
| **5.** | **Exercise 5:**<br>1. Write a program in C to print all unique elements in an array.<br>2. Write a program in C to separate odd and even integers in separate arrays.<br>3. Write a program in C to sort elements of array in ascending order. |
| **6.** | **Exercise 6:**<br>1. Write a program in C for multiplication of two square Matrices.<br>2. Write a program in C to find transpose of a given matrix. |
| **7.** | **Exercise 7:**<br>1. Write a program in C to search an element in a row wise and column wise sorted matrix.<br>2. Write a program in C to print individual characters of string in reverse order. |
| **8.** | **Exercise 8:**<br>1. Write a program in C to compare two strings without using string library functions.<br>2. Write a program in C to copy one string to another string. |

| | |
|---|---|
| **9.** | **Exercise 9:**<br>1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation<br>2. Write a program in C to demonstrate how to handle the pointers in the program. |
| **10.** | **Exercise 10:**<br>1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.<br>2.Write a program in C to add two numbers using pointers |
| **11.** | **Exercise 11:**<br>1. Write a program in C to add numbers using call by reference.<br>2. Write a program in C to find the largest element using Dynamic Memory Allocation. |
| **12.** | **Exercise 12:**<br>1. Write a program in C to swap elements using call by reference.<br>2. Write a program in C to count the number of vowels and consonants in a string using a pointer. |
| **13.** | **Exercise 13:**<br>1. Write a program in C to show how a function returning pointer.<br>2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( ) function. |
| **14.** | **Exercise 14:**<br>1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs<br>2. Write a program in C to convert decimal number to binary number using the function. |
| **15.** | **Exercise 15:**<br>1. Write a program in C to check whether a number is a prime number or not using the function.<br>2. Write a program in C to get the largest element of an array using the function. |
| **16.** | **Exercise 16:**<br>1. Write a program in C to append multiple lines at the end of a text file.<br>2. Write a program in C to copy a file in another name.<br>3. Write a program in C to remove a file from the disk. |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## Environmental Sciences

(Common to CE, ME, ECE, CSE, CSEDS&AI, IT)

| | | | |
|---|---|---|---|
| **Course Category** | Basic Sciences | **Course Code** | **20BE1MC01** |
| **Course Type** | Theory | **L-T-P-C** | 3 – 0 – 0 – 0 |
| **Prerequisites** | Basic Knowledge in Environment and protection. | **Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 0<br>0<br>0 |

| **COURSE OBJECTIVE:** | |
|---|---|
| **1** | To make the students to get awareness on environment, 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 to save earth from the inventions by the engineers. |

| **COURSE OUTCOMES** | |
|---|---|
| **Upon successful completion of the course, the student will be able to:** | |
| **CO1** | Gain a higher level of personal involvement and interest in understanding and solving environmental problems. |
| **CO2** | Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities |
| **CO3** | Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century |
| **CO4** | Recognize the interconnectedness of human dependence on the earth's ecosystems |
| **CO5** | Influence their society in proper utilization of goods and services. |
| **CO6** | Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices |

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| **CO2** | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CO3** | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CO4** | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CO5** | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

**R20- B.Tech – CSE (AI&ML)**

## Course contents:

**UNIT – I**

**Multidisciplinary nature of Environmental Studies**

Definition, Scope and Importance-*International Efforts & Indian Environmentalists*

## Natural Resources

Forest resources : deforestation – Mining, dams and other effects on forest and tribal people.
Water resources :Use and over utilization of surface and groundwater.
Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems.
Energy resources: renewable and nonrenewable energy sources.
Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

## LEARNING OUTCOMES:

**Students will be able to**

Articulate the basic structure, functions, and processes of key social systems affecting the environment
Explain why renewable and non-renewable energy resources are important. Explain how water resources should be used.

## UNIT- II

**Ecosystems, Biodiversity and its conservation**

Definition of Ecosystem and its structure, Functions
BiodiversityDefinition-Valueofbiodiversity,Indiaasamega-diversitynation,Threatsto biodiversity,Conservationofbiodiversity,*EndangeredandendemicspeciesofIndia*.

## LEARNING OUTCOMES:

**Students will be able to**

Get a clear picture of structure and functions of ecosystems.
Demonstrate knowledge and understanding of theories in the fieldof Biodiversity and Systematic in the broad sense.
Explain endangered and endemic species of India.

## UNIT III

**Environmental Pollution and Solid Waste Management**

Definition, Cause, Effects of Air pollution, Water pollution, Noise pollution, Radioactive pollution, Role of an individual in prevention of pollution.
SolidWasteManagement:Sources,effectsandcontrolmeasuresofurbanandindustrial waste, *e-waste management*

## LEARNING OUTCOMES

**Students will be able to**

Understand Cause, effects and control measures of air pollution. Understand solid waste management.

## UNIT IV

**Social Issues and the Environment**

Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act-Issues involved in enforcement of environmental legislation, Rain water harvesting, Global Environmental challenges-*case studies*

## LEARNING OUTCOMES:

**Students will be able to**

Explain the enforcement of Environmental legislations
Acquire knowledge on various environmental challenges induced due to unplanned anthropogenic activities.
Explain the reasons for global warming

## UNIT-V

**Human population and the Environment**

Population growth, Women and child welfare, Role of Information technology in environment and human health. *Impact Assessment and its significances, stages of EIA*

Field work:
A mini project related to Environmental issues / to visit a local polluted site (Submission of project by every student)

## LEARNING OUTCOMES

**Students will have**

Explain various types of information technologies Explain the theories of population explosion
Acquire knowledge on various environmental challenges induced due to unplanned anthropogenic activities

## DEPARTMENT OF ENVIRONMENTAL SCIENCES

| | |
|---|---|
| **TEXT BOOKS** | |
| **1.** | Environmental Studies for undergraduate courses by ErachBharucha,UGC. |
| **2.** | A Textbook of Environmental Studies by Dr.S.AzeemUnnisa,Acadamic publishing company. |
| **3.** | Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai |
| **REFERENCE BOOKS** | |
| **1.** | Text Book of Environmental Studies by Deeshita Dave & P. UdayaBhaskar, Cengage learning. |
| **2.** | Glimpses of Environment by K.V.S.G. Murali Krishna Published by Environmental Protection Society, Kakinada, A.P. |
| **3.** | Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi |
| **4.** | Environmental Studies by PiyushMalaviya, Pratibha Singh, Anoopsingh: Acme Learning, New Delhi. |
| **5.** | An Introduction to Environmental Pollution by Dr.B.k.Sharma AND Dr.(Miss)H.kaur,Goel publishing House ,a unit of Krishna Prakasham Media (p) LH,Meerut –India |
| **WEB RESOURCES** | |
| **1.** | **UNIT-1: MULTI DISPLINARY NATURE OF ENVIRONMENT and NATURAL RESOURCES** http://www.defra.gov.uk/environment/climatechange https://www.climatesolutions.org |
| | **https://en.wikibooks.org/wiki/Ecology/Ecosystems** |
| **2.** | **UNIT-2:ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION http://conbio.net/vl/ and www.biodiversitya-z.org/content/biodiversity** |
| **3.** | **UNIT-3: ENVIRONMENTAL POLLUTION https://www.omicsonline.org/environment-pollution-climate-change.php and https://www.britannica.com/technology/solid-waste-management** |
| **4.** | **UNIT-4: SOCIAL ISSUES AND THE ENVIRONMENT http://www.publichealthnotes.com/solid-waste-management/** |
| **5.** | **UNIT-5: HUMANPOPULATION AND THE NVIRONMENThttp://www.ecoindia.com/education/water-conservation.htmlhttps://thewaterproject.org/water_conservation\https://legalcareerpath.com/what-is-environmental-law/** |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

| I-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Category** | **Course Code** | **Course Title** | **Hours per week** | | | **Credits** |
| | | | | **L** | **T** | **P** | **C** |
| 1 | BS | | Linear Algebra and Partial Differential Equations | 3 | 0 | 0 | 3 |
| 2 | BS | | Applied Physics | 3 | 0 | 0 | 3 |
| 3 | ES | | Digital Logic Design | 3 | 0 | 0 | 3 |
| 4 | ES | | Python Programming | 3 | 0 | 0 | 3 |
| 5 | ES | | Data Structures | 3 | 0 | 0 | 3 |
| 6 | BS | | Applied Physics Lab | 0 | 0 | 3 | 1.5 |
| 7 | ES | | Python Programming Lab | 0 | 0 | 3 | 1.5 |
| 8 | ES | | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | MC | | Constitution of India | 2 | 0 | 0 | 0 |
| **Total Credits** | | | | **17** | **0** | **9** | **19.5** |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## I Year II Semester

## Linear Algebra and Partial Differential Equations

**(Common to CE, ME, ECE, CSE, IT, CSE-DS, CSE-AI&ML)**

**I B. Tech II Semester**

| | | | |
|---|---|---|---|
| **Course Category** | Basic Sciences | **Course Code** | |
| **Course Type** | Theory | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | Basics of Matrices, Differentiation, Integration | **Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 30<br>70<br>100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course. |
| **2** | The skills derived from the course will help the student form a necessary base to develop analytic and design concepts. |

| **COURSE OUTCOMES** | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | solve systems of linear equations, determine the rank, find the eigenvalues and eigenvectors, diagonalization of a matrix. | K3 |
| **CO2** | identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics. | K2 |
| **CO3** | find areas and volumes using double and triple integrals | K2 |
| **CO4** | find partial derivatives of multivariable functions and apply them to find extreme values of a function. | K3 |
| **CO5** | apply a range of techniques to find solutions of standard PDEs | K3 |

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

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

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

| **COURSE CONTENT** | |
|---|---|
| **UNIT I** | **Solving system of linear equations, Eigen Values and Eigen vectors**<br>Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss elimination method, Gauss Jacobi and Gauss Seidel for solving system of equations – Eigenvalues and Eigen vectors and their properties. |
| **UNIT II** | **Cayley-Hamilton Theorem and Quadratic forms**<br>Cayley-Hamilton theorem (without proof) – Finding inverse and powers of a matrix by Cayley-Hamilton theorem – Quadratic forms-Reduction to canonical form by congruent transformations-nature of the quadratic form - reduction of quadratic form to canonical form by orthogonal transformation. |
| **UNIT III** | **Multiple integrals**<br>Multiple integrals: Double and triple integrals – Change of variables -Polar coordinates -Cylindrical coordinates– Change of order of integration.<br>**Applications:** Finding Areas and Volumes. |
| **UNIT IV** | **Partial differentiation**<br>Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized Mean value theorem for single variable (without proof) – Taylor's and<br>Maclaurin's series expansion of functions of two variables – Jacobian – Functional dependence.<br>**Applications:** Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints). |
| **UNIT V** | **Partial Differential Equations and Applications**<br>Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.<br>**Applications:** One dimensional wave and heat equations. |

**R20- B.Tech – CSE (AI&ML)**

| | |
|---|---|
| **TEXT BOOKS** | |
| **1.** | **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers. |
| **2.** | **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India |
| **REFERENCE BOOKS** | |
| **1.** | **Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn |
| **2.** | **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press |
| **3.** | **Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning. |
| **4.** | **Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press. |
| **5.** | **T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications. |
| **6.** | **T. Amarnath,** An Elementary Course in Partial Differential Equations, Narosa Publications |

| | |
|---|---|
| **WEB RESOURCES** | |
| **1.** | **UNIT I: Solving system of linear equations, Eigen Values and Eigen vectors**<br>https://en.wikipedia.org/wiki/System_of_linear_equations<br>https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors |
| **2.** | **UNIT II: Cayley-Hamilton Theorem and Quadratic forms**<br>https://www.math.hmc.edu/calculus/tutorials/eigenstuff/<br>https://en.wikipedia.org/wiki/Quadratic_form |
| **3.** | **UNIT III: Multiple Integrals**<br>https://en.wikipedia.org/wiki/Multiple_integral<br>http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx |
| **4.** | **UNIT V: Partial Differentiation**<br>https://en.wikipedia.org/wiki/Partial_derivative<br>https://www.whitman.edu/mathematics/calculus_online/section14.03.html |
| **5.** | **UNIT V:Partial Differential Equations and Applications**<br>https://en.wikipedia.org/wiki/Partial_differential_equation |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## APPLIED PHYSICS

| | | | |
|---|---|---|---|
| **CourseCategory** | BASICSCIENCES | **Course Code** | |
| **Course Type** | Theory | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | IntermediatePhysics | **Internal Assessment**<br>**SemesterEndExamination**<br>**TotalMarks** | 30<br>70<br>100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | ImpartKnowledgeofPhysicalOpticsphenomenalikeInterferenceandDiffractionrequiredtodesigninstruments withhigherresolution. |
| **2** | Impart the knowledge of Lasers, Optical Fibers and their implications in optical communications. |
| **3** | Toexplainthesignificantconceptsofdielectricandmagneticmaterialsthatleadstopotential Applications in emerging micro devices. |
| **4** | ToexplaintheconceptsofQuantumMechanicsandfreeelectrontheoriesforstudyofmetalsand Semiconductors. |
| **5** | UnderstandtheformationofbandsinSemiconductorsandtheirworkingmechanismfortheirutilityin Engineering applications |

| **COURSEOUTCOMES** | | **Cognitive Level** |
|---|---|---|
| **Upon successful completion of the course ,the student will be able to:** | | |
| **CO1** | Analyzetheopticalapplicationsusingtheconceptsofinterferenceanddiffraction. | Analyze( K4) |
| **CO2** | Apply the basics of Laser Mechanism and fiber optics for the communications systems. | Applying(K3) |
| **CO3** | Apply the basics of phenomenon related to dielectric materials and MagneticMaterialstostudytheirdependenceontemperatureandfrequencyresponse. | Applying(K3) |
| **CO4** | Understand the concepts of quantum mechanics for calculation of free quantum particle energies and phenomenon of electrical & thermal conductivities to submicroscopic particles. | Understanding(K2) |
| **CO5** | UnderstandtheBandformation,electricalconductivitiesinsemiconductorsand Study the types of semiconductors using Hall Effect. | Understanding(K2) |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

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

| COURSECONTENT | |
|---|---|
| UNITI | **WAVEOPTICS** (**10hrs)**<br>**INTERFERENCE**<br>Introduction-PrincipleofSuperposition–CoherentSources–Interference inparallelthinfilm(reflectiongeometry)-Newton'srings,Determination of Wavelength and Refractive Index & Applications.<br><br>**DIFFRACTION**<br>Introduction-Typesofdiffraction-Fraunhofferdiffractionduetosingleslit,Doubleslit,NSlits(Qualitative)-Rayleighcriterionofresolution<br>And Resolving power of grating(Qualitative). |
| | **LASERS** **(8hrs)**<br>Introduction-Characteristics–SpontaneousandStimulatedemissionofradiation–populationinversion-PumpingSchemes-Rubylaser–<br>Helium Neon laser–Applications<br><br>**FIBEROPTICS:**<br>Introduction-Structure&PrincipleofOpticalFiber-NumericalApertureandAcceptanceAngle-classificationofOpticalfibersbasedonRefractiveIndexProfileandModes-BlockDiagramofopticalfibercommunicationsystem-AdvantagesofOpticalfibers-Applications. |
| UNITIII | **MAGNETICSPROPERTIES(12hrs)**<br>Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials Dia,Para,Ferro,Antiiferro and Ferri Magnetic materials-Weiss Domain Theory(Qualitative Treatment)-Hysteresis-B-HCurve-softandhardmagneticmaterials&applications<br>**DIELECTRICS**<br>Introduction - Dielectric polarization– Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations- Electronic Ionic and Orientation polarizations(qualitative) –Lorentz Internal field –Claussius-Mossoti equation-Applications of dielectrics. |
| UNITIV | **QUANTUMMECHANICS(9hrs)**<br>Introduction–Matterwaves–deBroglie'shypothesis–Interpretationofwavefunction–SchrödingerTimeIndependentandTimeDependentwaveequations–Particleinapotentialbox<br><br>**FREEELECTRONTHEORY**<br>Classical Free Electron Theory(Qualitative with discussions of merit and demerits)-Quantum Free Electron Theory-Equation of conductivity based on quantum free electron theory-Fermi Dirac Distribution-Density of States-Fermi Energy |
| UNITV | **BANDTHEORYOFSOLIDS** **(9hrs)**<br>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<br><br>**SEMICONDUCTORPHYSICS**<br>Introduction–Intrinsic Semi conductors - density of charge carriers- Electrical conductivity – Fermi level – extrinsic semiconductors -p-type&n-type-Densityofchargecarriers-DriftandDiffusioncurrents-Einstein'sEquation-Halleffect-ApplicationsofHalleffect |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

| | |
|---|---|
| **TEXTBOOKS** | |
| **1.** | EngineeringPhysicsbyM.N.Avadhanalu,P.G.Kshirsagar&TV SArun Murty,SChandPubication,11thEdition2019 |
| **2.** | "EngineeringPhysics"byM.R.Srinivasan,NewAgeinternationalpublishers |
| **3.** | EngineeringPhysicsbyP.KPalanisamy,SciTechPublication |
| **REFERENCEBOOKS** | |
| **1.** | KettlesIntroductionto Solid statePhysics-CharlesKittel,WileyIndiaEdition |
| **2.** | SolidStatePhysics,AJDekker,I Edition,MacmillanPublishersIndiaPrivateLimited |
| **3** | "SolidStatePhysics"bySOPilai.,- NewageInternationalPublishers |
| **4.** | EngineeringPhysicsbyDKBhattacharyaandPoonamTandon,OxfordPress(2018) |
| **WEBRESOURCES** | |
| **1.** | https://nptel.ac.in/courses/122/107/122107035/#<br>https://nptel.ac.in/courses/122/107/122107035/# |
| **2.** | https://pragatiengg.org/pluginfile.php/29143/mod_folder/content/0/UNIT%20IV%20LASERS%20.pptx?forcedownload=1https://nptel.ac.in/courses/104/104/104104085/<br>https://nptel.ac.in/courses/115/107/115107095/ |
| **3.** | https://nptel.ac.in/courses/113/104/113104090/<br>https://youtu.be/DDLljK1ODeg |
| **4.** | https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.htmlhttps://nptel.ac.in/courses/115/101/115101107/<br>https://nptel.ac.in/courses/115/105/115105122/ |
| **5.** | https://www.electronics-tutorials.ws/diode/diode_1.html<br>https://nptel.ac.in/courses/115/105/115105099/https://nptel.ac.in/courses/108/108/108108122/ |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## DIGITAL LOGIC DESIGN
## (CSE-AI & ML, CSE-Data Science)
## I Year II Semester

**Course Objectives:**

- To study the basic philosophy underlying the various number systems, negative number representation, binary arithmetic, theory of Boolean algebra and map method for minimization of switching functions.
- To introduce the basic tools for design of combinational and sequential digital logic.
- To learn simple digital circuits in preparation for computer engineering.

**Course outcomes:**

A student will be able to:

| | |
|---|---|
| CO1 | Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation. |
| CO2 | Understand the different switching algebra theorems and apply them for logic functions and Karnaugh map for a few variables and perform an algorithmic reduction of logic functions. |
| CO3 | Design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays. |
| CO4 | Design various sequential circuits starting from flip-flop and conversion of flipflops. |
| CO5 | Design registers, shift registers, synchronous counters and ring counters. |

| **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** |
| **CO1** | | | | | | | | | | | | | | |
| **CO2** | | | | | | | | | | | | | | |
| **CO3** | | | | | | | | | | | | | | |
| **CO4** | | | | | | | | | | | | | | |
| **CO5** | | | | | | | | | | | | | | |

**UNIT I:**

Digital Systems and Binary NumbersDigital Systems, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers,Signed Binary Numbers, Arithmetic addition and subtraction, 4-bit codes: BCD, EXCESS 3,alphanumeric codes, 9's complement, 2421, etc.

**UNIT II:**

Concept of Boolean algebra: Basic Theorems and Properties of Boolean algebra, BooleanFunctions, Canonical and StandardForms, Minterms and Maxterms.Gate level MinimizationMap Method, Three-

Variable K-Map, Four Variable K-Maps. Products of Sum Simplification,Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation,ExclusiveOR Function.

**UNIT III:**
Combinational Logic: Introduction, Analysis Procedure, Binary Adder–Subtractor, Binary Multiplier, Decoders,Encoders, Multiplexers, Demultiplexers, Priority Encoder, Code Converters, MagnitudeComparator, HDL Models of Combinational Circuits. Realization of Switching Functions Using PROM, PAL and PLA.

**UNIT IV:**
Synchronous Sequential LogicIntroduction to Sequential Circuits, Storage Elements: Latches, Flip-Flops, RS- Latch UsingNAND and NOR Gates, Truth Tables. RS, JK, T and D Flip Flops, Truth and Excitation Tables,Conversion of Flip Flops.

**UNIT V:** Registers and CountersRegisters, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, JohnsonCounter.

**Text Books:**
1) Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2) Fundamentals of Logic Design, 5/e, Roth, Cengage.

**Reference Books:**
1) Digital Logic and Computer Design, M.Morris Mano, PEA.
2) Digital Logic Design, Leach, Malvino, Saha, TMH.
3) Modern Digital Electronics, R.P. Jain, TMH.

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

**PYTHON PROGRAMMING**

**(Common to CSE and IT)**

| | | | |
|---|---|---|---|
| **Course Category** | Engineering Science | **Course Code** | |
| **Course Type** | Theory | **L-T-P-C** | 2-0-2-3 |
| **Prerequisites** | Exposure to Programming for Problem Solving using C | **Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 30<br>70<br>100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | To learn about Python programming language syntax, semantics, and the runtime environment |
| **2** | To be familiarized with universal computer programming concepts like data types, containers |
| **3** | To be familiarized with general computer programming concepts like conditional execution, loops & functions |
| **4** | To be familiarized with general coding techniques and object-oriented programming. |

| **COURSE OUTCOMES** | | **BTL** |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| **CO1** | Develop essential programming skills in computer programming concepts like data types, containers | K3 |
| **CO2** | Apply the basics of programming in the Python language | K3 |
| **CO3** | Solve coding tasks related conditional execution, loops | K3 |
| **CO4** | Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming | K3 |
| **CO5** | Develop Python programs using file concepts. | K3 |

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

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

| **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 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 |
| **CO2** | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 |
| **CO4** | 3 | 2 | 2 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 |
| **CO5** | 3 | 2 | 2 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 |

| **COURSE CONTENT** | |
|---|---|
| **UNIT I** | **Conceptual introduction**: topics in computer science, algorithms; modern computer systems: hardware architecture, data representation in computers, software and operating system; installing Python; basic syntax, interactive shell, editing, saving, and running a script.<br><br>The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages. |
| **UNIT II** | Conditions, boolean logic, logical operators; ranges;<br><br>**Control statements**: if-else, loops (for, while); short-circuit (lazy) evaluation<br><br>Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).<br><br>**String manipulations**: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers |
| **UNIT III** | **Lists, tuples, and dictionaries**; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.<br><br>**Design with functions**: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive functions. |
| **UNIT IV** | **File Operations**: Reading config files in python, Writing log files in python, Understanding<br><br>read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations<br><br>**Classes and OOP**: classes, objects, attributes and methods; defining classes; design with<br><br>classes, data modeling; persistent storage of objects |

| | |
|---|---|
| **UNIT V** | **OOP, continued**: inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes; exception handling, try block<br><br>Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames<br><br>Multithreading, Networks, and Client/Server Programming; introduction to HTML, interacting with remote HTML server, running html-based queries, downloading pages; CGI programming, programming a simple CGI form. |

| **TEXT BOOKS** | |
|---|---|
| **1.** | Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage. |
| **2.** | Python Programming: A Modern Approach, Vamsi Kurama, Pearson |
| **REFERENCE BOOKS** | |
| **1.** | Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press. |
| **2.** | Programming and Problem Solving with Python, Ashok Namdev Kamthane, Amit Ashok Kamthane, TMH, 2019. |
| **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 |
| **4.** | https://www.tutorialspoint.com/python3/python_tutorial.pdf |
| **5.** | http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/ |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## Data Structures

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

**COURSE OBJECTIVES**

The objective of the course is to

| | |
|---|---|
| **1** | Introduce the fundamental concept of data structures and abstract data types |
| **2** | Emphasize the importance of data structures in developing and implementing efficient algorithms |
| **3** | Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms |

| **COURSE OUTCOMES**<br>**Upon successful completion of the course, the student will be able to:** | | **Cognitive level** |
|---|---|---|
| **CO1** | Summarize the properties, interfaces, and behaviors of basic abstract data types | K2 |
| **CO2** | Discuss the computational efficiency of the principal algorithms for sorting & searching | K2 |
| **CO3** | Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs | K3 |
| **CO4** | Demonstrate different methods for traversing trees | K2 |
| **CO5** | Implement algorithms on Graphs | 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 | 3 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | 2 | 1 | - |
| **CO2** | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| **CO3** | 2 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| **CO4** | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| **CO5** | 3 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 |

**R20- B.Tech – CSE (AI&ML)**

| **COURSE CONTENT** | |
|---|---|
| **UNIT I** | Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity. Searching - Linear search, Binary search, Fibonacci search. Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms. |
| **UNIT II** | Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal ,Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation ,Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion. |
| **UNIT III** | Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues, Circular Queues, Deques, Priority Queues, Multiple Queues. Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, Applications-Reversing list, Factorial Calculation, Infix to Postfix Conversion, Evaluating Postfix Expressions. |
| **UNIT IV** | Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees using Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort, Balanced Binary Trees- AVL Trees, Insertion, Deletion and Rotations. |
| **UNIT V** | Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims &Kruskals Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm. |

| **TEXT BOOKS** | |
|---|---|
| **1.** | Data Structures Using C. 2nd Edition. Reema Thareja, Oxford. |
| **2.** | Data Structures and algorithm analysis in C, 2nd ed, Mark Allen Weiss. |
| **REFERENCE BOOKS** | |
| **1.** | Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press. |
| **2.** | Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage. |
| **3.** | Data Structures with C, Seymour Lipschutz TMH |
| **WEB RESOURCES** | |
| **1.** | http://algs4.cs.princeton.edu/home/ |
| **2.** | https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

**APPLIED PHYSICS LABORATORY**

| | | | |
|---|---|---|---|
| **Course Category** | BASIC SCIENCES | **Course Code** | |
| **Course Type** | Lab | **L-T-P-C** | 0 -0-3-1.5 |
| **Prerequisites** | Intermediate Physics | **Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 30<br>70<br>100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | The student will have exposure to experimental skills which is essential for an Engineering student. |
| **2** | To gain practical knowledge by applying the experimental results and correlate with the theoretical principles. |
| **3** | Apply the Analytical techniques and graphical analysis to the experimental data |

| **COURSE OUTCOMES** | | **Cognitive Level** |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| **CO1** | Understand the basics of Interference, Diffraction in Physics using instruments like Spectrometer, Travelling microscope. | Understanding(K2) |
| **CO2** | Determine the Magnetic and Dielectric constants of materials. | Application(K3) |
| **CO3** | Apply the basics of Current Electricity and Semiconductors in engineering application | Application(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 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

| **COURSE CONTENT: (Any 10 of the following listed 15 experiments):<br>8 Regular mode and any two experiments in Virtual mode(Virtual Lab)** | |
|---|---|
| **1.** | Determination of wavelength of laser Light using diffraction grating. |
| **2.** | Determination of wavelength of a light using Diffraction Grating-Normal incidence. |
| **3.** | Newton's rings – Determination of Radius of Curvature of Plano - Convex Lens. |
| **4.** | Determination of thickness of a spacer using wedge film and parallel interference fringes. |
| **5.** | Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus. |
| **6.** | Energy Band gap of a Semiconductor p - n junction. |
| **7.** | Characteristics of Thermistor – Temperature Coefficients |
| **8.** | Determination of dielectric constant by charging and discharging method |
| **9.** | Study the variation of B versus H by magnetizing the magnetic material (B-H curve). |
| **10.** | Determination of Dispersive power of diffraction grating. |
| **11.** | To Study the V-I Characteristics and determine the breakdown voltage of a Zener Diode |
| **12.** | Determination of Hall Voltage and Hall coefficients of a given semiconductor using Hall effect. |
| **13.** | Determination of Acceleration due to gravity and Radius of gyration Using Compound Pendulum. |
| **14.** | Determination of Numerical Aperture and acceptance angle of an Optical Fiber |
| **15.** | Estimation of Planck's Constant using Photoelectric Effect. |

| **TEXT BOOKS** | |
|---|---|
| **1.** | **College customized manual** |
| **WEB RESOURCES** | |
| **1.** | **www.vlab.co.in (virtual lab link)** |

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## PYTHON PROGRAMMING LAB

**(Common to CSE (AI&ML)& CSE(DS) )**

| | | | |
|---|---|---|---|
| **Course Category** | Professional Core | **Course Code** | |
| **Course Type** | Lab | **L-T-P-C** | 0-0-3-3 |
| **Prerequisites** | | **Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 30<br>70<br>100 |

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | To acquire programming skills in core Python and to acquire Object Oriented Skills in Python |
| **2** | To develop the skill of designing Graphical user Interfaces in Python |
| **3** | To develop the ability to write database applications in Python |

| **COURSE OUTCOMES** | | **BTL** |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | |
| **CO1** | Write, Test and Debug Python Programs and Use Conditionals and Loops for Python Programs | Analyzing |
| **CO2** | Use functions and represent Compound data using Lists, Tuples and Dictionaries | Applying |
| **CO3** | Use various applications using python | Applying |

**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 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 2 |
| **CO2** | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 2 |

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

**COURSE CONTENT**

1) Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
2) Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3) Write a program that uses a *for* loop to print the numbers 8, 11, 14, 17, 20, . . . , 83, 86, 89.
4) Write a program that asks the user for their name and how many times to print it. The program should print out the user's name the specified number of times.
5) Use a *for*loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

```
*
**
***
****
```

6) Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
7) Write a program that asks the user for two numbers and prints *Close* if the numbers are within .001 of each other and Not close otherwise.
8) Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
9) Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not, the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters *abcde*and*ABCDE* the program should print out *AaBbCcDdEe*.
10) Write a program that asks the user for a large integer and inserts commas into it according to the standard American convention for commas in large numbers. For instance, if the user enters 1000000, the output should be 1,000,000.
11) In algebraic expressions, the symbol for multiplication is often left out, as in 3x+4y or 3(x+5). Computers prefer those expressions to include the multiplication symbol, like 3*x+4*y or 3*(x+5). Write a program that asks the user for an algebraic expression and

    then inserts multiplication symbols where appropriate.
12) Write a program that generates a list of 20 random numbers between 1 and 100.
    (a) Print the list.
    (b) Print the average of the elements in the list.
    (c) Print the largest and smallest values in the list.
    (d) Print the second largest and second smallest entries in the list
    (e) Print how many even numbers are in the list.
13) Write a program that asks the user for an integer and creates a list that consists of the factors of that integer.
14) Write a program that generates 100 random integers that are either 0 or 1. Then find the longest run of zeros, the largest number of zeros in a row. For instance, the longest run of zeros in [1,0,1,1,0,0,0,0,1,0,0] is 4.
15) Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].

16) Write a program that asks the user to enter a length in feet. The program should then give the user the option to convert from feet into inches, yards, miles, millimeters, centimeters, meters, or kilometers. Say if the user enters a 1, then the program converts to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements,it is much shorter with lists and it is also easier to add new conversions if you use lists.
17) Write a function called *sum_digits*that is given an integer num and returns the sum of the digits of num.
18) Write a function called *first_diff*that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return -1.
19) Write a function called *number_of_factors*that takes an integer and returns how many factors the number has.
20) Write a function called *is_sorted*that is given a list and returns True if the list is sorted and False otherwise.
21) Write a function called root that is given a number x and an integer n and returns $x^{1/n}$. In the function definition, set the default value of n to 2.
22) Write a function called primes that is given a number n and returns a list of the first n primes. Let the default value of n be 100.
23) Write a function called merge that takes two already sorted lists of possibly different lengths, and merges them into a single sorted list.
(a) Do this using the sort method. (b) Do this without using the sort method.
24) Write a program that asks the user for a word and finds all the smaller words that can be made from the letters of that word. The number of occurrences of a letter in a smaller word can't exceed the number of occurrences of the letter in the user's word.
25) Write a program that reads a file consisting of email addresses, each on its own line. Your program should print out a string consisting of those email addresses separated by semicolons.
26) Write a program that reads a list of temperatures from a file called *temps.txt*, converts those temperatures to Fahrenheit, and writes the results to a file called ftemps.txt.

27) Write a class called Product. The class should have fields called name, amount, and price, holding the product's name, the number of items of that product in stock, and the regular price of the product. There should be a method *get_price*that receives the number of items to be bought and returns a the cost of buying that many items, where the regular price is charged for orders of less than 10 items, a 10% discount is applied for orders of between 10 and 99 items, and a 20% discount is applied for orders of 100 or more items. There should also be a method called *make_purchase*that receives the number of items to be bought and decreases amount by that much.
28) Write a class called Time whose only field is a time in seconds. It should have a method called *convert_to_minutes*that returns a string of minutes and seconds formatted as in the following example: if seconds is 230, the method should return '5:50'. It should also have a method called *convert_to_hours*that returns a string of hours, minutes, and seconds formatted analogously to the previous method.
29) Write a class called Converter. The user will pass a length and a unit when declaring an object from the class—for example, c = Converter(9,'inches'). The possible units are inches, feet, yards, miles, kilometers, meters, centimeters, and millimeters. For each of these units there should be a method that returns the length converted into those units. For example, using the Converter object created above, the user could call c.feet() and should get 0.75 as the result.

30) Write a Python class to implement pow(x, n).
31) Write a Python class to reverse a string word by word.
32) Write a program that opens a file dialog that allows you to select a text file. The program then displays the contents of the file in a textbox.
33) Write a program to demonstrate Try/except/else.
34) Write a program to demonstrate try/finally and with/as.

# PRAGATI ENGINEERING COLLEGE
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

## Data Structures Laboratory

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

| **COURSE OBJECTIVES** | |
|---|---|
| **1** | The objective of this lab is to demonstrate the different data structures implementation. |

| **COURSE OUTCOMES**<br>**Upon successful completion of the course, the student will be able to:** | | **Cognitive level** |
|---|---|---|
| **CO1** | Use basic data structures such as arrays and linked list. | K3 |
| **CO2** | Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths. | K2 |
| **CO3** | Use various searching and sorting algorithms. | K3 |

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

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

**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 | 3 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | 2 | 1 | - |
| **CO2** | 2 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| **CO3** | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 |

| **COURSE CONTENT** | |
|---|---|
| **Exercise -1 (Searching)** | a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.<br>b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list. |
| **Exercise -2 (Sorting-I)** | a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order<br>b) Write C program that implement Quick sort, to sort a given list of integers in ascending order<br>c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order |
| **Exercise -3 (Sorting-II)** | a) Write C program that implement radix sort, to sort a given list of integers in ascending order<br>b) Write C program that implement merge sort, to sort a given list of integers in ascending order |
| **Exercise -4 (Singly Linked List)** | a) Write a C program that uses functions to create a singly linked list<br>b) Write a C program that uses functions to perform insertion operation on a singly linked list<br>c) Write a C program that uses functions to perform deletion operation on a singly linked list<br>d) Write a C program to reverse elements of a single linked list. |
| **Exercise -5 (Queue)** | a) Write C program that implement Queue (its operations) using arrays.<br>b) Write C program that implement Queue (its operations) using linked lists |
| **Exercise -6 (Stack)** | a) Write C program that implement stack (its operations) using arrays<br>b) Write C program that implement stack (its operations) using Linked list<br>c) Write a C program that uses Stack operations to evaluate postfix expression |
| **Exercise -7 (Binary Tree)** | Write a recursive C program for traversing a binary tree in preorder, inorder and postorder. |

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## R20- B.Tech – CSE (AI&ML)

| | |
|---|---|
| **Exercise -8**<br><br>**(Binary Search Tree)** | a) Write a C program to Create a BST<br><br>b) Write a C program to insert a node into a BST.<br><br>c) Write a C program to delete a node from a BST. |

# PRAGATI ENGINEERING COLLEGE
# (Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R20- B.Tech – CSE (AI&ML)**

| **Constitution of India** | | | |
|---|---|---|---|
| **CourseCategory** | Humanities including Management | **Credits** | 0 |
| **CourseType** | Theory | **Lecture-Tutorial-Practice** | 2 -0 -0 |
| **Prerequisites** | | **Total Marks (Internal Assessment)** | 100 |

| **Course Outcomes** | | **Blooms Taxonomy Level** |
|---|---|---|
| **On successful completion of the course, the student will be able to** | | |
| **CO 1** | Understand the evolution of Constitution of India | Understanding |
| **CO 2** | Make use of one's Fundamental rights. | Application |
| **CO 3** | Understand the functioning of the Union Government | Understanding |
| **CO 4** | Understand the functioning of the State and local self Government. | Understanding |
| **CO 5** | Understand the value of Indian Constitution in functioning of the country. | Understanding |

| **Contribution of Course Outcomes towards achievement of Program** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Outcomes: 1 – Low, 2 - Medium, 3 – High | | | | | | | | | | | | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** |
| **CO1** | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 1 | 0 | 2 |
| **CO2** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 1 |
| **CO3** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| **CO4** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| **CO5** | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 2 |

**Course Content :**

**Unit – I**

**Introduction to Indian constitution:** Meaning of the term constitution - History and development – Preamble of the Constitution – Constituent Assembly – The salient features of Indian Constitution.

**Unit –II**

**Fundamental Rights:** Individual and Collective Rights – Limitations of the fundamental Rights – Fundamental Rights Vs Duties

**Unit –III**

**Union Government:** Union Legislature – Lok Sabha and Rajya Sabha (powers and functions) – President of India (powers and functions) – Prime minister of India (powers and functions) – Union Judiciary (supreme court powers and functions).

**Unit – IV State and Local self Government:**

**State Government:**State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) – Powers and functions of state legislature – The Chief Minister of the state (powers and functions)

**Local Self Government:** Election commission of India (Powers and Functions)- The Union Public Service Commission (Powers and Functions)

**Unit – V Working of the Indian Constitution**

The values of the Indian Constitution and Ushering of Social Revolution in India – Nature and Role of Higher Judiciary in India – Amendments (Recent)

**Reference Books** :

1. 'Indian Polity' by Laxmikanth

2. 'Indian Administration' by Subhash Kashyap

3. 'Indian Constitution' by D.D. Basu

4. 'Indian Administration' by Avasti and Avasti

**Web Resources:**

1. https://www.clearias.com/historical-background-of-indian-constitution/
2. https://www.civilserviceindia.com/subject/General-Studies/notes/functions-and-responsibilities-of-the-union-and-the-states.html

3.https://www.tutorialspoint.com/indian_polity/indian_polity_how_constitution_works