**GLOBAL INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)**
**COURSE CATALOGUE**
**REGULATIONS B.TECH – GR - 25**
**ELECTRONICS AND COMMUNICATION ENGINEERING**
**I YEAR II SEMESTER**

| Course Code | Course Name | Subject Area | Category | Periods Per Week | | | Credits | Scheme of Examination Max Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | CIA | SEE | Total |
| **THEORY** | | | | | | | | | | |
| MA201BS | Ordinary Differential Equations and Vector Calculus | BSC | Foundation | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| CH202BS | Engineering Chemistry | BSC | Foundation | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| EN203HS | English for Skill Enhancement | HSMC | Foundation | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| EC204ES | Electronics Devices and Circuits | ESC | Foundation | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| EC205PC | Network Analysis and Synthesis | PCC | Core | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| EN206HS | English Language and Communication Skills Lab | HSMC | Foundation | 0 | 0 | 2 | 1 | 40 | 60 | 100 |
| CH207BS | Engineering Chemistry Lab | BSC | Foundation | 0 | 0 | 2 | 1 | 40 | 60 | 100 |
| EC208ES | Electronics Devices and Circuits Lab | ESC | Foundation | 0 | 0 | 2 | 1 | 40 | 60 | 100 |
| DS209ES | Applied Python Programming | ESC | Foundation | 0 | 1 | 2 | 2 | 40 | 60 | 100 |
| | | | **Total Credits** | **15** | **2** | **8** | **21** | | | |

**COURSE CONTENT**

| ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - II Semester: ECE, CSE, CSE (AI & ML), CSE (Data Science), CE & ME** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **MA201BS** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **3** | **-** | **-** | **3** | **40** | **60** | **100** |
| Contact Classes: 48 | Tutorial Classes: Nil | Practical Classes: Nil | | | | **Total Classes: 48** | | |
| **Prerequisite:** Mathematical Knowledge at the pre-university level | | | | | | | | |

## 1. COURSE OVERVIEW

This course serves as a foundation course on differential equations and vector calculus. It includes techniques for solving ordinary differential equations, partial differential equations, vector differentiation and vector integration. It is designed to extract the mathematical developments, and skills, from basic concepts to advanced level of engineering problems to meet technological challenges.

## 2. COURSE OBJECTIVE

**The students will try to Learn:**

1) Methods of solving the differential equations of first and higher order.
2) Concept, properties of Laplace transforms
3) Solving ordinary differential equations using Laplace transform techniques
4) The physical quantities involved in the engineering field related to vector-valued functions
5) The basic properties of vector-valued functions and their applications to line, surface and volume integrals

## 3. COURSE OUTCOMES

**After successful completion of the course, students should be able to:**

| | |
|---|---|
| **CO 1** | Identify whether the given differential equation of first order is exact or not. |
| **CO 2** | Solve higher differential equations and apply the concept of differential equations to real-world problems. |
| **CO 3** | Use the Laplace transforms techniques to solve ODEs. |
| **CO 4** | To find Gradient, Divergence, Curl and Vector identities |
| **CO 5** | Evaluate the line, surface and volume integrals and convert them from one to another |

## 4. COURSE CONTENT

**UNIT - I: First Order Ordinary Differential Equations** **8 L**

Exact differential equations – Equations reducible to exact differential equations – linear and Bernoulli's equations – Orthogonal Trajectories (only in Cartesian Coordinates).

Applications: Newton's law of cooling – Law of natural growth and decay.

**UNIT - II: Ordinary Differential Equations of Higher Order** **10 L**

Second-order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}$, sinax , cosax, polynomials in $x, e^{ax}V(x), and\ xV(x)$, Method of variation of parameters.

**UNIT - III: Laplace Transforms** **10 L**

Laplace Transforms: Laplace Transform of standard functions – First shifting theorem – Laplace transforms of functions multiplied by 't' and divided by 't' – Laplace transforms of derivatives and integrals of function – Evaluation of integrals by Laplace transforms – Laplace transform of periodic functions – Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

**UNIT - IV: Vector Differentiation** **10 L**

Vector point functions and scalar point functions – Gradient – Divergence and Curl – Directional derivatives – Vector Identities – Scalar potential functions – Solenoidal and Irrotational vectors**.**

**UNIT-V: Vector Integration** **10 L**

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

## 5. TEXT BOOKS


1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2) R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.


## 6. REFERENCE BOOKS


1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3) N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications,
4) Reprint, 2008.
5) H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.


**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | **3** | **2** | | | | | | | | | | **2** | **3** | **2** |
| CO 2 | **2** | **3** | | | | | | | | | | **2** | **2** | **3** |
| CO 3 | **2** | **3** | | | | | | | | | | | **2** | **3** |
| CO 4 | **3** | **-** | **1** | | **2** | | | | | | | **2** | **3** | **-** |
| CO 5 | **3** | **3** | | | **1** | | | | | | | **2** | **3** | **3** |

**COURSE CONTENT**

| ENGINEERING CHEMISTRY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - I Semester: CSE**<br>**I Year - II Semester: CE, ME, ECE, CSE(AIML), CSE(DS)** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **CH202BS** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **3** | **-** | **-** | **3** | **40** | **60** | **100** |
| Contact Classes: 48 | Tutorial Classes: Nil | Practical Classes: Nil | | | | **Total Classes: 48** | | |
| **Prerequisite:** Basic principles of Chemistry | | | | | | | | |

## 1. COURSE OVERVIEW

Engineering Chemistry Course, focuses on the chemical principles and technologies relevant to engineering and industry. It covers water chemistry and treatment methods, electrochemical processes, batteries, corrosion mechanisms and control techniques, and the application of smart materials and biosensors. The course also explores challenges and future opportunities in sustainable energy solutions, particularly green hydrogen.

## 2. COURSE OBJECTIVE

**The students will try to Learn:**

1) The new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.
2) The industrial significance of water treatment, fundamental principles of battery chemistry, and the impact of corrosion along with its control methods for structural protection.
3) The foundational knowledge of various energy sources and their practical applications in engineering and classification, properties, and engineering applications of polymers for material selection and industrial advancements.
4) The working of smart materials, biosensors, and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

## 3. COURSE OUTCOMES

**After successful completion of the course, students should be able to:**

| | |
|---|---|
| **CO 1** | Understand the fundamental properties of water and its applications in both domestic and industrial purposes. |
| **CO 2** | Gain basic knowledge of electrochemical processes and their relevance to corrosion and its control methods. |
| **CO 3** | Comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs. |
| **CO 4** | The basic concepts and properties of polymers, lubricants and other engineering materials. |
| **CO 5** | Apply the principles of UV-Visible, IR spectroscopy and Raman spectroscopy in analyzing pollutants in dye industries and biomedical applications. |

## 4. COURSE CONTENT

**UNIT – I: Water and its treatment: [8]**

Introduction, types of hardness and units– Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) - Steps involved in the treatment of potable water – Disinfection of potable water by chlorination and break-point chlorination. Defluoridation - Nalgonda technique.

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water - Reverse osmosis.

**UNIT – II: Electrochemistry and Corrosion [8]**

Introduction - Electrode potential, standard electrode potential, types of electrodes, Nernst equation (no derivation), Galvanic cell, cell representation, EMF of cell- Numerical problems. Reference electrodes - Primary reference electrode – Standard Hydrogen Electrode (SHE), Secondary reference electrode - Calomel electrode. Determination of pH of an unknown solution using SHE and Calomel electrode.

Corrosion: Introduction - Definition, causes and effects of corrosion - Theories of corrosion, chemical and electrochemical corrosion - Mechanism of electrochemical corrosion, Types of corrosion: galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion - Nature of the metal, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods.

**UNIT - III: Energy Sources: [8]**

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air and Lithium ion battery. Fuel Cells – Differences between a battery and a fuel cell, construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics, Calorific value of fuel - HCV, LCV- Dulong's formula –Numerical problems.

Fossil **fuels:** Introduction, classification, Petroleum - Refining of Crude oil, Cracking - Moving bed catalytic cracking. LPG and CNG - composition and uses.

Synthetic Fuels: Fischer-Tropsch process, Introduction and applications of Hythane and Green Hydrogen.

**UNIT - IV: Polymers: [8]**

Definition, classification of polymers: Based on origin and tacticity with examples - Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization.

Plastics, Elastomers and Fibers: Definition and applications (PVC, Buna-S, Nylon-6,6).

Thermoplastics and thermosetting plastics, Fiber reinforced plastics (FRP).

Conducting polymers: Definition and classification with examples - Mechanism of conduction in trans-Polyacetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid (PLA) and its applications.

**UNIT - V: Applications of Materials: [8]**

Cement: Portland cement, its composition, setting and hardening.

Phase rule: Definition – Phase, component, degrees of freedom. Phase rule equation. Phase diagrams - One component system - water. Two component system - Lead silver system.

Lubricants: Definition and characteristics of a good lubricant – thin film mechanism of lubrication, properties of lubricants - viscosity, cloud and pour point, flash and fire point.

Interpretative spectroscopic applications of UV-Visible spectroscopy for Analysis of pollutants in dye industry, IR spectroscopy in night vision-security, Pollution Under Control- CO sensor (Passive Infrared detection).

## 5. TEXT BOOKS


1) Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
2) Engineering Chemistry by Rama Devi, Dr.P.Aparna and Rath, Cengage learning, 2025.
3) Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020).
4) Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
5) Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
6) Raman Spectroscopy in Human Health and Biomedicine.


## 6. REFERENCE BOOKS


1) Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020)
2) Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3) Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
4) Raman Spectroscopy in Human Health and Biomedicine.


**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | **2** | | | | | | | | | | | | | **2** |
| CO 2 | **1** | | **3** | | | | **2** | | | | | | | |
| CO 3 | **1** | | | | **3** | | | | | | | | | **2** |
| CO 4 | **3** | | | | **2** | | | | | | | | | |
| CO 5 | **3** | **2** | | | | | | | | | | | | |

**COURSE CONTENT**

| ENGLISH FOR SKILL ENHANCEMENT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - I Semester: CE, ME & CSE**<br>**I Year - II Semester: ECE, CSE (AIML) & CSE(DS)** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **EN203HS** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **3** | **-** | **-** | **3** | **40** | **60** | **100** |
| Contact Classes: 48 | Tutorial Classes: Nil | Practical Classes: Nil | | | | **Total Classes: 48** | | |
| **Prerequisite:** Oxford Advanced Learners Dictionary, Basic Word and Sentence formation | | | | | | | | |

## 1. COURSE OVERVIEW

National Education Policy-2020 aims at preparing students with knowledge, skills, values, leadership qualities and initiates them for lifelong learning. It also emphasizes language study and promotion of languages through understanding and proper interpretation. English language is central to the educational eco system. The importance of language as medium of communication for personal, social, official and professional needs to be emphasized for clear and concise expression. Teaching and learning of receptive and productive skills viz., Listening, Speaking, Reading and Writing (LSRW) are to be taught and learnt effectively in the undergraduate Engineering programs. Learners should be encouraged to engage in a rigorous process of learning to become proficient users of English language by adopting a deeply focused and yet flexible approach as opposed to rote learning.

In this connection, suitable syllabus, effective pedagogy, continuous assessments and students' involvement result in productive learning. This course supports the latest knowledge and skill requirements and shall meet specified learning outcomes. The main objectives of English language teaching and learning as medium of communication and for promotion of cultural values are embedded in this syllabus. Efforts are being made in providing a holistic approach towards value-based language learning which equips the learner with receptive as well as productive skills.

The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed textbook for detailed study. The students should be encouraged to read the texts leading to reading comprehension. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material.

## 2. COURSE OBJECTIVE

**The students will try to Learn:**

1) Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2) Develop study skills and communication skills in various professional situations.
3) Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

## 3. COURSE OUTCOMES

**After successful completion of the course, students should be able to:**

| | |
|---|---|
| **CO 1** | Choose appropriate vocabulary in their oral and written communication. |
| **CO 2** | Demonstrate their understanding of the rules of functional grammar and sentence structures. |
| **CO 3** | Develop comprehension skills from known and unknown passages. |
| **CO 4** | Write paragraphs, essays, précis and draft letters. |
| **CO 5** | Write abstracts and reports in various contexts. |

**4. COURSE CONTENT**

**UNIT-I:**

**Theme:** **Perspectives**

**Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled English for the Young in the Digital World published by Orient Black Swan Pvt. Ltd.**

**Vocabulary:** The Concept of Word Formation -The Use of Prefixes and Suffixes - Words Often Misspelt - Synonyms and Antonyms.

**Grammar:** Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions – Degrees of Comparison.

**Reading:** Reading and Its Importance- Sub Skills of Reading – Skimming and Scanning.

**Writing:** Sentence Structures and Types -Use of Phrases and Clauses in Sentences Importance of Proper Punctuation- Techniques for Writing Precisely –Nature and Style of Formal Writing.

**UNIT-II:**

**Theme:** **Digital Transformation**

**Lesson on 'Emerging Technologies' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.**

**Vocabulary:** Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Reading Strategies-Guessing Meaning from Context – Identifying Main Ideas – Exercises for Practice.

**Writing:** Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence – Linkers and Connectives - Organizing Principles in a Paragraph – Defining- Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

**UNIT-III:**

**Theme:** **Attitude and Gratitude**

**Poems on 'Leisure' by William Henry Davies and 'Be Thankful' - Unknown Author from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.**

**Vocabulary:** Words Often Confused - Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.

**Writing:** Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette.

**UNIT-IV:**

**Theme:** **Entrepreneurship**

**Lesson on 'Why a Start-Up Needs to Find its Customers First' by Pranav Jain from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.**

**Vocabulary:** Standard Abbreviations in English – Inferring Meanings of Words through Context – Phrasal Verbs – Idioms.

**Grammar:** Redundancies and Clichés in Written Communication – Converting Passive to Active Voice and Vice-Versa.

**Reading:** Prompt Engineering Techniques– Comprehending and Generating Appropriate Prompts - Exercises for Practice

**Writing:** Writing Practices- Note Making-Précis Writing.

**UNIT-V:**

**Theme:** **Integrity and Professionalism**

**Lesson on 'Professional Ethics' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.**

**Vocabulary:** Technical Vocabulary and their Usage– One Word Substitutes – Collocations.

**Grammar:** Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units).

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice

**Writing:** Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.

## 5. TEXT BOOKS


1) Board of Editors. 2025. English for the Young in the Digital World. Orient Black Swan Pvt. Ltd.


## 6. REFERENCE BOOKS


1) Swan, Michael. (2016). Practical English Usage. Oxford University Press. New Edition.
2) Karal, Rajeevan. 2023. English Grammar Just for You. Oxford University Press. New Delhi.
3) 2024. Empowering with Language: Communicative English for Undergraduates. Cengage Learning India Pvt. Ltd. New Delhi.
4) Sanjay Kumar & Pushp Lata. 2022. Communication Skills – A Workbook. Oxford University Press. New Delhi.
5) Wood,F.T. (2007). Remedial English Grammar. Macmillan.
6) Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.


**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | | | | | | | | | **2** | **3** | | **3** | | **2** |
| CO 2 | | | | | | | | | **2** | **3** | | **3** | | **2** |
| CO 3 | | | | | | | | | **2** | **3** | | **3** | | **2** |
| CO 4 | | | | | | | | | **2** | **3** | | **3** | | **2** |
| CO 5 | | | | | | | | | **2** | **3** | | **3** | | **2** |

## COURSE CONTENT

| ELECTRONIC DEVICES AND CIRCUITS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - II Semester: ECE** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **EC204ES** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **3** | **1** | **-** | **4** | **40** | **60** | **100** |
| Contact Classes: 48 | Tutorial Classes: 16 | Practical Classes: Nil | | | | **Total Classes: 64** | | |
| **Prerequisite:** | | | | | | | | |

### 1. COURSE OVERVIEW

This course introduces fundamental semiconductor devices and their behaviour, including diodes, BJTs, and FETs. It covers their characteristics, applications, and the analysis of basic electronic circuits. The course also explores rectifiers, voltage regulation, amplifier design, and advanced semiconductor technologies like FinFETs and CNTFETs. Emphasis is placed on developing a strong foundation for analog circuit design and understanding modern device technologies in electronics.)

### 2. COURSE OBJECTIVE

**The students will try to Learn:**

1) To introduce components such as diodes, BJTs and FETs.
2) To know the applications of devices.
3) To know the switching characteristics of devices.

### 3. COURSE OUTCOMES

**After successful completion of the course, students should be able to:**

| | |
|---|---|
| **CO 1** | Analyze the electrical characteristics and models of semiconductor diodes and apply them in rectifier and clipping circuits. |
| **CO 2** | Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and analyze their input and output characteristics. |
| **CO 3** | Design appropriate biasing networks for BJTs and determine the operating point for amplifier |
| **CO 4** | Analyze transistor amplifier circuits using h-parameter models and assess performance for various configurations |
| **CO 5** | Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare modern device technologies. |

### 4. COURSE CONTENT

**UNIT - I:**

Diode Characteristics and Applications: PN junction diode – I-V characteristics, Diode resistance and capacitance, Diode models (Ideal, Simplified, Piecewise Linear), Rectifiers – Half-wave, Full-wave (Center-tap and bridge), Capacitor filter for rectifiers, Clippers and clampers, Zener diode – I-V characteristics and voltage regulation.

**UNIT - II:**

Bipolar Junction Transistor (BJT): Structure and working principle of BJT, Current components and transistor action, Configurations: Common Base (CB), Common Emitter (CE), Common Collector (CC), Input and output characteristics, Determination of h-parameters from transistor characteristics.

**UNIT - III:**

BJT Biasing: Need for biasing and stabilization, Load line and operating point, Biasing techniques: Fixed bias, Collector-to-base bias, Voltage divider bias, Stability factors and thermal runaway

**UNIT - IV:**

Transistor Amplifiers: Transistor as a small-signal amplifier, h-parameter equivalent circuit, CE, CB, CC amplifier analysis using h-parameters, Approximate CE model – with and without emitter bypass capacitor.

**UNIT-V:**

Special Purpose Diodes: Principle of Operation of – SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED and Schottky Diode

Field Effect Transistors and Advanced Devices: JFET: Structure, operation, and characteristics, MOSFET: Enhancement and Depletion modes – Structure, operation, and characteristics, Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET.

## 5. TEXT BOOKS


1) Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. Tata McGraw-Hill, 1991
2) Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. Pearson, 11th ed., 2013.
3) Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. Oxford University Press, 7th ed., 2014.


## 6. REFERENCE BOOKS


1) Bell, David A. Electronic Devices and Circuits. Oxford University Press, 5th ed., 2008.
2) Neamen, Donald A. Electronic Circuit Analysis and Design. McGraw-Hill, 2nd ed., 2001.
3) Salivahanan, S., and N. Suresh Kumar. Electronic Devices and Circuits. McGraw-Hill Education, 4th ed., 2017.
4) Razavi, Behzad. Fundamentals of Microelectronics. Wiley, 2nd ed., 2013.
5) Taur, Yuan, and Tak H. Ning. Fundamentals of Modern VLSI Devices. Cambridge University Press, 2nd ed., 2009


## 7. REFERENCE BOOKS

1) https://onlinecourses.nptel.ac.in/noc21_ee55/preview

**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | **3** | **3** | **2** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **1** | **1** | **2** | **2** |
| CO 2 | **3** | **3** | **2** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **1** | **1** | **2** | **2** |
| CO 3 | **3** | **3** | **2** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **1** | **1** | **2** | **2** |
| CO 4 | **3** | **3** | **2** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **1** | **1** | **2** | **2** |
| CO 5 | **3** | **3** | **2** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **1** | **1** | **2** | **2** |

**COURSE CONTENT**

| NETWORK ANALYSIS AND SYNTHESIS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - II Semester: ECE** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **EC205PC** | **Core** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **3** | **-** | **-** | **3** | **40** | **60** | **100** |
| Contact Classes: 48 | Tutorial Classes: Nil | Practical Classes: Nil | | | | **Total Classes: 48** | | |
| **Prerequisite:** Nil | | | | | | | | |

## 1. COURSE OVERVIEW

The course begins with description with circuit elements, sources. Understanding of various interesting network theorems applied to solve linear, time invariant network problems efficiently in time and s-domain. Steady and transient solution of network problems with various sources including impulse source.

## 2. COURSE OBJECTIVE

**The students will try to Learn:**

1) To understand the basic concepts on RLC circuits.
2) To know the behavior of the steady state and transient states in RLC circuits.
3) To understand the two port network parameters.
4) Learn the design concepts of various filters and attenuators

## 3. COURSE OUTCOMES

**After successful completion of the course, students should be able to:**

| | |
|---|---|
| **CO 1** | Gain the knowledge on basic RLC circuits behaviour. |
| **CO 2** | Analyse the Steady state and transient analysis of RLC Circuits. |
| **CO 3** | Characterization of two port network parameters. |
| **CO 4** | Analyse the Design aspect of various filters and attenuators |
| **CO 5** | Analyse the Design aspect of various attenuators |

## 4. COURSE CONTENT

### UNIT - I

**Network Topology:** Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

### UNIT - II

**Transient and Steady state analysis:** RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. $2^{nd}$ order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

**UNIT - III**

**Two port network parameters:** Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions — using transformed (S) variables, Poles and Zeros. Standard T, π, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

**UNIT-IV**

**Filters:** Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass

**Attenuators:** Types — T, π , L, Bridge T and lattice ,Asymmetrical Attenuators T, π , L Equalizers- Types- Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers.

**UNIT – V**

**Network Synthesis:** Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non ladder networks, Poles, Zeros analysis of network functions**,** Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster and causer methods.

## 5. TEXT BOOKS


1) Van Valkenburg -Network Analysis, 3rd Ed., Pearson, 216.
2) JD Ryder - Networks, Lines and Fields, 2nd Ed., PHI, 1999.


## 6. REFERENCE BOOKS


1) J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, Mc Graw Hills Education, 1999.
2) A. Sudhakar and Shyammohan S Palli - Networks & Circuits, 4th Ed., Tata Mc Graw - Hill Publications.
3) William Hayt and Jack E. Kimmerley - Engineering Circuit Analysis, 6th Ed., William Hayt and Jack E. Kimmerley, McGraw Hill Company.


## 7. ELECTRONIC RESOURCES

1) https://www.ee.iitb.ac.in/~belur/ee225/books/AndersonAndVongpanitlerd-Network-Analysis-and-Synthesis1973.pdf

**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | **3** | **2** | **1** | **-** | **-** | **-** | **1** | **-** | **-** | **-** | **-** | **1** | **3** | **2** |
| CO 2 | **2** | **3** | **2** | **-** | **-** | **-** | **1** | **-** | **-** | **-** | **-** | **1** | **2** | **3** |
| CO 3 | **3** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **3** | **2** |
| CO 4 | **2** | **3** | **3** | **-** | **-** | **-** | **1** | **-** | **-** | **-** | **-** | **1** | **2** | **3** |
| CO 5 | **3** | **2** | **1** | **-** | **-** | **-** | **1** | **-** | **-** | **-** | **-** | **1** | **3** | **2** |

**COURSE CONTENT**

| ENGLISH LANGUAGE & COMMUNICATION SKILLS LABORATORY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - I Semester: CE, ME & CSE**<br>**I Year - II Semester: ECE, CSE (AIML) & CSE(DS)** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **EN206HS** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **-** | **-** | **2** | **1** | **40** | **60** | **100** |
| Contact Classes: Nil | Tutorial Classes: Nil | Practical Classes: 32 | | | | **Total Classes: 32** | | |
| **Prerequisite:** Computer with Headphones, OALD & Interactive Communication Skills Lab | | | | | | | | |

**1. COURSE OVERVIEW:**

The Professional Communication Skills (PCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**2. COURSE OBJECTIVES:**

**The students will try to Learn:**

1) To facilitate computer-assisted multi-media instruction enabling individualized andindependent language learning
2) To sensitize the students to the nuances of English speech sounds, word accent,intonation and rhythm
3) To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4) To improve the fluency of students in spoken English and neutralize the impact of dialects.

**3. COURSE OUTCOMES:**

**After successful completion of the course, students should be able to**

| | |
|---|---|
| **CO 1** | Understand the speech sounds, word accent, intonation and rhythm in day-to-day communication. |
| **CO 2** | Understand the nuances of English language through audio- visual experience and group activities. |
| **CO 3** | Neutralise their accent for intelligibility. |
| **CO 4** | Speak with clarity and confidence which in turn enhances their employability skills. |
| **CO 5** | Train students to use language appropriately for public speaking and group discussions. |

**4. COURRSE CONTENT**

**Exercise – I**

**CALL Lab:**

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises.

**ICS Lab:**

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

**Exercise – II**

**CALL Lab:**

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences — Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences — Intonation - Testing Exercises.

**ICS Lab:**

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

**Exercise – III**

**CALL Lab:**

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises.

**ICS Lab:**

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing.

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

**Exercise – IV**

**CALL Lab:**

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - Testing Exercises.

**ICS Lab:**

Understand: Public Speaking — Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

**Exercise – V**

**CALL Lab:**

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -Testing Exercises.

**ICS Lab:**

Understand: Group Discussion

Practice: Group Discussion

## 5. TEXT BOOKS:

1) (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.

## 6. REFERENCE BOOKS:


1) Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press.
2) Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press.
3) Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
4) Vishwa Mohan, Aysha. (2013). English for Technical Communication for Engineering Students.Mc Graw-Hill Education India Pvt. Ltd.


## 7. SUGGESTED SOFTWARE

1) Cambridge Advanced Learners' English Dictionary with CD.
2) English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
3) English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
4) TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | | | | | | | | | **3** | **3** | | **3** | | **2** |
| CO 2 | | | | | | | | | **3** | **3** | | **3** | | **2** |
| CO 3 | | | | | | | | | **3** | **3** | | **3** | | **2** |
| CO 4 | | | | | | | | | **3** | **3** | | **3** | | **2** |
| CO 5 | | | | | | | | | **3** | **3** | | **3** | | **2** |

**COURSE CONTENT**

| ENGINEERING CHEMISTRY LABORATORY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - I Semester: CSE**<br>**I Year - II Semester: ECE, CE, ME, CSE(AI&ML), CSE(DS)** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **CH207BS** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **-** | **-** | **2** | **1** | **40** | **60** | **100** |
| Contact Classes: Nil | Tutorial Classes: Nil | Practical Classes: 32 | | | | **Total Classes: 32** | | |
| **Prerequisite:** Basic principles of chemistry | | | | | | | | |

## 1. COURSE OVERVIEW

This laboratory course equips B. Tech students with practical skills in key chemical analysis techniques such as volumetric analysis, conductometry, potentiometry, and pH measurement, enabling precise quantification of chemical substances. It also includes experiments on polymer preparation, corrosion rate determination, and lubricant property evaluation. Additionally, virtual lab sessions introduce students to advanced topics like fuel cells, smart biomedical materials, electric vehicle batteries, and solar cell applications, bridging theoretical knowledge with modern technological advancements and fostering a comprehensive understanding of chemistry's role in engineering.

## 2. COURSE OBJECTIVE

**The students will try to Learn:**

1) The core chemical principles relevant to engineering applications.
2) The water hardness estimation method to assess its suitability for drinking purposes.
3) The ability to perform acid-base titrations using instrumental methods such as conductometry, potentiometry, and pH metry.
4) The hands-on synthesis of polymers, specifically Bakelite and Nylon – 6, 6, gaining practical experience in polymer preparation techniques in the laboratory.

## 3. COURSE OUTCOMES

**After successful completion of the course, students should be able to:**

| | |
|---|---|
| **CO 1** | Perform volumetric analysis by estimating water hardness using complexometry |
| **CO 2** | Develop skills in conductometric techniques to determine the concentration of acids. |
| **CO 3** | Gain practical experience in potentiometric analysis in to estimate acid concentration and also Iron(II) from the given samples |
| **CO 4** | Understand and apply pH metry techniques to determine acid concentrations |
| **CO 5** | Acquire hands-on experience in polymer synthesis by preparing Bakelite and Nylon-6,6 in the laboratory. |
| **CO 6** | Explore corrosion measurement methods, lubricant property evaluation, and virtual labs on renewable energy technologies, smart materials, and battery applications to bridge theoretical concepts with modern engineering applications. |

## 4. LIST OF EXPERIMENTS / DEMONSTRATIONS:

1) Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
2) Conductometry:
    a) Estimation of the concentration of strong acid by Conductometry.
    b) Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

3) Potentiometry:
    a) Estimation of concentration of Fe+2ion by Potentiometry using KMnO4.
    b) Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone.
4) pH Metry: Determination of an acid concentration using pH meter.
5) Preparations:
    a) Preparation of Bakelite.
    b) Preparation Nylon – 6, 6.
6) Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
7) Lubricants:
    a) Estimation of acid value of given lubricant oil.
    b) Estimation of viscosity of lubricant oil using Ostwald's Viscometer.
8) Virtual lab experiments:
    a) Construction of Fuel cell and it's working.
    b) Smart materials for Biomedical applications.
    c) Batteries for electrical vehicles.
    d) Functioning of solar cell and its applications.

## 5. REFERENCE BOOK


1) Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022).
2) Vogel's text book of practical organic chemistry 5th edition.
3) Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4) College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).


## 6. MATERIALS ONLINE

1) Course template
2) Lab manual

**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | **2** | | | | | | | | | | | | | **2** |
| CO 2 | **1** | | **3** | | | | **2** | | | | | | | |
| CO 3 | **1** | | | | **3** | | | | | | | | | **2** |
| CO 4 | **3** | | | | **2** | | | | | | | | | |
| CO 5 | **3** | **2** | | | | | | | | | | | | |

**COURSE CONTENT**

| ELECTRONIC DEVICES AND CIRCUITS LABORATORY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year – II Semester: ECE** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **EC208ES** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **-** | **-** | **2** | **1** | **40** | **60** | **100** |
| Contact Classes: Nil | Tutorial Classes: Nil | Practical Classes: 32 | | | | **Total Classes: 32** | | |
| **Prerequisite:** Nil | | | | | | | | |

## 1. COURSE OVERVIEW:

This course provides a fundamental understanding of how semiconductor devices like diodes and transistors function and how to design and analyze basic analog and digital circuits using them.

## 2. COURSE OBJECTIVES:

**The students will try to Learn:**

1) To study the principle of working of various semiconductor devices, their characteristics and application.
2) Analyze the diodes circuits, BJT and FET amplifiers.

## 3. COURSE OUTCOMES:

**After successful completion of the course, students should be able to**

| | |
|---|---|
| **CO 1** | Identify and discuss the specifications, and Test the various passive and active electronic components including R, L, C, diodes, BJT, FET, SCR. |
| **CO 2** | Demonstrate the characteristics of PN junction diode, Zener diode, SCR and Clippers and Clampers. |
| **CO 3** | Design and compare various rectifier circuits with and without filter. |
| **CO 4** | Examine the input and output characteristics of BJT and FET in various configurations and compute the various performance parameters. |
| **CO 5** | Design the various transistor biasing circuits and obtain the frequency response of BJT and FET amplifiers. |

## 4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

**PART- A**

**Electronic Workshop Practice (in 3 Lab sessions)**

1) Identification and Testing of RLC components, Potentiometers, Switches, Transformers, Bread board, PCB.
2) Identification and Testing of Active Devices, Diodes, BJTs, FETs, LED, SCR, UJT.
3) Study and operation of Regulated Power Supply, Function Generator, Digital Multimeter, CRO.

**PART- B**

**List of Experiments (Minimum of Twelve experiments to be done):**

1) Forward and reverse bias characteristics of PN junction diode.
2) Reverse bias characteristics of a Zener diode and its application as a voltage regulator.
3) Full-wave rectifiers (center-tap and bridge) with and without capacitor filters.
4) Types of Clippers at different reference voltages.
5) Types of Clampers at different reference voltages.
6) Input and output characteristics of BJT in common base configuration.
7) Input and output characteristics of BJT in common emitter configuration.
8) Design of Self bias circuits to establish a stable operating point for a BJT amplifier and study DC load line behavior.
9) Frequency response of Common Emitter Amplifier.
10) JFET Characteristics.
11) Frequency response of Common Source FET Amplifier.
12) SCR Characteristics.
13) UJT Characteristics.
14) Enhancement-mode NMOS transistor characteristics.

## 5. TEXT BOOKS:

1) Lab manual

## 6. MATERIALS ONLINE:

1) Course template
2) Lab manual

**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | **3** | **3** | **2** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **3** |
| CO 2 | **3** | **3** | **3** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **3** |
| CO 3 | **3** | **3** | **2** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **3** |
| CO 4 | **3** | **3** | **3** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **2** | **3** |
| CO 5 | **2** | **2** | **2** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **2** | **3** |

**COURSE CONTENT**

| APPLIED PYTHON PROGRAMMING LABORATORY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **I Year - II Semester: ECE** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| **DS209ES** | **Foundation** | **L** | **T** | **P** | **C** | **CIA** | **SEE** | **Total** |
| | | **-** | **1** | **2** | **2** | **40** | **60** | **100** |
| Contact Classes: Nil | Tutorial Classes: 16 | Practical Classes: 32 | | | | **Total Classes: 48** | | |
| **Prerequisite:** Nil | | | | | | | | |

## 1. COURSE OVERVIEW

The course focuses on practical Python programming skills through a series of progressively challenging tasks. In the initial weeks, students get familiar with Python basics, including using the interpreter, writing simple programs, and understanding basic functions. As the course advances, students work on more complex problems like matrix operations, file handling, and implementing algorithms. They also explore object-oriented programming concepts, exception handling, and basic GUI development. The course culminates with applications in numerical computing and digital logic, preparing students for real-world problem-solving scenarios.

## 2. COURSE OBJECTIVE

**The students will try to Learn:**

1) To install and run the Python interpreter.
2) To learn control structures.
3) To Understand Lists, Dictionaries in python.
4) To Handle Strings and Files in Python

## 3. COURSE OUTCOMES

**After successful completion of the course, students should be able to:**

| | |
|---|---|
| **CO 1** | Develop the application specific codes using python. |
| **CO 2** | Understand Strings, Lists, Tuples and Dictionaries in Python |
| **CO 3** | Verify programs using modular approach |
| **CO 4** | Verify programs using file I/O, Python standard library |
| **CO 5** | Implement Digital Systems using Python |

## 4. LIST OF EXPERIMENTS:

1)
   a) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   b) Start the Python interpreter and type help () to start the online help utility.
2) Start a Python interpreter and use it as a Calculator.
3) Write a program to calculate compound interest when principal, rate and number of periods are given.
4) Read the name, address, email and phone number of a person through the keyboard and print the details.

5) Print the below triangle using for loop.

```
 5
4 4
3 3 3
2 2 2 2
1 1 1 1 1
```

6) Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)

7) Python program to print all prime numbers in a given interval (use break)

8) Write a program to convert a list and tuple into arrays.

9) Write a program to find common values between two arrays.

10) Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

11) Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.

12) Write a function called has duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

13) Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

14) The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.

15) Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.

16) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'

17) Remove the given word in all the places in a string?

18) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

19) Writes a recursive function that generates all binary strings of n-bit length

20) Write a python program that defines a matrix and prints

21) Write a python program to perform multiplication of two square matrices

22) How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.

23) Use the structure of exception handling all general-purpose exceptions.

24) Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

25) Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.

26) Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.

27) Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.

28) Write a python code to read a phone number and email-id from the user and validate it for correctness.

29) Write a Python code to merge two given file contents into a third file.

30) Write a Python code to open a given file and construct a function to check for given words present in it and display on found.

31) Write a Python code to Read text from a text file, find the word with most number of occurrences

32) Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

33) Import numpy, Plotpy and Scipy and explore their functionalities.

34) Install NumPy package with pip and explore it.

35) Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

36) Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

## 5. TEXT BOOKS


1) Supercharged Python: Take your code to the next level, Overland.
2) Learning Python, Mark Lutz, O'reilly.


## 6. REFERENCE BOOKS


1) Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
2) Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson.
3) Introduction to Python Programming, Gowrishakar S, Veena A, CRC Press.
4) Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition.
5) Python for Data Science, Dr. Mohd Abdul Hameed, Wiley publications.
6) Core Python Programming, Dr. R. Nageswara Rao, Dreamtech press.
7) Introduction to Python, Gowrishankar S, Veena A., CRC Press.


**CO-PO-PSO Mapping**

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | **3** | **2** | **2** | **1** | **2** | | | | | | | **1** | | |
| CO 2 | **3** | **3** | **2** | **2** | **2** | | | | | | | **1** | | |
| CO 3 | **3** | **3** | **2** | **2** | **3** | | | | | | | **2** | | |
| CO 4 | **3** | **3** | **2** | **2** | **3** | | | | | | | **2** | | |
| CO 5 | **3** | **2** | **2** | **1** | **3** | | | | | | | **2** | | |