**ACHARYANAGARJUNA UNIVERSITY**

**Faculty of Engineering**

**B.TECH COURSE STRUCTURE**

**For Circuit Branches: EEE (2019-20)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| I/IV B.Tech EE-Semester – 1(Theory - 5, Lab-4) | | | | |
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P-C** |
| 1 | EEE 111 | Mathematics- I (Calculus & Linear Algebra) | BS | 3-0-0-3 |
| 2 | EEE 112 | Engineering Chemistry | BS | 3-0-0-3 |
| 3 | EEE 113 | Problem Solving & Programming(using C) | ES | 3-1-0-4 |
| 4 | EEE 114 | Communicative English I | HS | 2-0-0-2 |
| 5 | EEE 115 | Constitution of India | MC | 3-0-0-0 |
| 6 | EEE 151 | Chemistry lab | BS | 0-0-3-1.5 |
| 7 | EEE 152 | Problem solving & Programming using C | ES | 0-0-3-1.5 |
| 8 | EEE153 | English lab | HS | 0-0-3-1.5 |
| 9 | EEE 154 | Workshop I (Basic Engineering Workshop) | LC | 0-0-3-1.5 |
|  |  |  | **Total ==>** | **18** |

I/IV B.Tech CE-Semester - 2 (Theory - 6, Lab - 5)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P-C** |
| 1 | EEE 121 | Mathematics- II (ODE and Multivariable Calculus) | BS | 3-0-0-3 |
| 2 | EEE 122 | Engineering Physics | BS | 3-0-0-3 |
| 3 | EEE 123 | Engineering Graphics & Design | ES | 1-0-3-2.5 |
| 4 | EEE 124 | Essential Electrical & Electronic Engineering | ES | 3-1-0-4 |
| 5 | EEE 125 | Python Programming | ES | 2-1-0-3 |
| 6 | EEE 126 | Environmental Science | MC | 3-0-0-0 |
| 7 | EEE 161 | Physics Lab | BS | 0-0-3-1.5 |
| 8 | EEE 162 | Electrical & Electronics Lab | ES | 0-0-3-1.5 |
| 9 | EEE 163 | Python Lab | ES | 0-0-3-1.5 |
| 10 | EEE 164 | Workshop (Electrical & Electronics Engineering) | LC | 0-0-3-1.5 |
|  |  |  | **Total ==>** | **21.5** |

**MATHEMATICS-I**

(Calculus & Algebra)

(Common to all branches of Engineering)

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

**Course Objectives:**

* This course will illuminate the students in the concepts of calculus and linear algebra.
* To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

**Bridge Course:** Limits, continuity, Types of matrices

**Unit I: Matrix Operations and Solving Systems of Linear Equations 10 hrs**

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix; (L3)
* identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

**Unit II: Mean Value Theorems 6 hrs**

Rolle’s Theorem, Lagrange’s mean value theorem, Cauchy’s mean value theorem, Taylor’s and Maclaurin theorems with remainders (without proof);

**Learning Outcomes:**

At the end of this unit, the student will be able to

* Translate the given function as series of Taylor’s and Maclaurin’s with remainders (L3)
* analyze the behaviour of functions by using mean value theorems (L3)

**Unit III: Multivariable calculus 8 hrs**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
* Acquire the Knowledge maxima and minima of functions of several variable (L1)
* Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

**Unit IV: Double Integrals 8hrs**

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
* Apply double integration techniques in evaluating areas bounded by region (L4)

**Unit V: Multiple Integrals and Special Functions 8 hrs**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* Conclude the use of special function in multiple integrals (L4)
* evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

**Textbooks:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

**References:**

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

**Course Outcomes:**

At the end of the course, the student will be able to:

* develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
* Utilize mean value theorems to real life problems (L3)
* familiarize with functions of several variables which is useful in optimization (L3)
* Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
* Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

**ENGINEERING CHEMISTRY** Common to all branches **L  T P  C**

3 0  3 4.5

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**Course Objectives**:

* To familiarize engineering chemistry and its applications
* To impart the concept of soft and hard waters, softening methods of hard water
* To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.
* **compare** the materials of construction for battery and electrochemical sensors (L2)
* **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
* **explain** the principles of  spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

**UNIT-I: WATER TECHNOLOGY**

Various impurities of Water, WHO guidelines, Hardness unit sand determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler

Corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and

Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion-

Exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

**Learning outcomes:**

**The student will be able to**

* **list** the differences between temporary and permanent hardness of water (L1)
* **explain** the principles of reverse osmosis and electrodialysis. (L2)
* **compare** quality ofdrinking water with BIS and WHO standards. (L2)
* **illustrate** problems associated with hard water - scale and sludge**.**(L2)
* **explain** the working principles of different Industrial water treatment processes  (L2)

**UNIT-II: POLYMER CHEMISTRY**

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

**PLASTICS:** Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

**Conducting Polymers**- Introduction, examples, general applications and mechanism of Conduction on Polyacetylene.

**Chemistry of Nano materials:** Introduction to nano chemistry, preparation of nano materials - carbon nanotubes and fullerenes and their engineering applications.

**Learning Outcomes:**

***At the end of this unit, the students will be able to***

* **explain** different types of polymers and their applications (L2)
* **demonstrate** the mechanism of conduction in conducting polymers (L2)
* **explain** the preparation, properties and applications of Bakelite, Nylon-66,  and carbon fibres (L2)
* **describe** the mechanism of conduction in conducting polymers (L2)
* **discuss** Buna-S and Buna-N elastomers and their applications (L2)
* **discuss** types and preparation of Nano materials and Fullerenes(L3)

**UNIT-III: ELECTRO CHEMISTRY AND APPLICATIONS**

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.

BATTERIES: Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and their advantages, Fuel cell (H2-O2 cell).

**Corrosion**:

Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

**Corrosion control**: Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

**Learning Outcomes:**

***At the end of this unit, the students will be able to***

* **apply** Nernst equation for calculating electrode and cell potentials (L3)
* **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
* **explain** the theory of construction of battery and fuel cells (L2)
* **explain** the types of corrosion, factors affecting corrosion(L2)
* **explain** protection methods of corrosion and corrosion inhibitors(L2)

**UNIT-IV: INSTRUMENTAL METHODS**

Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert’s law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.

**Learning outcomes:**

After completion of Module IV, students will be able to

* **explain** the different types of spectral series in electromagnetic spectrum (L2)
* **understand** the principles of different analytical instruments (L2)
* **explain** the different applications of analytical instruments (L2)
* **explain** the principles of  spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

**UNIT-V: (i) Cement and Concrete Chemistry**

Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process, Setting and Hardening Cement.

**(ii) Organic reactions and synthesis of a drug molecule:**

Introduction to reactions involving substitution (SN1 and SN2), elimination reactions (E1 and E2), Synthesis of commonly used drug molecule – Aspirin and Paracetmol.

**Learning Outcomes:**

***At the end of this unit, the students will be able to***

* **explain** the manufacturing of portland cement (L2)
* **demonstrate** the scheme of concrete formation (L2)
* **identify** the constituents of portland cement (L2)
* **enumerate** the reactions at different temperatures in the manufacture of cement (L2)
* **explain** substitution and elimination reactions(L2)
* **explain** the synthesis of aspirin and paracetmol drug molecules(L2)

**Prescribed Text Books**

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi

2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi

3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut

4. Shashi chawla,A text book of engineering chemistry,3rd Edition,Dhanpat rai & co new delhi,2007.

5. Gurudeep raj & chatwal anand , “Instrumental methods of analysis “, 7th edition,CBS publications,1986.

6. Quantitative analysis by day&underwood.

7. A Text book of Instrumental methods by Skoog and West.

8. H.W. Wilard and demerit, “Instrumental methods of analysis “, 7th edition,CBS publications,1986.

9. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University

press.

**Course Outcomes:**

**At the end of the course, the students will be able to**

* **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
* **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
* **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
* **explain** the manufacturing of portland cement **and** concrete formation (L2)
* **explain** the principles of  spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

**CS 113 Problem Solving and Programming(Using C)**

**L-T-P-C : 3-1-3-5.5**

**Course Objectives:**

1. To teach problem solving through Flow charting tool – Raptor
2. To solve numerical problems using Raptor
3. To analyze problems by modular approach using Raptor
4. To understand the basic concepts and tokens of C
5. To learn the concepts of control structures, functions, arrays and pointers of C
6. To understand the concepts of structures , unions and files in C

**Unit – 1: Flowchart design through Raptor**

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers

Example problems(section 2) - Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, Linear search, Binary Search.

**Learning Outcomes:** Student should be able to

1. Select  flowchart symbols for solving problems.
2. Develop basic flowcharts for performing Input, Output and Computations
3. Solve numerical problems using Raptor
4. Analyse problems by modular approach using Raptor

**Unit 2: C Basics**

C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associatively, Simple programs in C using all the operators, Type casting ,type coercion.

**Learning outcomes:** Student should be able to

1. Exercise concepts of control structures in C
2. Develope user defined and predefined functions in C

**Unit 3: Control Structures and Functions**

Control Structures, Basic input and output statements, Preprocessor directives.

Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

**Learning Outcomes:** Student should be able to

1. Illustrate the flowchart and design an algorithm for a given problem and to develop IC programs using operators
2. Develop conditional and iterative statements to write C programs
3. Exercise user defined functions to solve real time problems

**Unit 4: Arrays and Pointers**

Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation.

Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

**Learning Outcomes:** Student should be able to

1. Inscribe C programs that use the concepts of structures , unions in C
2. Develop programs on files and command line arguments in C
3. Inscribe C programs that use Pointers to access arrays, strings and functions.
4. Inscribe C programs using pointers and to allocate memory using dynamic memory management functions.

**Unit 5: Structures and Files**

Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types, pointers to structures.Command line arguments.

Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

**Learning Outcomes**: Student should be able to

1. Exercise user defined data types including structures and unions to solve problems
2. Exercise files concept to show input and output of files in C

**Text Books:**

1. <https://raptor.martincarlisle.com/>

2. Programming with C-Gottfried-Schaums Outline Series-TMH

3. C Programming – AnithaGoel/Ajay Mittal/E.Sreenivasa Reddy-Pearson India

**Referrences:**

1. Problem Solving with C- Somasekharan-PHI.

2. C Programming- Behrouz A forouzan – CENGAGE Learning

3. Test your c skills-Yaswanthkanithker

4. Let us C- Yaswanthkanithker

**Communicative English-I**

B.T./CE/Ch.E./CSE/ECE/EEE/EI/IT/ME

L-T-P-C 2-1-3-3.5

**Course Objectives:**

The course aims to inculcate a sense of professionalism among the students while emphasizing on the basic aspects of the language learning such as grammar and vocabulary building. It also aspires to train the students to meet the global challenges.

* Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language in the classroom sessions.
* Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
* Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
* Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

**Syllabus:**

UNIT-1: 6 Hrs.

1. Reading: Reading Comprehension (Skimming, Scanning & Inference)

2. Writing: Paragraph Writing

3. Grammar: Common Errors in Nouns- Pronoun Agreement

4. Vocabulary Building: Content and Functional word list -100

**Learning Outcomes:**

At the end of the module, the learners will be able to

* identify the context, topic, and pieces of specific information (L3)
* ask & answer general questions on familiar topics (L2)
* employ suitable strategies for skimming & scanning to get the general idea of a text and specific information (L3)
* recognize paragraph structure with beginnings/endings (L3)
* form sentences using proper grammatical structures and correct word forms (L3)

UNIT- II: 6 Hrs.

1. Reading: Jumbled Sentences

2. Writing: Proposal Writing

3. Grammar: Correction of Errors in Subject- Verb Agreement

4. Vocabulary Building: Sign Post, Transition signals

**Learning Outcomes:**

At the end of the module, the learners will be able to

* comprehend short paragraphs on general topics (L2)
* understand the use of cohesive devices for better reading comprehension (L2)
* write well-structured paragraphs on specific topics (L3)
* make necessary grammatical corrections in short texts (L3)

UNIT - III: 6 Hrs.

* 1. Reading: Article Review

2. Writing: Note Making, Note Taking

3. Grammar: Correction of errors in Tense Usage

4. Vocabulary Building: Synonyms and Antonyms

**Learning Outcomes:**

At the end of the module, the learners will be able to

* Review the content with clarity & precision from an article (L3)
* infer meanings of unfamiliar words using contextual clues (L3)
* write summaries based on global comprehension of reading texts (L3)
* produce a well-organized essay with adequate details (L3)
* use correct tense forms, appropriate structures in speaking and writing (L3)

UNIT - IV: 6 Hrs.

1. Reading: Story Reflection

2. Writing: Pictorial Description

3. Grammar: Correction of Errors in Adjectives, Articles, Prepositions

4. Vocabulary Building: Root Words (200)

**Learning Outcomes:**

At the end of the module, the learners will be able to

* Reflect the content of the story with clarity & creatively (L3)
* infer meanings of unfamiliar words using contextual clues in the story (L3)
* infer & predict about content of a discourse (L4)
* interpret graphic elements used in academic texts (L2)
* make formal written communication using effective strategies (L3)

UNIT - V: 6 Hrs.

1. Reading: Mind Mapping

2. Writing: Information Transfer

3. Grammar: Correction of Errors in Wh- questions, Question Tags

4. Vocabulary Building: One Word Substitutes

**Learning Outcomes:**

At the end of the module, the learners will be able to

* take notes in mind while reading a text to answer questions (L3)
* edit short texts by correcting common errors (L4)
* produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
* use language appropriate for description and interpretation of graphical elements (L4)

**Course Outcomes:**

At the end of the course, the learners will be able to

* identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (L3)
* formulate sentences using proper grammatical structures and correct word forms (L3)
* speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)
* write summaries based on global comprehension of reading texts (L3)
* produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
* take notes while listening to a talk/lecture to answer questions (L3)

**REFERENCE BOOKS:**

1. Bailey, Stephen. *Academic writing: A handbook for International Students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.*Heinley ELT; 2nd Edition, 2018.
3. *Skillful Level 2 Reading & Writing Student's Book Pack (B10),* Macmillan Educational.
4. Hewings, Martin.*Cambridge Academic English (B2)*. CUP, 2012.
5. Michael Swan. *Practical English Usage*, OUP. 1995.
6. F.T. Wood. *Remedial English Grammar,* Macmillan.2007
7. William Zinsser. *On Writing Well.* Harper Resource Book. 2001
8. Liz Hamp-Lyons and Ben Heasly. *Study Writing,* Cambridge University Press. 2006.
9. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad.
10. Sharon J.Gerson, Steven M.Gerson, *Technical Writing*, New Delhi: Pearson education, 2007.
11. Sanjay Kumar and Pushp Lata, *Communication Skills*, Noida: Oxford University Press, 2012.
12. Dr. Shalini Verma, *Word Power Made Handy*, S.Chand & Co Ltd., 2009.

Constitution of India

**L-T-P-C**

**3-0-0-0**

**Course Objectives:**

* To Enable the student to understand the importance of constitution
* To understand the structure of executive, legislature and judiciary
* To understand philosophy of  fundamental rights and duties
* To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
* To understand the central and state relation financial and administrative.

**UNIT-I**

Introduction to Indian Constitution: Constitution’ meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

**LEARNING OUTCOMES:**After completion of this unit student will

* Understand the concept of Indian constitution
* Apply the knowledge on directive principle of state policy
* Analyze  the History, features  of Indian constitution
* Evaluate Preamble Fundamental Rights and Duties

**UNIT-II**  
Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

**LEARNING OUTCOMES:-** After completion of this unit student will

* Understand the structure of Indian government
* Differentiate between the state and central government
* Explain the  role of President and Prime Minister
* Know the Structure of supreme court and High court

**UNIT-III**

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

**LEARNING OUTCOMES:-** After completion of this unit student will

* Understand the structure of state government
* Analyze the role Governor and Chief Minister
* Explain the role of state Secretariat
* Differentiate between structure and functions of state secrateriate

**UNIT-IV**

A.Local Administration - District’s Administration Head - Role and Importance, Municipalities -  Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat:  Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

**LEARNING OUTCOMES:-** After completion of this unit student will

* Understand the local Administration
* Compare and contrast district administration role and importance
* Analyze the role of Myer and elected representatives of Municipalities
* Evaluate Zilla panchayat block level organisation

**UNIT-V**

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

**LEARNING OUTCOMES:-** After completion of this unit student will

* Know the role of Election Commission apply knowledge
* Contrast  and compare the role of Chief Election commissioner and Commissiononerate
* Analyze  role of state election commission
* Evaluate  various commissions of viz SC/ST/OBC and women

**REFERENCES:**

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

**E-RESOURCES**:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

**Course Outcomes**: At the end of the semester/course, the student will be able to have a clear knowledge on the following:

* Understand historical background of the constitution making and its importance for building a democratic India.
* Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
* Understand the value of the fundamental rights and duties for becoming good citizen of India.
* Analyze the decentralization of power between central, state and local self-government.
* Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

**ENGINEERING CHEMISTRY LABORATORY**

**Course Objectives**:

* Verify the fundamental concepts with experiments

**LIST OF EXPERIMENTS:**

1. **Determination of hardness of water by EDTA method**
2. **Estimation of Mohr’s salt by Permanganometry**
3. **Estimation of Mohr’s salt by Dicrometry**
4. **Determination of alkalinity of water**
5. **Percentage of purity of washing soda**
6. **Determination of available chlorine in bleaching powder**
7. **Preparation of Urea-formaldehyde resin**
8. **Determination on strength of NaoH using HCl conductometrically**
9. **Acid-Base titration by PH meter**
10. **Acid-Base titration by Potentiometer**
11. **Determination of viscosity of lubricating oil**
12. **Determination of Surface tension**

**Course Outcomes:**

**At the end of the course, the students will be able to**

* **measure** the strength of an acid present in secondary batteries (L3)
* **determine** the cell constant and conductance of solutions (L3)
* **prepare** advanced polymer materials (L2)
* **determine** the physical properties like surface tension, adsorption and viscosity (L3)
* **estimate** the Iron and Calcium in cement (L3)
* **calculate** the hardness of water (L4)

**Problem Solving & Programming Using C Lab (CSE152)**

Cycle 1:

1. Construct flowcharts to
   1. calculate the maximum, minimum and average of N numbers
   2. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
2. Construct flowcharts with separate procedures to
3. calculate simple and compound interest for various parameters specified by the user
4. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
5. Construct flowcharts with procedures to
6. generate first N numbers in the Fibonacci series
7. generate N Prime numbers
8. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
9. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
10. Design a flowchart to determine the number of characters and lines in a text file specified by the user

Cycle 2:

1.Exercises on data types and operators?

a) Practice exercises 3.1 to 3.16 and 4.1 to 4.17 and 14.1 to 14.20 Test your C Skills – yaswanth kanitkar text book.

b) Write a program which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?

c) Write a program to find greatest of three numbers using conditional operator?

d) Write a program to swap two numbers with and without temp variable?

e) Practice a program using multiple unary increment and decrement operators in arithmetic expressions?

2. Exercises on control structures?

a) Practice exercise 2.1 to 2.15 Test your C Skills - yaswanthkanitkar text book.

b)Write a program to find greatest of three numbers? Use nested if, if else if and switch statements?

c) Write a program to read marks of a student and print the sum and average?

d) Display the grade based on the sum of marks?

e) write a program to count the digits of a number? Use for loop

f) Write a program to check whether a number is perfect or not? Use do-while

g) Write a program to check whether a number is strong or not? Use while

h) Write a program to check whether a number is amstrong or not? Use for

i) Write a program to check whether a number is palindrome or not? Use for

j) Write a program to find the Fibonacci series upto the given number? Use while

k) Write a program to print the pascals triangle? Used do-while

l) Write a program to print the result of the series 1+x^2/2+x^3/3+….+x^n/n

3. Exercises on functions?

a) Practice exercise 5.1 to 5.14 Test your C skills -yaswanthkanitkar text book.

b) Write program to swap two variables using functions? Write a program to perform menu driven arithmetic operations using functions?

c) Write a program to find the factorial of a number using recursive and non- recursive functions?

d) Write a program to find the Fibonacci series using recursive functions?

e) Write a program to find the solution for towers of Hanoi using recursive function?

f) Write a program to pass parameters to a functions using call by value and call by reference?

4. Exercises on Arrays?

a) Practice exercise 9.1 to 9.17 Test your C skills - yaswanthkanitkar text book.

b) Write a program to read n numbers and sort them?

c) Write a program to find the minimum and maximum numbers of the array?

d) Write a program to read two matrices and find their sum, difference and product of them?

e)Find the transpose of a matrix?

f) Write a program to print upper and lower triangle of a given matrix?

5. Exercises on strings?

a) Practice exercise 10.1 to 10.15 yaswanthkanitkar text book.

b) Write a program to demonstrate the use of string manipulation functions?

c) Write a program to compare two strings?

d) Write a program to sort the names in Alphabetical order?

6. Exercises on pointers?

a) Practice exercise 7.1 to 8.26 yaswanthkanitkar text book.

b) Write a program to read dynamic array and sort the elements?

c) Write a program to read dynamic array and find the minimum and maximum of the elements?

d) Write a program to perform pointer arithmetic?

e) Write a program on pointers for strings?

f) Write a program to use array of pointers?

7. Exercises on structures?

a) Practice exercise 11.1 to 11.30 yaswanthkanitkar text book.

b) Write a program to create student structure and read marks of three subjects and find the sum and total of the student?

c) Write a program on arrays of structures for 60 students record using the above student structure?

d) Write a program for complex structure? Perform addition, subtraction and multiplication of two complex numbers?

e) Write a program for addition and multiplication of two polinomials?

8.Write a program on Files?

a) Practice exercise 12.1 to 12.20 yaswanthkanitkar text book.

b)write a program to append content of a file?

c)Write a program to display the content of a file?

d)Write a program to copy content of one file to other file?

e)Write a program to count the no of characters in a file?

f)Write a program to compare the contents of two files?

References:

1. Test your C Skills by – YaswanthKanithkar-BPB Publishers

2. C programming; Test your skills-A.N.Kamthane-Pearson India

Communicative English Lab -I

**(*Common to all branches)***

Lectures: 3 Periods Sessional Marks: 40

University Exam: 3 hours University Examination Marks: 60

**Learning Objectives**

The C***ommunicative English Lab*** mainly focuses on to improve the Linguistic Listening, Communicative Competence and Presentation Skills of the learners. Activities in the English Communication Skills Lab will simulate actual discourses that students will engage in their interaction with their peers, teachers or strangers in their day-to-day situations.

**Learning Outcomes**

The students will be able to

* Identify the sounds of English and able to check the correct pronunciation of the words
* Able to listen carefully to communicate effectively in cross- cultural contexts
* Capable to make the students communicate in Daily life situations
* Capable to read for content/ main idea
* Able to communicate confidently in oral presentations
* Enhance vocabulary

**List of Activities**

1. Identifying phonic sounds, listening to the sounds, practice and record the sounds from the English learning software
2. Common mispronounced words
3. Listening to the short audios and complete the tasks based on the audios
4. Listening to motivational speeches and answering the questions
5. Comprehending Spoken material in British English & American English
6. Situational Dialogues
7. Role plays
8. Reading comprehension exercises for GRE, TOEFL, GATE etc
9. Reading articles from newspaper
10. Specific reading for enhancing vocabulary
11. Vocabulary building exercises
12. Extempore
13. JAM sessions
14. Small talks
15. Oral presentations

**Basic Engineering Workshop**

**(Common to all branches)**

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**Course Objective:**

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

**Wood Working:**

Familiarity with different types of woods and tools used in wood working and make following joints

1. Half – Lap joint
2. Mortise and Tenon joint
3. Corner Dovetail joint or Bridle joint

**Sheet Metal Working:**

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

1. Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

**Fitting:**

Familiarity with different types of tools used in fitting and do the following fitting exercises

1. V-fit b) Dovetail fit c) Semi-circular fit           d) Bicycle tire puncture and change of two wheeler  tyre

**Electrical Wiring:**

Familiarities with different types of basic electrical circuits and make the following connections

1. Parallel and series b) Two way switch c) Godown lighting d) Tube light            e) Three phase motor f) Soldering of wires

**Course Outcomes:**

After completion of this lab the student will be able to

1. apply wood working skills in real world applications. (L3)
2. build different parts with metal sheets in real world applications. (L3)
3. apply fitting operations in various applications. (L3)
4. apply different types of basic electric circuit connections. (L3)
5. demonstrate soldering and brazing. (L2)

**Mathematics-II**

**(ODE, PDE and Multivariable Calculus)**

**(Common to all branches of Engineering except CSE)**

|  |  |  |  |
| --- | --- | --- | --- |
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**Course Objectives:**

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

**UNIT I: Linear Differential Equations of Higher Order**

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* identify the essential characteristics of linear differential equations with constant coefficients (L3)
* solve the linear differential equations with constant coefficients by appropriate method (L3)

**UNIT II: Equations Reducible to Linear Differential Equations and Applications**

Cauchy’s and Legendre’s linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* classify and interpret the solutions of linear differential equations (L3)
* formulate and solve the higher order differential equation by analyzing physical situations (L3)

**UNIT III: Partial Differential Equations – First order**  **8 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Solutions to homogenous and non-homogenous higher order linear partial differential equations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* apply a range of techniques to find solutions of standard PDEs (L3)
* outline the basic properties of standard PDEs (L2)

**UNIT IV: Multivariable Calculus (Vector differentiation)**

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* apply del to Scalar and vector point functions (L3)
* illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

**UNIT V: Multivariable Calculus (Vector integration)**

Line integral-circulation-work done, surface integral-flux, Green’s theorem in the plane (without proof), Stoke’s theorem (without proof), volume integral, Divergence theorem (without proof).

**Learning Outcomes:**

At the end of this unit, the student will be able to

* find the work done in moving a particle along the path over a force field (L4)
* evaluate the rates of fluid flow along and across curves (L4)
* apply Green’s, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

**Textbooks:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

**References:**

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

**Course Outcomes:**

At the end of the course, the student will be able to

* solve the differential equations related to various engineering fields (L6)
* Identify solution methods for partial differential equations that model physical processes (L3)
* interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
* estimate the work done against a field, circulation and flux using vector calculus (L6)

**Engineering Physics**

**(ECE, CSE, EEE)**

**L  T P  C           3 0 3 4.5**

**Course Objectives:**

* To impart knowledge in basic concepts of wave optics, properties of dielectric and magnetic materials, electromagnetic theory, fiber optics, semiconductors, superconductivity
* To familiarize the applications of nanomaterials relevant to engineering branches

**Course Outcomes:**

***The students will be able to***

* **interpret** the interaction of energy with the matter (L2)
* **explain** the principles of physics in materials science, nanoscience,  medical physics and communication industry (L2)
* **apply** electromagnetic  wave propagation in different guided media (L3)
* **calculate** conductivity of semiconductors (L3)
* **interpret** the difference between normal conductor and super conductor (L2)
* **demonstrate** the application of nanomaterials (L2)

**Unit-I : Wave Optics (8hrs)**

Principle of Superposition-Interference of light-Theory of Interference fringes-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton’s Rings-Determination of Wavelength.

Diffraction-Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum -Determination of Wavelength.

Polarization-Polarization by reflection, refraction and double refraction-Nicol’s Prism--Half wave and Quarter wave plate- Engineering applications of Interference, Diffraction and Polarization.

**Learning Outcomes:**

***The students will be able to***

* **explain**  various types of coherent sources (L2)
* **outline** the conditions for sustained interference (L2)
* **identify**  applications of interference including homodyne and heterodyne detection (L3)
* **analyze** the differences between interference and diffraction (L4)
* **illustrate** the concept of polarization of light and its applications (L2)
* **classify**  the  production and detection of different polarized light (L4)

**Unit-II: Dielectrics and Magnetics (10hrs)**

Introduction to Dielectrics--Electric polarization-Dielectric polarizability, Susceptability and Dielectric constant- Types of polarizations Lorentz(internal) field-Claussius -Mosotti equation-Applications of Dielectrics .

 Introduction to Magnetics-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials - Hysteresis-soft and hard magnetic materials-Ferrites and applications.

**Learning Outcomes:**

***The students will be able to***

* **explain** the concept of dielectric constant and polarization in dielectric materials (L2)
* **summarize** Gauss’s law in the presence of dielectrics (L2)
* **interpret** dielectric loss, Lorentz field and Claussius- Mosotti relation (L2)
* **classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
* **explain** the applications of dielectric and magnetic materials (L2)

**Unit – III: Electromagnetic Waves and Fiber Optics (10hrs)**

Divergence and Curl of Electric and Magnetic  Fields-Maxwell’s Equations- Electromagnetic wave Equation and velocity.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile, modes - Propagation of electromagnetic wave through optical fiber - -Block Diagram of Fiber optic Communication.

**Learning Outcomes:**

***The students will be able to***

* **apply** the Gauss’ Theorem for divergence and Stokes’ Theorem for curl  (L3)
* **evaluate** Maxwell’s displacement current and correction in Ampere’s law (L3)
* **assess** the electromagnetic wave propagation in different media and  its power (L3)
* **explain** the working  principle of optical fibers and its classification based on refractive index profile and mode of  propagation (L2)
* **identify** the applications of optical fibers in medical , communication and other fields (L2)

**Unit – IV: Semiconductors (8 hrs)**

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi conductors - Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type Dependence of Fermi energy on carrier concentration and temperature (Qualitative)- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect - Applications of Semiconductors.

**Learning Outcomes:**

***The students will be able to***

* **classify** the energy bands of semiconductors (L2)
* **outline** the properties of n-type and p-type semiconductors (L2)
* **interpret** the direct and indirect band gap in semiconductors (L2)
* **identify** the type of semiconductor using Hall effect (L2)
* **list** the applications of semiconductors in  electronic manufacturing (L2)

**Unit – V: Superconductors and Nano materials ( 8 hrs)**

Superconductors-Properties-Critical parameters of Superconductors- Meissner effect-BCS Theory-Josephson effect(AC & DC)-Types of Superconductors-High TC Superconductors- Applications.

Basics of Nano materials - Preparation and characterization – CNTs - Applications of Nano materials.

**Learning Outcomes:**

***The students will be able to***

* **explain** electrical resistivity of solids with temperature (L2)
* **classify** superconductors based on Meissner effect (L2)
* **explain** BCS theory , Josephson effect and high Tcmaterials (L2)
* **analyze** the size dependent properties of  nanomaterials (L4)
* **choose** the methods for the preparation and characterization of CNTs (L3)

**Text books:**

1. M.N. Avadhanulu, P.G.Kshirsagar “A Text book of Engineering Physics”-S.Chand Publications,2017
2. H.K.Malik & A.K.Singh “Engineering Physics”,- McGraw Hill Publishing Company Ltd, 2018

**Reference Books:**

1. David J.Griffiths, “Introduction to Electrodynamics”- 4/e, Pearson Education,2014
2. Gerd Keiser  “Optical Fiber Communications”- 4/e, Tata Mc GrawHill ,2008
3. Charles Kittel  “Introduction to Solid State Physics”,Wiley Publications,2011
4. S.M.Sze “Semiconductor devices-Physics and Technology”-Wiley,2008
5. T Pradeep “A Text book of Nano Science and Nano Technology”- Tata Mc GrawHill 2013

**Engineering Graphics and Design**

**Course Objectives:**

● Bring awareness that Engineering Drawing is the Language of Engineers.

● Familiarize how industry communicates technical information.

● Teach the practices for accuracy and clarity in presenting the technical information.

● Develop the engineering imagination essential for successful design.

● Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.

● Train the usage of 2D and 3D modeling.

● Instruct graphical representation of machine components.

**Manual Drawing: (7 Classes)**

L T P C

1 0 3 2.5

**Introduction to Engineering graphics:** Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions. Dimensioning principles and conventional representations

a) Conic sections including the rectangular hyperbola- general method only, b) Cycloid, epicycloids and hypocycloid

c) Involutes **(2L + 6P hrs)**

**Projection of points, lines and planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces. **(2L + 6P hrs)**

**Projections of solids:** Projections of regular solids inclined to one or both planes by rotational. **(1L + 3P hrs)**

**Sections of solids:** Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections. **(1L + 3P hrs)**

**Development of surfaces:** Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts. **(1L + 6P hrs)**

**Orthographic Projections:** Systems of projections, orthographic projections (Simple Figures). **(3L +9P hrs)**

**Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids. **(2L + 6P hrs)**

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.

2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016. Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009

2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009

3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000

4. K.C.John, Engineering Graphics, 2/e, PHI, 2013

5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

**Course Outcomes:**

After completing the course, the student will be able to

● draw various curves applied in engineering. (L2)

● show projections of solids and sections graphically. (L2)

● draw the development of surfaces of solids. (L3)

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● use computers as a drafting tool. (L2)

● draw isometric and orthographic drawings using CAD packages. (L3) Note:

1. Manual and Computer Aided Drafting classes can be held in alternative weeks for optimal utilization of computer facilities.

2. External examinations to be conducted both manual and computer mode with equal weightage of marks. Additional Sources

1. Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

**Essential Electrical & Electronic Engineering**

**Common to all branches L-T-P-C 3-1-3-5.5**

**Course Objectives:**

1. To introduce basics of electric circuits.

2. To teach DC and AC electrical circuit analysis.

3. To explain working principles of transformers and electrical machines.

4. To impart knowledge on BasicElectronic Components.

**UNIT – I: DC & AC Circuits**

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Nodal and loop analysis. Thevenin’s and Superposition Theorems

Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits. Series Resonance and band width.

**Learning Outcomes:**

***The students will be able to***

* **explain** properties and behaviour of Electric circuit elements (R, L and C) in DC and AC circuits.
* **analyze** various circuits using Kirchhoff laws, Nodal and loop analysis & Theorems.
* Make use of basic principles involved in electrical engineering concepts.
* Analysis of single phase ac circuits.

.**UNIT-II: Poly phase & Magnetic circuits**

Generation of 3-phase voltages - phase sequence - star & delta connections - voltage, current & power in star & delta connected systems - analysis of 3-phase balanced circuits - measurement of 3-phase power by 2 wattmeter method.

Faraday’s Laws of Electromagnetic Induction .Dynamically induced EMF –Statically induced EMF – Self Inductance – Mutual Inductance - Coefficient of coupling –Inductances in Series – Inductances in parallel – Dot convention.

**Learning Outcomes:**

***The students will be able to***

* Analysis of Poly Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits.
* Faraday’s laws.

**UNIT-III: DC Machines**

Principle and operation of DC Generator - EMF equation - OCC characteristics of DC generator – Principle and operation of DC Motor – Performance Characteristics of DC Motors - Speed control of DC Motors.

**Learning Outcomes:**

***The students will be able to***

* Know the principles and basics of DC machines used in industries.
* Analyze the performance of DC Machines.
* Summarize the different applications of commonly used electric machinery.

**UNIT-IV: AC Machines:**

Principle and operation of Single Phase Transformer - EMF equations-losses in transformers, regulation and efficiency. OC and SC test on transformer – auto transformer.

Principle, operation and construction of Three phase Induction Motor –torque equation and torque slip characteristics-power losses and efficiency.

**Learning Outcomes:**

***The students will be able to***

* Know the principles and basics of AC machines used in industries.
* Analyze the performance of AC Machines.
* Summarize the different applications of commonly used electric machinery.

**UNIT-V: Semiconductor Devices:**

Characteristics of Semiconductor junction Diode, Zener diode, transistor, JFET, UJT, SCR and their applications. Half-wave, Full-wave rectifiers and Bridge rectifier, with (L and LC) and without filters.

Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitterconfiguration, Transistor amplifying action, Common collector configuration, Operating point

**Learning Outcomes:**

***The students will be able to***

* . To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor.
* To study the Characteristics of basic electronic devices like P-N junction diode, zener diode & transistor in various configurations.

**Text Books:**

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.

**References:**

1. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.

**Python programming**

**L   T P   C**

**2    1 3   4.5**

**Course Objectives:**

* To understand software development life cycle
* To learn the basics of Python Programming
* Apply a solution clearly and accurately in a program using Python.
* Apply the best features of mathematics, engineering and natural sciences to program real life problems.

**Unit 1:**

**Context of software development:** Software, Development tools, Learning programming with Python, Writing a python program.

**Values and Variables**: Variables and assignments, identifier, Control codes within Strings, User Input, The eval function, the print function.

**Expressions and Arithmetic:**Expressions, Operator precedence and Associativity, Comments, Errors, More arithmetic operators.

**Learning Outcomes: The students will be able to**

* Learn how to design and program Python applications.
* Learn how to write loops and decision statements in Python.
* Acquire programming skills in core Python.

**Unit 2:**

**Conditional Execution:**Boolean Expressions, Simple if and if else,nested conditionals, multiway decision statements, conditional expressions, errors in conditional statements.

**Iteration:**While statements, for statement, definite loops and indefinite loops, nested loops, abnormal loop termination, infinite loops, iteration examples: computing square root, drawing a tree, printing prime numbers.

**Learning Outcomes: The students will be able to**

* Develop write functions and pass arguments in Python.
* Exercise custom and standard functions of Python programming

**Unit 3:**

**Functions:** Introduction, standard mathematical functions, time functions, Random numbers, main function, parameter passing, Function examples: Better organized prime number, Command Interpreter, Restricted Input, Better Die rolling simulator, Tree-Drawing Function, Floating –Point equality, Custom functions Vs Standard functions.

**More on Functions**: Global variables, Default Parameters, recursion, Making functions reusable, documenting functions and modules, functions as data.

**Learning Outcomes: The students will be able to**

* Exercise usage of Lists in Python programming
* To learn processing of Lists in Python programming

**Unit 4:**

**Lists:** Using Lists, List assignment and equivalence, list bounds, Slicing, Lists and functions, Prime generation with a list

**Lists processing:** Sorting, flexible sorting, search, list permutations, randomly permuting a list, reversing a list.

**Learning Outcomes: The students will be able to**

* Develop programs on Lists in Python programming
* Develop programs on processing Lists using Python

**Unit 5:**

**Objects:** Using Objects, String Objects, List Objects.

**Custom types:** geometric points, Methods, Custom type examples, Class inheritance.

**Handling Exceptions:** Motivation, Exception examples, Using Exceptions, Custom Exceptions.

**Learning Outcomes: The students will be able to**

* Understand String and List Objects
* Exercise on exception handling in Python applications

Text books:

1. LEARNING TO PROGRAM WITH PYTHON Richard L. Halterman
2. Core Python Programming by Dr. R.Nageswara Rao, dreamtech, second edition

Environmental Science

**Common to all branches L-T-P-C**

**3-0-0-0**

**OBJECTIVE:**

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.

**UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES**

Definition, Scope and Importance – Need for Public Awareness.

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

**LEARNING OUTCOMES**Students will be able to

1. articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. explain how water resources should be used.
3. articulate basic understanding of effects of modern agriculture on environment.
4. explain how various paradigms or world views and their implicit and explicit assumptions and values shape the viewer’s perception of environmental problems and solutions.

**UNIT – II: Ecosystems, Biodiversity, and its Conservation**

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

* + 1. Forest ecosystem.
    2. Grassland ecosystem
    3. Desert ecosystem
    4. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

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

**LEARNING OUTCOMES**

Students will be able to

1. get a clear picture of structure and functions of ecosystems.
2. explain why renewable and non-renewable energy resources are important.
3. get awareness about land degradation, soil erosion & desertification.
4. gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.

**UNIT – III: Environmental Pollution and Solid Waste Management**

**ENVIRONMENTAL POLLUTION:** Definition, Cause, effects and control measures of :

* 1. Air Pollution.
  2. Water pollution
  3. Soil pollution
  4. Marine pollution
  5. Noise pollution
  6. Thermal pollution
  7. Nuclear hazards

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

**LEARNING OUTCOMES UNIT-3**

Students will be able to

1. demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematics in the broad sense.
2. conduct basic conservation biology research.
3. explain endangered and endemic species of India.
4. identify the threats to biodiversity.

**UNIT – IV: Social Issues and the Environment**

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

**LEARNING OUTCOMES:**

Students will be able to

1. understand Cause, effects and control measures of air pollution.
2. understand soil, noise & water pollution.
3. explain the enforcement of Environmental legislation
4. understand solid waste management.

**UNIT – V: Human Population and the Environment**

**HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, variation among nations.  Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

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

**LEARNING OUTCOMES**

Students will have

1. knowledge about watershed management and environmental ethics.
2. explain the reasons for global warming
3. explain principles and impact of disasters on environment.
4. explain disaster management cycle in India.

**TEXT BOOKS** :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

**REFERENCES :**

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies  by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India  Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by  Gilbert M. Masters and Wendell P. Ela - Prentice hall of India  Private limited.

**Course Outcomes:** At the end 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. |

**ENGINEERING PHYSICS LABORATORY SYLLABUS**

**Learning Outcomes:**

***The students will be able to***

* **handle**  optical instruments like microscope and spectrometer
* **determine** thickness of a hair/paper with the concept of interference
* **estimate** the wavelength and resolving power of  different colors using diffraction grating
* **demonstrate** the importance of dielectric material in storage of electric field energy in the capacitors
* **plot** the intensity of  the magnetic field of circular coil carrying current with varying distance
* **evaluate** the acceptance angle of an optical fiber and numerical aperture
* **determine**  magnetic susceptibility of the material and its losses by B-H curve
* **determine** the fill-factor of the given semiconductor using solar cell
* **identify**  the type of semiconductor i.e., n-type or p-type using Hall effect
* **determine** the band gap of a given semiconductor

**List of Physics Experiments**

* + - 1. Determine the thickness of the fiber using wedge shape method
      2. Determination of the radius of curvature of the lens by Newton’s ring method
      3. Determination of wavelength by plane diffraction grating method
      4. Dispersive power of a Prisam
      5. Resolving power of a grating
      6. Photo cell – I-V Characteristic curves and determination of stopping potential
      7. Magnetic field along the axis of a circular coil carrying current.
      8. To determine the self inductance of the coil (L) using Maxwells-wines bridge.
      9. B-H Curve
      10. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
      11. Hall effect
      12. Photo voltaic cell - Determination of fill-factor
      13. To determine the energy gap of a semiconductor
      14. Measurement of resistance with varying temperature
      15. Determination of Acceleration due to gravity by using compound Pendulum
      16. **References:**
      17. S. Balasubramanian , M.N.  Srinivasan “ A Text book of Practical Physics”-  S Chand Publishers, 2017
      18. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

**ELECTRICAL & ELECTRONICS LABORATORY SYLLABUS**

**Learning Outcomes:**

***The students will be able to***

1. Verify Kirchoff’s Laws, Superposition theorem & Thevenin’s Theorem for dc excitation
2. Analyze the performance of AC and DC Machines by testing.
3. Study Characteristics of P-N junction and Zener diode, transistor
4. Perform speed control of dc shunt motor

**List of experiments:** -

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Verification of Kirchhoff laws.
3. Verification of Superposition Theorem.
4. Verification of Thevenin’s Theorems
5. Open circuit characteristics of a DC Shunt Generator.
6. Speed control of DC Shunt Motor.
7. Brake test on DC Shunt Motor.
8. OC & SC test of 1 – Phase Transformer.
9. Brake test on 3 - Phase Induction Motor.
10. Characteristics of PN junction and zener diode
11. Characteristics of transistor in common emitter configuration
12. Verification of transistor self bias circuit

**Python Programming Lab**

1. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
2. Design a Python script to determine if a given string is a Palindrome using recursion
3. Design a Python script to sort numbers specified in a text file using lists.
4. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
5. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
6. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.( 0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
7. Design a Python Script to find the value of (Sine, Cosine, Log, PI, *e* ) of a given number using infinite series of the function.
8. Design a Python Script to  convert a given number to words
9. Design a Python Script to convert a given number to roman number.
10. Design a Python Script to generate the frequency count of words in a text file.
11. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
12. Design a Python Script to implement Gaussian Elimination method.
13. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
14. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.
15. Design a Python script to search an element in the given list.
16. Design a Python script on *str* methods and *list* methods.

Electrical & Electronics Engineering Workshop

**I B. Tech – II Semester**

**WORKSHOP-II**

L T P C

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**Course Objectives for Workshop:**

1. To know about different tools, abbreviations and symbols in Electrical Engineering
2. To learn about types of measuring instruments to measure electrical quantities
3. To gain knowledge on different types of earthing and earth resistance
4. To study different types of wiring

**Syllabus:**

1. Study on Introduction to Electrical tools, symbols and abbreviations
2. Study of types of sizes of wires and making “T” joint and straight joint for wires
3. Measurements of Electrical quantities (like Voltage, Current, Power, Power factor in RLC circuits)
4. Study of measurements of Energy (using Single phase and Three phase Energy meter) by connecting different loads
5. Study of earthing and measurement of earth resistance
6. Study and performance of residential wiring (using Energy meter, Fuses, Switches, Indicator, Lamps, etc.)
7. Study of Fluorescent lamp wiring
8. Study of various electrical gadgets (CFL and LED)
9. Study of PV Cell
10. Study of Induction motor and Transformer
11. Assembly of choke or small transformer
12. Study of trouble shooting of electrical equipments (fan, iron box, mixer-grinder, etc.)
13. Introduction to basics of Electronic components: Solder practice, Multi meter, Power supply
14. Measurement of wire gauges using gauge meter
15. Identification of color code, resistors, ICs, Transistors, capacitors, diodes, SCRs, IGBTs etc.

**References:**

1. Lab manual of Electrical Engineering by TTTI, Chennai.

**Course Outcomes for Workshop:**

1. Able to demonstrate knowledge on different tools, abbreviations and symbols used in Electrical Engineering (L2)
2. Able to measure different electrical quantities using measuring instruments (L3)
3. Able to demonstrate how to trouble shoot the electrical equipments (like fan, grinder, motor, etc.) (L4)
4. Able to perform wiring and earthing for residential houses (L5)