JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS)
ANANTHAPURAMU–515002(A.P)INDIA

B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the Academic Year **2023-24** onwards)

ELECTRICAL AND ELECTRONICS ENGINEERING

I YEAR COURSE STRUCTURE AND SYLLABUS

B.TECH.-EEE-COURSESTRUCTURE & SYLLABUS–R23

(Applicable from the academic year 2023-24 onwards)

INDUCTION PROGRAMME

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

B. Tech. – I Year I Semester (Electrical &Electronics Engineering)

S.No.	Subject Code	Subject	L/D	T	P	Credits
1	23A15501	Communicative English Common to EE, ECE, CSE	2	0	0	2
2	23A15301	Chemistry Common to EE, ECE, CSE	3	0	0	3
3	23A15101	Linear Algebra & Calculus Common to All Branches	3	0	0	3
4	23A11301	Basic Civil & Mechanical Engineering Common to EE, ECE, CSE	3	0	0	3
5	23A10501	Introduction to Programming Common to All Branches	3	0	0	3
6	23A15502	Communicative English Lab Common to EE, ECE, CSE	0	0	2	1
7	23A15302	Chemistry Lab Common to EE, ECE, CSE	0	0	2	1
8	23A10302	Engineering Workshop Common to EE, ECE, CSE	0	0	3	1.5
9	23A10502	Computer Programming Lab Common to All Branches	0	0	3	1.5
10	23A15901	Health and wellness, Yoga and sports Common to EE, ECE, CSE	-	-	1	0.5
Total			14	00	11	19.5

B. Tech. – I Year II Semester

S.No.	Subject Code	Subject	L/D	T	P	Credits
1	23A25201	Engineering Physics Common to EE, ECE, CSE	3	0	0	3
2	23A25101	Differential Equations and Vector Calculus (Common to All Branches)	3	0	0	3
3	23A22401	Basic Electrical and Electronics Engineering Common to EE, ECE, CSE	3	0	0	3
4	23A20302	Engineering Graphics Common to EE, ECE, CSE	1	0	4	3
5	23A20201	Electrical Circuit Analysis–I	3	0	0	3
6	23A25202	Engineering Physics Lab Common to EE, ECE, CSE	0	0	2	1
7	23A20501	IT Work Shop Common to EE, ECE, CSE	0	0	2	1
8	23A22402	Electrical and Electronics Engineering workshop Common to EE, ECE, CSE	0	0	3	1.5
9	23A20202	Electrical Circuit Analysis–I -Lab	0	0	3	1.5
10	23A25902	NSS/NCC /SCOUTS and Guides/ Community Service Common to EE, ECE, CSE	-	-	1	0.5
Total			13	00	15	20.5

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B. Tech. – I Year I Semester
(Common to EEE, ECE, CSE)

Subject Code	Title of the Subject	L	T	P	C
23A15501	Communicative English	2	0	0	2

Course Objectives:

The main objective of introducing this course, Communicative English, is to facilitate effective Reading, Speaking and Writing skills among the students.

- It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary.
- This course helps the students to make them effective in speaking and writing skills and to make them industry-ready.

Course Outcomes:

- **CO1**: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
- **CO2:** Apply grammatical structures to formulate sentences and correct word forms.
- **CO3:** Analyze discourse markers to speak clearly on a specific topic in informal discussions.
- **CO4:** Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- **CO5:** Create a coherent paragraph, essay, and resume.

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SYLLABUS

UNIT I

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

UNIT II

Lesson: NATURE: The Brook by Alfred Tennyson **(Poem)**
Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structuredtalks.
Reading: Identifying sequence of ideas; recognizing verbal techniques the lpto link the ideas in paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesi vedevices-linkers, use of articles and zero article; prepositions.
Vocabulary: Homonyms, Homophones, Homographs

UNIT III

Lesson: BIOGRAPHY: Elon Musk

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

UNIT IV

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

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

Textbooks:

1. Pathfinder: *Communicative English for Undergraduate Students*,1st Edition, OrientBlackSwan,2023(Units 1,2&3)
2. *Empowering with Language* byCengagePublications,2023(Units4 &5)

Reference Books:

1.Dubey, Sham Ji& Co. *English for Engineers*, VikasPublishers,2020
2. Bailey, Stephen. Academic writing*: AHandbookforInternationalStudents.Routledge*,2014.
3. Murphy, Raymond. *English Grammarin Use*, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman.WordPowerMadeEasy-*TheCompleteHandbookforBuildingaSuperiorVocabulary*.Anchor,2014.

Web Resources:
GRAMMAR:

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

6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

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

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B. Tech. – I Year I Semester
(Common to EEE, ECE, CSE)

Subject code	Title of the Subject	L	T	P	C
23A15301	Chemistry	3	0	0	3

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches.

Course Outcomes:

- **CO1:** Apply Schrodinger wave equation to hydrogen atom, Illustrate the molecular orbital energy level diagram of different molecular species, Explain the band theory of solids for conductors, semiconductors and insulators Discuss the magnetic behavior and color of complexes.
- **CO2:** Explain the band theory of solids for conductors, semiconductors and insulators. Explain Basic concept and application of Super Conductors Super Capacitors Demonstrate the application of Fullerenes, carbon Nano tubes and Graphene's nanoparticles
- **CO3:**Apply Nernst equation for calculating electrode and cell potentials, Differentiate between potentiometric and conduct metric titrations, Explain the theory of construction of battery and fuel cells, Solve problems based on cell potential
- **CO4:** Explain the different types of polymers and their applications, Explain the preparation, properties and applications of PVC, Bakelite Describe the mechanism of conduction in conducting polymers, Discuss Buna-S and Buna-N elastomers and their applications
- **CO5:** Explain the different types of spectral series in electromagnetic spectrum, Understand the principles of different

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

UNIT I: Structure and Bonding Models: (10 hrs.)

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo- and hetero nuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes:
At the end of this unit, the students will be able to

- **apply** Schrodinger wave equation to hydrogen atom (L3)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the calculation of bond order of O_2 and CO molecules (L2)
- **Discuss** the basic concept of molecular orbital theory (L3)

UNIT II: Modern Engineering materials (8hrs)

Semiconductors – Introduction, basic concept, application
Super Conductors-Introduction, basic concept, applications.
Super capacitors: Introduction, Basic Concept-Classification – Applications.
Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon Nano tubes and Graphene's nanoparticles.

Learning Outcomes:
At the end of this unit, the students will be able to

- **Explain** the Applications of Super Capacitors (L2).
- **Discuss** the Basic concept of Super Conductors (L3).
- **Explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **Demonstrate** the application of Fullerenes, carbon nanotubes and Graphene's nanoparticles (L2).

UNIT III: Electrochemistry and Applications (10hrs)

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry-potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), pH metry.
Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.
Primary cells – Zinc-air battery, Sodium-Air Battery Secondary cells –lithium-ion batteries- working of the batteries including cell reactions;
Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

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 potentiometric and conduct metric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)
- **solve** problems based on cell potential (L3)

UNIT IV: Polymer Chemistry (10hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation, Polydispersity index (PDI)-significance Plastics –Thermos and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6, 6, carbon fibers. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – oxyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

Learning Outcomes:
At the end of this unit, the students will be able to

- **explain** the different types of polymers and their applications (L2)
- **explain** the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibers (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)

UNIT V: Instrumental Methods and Applications (10 hrs.)

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Principle, Instrumentation and Applications, IR spectroscopy, fundamental modes and selection rules, Principle, Instrumentation and Applications. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

Learning outcomes:

After completion of this unit, 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)

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

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B. Tech. – I Year I Semester
(Common to All Branches)

Subject code	Title of the Subject	L	T	P	C
23A15101	Linear Algebra & Calculus	3	0	0	3

Course Objectives:

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

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

- **CO1:** Develop and use of matrix algebra techniques that are needed by engineers for practical applications.
- **CO2:** Utilize mean value theorems to real life problems.
- **CO3:** Familiarize with functions of several variables which is useful in optimization.
- **CO4:** Learn important tools of calculus in higher dimensions.
- **CO5:** Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

UNIT I: Matrices

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations, consistency of linear system of equations Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT II: Eigen values, Eigenvectors and Orthogonal Transformation

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by similarity transformation, Lagrange's reduction and Orthogonal Transformation, types of complex matrices (Hermition skew Hermition & unitary)

UNIT III: Calculus

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.
Radius of curvature, centre of curvature and circle of curvature.

UNIT IV: Partial differentiation and Applications (Multi variable calculus)

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers, Differentiation under the integral sign (Liebntiz's rule)

UNIT V: Multiple Integrals (Multi variable Calculus)

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Textbooks:

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

Reference Books:

1) Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2) Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3) Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4) Advanced Engineering Mathematics, Michael Greenberg, , Pearson publishers, 9th edition
5) Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014, Third Edition (Reprint 2021

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B. Tech. – I Year I Semester
(Common to EEE, ECE, CSE)

Subject code	Title of the Subject	L	T	P	C
23A11301	Basic Civil & Mechanical Engineering	3	0	0	3

Course Objectives:

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

Course Outcomes: On completion of the course, the student should be able to:

- **CO1:** Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
- **CO2:** Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.
- **CO3:** Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.
- **CO4:** Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.
- **CO5:** Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

(PART A) BASIC CIVIL ENGINEERING

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering-Structural Engineering Geo-Technical Engineering- Transportation Engineering-Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline-BuildingConstructionandPlanning-ConstructionMaterials-Cement-Aggregate- Bricks- Cement concrete-Steel. Introduction to Prefabricated construction Techniques.

UNIT II

Surveying: Objectives of Surveying- Horizontal Measurements-Angular Measurements- Introduction to Bearings Levelling instruments used for leveling -Simple problems on levelling and Bearings-Contour mapping.

UNIT III

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbor, Tunnel, Airport, and Railway Engineering.

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Textbooks:

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

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi.2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38thEdition.
4. Highway Engineering, S.K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchandand Brothers Publications 2019. 10thEdition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

Course Objectives: The students after completing the course are expected to

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

Course Outcomes: On completion of the course, the student should be able to

- **CO1:** Understand the different manufacturing processes.
- **CO2:** Explain the basics of thermal engineering and its applications.
- **CO3:** Describe the working of different mechanical power transmission systems.
- **CO4:** Describe the working of different power plants.
- **CO5:** Describe the basics of robotics and its applications.

UNIT I

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society-Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors**.**
Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT II

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of oilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.
Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.
Introduction to Robotics - Joints & links, configurations, and applications of robotics
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(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Textbooks:

1. Internal Combustion Engines by V. Ganesan, By Tata Mc Graw Hill publications (India) Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt.Ltd.
3. An introduction to Mechanical Eng. by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt.Ltd.

Reference Books:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd.Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata Mc Graw Hill publications (India)Pvt. Ltd.
4. G. Shanmugam and M.S. Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓						✓	
CO2	✓						✓				✓	
CO3	✓						✓				✓	
CO4	✓					✓					✓	
CO5	✓										✓	

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B. Tech. – I Year I Semester
(Common to All Branches)

Subject code	Title of the Subject	L	T	P	C
23A10501	Introduction To Programming	3	0	0	3

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- To encourage collaborative learning and teamwork in coding projects.

Course Outcomes: A student after completion of the course will be able to

- **CO1:** Understand basics of computers, the concept of algorithm and algorithmic thinking.
- **CO2:** Analyze a problem and develop an algorithm to solve it.
- **CO3:** Implement various algorithms using the C programming language.
- **CO4:** Understand more advanced features of C language.
- **CO5:** Develop problem-solving skills and the ability to debug and optimize the code.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1									1	1	1	
CO2	1	2	1										1	1	
CO3	2	2	1										1	1	
CO4	2	1	1										1	1	
CO5	2	2	1										1	1	

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

UNIT II: Control Structures
Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and continue.

UNIT III: Arrays and Strings
Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

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

UNIT V: Functions & File Handling
Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Command line arguments,
Basics of File Handling: why files, file opening and closing a data files, reading and writing a data file, processing data files.

Note: The syllabus is designed with C Language as the fundamental language of implementation**.**

Textbooks:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:
1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

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B. Tech. – I Year I Semester
(Common to EEE, ECE, CSE)

Subject code	Title of the Subject	L	T	P	C
23A15502	Communicative English Lab	0	0	2	1

Course Objectives:

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

Course Outcomes:

- **CO1:** Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- **CO2:** Apply communication skills through various language learning activities.
- **CO3**: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for Better listening and speaking comprehension.
- **CO4:** Evaluate and exhibit professional is min participating in debates and group discussions.
- **CO5:** Create effective resume and prepare themselves to face interviews I n future.

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules/Syllable division
3. Communication Skills & JAM
4. Role Player Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP(Statement of Purpose)
7. Group Discussions- Methods & Practice
8. Debates- Methods &Practice
9. PPT Presentations /Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Infotech
- Young India Films
- K-Van Solutions

Reference Books:

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

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS)ANANTHAPURAMU– 515 002 (A.P) INDIA

B. Tech. – I Year I Semester
(Common to EEE, ECE, CSE)

Subject code	Title of the Subject	L	T	P	C
23A15302	Chemistry Lab	0	0	2	1

Course Objectives: Verify the fundamental concepts with experiments

Course Outcomes: At the end of the course, the students will be able to

- **CO1:** Determine the cell constant and conductance of solutions.
- **CO2:** Prepare advanced polymer Bakelite materials.
- **CO3:** Measure the strength of an acid present in secondary batteries.
- **CO4:** Analyse their spectra of some organic compounds.
- **CO5:** Calculate strength of acid in Pb- Acid battery.

List of Experiments:

1. Measurementof10Dqbyspectrophotometricmethod
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry-determination of redo x potential sand emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. p^H metric titration of strong Acid Vs Strong Base
8. Preparation of a Bakelite
9. Verify Lambert- Beer's law
10. Wave length measurement of sample through UV-Visible Spectroscopy
11. Identification of simple organic compounds by IR
12. Preparation of Nano materials by precipitation method
13. Estimation of Ferrous Iron by Dichrometry

Learning outcomes:

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

- **Determine** the cell constant and conductance of solutions(L3)
- **Prepare** advanced polymer Bakelite materials(L2)
- **Measure** the strength of an acid present in secondary batteries(L3)
- **Analyze** the IR of some organic compounds(L3)

Reference:

- "Vogel'sQuantitativeChemicalAnalysis6thEdition6thEdition"PearsonPublicationsbyJ.Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

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B. Tech. – I Year I Semester
(Common to EEE, ECE, CSE)

Subject code	Title of the Subject	L	T	P	C
23A10302	Engineering Workshop	0	0	3	1.5

Course Objectives: To familiarize students with wood working, sheet metal operations, fitting and Electrical house wiring skills

Course Outcomes:

- **CO1:** Identify workshop tools and their operational capabilities.
- **CO2**: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
- **CO3:** Apply fitting operations in various applications.
- **CO4**: Apply basic electrical engineering knowledge for House Wiring Practice.
- **CO5:** Demonstration and Practice of plumbing and welding.

SYLLABUS

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half–Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint d) Demonstration of Power tools
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tape red tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b) Two-ways witch c) God own lighting
   b) d)Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds forgiven Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameter

Textbooks:

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

Reference Books:

1. Elements of Workshop Technology, Vol. I by S.K. Hajra Choudhury &Others, Media Promoters and Publishers, Mumbai.2007,14thedition
2. Workshop Practice by H.S.Bawa,Tata-McGrawHill,2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. &Upadhyay P.A.; Atul Prakashan, 2021-22.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					✓	✓	✓		✓			
CO2					✓						✓	✓
CO3						✓					✓	✓
CO4						✓			✓		✓	✓
CO5						✓			✓		✓	✓

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B. Tech. – I Year I Semester
(Common to All Branches)

Subject code	Title of the Subject	L	T	P	C
23A10502	Computer Programming Lab	**0**	**0**	**3**	**1.5**

Course Objectives:

- The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

Course Outcomes:

- **CO1:** Read, understand, and trace the execution of programs written in C language.
- **CO2:** Select the right control structure for solving the problem.
- **CO3:** Develop C programs which utilize memory efficiently using programming constructs like pointers.
- **CO4:** Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1									1	1	1	
CO2	1	2	1										1	1	
CO3	2	2	1										1	1	
CO4	2	1	1										1	1	
CO5	2	2	1										1	1	

UNIT I
WEEK 1
Objective: Getting familiar with the programming environment on the computer and writing the first program.
Suggested Experiments/Activities:
Tutorial 1: Problem-solving using Computers.
Lab1: Familiarization with programming environment

i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
ii) Exposure to Turbo C, gcc
iii) Writing simple programs using printf (), scanf ()

WEEK 2
Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.
Suggested Experiments /Activities:
Tutorial 2: Problem-solving using Algorithms and Flow charts.
Lab 1: Converting algorithms/flow charts into C Source code.
Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers

ii) Conversion of Fahrenheit to Celsius and vice versa
iii) Simple interest calculation

WEEK 3
Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.
Suggested Experiments/Activities:
Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions.
i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT II
WEEK 4
Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.
Suggested Experiments/Activities:
Tutorial4: Operators and the precedence and as associativity:
Lab4: Simple computational problems using the operator' precedence and associativity
i) Evaluate the following expressions.
    a. A+B*C+(D*E) + F*G
    b. A/B*C-B+A*D/3
    c. A+++B---A
    d. J= (i++) + (++i)
ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5
Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".
Suggested Experiments/Activities:
Tutorial 5: Branching and logical expressions:
Lab 5: Problems involving if-then-else structures.
i) Write a C program to find the max and min of four numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6
Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.
Suggested Experiments/Activities:
Tutorial 6: Loops, while and for loops
Lab 6: Iterative problems e.g., the sum of series
i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

UNIT III

WEEK 7:

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

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7:1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array.
ii) Perform linear search on1D array.
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number.
v) Eliminate duplicate elements in an array.

WEEK 8:

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

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK9:

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

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a 1D array using malloc ()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc () and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc ()

WEEK 10:

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

Suggested Experiments/Activities:

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

Lab10: Bit fields, linked lists

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

i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bit fields.
iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT V

WEEK 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent,

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

i) Write a C function to calculate NCR value.
ii) Write a C function to find the length of a string.
iii) Write a C function to transpose of a matrix.
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

i) Write a recursive function to generate Fibonacci series.
ii) Write a recursive function to find the lcm of two numbers.
iii) Write a recursive function to find the factorial of a number.
iv) Write a C Program to implement Ackermann function using recursion.
v) Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations Using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.
ii) Demonstrate Dangling pointer problem using a C program.
iii) Write a C program to copy one string into another using pointer.
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

i) Write a C program to write and read text into a file.
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file.
iv) Write a C program to merge two files into the third file using command-line arguments.
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill

Reference Books:

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

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B. Tech. – I Year I Semester
(Common to EEE, ECE, CSE)

Subject code	Title of the Subject	L	T	P	C
23A15901	Health And Wellness Yoga and Sports	**0**	**0**	**1**	**0.5**

Course Objectives:

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

Course Outcomes: After completion of the course the student will be able to

- **CO1:** Understand the importance of yoga and sports for Physical fitness and sound health
- **CO2:** Demonstrate an understanding of health-related fitness components
- **CO3:** Compare and contrast various activities that help enhance their health
- **CO4:** Assess current personal fitness levels.
- **CO5:** Develop Positive Personality

SYLLABUS

UNIT I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship Between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI)of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balanced diet for all age groups

UNIT II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNITIII

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Common wealth games.

Activities:

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

Reference Books

1. Gordon Edlin, EricGolanty.*HealthandWellness*,14thEdn. Jones & Bartlett Learning,2022
2. T.K.V. Desi achar. The Heart of Yoga: Developing a Personal Practice
3. Archie J. Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, *SAS Survival Handbook*: *The Ultimate Guide to Surviving Anywhere* Third Edition, WilliamMorrowPaperbacks,2014
5. *The Sports Rules Book*/ Human Kinetics with Thomas Hanlon.--3rd ed. Human Kinetics,Inc.2014

General Guidelines:

1. InstitutesmustassignslotsintheTimetablefortheactivitiesofHealth/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as manyas Games/Sports.
3. Institutesarerequiredtoprovidesportsinstructor/yogateachertomentorthestudents.

Evaluation Guidelines:

1. Evaluatedforatotalof100marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activities per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to90marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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I B. TECH (R23) – II SEMESTER
Common to EEE, ECE, & CSE

Subject Code	Title of the Subject	L	T	P	C
23A25201	**ENGINEERING PHYSICS**	3	0	0	3

PREAMBLE

There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. This helped to the discovery of new phenomena in macro, micro and nano scale device technologies. The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering.

To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi has been thoroughly revised keeping in view of the basic needs of all branches of Engineering by including the topics like Physical Optics, Dielectric and Magnetic materials, Crystallography and X-ray Diffraction, Quantum Mechanics, Free Electron Theory, Semiconductors and superconductors.

COURSE OBJECTIVES	
1	Bridging the gap between the Physics in school at 10+2 level and UG level engineering courses.
2	To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
3	Enlighten the periodic arrangement of atoms in Crystalline solids by Bragg's law – Learning thestructural analysis through X-ray diffraction techniques.
4	Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of de Broglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals.
5	To Understand the Physics of Semiconductors and their working mechanism, Concepts utilization of transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.
6.	To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.

COURSE OUTCOMES	
CO1	**Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** the applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary refracted light and extraordinary refracted rays by their states of polarization (L2)
CO2	**Interpret** various crystal systems (L2) and **analyze** the characterization of materials by XRD (L4). **Identify** the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique (L3). **Analysis** of structure of the crystals by Laue's method (L2).
CO3	**Describe** the dual nature of matter (L1). **Explain** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). **Identify** the role of classical and quantum free electron theory in the study of electrical conductivity (L3).
CO4	**Classify** the crystalline solids (L2). **Outline** the properties of charge carriers in semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Classify** superconductors based on Meissner's effect (L2). **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)**.**
CO5	**Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility (L2).

Unit-I: Wave Optics **12hrs**

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates.

Unit II: Crystallography and X-ray diffraction **8hrs**

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Crystal systems Bravais Lattices — Coordination number - Packing fraction of SC, BCC & FCC - Miller indices – Separationbetween successive (h k l) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – Crystal structure determination by Laue's method.

Unit-III: Quantum Mechanics and Free Electron Theory 9hrs

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle - Schrodinger's time independent and dependent wave equation – Significance and properties of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Fermi energy - Failures of free electron theory.

Unit – IV: Semiconductors and Superconductors 8hrs

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers - Drift and diffusion currents – Einstein's equation - Hall effect and its Applications.

Superconductors: Introduction – Properties of superconductors – Meissner effect– Type I and Type II superconductors – AC and DC Josephson effects – BCS theory (qualitative treatment) – High T_c superconductors – Applications of superconductors.

Unit–V: Dielectric and Magnetic Materials 8hrs

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) -Lorentz field - Clausius-Mossotti equation - Dielectric loss.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Atomic origin of magnetism – Classification of magnetic materials: Dia, Para, Ferro, Ferri & Antiferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Text books:

1. Engineering Physics by M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy S. Chand Publications, 11th Edition 2019.
2. Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2018).

Reference Books:

1. "Engineering Physics" - B.K. Pandey and S. Chaturvedi, Cengage Learning
2. "Fundamentals of Physics" - Halliday, Resnick and Walker, John Wiley &Sons.
3. "Fundamentals of Physics with Applications", Arthur Beiser, Samarjit Sengupta, Schaum Series.
4. "Engineering Physics" - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
5. "Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
6. "Semiconductor physics and devices: Basic principle" - A. Donald, Neamen, Mc GrawHill.
7. "Solid state physics" – A.J.Dekker , Pan Macmillan publishers
8. "Introduction to Solid State Physics" -Charles Kittel, Wiley

Mapping between Course Outcomes and Programme Outcomes

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

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I B. TECH (R23) – II SEMESTER

(Common to All Branches of Engineering)

Subject Code	Title of the Subject	L	T	P	C
23A25101	**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**	3	0	0	3

Course Objectives:

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

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

CO1: Solve the differential equations related to various engineering fields.

CO2: Identify solution methods for partial differential equations that model physical processes.

CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO4: Estimate the work done against a field, circulation and flux using vector calculus.

UNIT I Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay orthogonal Trajectories,Electrical circuits.

UNIT II Linear differential equations of higher order (Constant Coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Equations reducible to Linear Differential equations with constant coefficients (Caushy's equation, Lagendre's equation) Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients, Non-linear partial differential equations (Standardforms)

UNIT IV Vector differentiation

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions-Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, physical interpretation, examples and vector identities.

UNIT V 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) physical interpretation and related problems.

Textbooks:

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

Reference Books:

1) Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018,14th Edition.
2) Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3) Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4) Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science InternationalLtd., 2021 5th Edition (9th reprint)

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I B. TECH (R23) – II SEMESTER

(Common to EEE, ECE, CSE)

Subject Code	Title of the Subject	L	T	P	C
23A22401	**BASIC ELECTRICAL & ELECTRONICS ENGINEERING**	3	0	0	3

PART A: BASIC ELECTRICAL ENGINEERING

Course Objectives:

To expose to the field of electrical engineering, laws and principles of electrical engineering and to acquire fundamental knowledge in the relevant field.

Course Outcomes:

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments (L1)

CO2: Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations (L2)

CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems (L3)

CO4: Analyze different electrical circuits, performance of machines and measuring instruments (L4)

CO5: Evaluate different circuit configurations, Machine performance and Power systems operation (L5)

Syllabus

UNIT I DC & AC CIRCUITS

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple Numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Analysis of R-L, R-C, R-L-C Series circuits, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT II MACHINES AND MEASURING INSTRUMENTS

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT III ENERGY RESOURCES, ELECTRICITY BILL & SAFETY MEASURES

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity Bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature Circuit Breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Learning Resources:

Textbooks:

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

Reference Books:

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

Web Resources:

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

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

- To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

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

CO1: Understand the principle of working of diodes, transistors and their characteristics.
CO2: Understand the fundamental concepts of various semiconductor devices in electronic circuits and instruments.
CO3: Apply the concepts of diodes in rectifiers and regulated power supplies
CO4: Explain the concepts of various number systems and the functionality of logic gates with Boolean functions.
CO5: Understand the simple combinational circuits and sequential circuits.

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

UNIT I: SEMICONDUCTOR DEVICES

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

UNIT II: BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and Power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator.

Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.

Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III: DIGITAL ELECTRONICS

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

Textbooks:

1. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill, 2009

Reference Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

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I B. TECH (R23) – II SEMESTER

(Common to EEE, ECE, CSE)

Subject Code	Title of the Subject	L	T	P	C
23A20301	**ENGINEERING GRAPHICS**	1	0	4	3

Course Objectives:

- To enable the students with various concepts like dimensioning, conventions andstandards related to Engineering Drawing
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand Section of solidsand Developments of surfaces.
- To make the students understand the viewing perception of a solid object in Isometricand Perspective projections.

Course Outcomes:

CO1: Understand the principles of engineering drawing, including engineering curves, scales,orthographic and isometric projections.
CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front,top and side views.
CO3: Understand and draw projection of solids in various positions in first quadrant.CO4: Explain principles behind development of surfaces.
CO5: Prepare isometric and perspective sections of simple solids.

UNIT I

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

UNIT II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III

Projections of Solids: Types of solids: Poly hedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid andcone.

UNIT V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

Textbook:

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

Reference Books:

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

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓						✓	
CO2						✓						
CO3						✓						
CO4		✓										
CO5						✓						

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I B. TECH (R23) – II SEMESTER

(23A20201) ELECTRICAL CIRCUIT ANALYSIS-I

Subject Code	Title of the Subject	L	T	P	C
23A20201	ELECTRICAL CIRCUIT ANALYSIS-I	3	0	0	3

Course Objectives:

To develop an understanding of the fundamental laws, elements of electrical circuits and to apply circuitanalysis to DC and AC circuits.

Course Outcomes:

CO1: Remembering the basic electrical elements and different fundamental laws (L1)
CO2: Understand the network reduction techniques, transformations, concept of self inductance andmutual inductance, phasor diagrams, resonance and network theorems (L2)
CO3: Apply the concepts in order to obtain various mathematical and graphical representations (L3)
CO4: Analyse nodal and mesh networks, series and parallel circuits, steady state response, different circuittopologies (with R, L and C components) (L4)
CO5: Evaluation of Network theorems, electrical, magnetic and single-phase circuits (L5)

Syllabus

UNIT I INTRODUCTION TO ELECTRICAL CIRCUITS

Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources, node and mesh analysis.

UNIT II SINGLE PHASE CIRCUITS

Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, node and mesh analysis. Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit, parallel RL circuit, parallel RC circuit.

UNIT III NETWORK THEOREMS (DC & AC EXCITATIONS)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem

UNIT IV RESONANCE AND LOCUS DIAGRAMS

Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth; Locus diagram: RL, RC, RLC with R, L and C variables.

UNIT V MAGNETIC CIRCUITS

Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

Learning Resources:

Textbooks:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc GrawHill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition

Reference Books:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw HillEducation (India), 2013, Fifth Edition
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, McGraw Hill Education, 2017, Fifth Edition.
3. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
4. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, SeventhRevised Edition.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc23_ee81/preview
2. https://nptel.ac.in/courses/108104139
3. https://nptel.ac.in/courses/108106172
4. https://nptel.ac.in/courses/117106108

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I B. TECH (R23) – II SEMESTER
(Common to EEE, ECE &CSE)

Subject Code	Title of the Subject	L	T	P	C
23A25202	ENGINEERING PHYSICS LAB	0	0	2	1

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semi conductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

(Any **TEN** of the following listed experiments)

(Out of which any **TWO** experiments may be conducted in virtual mode)

List of Engineering Physics Experiments

1. Determination of radius of curvature of a given plano convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum usingdiffraction grating in normal incidence configuration.
3. Determination of dispersive power of prism.
4. Verification of Brewster's law
5. Determination of the resistivity of semiconductor by four probe method.
6. Determination of energy gap of a semiconductor using p-n junction diode.
7. Determination of Hall voltage and Hall coefficient of a given semiconductor using Halleffect.
8. Determination of dielectric constant using charging and discharging method.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10. Magnetic field along the axis of a current carrying circular coil by Stewart & Gee'sMethod.
11. Determination of wavelength of Laser light using diffraction grating.
12. Estimation of Planck's constant using photoelectric effect.
13. Determination of temperature coefficients of a thermistor.
14. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.

17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Course Outcomes:

The students will be able to

- **Operate** optical instruments like microscope and spectrometer (L2)
- **Estimate** the wavelength of different colors using diffraction grating and resolvingpower(L2)
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **Determine** the resistivity of the given semiconductor using four probe method (L3)
- **Identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- **Calculate** the band gap of a given semiconductor (L3)

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

References: 1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- SChand Publishers, 2017.

- ***URL***:*www.vlab.co.in*

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I B. TECH (R23) – II SEMESTER

(Common to EEE, ECE, CSE)

Subject Code	Title of the Subject	L	T	P	C
23A20501	IT WORK SHOP	0	0	2	1

Course Objectives:

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

Course Outcomes:

CO1: Perform Hardware troubleshooting.
CO2: Understand Hardware components and interdependencies.
CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation. **CO5**: Perform calculations using spreadsheets.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1												
CO2															
CO3		1												2	
CO4			2		2									2	
CO5	1													2	

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the blockdiagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given

as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructorshould verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and followit up with a Viva

Internet & World Wide Web

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

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JREfor applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

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

LaTeX and WORD

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

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

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

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

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

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

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

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditionalformatting

POWER POINT

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

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

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

AI TOOLS – ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

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

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

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

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

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

Reference Books:

2. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
3. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rdedition
4. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012,2nd edition
5. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
6. LaTeX Companion, Leslie Lamport, PHI/Pearson.
7. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken

Quamme. –CISCO Press, Pearson Education, 3rd edition
IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, PearsonEducation, 3rd edition

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I B. TECH (R23) – II SEMESTER

(Common to EEE, ECE &CSE)

Subject Code	Title of the Subject	L	T	P	C
23A12402	ELECTRICALAND ELECTRONICS ENGINEERING WORK SHOP	0	0	3	1.5

Course Objectives:

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

Course Outcomes:

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor;
concept of wiring and operation of Electrical Machines and Transformer (L2)

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance,
power and power factor (L3)

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and
power factor (L3)

CO4: Analyze various characteristics of electrical circuits, electrical machines and measuring instruments (L4)

CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters;
Household and commercial wiring (L5)

List of Experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Learning Resources:

Reference books:

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

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

- To impart knowledge on the principles of digital electronics and fundamentals of electron devices& its applications.

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

CO1: Identify and testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.

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

List of Experiments:

1. Determine and Demonstrate V-I characteristics of PN Junction diode:
   (a) Forward bias (b) Reverse bias.
2. Determine and Demonstrate V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Determine and Demonstrate Input & Output characteristics of BJT in CE& CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR Gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters,

DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

References:

1. R. L. Boylestad& Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

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

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I B. TECH (R23) – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
23A20202	ELECTRICAL CIRCUIT ANALYSIS-I LAB	0	0	3	1.5

Course Objectives:

To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usage of different circuits with different conditions.

Course Outcomes:

CO1: Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams (L2)

CO2: Apply Thevenin's, Norton's, Thevenin's, superposition theorem, maximum power transfer, compensation, reciprocity and Millman's Theorems to compare practical results obtained with theoretical calculations (L3)

CO3: Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil (L3)

CO4: Analyze different Circuit characteristics with the help of fundamental laws and various configurations (L4)

CO5: Create locus diagrams of RL, RC series circuits and examine series and parallel resonance (L6)

List of Experiments:

1. Verification of network reduction techniques.
2. Determination of cold and hot resistance of an electric lamp
3. Determination of Parameters of a choke coil.
4. Determination of self, mutual inductances, and coefficient of coupling
5. Series and parallel resonance
6. Locus diagrams of R-L (L Variable) and R-C (C Variable) series circuits
7. Verification of Superposition theorem using AC Excitation
8. Verification of Thevenin's and Norton's Theorems with DC Excitation
9. Verification of Maximum power transfer theorem with DC & AC Excitation
10. Verification of Compensation theorem with DC Excitation
11. Verification of Reciprocity Theorem using AC Excitation
12. Verification of Millman's Theorems using DC Excitation

Learning Resources:

Reference Books:

3. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, TataMc Graw Hill Education, 2005, sixth edition.
4. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised ThirdEdition

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I B. TECH (R23) – II SEMESTER
(Common to EEE, ECE &CSE)

Subject Code	Title of the Subject	L	T	P	C
23A25902	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	0	0	1	0.5

Course Objectives:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

Course Outcomes: After completion of the course the students will be able to

CO1: Understand the importance of discipline, character and service motto.

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques

CO3: Explore human relationships by analysing social problems

CO4: Determine to extend their help for the fellow beings and downtrodden people

CO5: Develop leadership skills and civic responsibilities.

SYLLABUS

UNIT I Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, Career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents andskills
ii) Conducting orientation programs for the students –future plans-activities-releasing road mapetc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II Nature & Care

Activities:

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

UNIT III Community Service

Activities:

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

Reference Books:

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

General Guidelines:

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

Evaluation Guidelines:

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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Department of Electrical and Electronics Engineering
II B.Tech (R23) Course Structure and Syllabus

B. Tech. II Year-I Semester (R23) Course Structure

S.No.	Course Code	Title	L	T	P	C
1	23A35102	Complex Variables & Numerical Methods	3	0	0	3
2	23A35401a 23A35401b 23A35401c	Managerial Economics & Financial Analysis Organizational Behavior Business Environment (Common to EEE, ECE, CSE)	2	0	0	2
3	23A30201	Electromagnetic Field Theory	3	0	0	3
4	23A30202	Electrical Circuit Analysis-II	3	0	0	3
5	23A30203	DC Machines & Transformers	3	0	0	3
6	23A30204	Electrical Circuit Analysis-II Lab	0	0	3	1.5
7	23A30205	DC Machines & Transformers Lab	0	0	3	1.5
8	23A30501	Data Structures (Skill Enhancement Course)	0	1	2	2
9	23A39902	Environmental Science (Audit Course) (Common to all Branches)	2	0	0	-
		Total	**16**	**1**	**8**	**19**

B. Tech. II Year-II Semester (R23) Course Structure

S.No.	Course Code	Title	L	T	P	C
1	23A49902	Universal Human Values- Understanding Harmony and ethical Human Conduct (Common to EEE, ECE, CSE)	2	1	0	3
2	23A40201	Analog Circuits	3	0	0	3
3	23A40202	Power Systems-I	3	0	0	3
4	23A40203	Induction and Synchronous Machines	3	0	0	3
5	23A40204	Control Systems	3	0	0	3
6	23A40205	Induction and Synchronous Machines Lab	0	0	3	1.5
7	23A40206	Control Systems Lab	0	0	3	1.5
8	23A40207	Scientific Programming Languages (Skill Enhancement course)	0	1	2	2
9	23A49901	Design Thinking & Innovation (Common to All Branches)	1	0	2	2
		Total	**15**	**2**	**10**	**22**
23A49903-Mandatory Community Service Project of 08 weeks duration during summer vacation						

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II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A35102	**Complex variables and Numerical Methods**	**3**	**0**	**0**	**3**

Course Outcomes:

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

COs	Statements	Blooms level
CO1	Analyze limit, continuity and differentiation of functions of complex variablesand 3. Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions.	L2, L3
CO2	Understand Cauchy theorem, Cauchy integral formulas and apply these to evaluate complex contour integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem.	L3, L5
CO3	Apply numerical methods to solve algebraic and transcendental equations	L3
CO4	Derive interpolating polynomials using interpolation formulae	L2, L3
CO5	Solve differential and integral equations numerically	L3, L5

CourseArticulationMatrix:

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

1-Slightly, 2-Moderately, 3-Substantially.

UNIT I : Complex Variable – Differentiation

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

UNIT II Complex Variable – Integration

Line integral-Contour integration, Cauchy's integral theorem (Simple Case), Cauchy Integral formula, Power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integralinvolving sine and cosine.

UNIT III: Solution of Algebraic & Transcendental Equations

Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson methodSystem of Algebraic equations: Gauss Elimination, Jacoby and Gauss Siedal method.

UNIT IV Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNITV Solution of Initial value problems to Ordinary differential equations

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

Textbooks:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers,2017, 44th Edition
2. Introductory Methods of Numerical Analysis, S S Sastry, PHI Learning Private Limited.

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers
3. Advanced Engineering Mathematics, R.K. Jain and S.R.K.Iyengar, Alpha Science International Ltd.,2021 5th Edition(9th reprint).

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
3. http://nptel.ac.in/courses/111105090

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II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A345401a	**Managerial Economics And Financial Analysis (Common to EEE, ECE, CSE)**	**2**	**0**	**0**	**2**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Define the concepts related to Managerial Economics, financial accounting and management	**L1**
CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets	**L2**
CO3	Apply the Concept of Production cost and revenues for effective Business decision	**L3**
CO4	Analyze how to invest their capital and maximize returns	**L4**
CO5	Evaluate the capital budgeting techniques	**L5**
CO6	Develop the accounting statements and evaluate the financial performance of business entity	**L6**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	1	1	-	1	1	-	3	2	1	-	-
CO2	1	2	1	1	1	1	-	1	1	-	3	2	1	-	-
CO3	1	2	1	1	1	1	-	1	1	-	3	2	1	-	-
CO4	1	2	1	1	1	1	-	1	1	-	3	2	1	-	-
CO5	1	2	1	1	1	1	-	1	1	-	3	2	1	-	-
CO6	1	2	1	1	1	1	-	1	1	-	3	2	1	-	-

UNIT - I Managerial Economics

Introduction – Nature, meaning, significance, functions, and advantages - Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement Demand Forecasting- Factors governing Forecasting, Methods - Managerial Economics and Financial Accounting and Management.

UNIT - II Production and Cost Analysis

Introduction – meaning, functions - Production Function– Least-cost combination – Short run and long run Production Function- Isoquants and Isocosts, Cost & Break-Even Analysis - Cost concepts - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)

UNIT - III Business Organizations and Markets

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT - IV Capital Budgeting

Introduction –Meaning, Capital Budgeting– Features, Proposals, Methods and Evaluation - Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT - V Financial Accounting and Analysis

Introduction –- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments) - Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability

Textbooks:

1. Varshney & Maheswari, *Managerial Economics*, Sultan Chand & sons. 2014
2. Aryasri, *Business Economics and Financial Analysis*, 4/e, MGH. 2008

Reference Books:

1. Ahuja H, *Managerial Economics,* S chand. 2022
2. S.A. Siddiqui and A.S. Siddiqui, *Managerial Economics and Financial Analysis*, New Age International. Third edition 2022
3. Joseph G. Nellis and David Parker, *Principles of Business Economics*, Pearson, 2/e, New Delhi. 2002
4. Domnick Salvatore, *Managerial Economics in a Global Economy*, Cengage. 2004

Online Learning Resources:

https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market
https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
https://www.slideshare.net/ashu1983/financial-accounting

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II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A35401b	**ORGANIZATIONAL BEHAVIOR (Common to EEE, ECE, CSE)**	**2**	**0**	**0**	**2**

To enable student's comprehension of organizational behaviour

- To offer knowledge to students on self-motivation, leadership and management
- To facilitate them to become powerful leaders
- To impart knowledge about group dynamics
- To make them understand the importance of change and development

Course Outcomes:

- Define the Organizational Behaviour, its nature and scope (L1)
- Understand the nature and concept of Organizational behaviour (L2)
- Apply theories of motivation to analyse the performance problems (L3)
- Analyse the different theories of leadership (L4)
- Evaluate group dynamics (L5)
- Develop as powerful leader (L3,L6)

UNIT - I Introduction to Organizational Behavior

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective - Understanding Individual Behavior – Attitude - Perception - Learning – Personality

UNIT - II Motivation

Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Cleland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory

UNIT - III Organizational Culture & Leadership

Meaning definition - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader

UNIT - IV Group Dynamics

Introduction – Meaning, definition - Types of groups - Determinants of group behavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building

UNIT - V Organizational Change and Development

Introduction –Meaning, definition and functions - Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management

Textbooks:

1. Fred Luthans, Organisational *Behaviour*, McGraw-Hill, 12 Th edition. 2011
2. P Subba Rao, *Organisational Behaviour*, Himalya Publishing House. 2010

Reference Books:

1. McShane, *Organizational Behaviour*, TMH. 2022
2. Nelson, *Organisational Behaviour*, Thomson. 2012
3. Robbins, P. Stephen, Timothy A. Judge, *Organisational Behaviour*, Pearson. 2013
4. Aswathappa, *Organisational Behaviour*, Himalaya. 2010

Online Learning Resources:

https://www.slideshare.net/Knight1040/organizational-culture
9608857s://www.slideshare.net/AbhayRajpoot3/motivation-165556714
https://www.slideshare.net/harshrastogi1/group-dynamics-159412405
https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951

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II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A35401c	**BUSINESS ENVIRONMENT (Common to EEE, ECE, CSE)**	**2**	**0**	**0**	**2**

Course Objectives:

- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monitory policy
- To facilitate them in understanding the export policy of the country
- To Impart knowledge about the functioning and role of WTO
- To Encourage the student in knowing the structure of stock markets

Course Outcomes:

- Define Business Environment and its Importance. (L1)
- Understand various types of business environment. (L2)
- Apply the knowledge of Money markets in future investment (L3)
- Analyse India's Trade Policy (L4)
- Evaluate fiscal and monitory policy (L5)
- Develop a personal synthesis and approach for identifying business opportunities (L6)

UNIT – I Overview of Business Environment

Introduction – meaning nature, scope, significance, functions and advantages - Internal & External environment - Competitive structure of industries -Environmental analysis

UNIT – II Fiscal & Monetary Policy

Meaning – advantages of Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI - Monetary Policy – RBI -Objectives of monetary and credit policy - Role of Finance Commission.

UNIT – III India's Trade Policy

Meaning- Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments – Causes for Disequilibrium in Balance of Payments

UNIT – IV World Trade Organization

Nature, significance, functions and advantages - Organization and Structure - Role and functions of WTO in promoting world trade - GATT -Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures

UNIT – V Money Markets and Capital Markets

Nature, meaning - Features and components of Indian financial systems - Objectives and structure of money markets and capital markets – SEBI – Stock Exchanges

- Investor protection and role of SEBI

Textbooks:

1. Cherunilam Francis, *International Business*: Text and Cases, Prentice Hall of India. 2010
2. K. Aswathappa, *Essentials of Business Environment*: Texts and Cases & Exercises 13th Revised Edition.HPH 2015

Reference Books:

1. K. V. Sivayya, V. B. M Das, *Indian Industrial Economy*, Sultan Chand Publishers, New Delhi, India. 1975
2. Sundaram, Black, *International Business Environment* Text and Cases, Prentice Hall of India, New Delhi, India. 2015
3. Chari. S. N, *International Business*, Wiley India. 2005
4.E. Bhattacharya, *International Business*, Excel Publications, New Delhi. 2022

Online Learning Resources:

https://www.slideshare.net/ShompaDhali/business-environment-53111245
https://www.slideshare.net/rbalsells/fiscal-policy-ppt
https://www.slideshare.net/aguness/monetary-policy-presentationppt
https://www.slideshare.net/DaudRizwan/monetary-policy-of-india-69561982
https://www.slideshare.net/ShikhaGupta31/indias-trade-policyppt
https://www.slideshare.net/viking2690/wto-ppt-60260883
https://www.slideshare.net/prateeknepal3/ppt-mo

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II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A30201	**Electromagnetic Field Theory**	**3**	**0**	**0**	**3**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Remember the concepts of vector algebra, vector calculus, various fundamental laws, self and mutual inductance	**L1**
CO2	Understand the concepts of electrostatics, conductors, dielectrics, capacitance, magneto statics, magnetic fields, time varying fields, self and mutual inductances	**L2**
CO3	Apply vector calculus, Coulomb's law, Gauss's law, Ohm's law in point form, Biot-Savart's law, Ampere's circuital law, Maxwell's third equation, self and mutual inductances, Faraday's laws, Maxwell's fourth equation, Poynting theorem to solve various numerical problems	**L3**
CO4	Analyze vector calculus, electrostatic fields, behavior of conductor in electric filed, Biot-Savart's law and its applications	**L4**
CO5	Analyze magnetic force, moving charges in a magnetic field, self-inductance of different cables, mutual inductance between different wires and time varying fields	**L4**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	-	-	-	-	-	1	1	3	3	3
CO2	3	3	3	2	1	-	-	-	-	-	1	1	3	3	3
CO3	3	3	3	2	1	-	-	-	-	-	1	1	3	3	3
CO4	3	3	3	2	1	-	-	-	-	-	1	1	3	3	3
CO5	3	3	3	2	1	-	-	-	-	-	1	1	3	3	3

UNIT I

Vector Analysis:

Vector Algebra: Scalars and Vectors, Unit vector, Vector addition and subtraction, Position and distance vectors, Vector multiplication, Components of a vector.

Coordinate Systems: Rectangular, Cylindrical and Spherical coordinate systems.

Vector Calculus: Differential length, Area and Volume. Del operator, Gradient of a scalar, Divergence of a vector and Divergence theorem (definition only). Curl of a vector and Stoke's theorem (definition only), Laplacian of a scalar

Electrostatics:

Coulomb's law and Electric field intensity (EFI) – EFI due to Continuous charge distributions (line and surface charge), Electric flux density, Gauss's law (Maxwell's first equation, $\nabla.\vec{D} = \rho_v$ $\nabla.\vec{D} = \rho_v$), Applications of Gauss's law, Electric Potential, Work done in moving a point charge in

an electrostatic field (second Maxwell's equation for static electric fields, $\nabla \times \vec{E} = 0$ $\nabla \times \vec{E} = 0$), Potential gradient, Laplace's and Poison's equations.

UNIT II

Conductors – Dielectrics and Capacitance:

Behaviour of conductor in Electric field, Electric dipole and dipole moment – Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field, Current density-conduction and convection current densities, Ohm's law in point form, Behaviour of conductors in an electric field, Polarization, dielectric constant and strength, Continuity equation and relaxation time, Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space, Capacitance of parallel plate, coaxial and spherical capacitors, Energy stored and density in a static electric field, Coupled and decoupled capacitors.

UNIT III

Magneto statics, Ampere's Law and Force in magnetic fields:

Biot-Savart's law and its applications viz. Straight current carrying filament, circular, square, rectangle and solenoid current carrying wire – Magnetic flux density and Maxwell's second Equation ($\nabla.\vec{B} = 0$ $\nabla.\vec{B} = 0$), Ampere's circuital law and its applications viz. MFI due to an infinite sheet, long filament, solenoid, toroidal current carrying conductor, point form of Ampere's circuital law, Maxwell's third equation ($\nabla \times \vec{H} = \vec{J}$ $\nabla \times \vec{H} = \vec{J}$).

Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors, Magnetic dipole, Magnetic torque, and moment.

UNIT IV

Self and mutual inductance:

Self and mutual inductance – determination of self-inductance of a solenoid, toroid, coaxial cable and mutual inductance between a straight long wire and a square loop wire in the same plane – Energy stored and energy density in a magnetic field.

UNIT V

Time Varying Fields:

Faraday's laws of electromagnetic induction, Maxwell's fourth equation $\left(\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}\right)$ $\left(\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}\right)$, integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current, Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting vector.

Textbooks:

1. "Elements of Electromagnetics" by Matthew N O Sadiku, Oxford Publications, 7th edition, 2018.
2. "Engineering Electromagnetics" by William H. Hayt& John. A. Buck Mc. Graw-Hill, 7th Editon.2006.

Reference Books:

1. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition.

2. “Electromagnetic Field Theory” by Yaduvir Singh, Pearson India, 1st edition, 2011.
3. “Fundamentals of Engineering Electromagnetics” by Sunil Bhooshan, Oxford University Press, 2012.
4. Schaum's Outline of Electromagneticsby Joseph A. Edminister, MahamoodNavi, 4th Edition,2014.

Web Resources:

1. https://archive.nptel.ac.in/courses/108/106/108106073/
2. https://nptel.ac.in/courses/117103065

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II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A30202	**Electrical Circuit Analysis-II**	**3**	**0**	**0**	**3**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Remember the concepts of Laplace transforms, formulation of various circuit topologies (R, L and C components) and basic filters	**L1**
CO2	Understand three phase balanced and unbalanced circuits, different circuit configurations and it's mathematical modeling, network parameters and various filters	**L2**
CO3	Apply Laplace transforms to solve various electrical network topologies and filter design concepts	**L3**
CO4	Analyze three phase circuits, transient response of various network topologies, electric circuits with periodic excitations and filter characteristics	**L4**
CO5	Design suitable electrical circuits and various filters for different applications	**L5**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO2	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO3	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO4	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO5	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3

UNIT I

Analysis of three phase balanced circuits:

Phase sequence, star and delta connection of sources and loads, relation between line and phase quantities, analysis of balanced three phase circuits, measurement of active and reactive power.

Analysis of three phase unbalanced circuits:

Loop method, Star-Delta transformation technique, two-wattmeter method for measurement of three phase power.

UNIT II

Laplace transforms – Definition and Laplace transforms of standard functions– Shifting theorem – Transforms of derivatives and integrals, Inverse Laplace transforms and applications.

Transient Analysis: Transient response of R-L, R-C and R-L-C circuits (Series and parallel combinations) for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform approach.

UNIT III

Network Parameters: Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations- problems.

UNIT IV

Analysis of Electric Circuits with Periodic Excitation: Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for periodic waveforms, Application to Electrical Systems – Effective value and average value of non-sinusoidal periodic waveforms, power factor, effect of harmonics

UNIT V

Filters: Classification of filters-Low pass, High pass, Band pass and Band Elimination filters, Constant-k filters -Low pass and High Pass, Design of Filters.

Textbooks:

1. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 8th Edition McGraw-Hill, 2013
2. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3rd Edition, Tata McGraw-Hill, 2019

Reference Books:

1. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI, 2019.
2. Network Theory, N. C. Jagan and C. Lakshminarayana, 1st Edition, B. S. Publications, 2012.
3. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017.
4. Engineering Network Analysis and Filter Design (Including Synthesis of One Port Networks)- Durgesh C. KulshreshthaGopal G. Bhise, Prem R. Chadha ,Umesh Publications 2012.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, DhanpatRai& Co., 2018, 7th Revised Edition.

Web Resources:

1. https://archive.nptel.ac.in/courses/117/106/117106108/
2. https://archive.nptel.ac.in/courses/108/105/108105159/

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS) ANANTHAPURAMU– 515002 (A.P) INDIA

Department of Electrical and Electronics Engineering

II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A30203	**DC Machines & Transformers**	**3**	**0**	**0**	**3**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the process of voltage build-up in DC generators and characteristics.	**L2**
CO2	Understand the process of torque production, starting and speed control of DC motors and illustrate their characteristics.	**L2**
CO3	Obtain the equivalent circuit of single-phase transformer, auto transformer and determine its efficiency & regulation.	**L3**
CO4	Apply various testing methods for transformers and speed control of DC motors	**L3**
CO5	Analyze various configurations of three-phase transformers.	**L4**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO2	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO3	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO4	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO5	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3

UNIT I

DC Generators:

Construction and principle of operation of DC machines – EMF equation for generator – Excitation techniques– Armature reaction and commutation - Methods of improving commutation - OCC and load characteristics of different types of generators – Parallel operation of DC Generators - Applications of DC Generators.

UNIT II

DC Motors:

DC motor – Back-emf - Generation of torque - Torque equation - Performance characteristics of different types of motors – Necessity of starters- 3-point and 4-point starters - Losses in DC machines- Applications of DC Motors numerical problems.

UNIT III

Speed Control and Testing of DC Machines:

Speed control of DC Machines: Armature control and Flux control methods

Testing of DC machines: Brake test - Swinburne's test - Hopkinson's test - Fields test, Retardation test.

UNIT IV

Single-phase Transformers:

Introduction to single-phase Transformers (Construction and principle of operation)–emf equation – operation on no-load and on load –lagging, leading and unity power factors loads –phasor diagrams– equivalent circuit –regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – all day efficiency, Applications.

UNIT V

Testing of Transformers:

Open Circuit and Short Circuit tests – Sumpner's test – separation of losses— Parallel operation with equal and unequal voltage ratios– auto transformer – equivalent circuit – comparison with two winding transformers - Scott connection- off load and on load tap changers.

Textbooks:

1. Electrical Machinery by Dr. P S Bimbhra, 7th edition, Khanna Publishers, New Delhi,1995.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Reference Books:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition
2. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2011.
3. Generalized Theory of Electrical Machines by Dr. P S Bimbhra, 7th Edition, Khanna Publishers, 2021.
4. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria& Sons,2007.
5. Electric Machinery by Fitzgerald, A.E.,Kingsley, Jr.,C.,&Umans, S. D, 7th edition, McGraw-Hill Education, 2014.

Web Resources:

1. nptel.ac.in/courses/108/105/108105112
2. nptel.ac.in/courses/108/105/108105155

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Department of Electrical and Electronics Engineering

II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A30204	**Electrical Circuit Analysis-II Lab**	**0**	**0**	**3**	**1.5**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the power calculations in three phase circuits.	**L2**
CO2	Analyze the time response of given network.	**L4**
CO3	Determination of two port network parameters.	**L4**
CO4	Simulate and analyze electrical circuits using software tools	**L4**
CO5	Apply various theorems to solve different electrical networks using simulation tools	**L3**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO2	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO3	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO4	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO5	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Measurement of Active Power and Reactive Power for Balanced loads.
2. Measurement of Active Power and Reactive Power for Unbalanced loads
3. Determination of Z and Y parameters.
4. Determination of ABCD and Hybrid parameters.
5. Series and Parallel connection of two port networks.
6. Cascaded connection of two port networks.
7. Transient Response of RL series circuits.
8. Transient Response of RC series circuits.
9. Transient Response of RLC Series & Parallel circuits.
10. Frequency response of Low Pass Filter.
11. Frequency response of High Pass Filter.
12. Frequency response of Band Pass Filter.
13. Frequency response of Band Stop Filter.

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Department of Electrical and Electronics Engineering

II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A30205	**DC Machines & Transformers Lab**	**0**	**0**	**3**	**1.5**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Demonstrate starting and speed control methods of DC Machines.	**L2**
CO2	Apply theoretical concepts to determine the performance characteristics of DC Machines.	**L3**
CO3	Analyze the parallel operation of single phase transformers	**L4**
CO4	Determine the performance parameters of single-phase transformer.	**L3**
CO5	Analyze the performance analysis of transformers using various tests	**L4**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO2	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO3	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO4	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3
CO5	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Speed control of DC shunt motor by Field Current and Armature Voltage Control.
2. Brake test on DC shunt motor- Determination of performance curves.
3. Swinburne's test - Predetermination of efficiencies as DC Generator and Motor.
4. Hopkinson's test on DC shunt Machines.
5. Load test on DC compound generator-Determination of characteristics.
6. Load test on DC shunt generator-Determination of characteristics.
7. Fields test on DC series machines-Determination of efficiency.
8. Brake test on DC compound motor-Determination of performance curves.
9. OC & SC tests on single phase transformer.
10. Sumpner's test on single phase transformer.
11. Scott connection of transformers.
12. Parallel operation of Single-phase Transformers.
13. Separation of core losses of a single-phase transformer.

Reference:

1. https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

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II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A30501	**Data Structures (Skill Enhancement Course)**	**0**	**1**	**2**	**2**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the role of data structures in organizing and accessing data	**L2**
CO2	Design, implement and apply linked lists for dynamic data storage	**L3**
CO3	Develop applications using stacks and queues	**L5**
CO4	Design and implement algorithms for operations on binary trees and binary search trees	**L5**
CO5	Design novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees	**L5**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	2	3	2	1	1
CO2	3	3	3	3	3	-	-	-	-	-	2	3	2	1	1
CO3	3	3	3	3	3	-	-	-	-	-	2	3	2	1	1
CO4	3	3	3	3	3	-	-	-	-	-	2	3	2	1	1
CO5	3	3	3	3	3	-	-	-	-	-	2	3	2	1	1

UNIT I

Introduction to Data Structures: Definition and importance of Data structures, Abstract data types (ADTs) and its specifications, **Arrays**: Introduction, 1-D, 2-D Arrays, accessing elements of array, Row Major and Column Major storage of Arrays, **Searching Techniques**: Linear & Binary Search, **Sorting Techniques**: Bubble sort, Selection sort, Quick sort.

Sample experiments:

1. Program to find min & max element in an array.
2. Program to implement matrix multiplication.
3. Find an element in given list of sorted elements in an array using Binary search.
4. Implement Selection and Quick sort techniques.

UNIT II

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

Sample experiments:

1. Write a program to implement the following operations.

a. Insert b. Deletion c. Traversal

2. Write a program to store name, roll no, and marks of students in a class using circular double linked list.
3. Write a program to perform addition of given two polynomial expressions using linked list.

UNIT III

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

Sample experiments:

1. Implement stack operations using
   a. Arrays b. Linked list
2. Convert given infix expression into post fix expression using stacks.
3. Evaluate given post fix expression using stack.
4. Write a program to reverse given linked list using stack.

UNIT IV

Queues: Introduction to queues: properties and operations, Circular queues, implementing queues using arrays and linked lists, Applications of queues scheduling, etc.

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

Sample experiments:

1. Implement Queue operations using
   a. Arrays b. Linked list
2. Implement Circular Queue using
   a. Arrays b. Linked list
3. Implement Dequeue using linked list.

UNIT V

Trees: Introduction to Trees, Binary trees and traversals, Binary Search Tree – Insertion, Deletion & Traversal

Sample experiments:

1. Implement binary tree traversals using linked list.
2. Write program to create binary search tree for given list of integers. Perform in-order traversal of the tree. Implement insertion and deletion operations.

Textbooks:

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

Reference Books:

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

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Department of Electrical and Electronics Engineering

II B.Tech I Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A39902	**Environmental Science (Audit Course) (Common to All Branches)**	**2**	**0**	**0**	**0**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Gain knowledge on natural resources that sustain life and govern economy	**L1**
CO2	Understand various causes of pollution and solid waste management and related preventive measures	**L2**
CO3	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development	**L5**
CO4	Gain knowledge on climate change, adaptation and mitigation	**L2**
CO5	Adopt sustainability as a practice in life, society, and industry	**L3**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	3	1	1	-	-	1	1	-	1
CO2	-	-	-	-	-	1	3	1	1	-	-	1	1	-	1
CO3	-	-	-	-	-	1	3	1	1	-	-	1	1	-	1
CO4	-	-	-	-	-	1	3	1	1	-	-	1	1	-	1
CO5	-	-	-	-	-	1	3	1	1	-	-	1	1	-	1

UNIT – I:

NATURAL RESOURCES:

Energy resources: Sources of energy and their classification, renewable and non-renewable sources of energy; Conventional energy sources, Non-conventional energy sources; Implications of energy use on the environment.

Forest resources – Use and over – exploitation, deforestation, **Water resources** – Use and over utilization of surface and ground water–**Mineral resources**: Use and exploitation, environmental effects of extracting and using mineral resources

Introduction to sustainable development: Sustainable Development Goals (SDGs) - targets and indicators, challenges and strategies for SDGs.

UNIT – II:

ECOSYSTEMS: Concept of an ecosystem, Structure and function of an ecosystem, Energy flow in the ecosystem, Ecological succession. Introduction, types, characteristic features, structure and function of Forest, Grassland, Desert and aquatic ecosystems.

BIODIVERSITY AND ITS CONSERVATION : 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

UNIT – III:
ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of Air, Water, Soil, Marine, Noise, Thermal and Nuclear Pollutions.

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution.

UNIT – IV:
Climate Change: Impacts, Adaptation and Mitigation:
Understanding climate change: Natural variations in climate; Structure of atmosphere; **Anthropogenicclimate change from greenhouse gas emissions**– past, present and future; Projections of global climate change
Impacts, vulnerability and adaptation to climate change. Observed impacts of climate change on ocean and land systems.
Mitigation of climate change: Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality; Energy efficiency measures; Renewable energy sources; Carbon capture and storage.

UNIT – V: **Environmental Management**
Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control.
Environmental management system: ISO 14001, Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis, Environmental audit and impact assessment; Environmental risk assessment Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme.

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.AzeemUnnisa, 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 byJ.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Pubilishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited

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Department of Electrical and Electronics Engineering
II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A49902	**Universal Human Values – Understanding Harmony And Ethical Human Conduct (Common to EEE, ECE, CSE)**	**2**	**1**	**0**	**3**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	**L1, L2**
CO2	Identify one's self, and one's surroundings (family, society nature)	**L1, L2**
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life	**L3**
CO4	Relate human values with human relationship and human society.	**L4**
CO5	Justify the need for universal human values and harmonious existence	**L5**
CO6	Develop as socially and ecologically responsible engineers	**L3, L6**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	1	3	1	1	-	1	1	-	-
CO2	-	-	-	-	-	2	1	3	1	1	-	1	1	-	-
CO3	-	-	-	-	-	2	1	3	1	1	-	1	1	-	-
CO4	-	-	-	-	-	2	1	3	1	1	-	1	1	-	-
CO5	-	-	-	-	-	2	1	3	1	1	-	1	1	-	-
CO6	-	-	-	-	-	2	1	3	1	1	-	1	1	-	-

Course Topics
The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.
The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I Introduction to Value Education (6 lectures and 3 tutorials for practice session)
Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)
Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV Harmony in the Nature/Existence(4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence

UNIT V Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)
Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education
PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being
PS4 Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self
PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

a. The Textbook

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

b. The Teacher's Manual

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

Reference Books

1. *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautifu*l - Cecile Andrews
7. *Economy of Permanence* - J C Kumarappa
8. *Bharat Mein Angreji Raj* – PanditSunderlal
9. *Rediscovering India* - by Dharampal
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)

13. *Gandhi* - Romain Rolland (English)

Mode of Conduct:
Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.
Tutorial hours are to be used for practice sessions.
While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.
In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.
Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.
It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.
Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources
1. **https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf**

2. **https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf**

3. **https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf**

4. **https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf**

5. **https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf**

6. **https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf**

7. **https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf**

8. **https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385https://onlinecourses.swayam2.ac.in/aic22_ge23/preview**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS) ANANTHAPURAMU– 515002 (A.P) INDIA

Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A40201	**Analog Circuits**	**3**	**0**	**0**	**3**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the concepts of diode clipping and clamping circuits, different amplifier configurations, operation of oscillator circuits, operational amplifiers, timers, ADC and DAC	**L2**
CO2	Apply the above concepts for different circuit design	**L3**
CO3	Analyze various circuit characteristics by using Amplifiers, Transistors, Comparators, Wave form generators, ADC and DAC	**L4**
CO4	Analyze various circuit characteristics by using timers, Phase locked loops and operational amplifiers	**L4**
CO5	Evaluate different system configurations by using various amplifier, transistor and waveform generators	**L5**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	1	-	-	-	-	-	2	2	3	3
CO2	3	3	3	3	3	1	-	-	-	-	-	2	2	3	3
CO3	3	3	3	3	3	1	-	-	-	-	-	2	2	3	3
CO4	3	3	3	3	3	1	-	-	-	-	-	2	2	3	3
CO5	3	3	3	3	3	1	-	-	-	-	-	2	2	3	3

UNIT I

DC biasing of BJTs: Load lines, Operating Point, Bias Stability, Collector-to-Base Bias, Self-Bias, Stabilization against Variations in V_{BE} and β for the Self-Bias Circuit, Bias Compensation, Thermal Runaway, Thermal Stability.

Small Signals Modeling of BJT: Analysis of a Transistor Amplifier Circuit using h-parameters, Simplified CE Hybrid Model, Analysis of CE, CC, CB Configuration using Approximate Model, Frequency Response of CE and CC amplifiers.

UNIT II

Feedback Amplifiers: Classification of Amplifiers, the Feedback Concept, General Characteristics of Negative-Feedback Amplifiers, Effect of Negative Feedback upon Output and Input Resistances, Voltage-Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback.

Oscillator Circuits: Barkhausen Criterion of oscillation, Oscillator operation, R-C phase shift oscillator, Wien bridge Oscillator, Crystal Oscillator.

UNIT III

Operational Amplifiers: Introduction, Basic information of Op-Amp, Ideal Operational Amplifier, Block Diagram Representation of Typical Op-Amp, OP-Amps Characteristics: Introduction, DC and AC characteristics, 741 op-amp & its features.

Operation Amplifier Applications: Introduction, Basic Op-Amp Applications, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converter, Sample and Hold Circuit, Log and Antilog Amplifier, Multiplier and Divider, Differentiator, integrator.

UNIT IV

Comparators and Waveform Generators: Introduction, Comparator, Square Wave Generator, Monostable Multivibrator, Triangular Wave Generator, Sine Wave Generators.

Timers and Phase Locked Loop: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL block schematic, principles and description of individual blocks, 565 PLL, Applications of VCO (566).

UNIT V

Digital To Analog and Analog To Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A-D Converters – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

Textbooks:

1. Electronic Devices and Circuits- J. Millman, C.Halkias, Tata Mc-Graw Hill, 2nd Edition, 2010.
2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition, 2003.

Reference Books:

1. Electronic Devices and Circuit Theory – Robert L.Boylestad and Lowis Nashelsky, Pearson Edition, 2021.
2. Electronic Devices and Circuits–G.K. Mithal, Khanna Publisher, 23rd Edition, 2017.
3. Electronic Devices and Circuits – David Bell, Oxford, 5thEdition, 2008.
4. Electronic Principles–Malvino, Albert Paul, and David J. Bates, McGraw-Hill/Higher Education, 2007.
5. Operational Amplifiers and Linear Integrated Circuits– Gayakwad R.A, Prentice Hall India, 2002.
6. Operational Amplifiers and Linear Integrated Circuits –Sanjay Sharma, Kataria & Sons, 2nd Edition, 2010.
7. Design of Analog CMOS Integrated Circuits - Behzad Razavi

Web Resources:

1. https://nptel.ac.in/courses/122106025.
2. https://nptel.ac.in/courses/108102112.

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Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
234A0202	**Power Systems-I**	**3**	**0**	**0**	**3**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the different types of power plants, operation of power plants	**L2**
CO2	Understand the concepts of distribution systems, underground cables, economic aspects and tariff	**L2**
CO3	Understand various substations that are located in distribution systems	**L2**
CO4	Apply the above concepts to illustrate different power generation layouts	**L3**
CO5	Analyze various economic aspects related to power generation and distribution	**L4**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	2	-	-	-	-	1	3	3	2
CO2	3	3	3	3	2	2	2	-	-	-	-	1	3	3	2
CO3	3	3	3	3	2	2	2	-	-	-	-	1	3	3	2
CO4	3	3	3	3	2	2	2	-	-	-	-	1	3	3	2
CO5	3	3	3	3	2	2	2	-	-	-	-	1	3	3	2

UNIT I

Hydroelectric Power Stations:

Selection of site, general layout of a hydroelectric power plant with brief description of major components and principle of operation

Thermal Power Stations:

Selection of site, general layout of a thermal power plant. Brief description of components: boilers, super heaters, economizers and electrostatic precipitators, steam turbines: impulse and reaction turbines, condensers, feed water circuit, cooling towers and chimney.

UNIT II

Nuclear Power Stations:

Location of nuclear power plant, working principle, nuclear fission, nuclear fuels, nuclear chain reaction, nuclear reactor components: moderators, control rods, reflectors and coolants, types of nuclear reactors and brief description of PWR, BWR and FBR. Radiation: radiation hazards and shielding, nuclear waste disposal.

UNIT III

Substations:

Air Insulated Substations – indoor & outdoor substations, substations layouts of 33/11 kV showing the location of all the substation equipment. Bus bar arrangements in the sub-stations: simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.

Gas Insulated Substations (GIS) – advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

UNIT IV

Distribution Systems:

Classification of Distribution systems, A.C Distribution, Overhead versus Underground system, Connection schemes of Distribution system, Requirements of Distribution system, Design considerations in Distribution system.

Underground Cables:

Types of cables, construction, types of insulating materials, calculation of insulation resistance, stress in insulation and power factor of cable. Capacitance of single and 3-Core belted Cables. Grading of cables: capacitance grading and intersheath grading.

UNIT V

Economic Aspects & Tariff:

Economic Aspects – load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor and plant use factor, base and peak load plants.

Tariff Methods– Costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two-part, three–part, and power factor tariff methods, Time of Day (ToD) tariff and Time of Use (ToU) tariff.

Textbooks:

1. S. N. Singh, Electric Power Generation, Transmission and Distribution, PHI Learning Pvt Ltd, New Delhi, 2nd Edition, 2010
2. J. B. Gupta, Transmission and Distribution of Electrical Power, S. K. Kataria and sons,10th Edition, 2012

Reference Books:

1. I.J. Nagarath & D.P. Kothari, Power System Engineering, McGraw-Hill Education, 3rd Edition, 2019.
2. C.L.Wadhwa,Generation, Distribution and Utilization of Electrical Energy, New Age International Publishers, 6th Edition, 2018.
3. V. K. Mehta and Rohit Mehta, Principles of Power System, S. Chand, 4th Edition, 2005.
4. Turan Gonen, Electric Power Distribution System Engineering, McGraw-Hill, 1985.
5. Handbook of switchgear, BHEL, McGraw-Hill Education, 2007.

Web Resources:

1. https://nptel.ac.in/courses/108102047

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Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A40203	**Induction And Synchronous Machines**	3	0	0	3

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the construction, principle and operation of single phase and three phase induction motors	**L2**
CO2	Understand the construction, principle and operation of synchronous generator and synchronous motor	**L2**
CO3	Understand various applications of various alternating machines	**L2**
CO4	Apply the above concepts to solve various mathematical and complex problems	**L3**
CO5	Analyze the characteristics of induction motor, synchronous motor and synchronous generators	**L4**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	1	1	-	-	-	-	1	3	3	3
CO2	3	3	3	3	2	1	1	-	-	-	-	1	3	3	3
CO3	3	3	3	3	2	1	1	-	-	-	-	1	3	3	3
CO4	3	3	3	3	2	1	1	-	-	-	-	1	3	3	3
CO5	3	3	3	3	2	1	1	-	-	-	-	1	3	3	3

UNIT I

3-phase induction motors:

Construction of Squirrel cage and Slipring induction motors– production of rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and power factor at standstill and during running conditions– rotor power input, rotor copper loss and mechanical power developed and their inter-relationship –equivalent circuit – phasor diagram, Applications.

UNIT II

Performance of 3-Phase induction motors:

Torque equation – expressions for maximum torque and starting torque – torque-slip characteristics – double cage and deep bar rotors –No load, Brake test and Blocked rotor tests – circle diagram for predetermination of performance- methods of starting –starting current and torque calculations -speed control of induction motor with V/f control method, rotor resistance control and rotor emf injection technique –crawling and cogging – induction generator operation.

UNIT III

Synchronous Generator:
Constructional features of non-salient and salient pole type alternators- armature windings – distributed and concentrated windings – distribution& pitch factors – E.M.F equation –armature reaction – voltage regulation by synchronous impedance method – MMF method and Potier triangle method –two reaction analysis of salient pole machines -methods of synchronization- Slip test – Parallel operation of alternators.

UNIT V
Synchronous Motor:
Synchronous motor principle and theory of operation – Effect of excitation on current and power factor– synchronous condenser –expression for power developed –hunting and its suppression – methods of starting, Applications.

UNIT III
Special Machines:
Single phase induction motors – constructional features – equivalent circuit- starting methods- Principle of operation of Shaded pole motor.
Principle of operation of reluctance motor, stepper motor, BLDC motor and universal motor- Applications.

Textbooks:
1. Electrical Machinery, Dr. P.S. Bhimbra, Khanna Publishing, 2021,First Edition.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Reference Books:
1. Electrical machines, D.P. Kothari and I.J. Nagrath, McGraw Hill Education, 2017, Fifth Edition.
2. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria & Sons,2007.
3. Electric Machinery, A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, McGraw-Hill, 2020, Seventh edition.

Web Resources:
1. https://nptel.ac.in/courses/108/105/108105131
2. https://nptel.ac.in/courses/108106072

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Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A40204	**Control Systems**	**3**	**0**	**0**	**3**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the concepts of various mathematical representations of control systems, Time response of first order and second order systems, stability, frequency response and fundamentals of modern control systems	**L2**
CO2	Apply Block diagram reduction, Signal flow graph, Routh criterion, Root locus, Bode, Polar, Nyquist concepts for solving various numerical problems	**L3**
CO3	Analyze time response characteristics, frequency response characteristics, stability analysis of various control systems	**L4**
CO4	Design various compensators and controllers for different control systems by using design procedures	**L5**
CO5	Create suitable control systems for various real time applications	**L5**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	-	-	-	-	-	2	3	3	3
CO2	3	3	3	3	2	2	-	-	-	-	-	2	3	3	3
CO3	3	3	3	3	2	2	-	-	-	-	-	2	3	3	3
CO4	3	3	3	3	2	2	-	-	-	-	-	2	3	3	3
CO5	3	3	3	3	2	2	-	-	-	-	-	2	3	3	3

UNIT I
CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

UNIT II
TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

UNIT III

STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis.
Compensation techniques – Lag, Lead, Lag-Lead Compensator design in frequency Domain.

UNIT V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability. Pole placement design using state feedback.

Textbooks:

1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 5th edition, 2007.

Reference Books:

1. Control Systems Principles & Design by M.Gopal, 4th Edition, Mc Graw Hill Education, 2012.
2. Automatic Control Systems by B. C. Kuo and Farid Golnaraghi, John wiley and sons, 8th edition, 2003.
3. Feedback and Control Systems, Joseph J Distefano III, Allen R Stubberud & Ivan J Williams, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell and Abbas Emami-Naeini, 6th Edition, Pearson, 2010.

Web Resources:

1. https://nptel.ac.in/courses/108102043
2. https://nptel.ac.in/courses/108106098.

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Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A40205	**Induction And Synchronous Machines Lab**	**0**	**0**	**3**	**1.5**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Analyze various performance characteristics of 3-phase and 1-phase induction motors	**L4**
CO2	Evaluate the performance of 3-phase Induction Motor by obtaining the circle diagram and equivalent circuit of 3-phase Induction Motor and single phase induction motor	**L4**
CO3	Adapt the power factor improvement methods for single phase Induction Motor	**L3**
CO4	Pre-determine the regulation of 3-phase alternator	**L3**
CO5	Determine the synchronous machine reactance of 3-phase alternator	**L3**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	1	-	-	1	3	3	3
CO2	3	3	3	3	1	-	-	-	1	-	-	1	3	3	3
CO3	3	3	3	3	1	-	-	-	1	-	-	1	3	3	3
CO4	3	3	3	3	1	-	-	-	1	-	-	1	3	3	3
CO5	3	3	3	3	1	-	-	-	1	-	-	1	3	3	3

List of Experiments:

Any 10 experiments of the following are required to be conducted

1. Brake test on three phase Induction Motor.
2. Circle diagram of three phase induction motor.
3. Speed control of three phase induction motor by V/f method.
4. Equivalent circuit of single-phase induction motor.
5. Power factor improvement of single-phase induction motor by using capacitors.
6. Load test on single phase induction motor.
7. Regulation of a three -phase alternator by synchronous impedance &MMF methods.
8. Regulation of three-phase alternator by Potier triangle method.
9. V and Inverted V curves of a three-phase synchronous motor.
10. Determination of X_d, X_q& Regulation of a salient pole synchronous generator.
11. Determination of efficiency of three phase alternator by loading with three phase induction motor.
12. Parallel operation of three-phase alternator under no-load and load conditions.
13. Determination of efficiency of a single-phase AC series Motor by conducting Brake test.

Reference:

1. https://em-coep.vlabs.ac.in/List%20of%20experiments.html

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS) ANANTHAPURAMU– 515002 (A.P) INDIA

Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A40206	**Control Systems Lab**	**0**	**0**	**3**	**1.5**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand how to use feedback control system to determine transfer function of DC servo motor and any other given circuit with R, L and C components	**L2**
CO2	Model the systems and able to design the controllers and compensators.	**L3**
CO3	Get the knowledge about the effect of poles and zeros location on transient and steady state behavior of second order systems and implement through software tools	**L4**
CO4	Determine the performance and time domain specifications of first and second order systems.	**L4**
CO5	Understand the stability analysis	**L2**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	1	-	-	1	-	-	2	3	3	3
CO2	3	3	3	3	2	1	-	-	1	-	-	2	3	3	3
CO3	3	3	3	3	2	1	-	-	1	-	-	2	3	3	3
CO4	3	3	3	3	2	1	-	-	1	-	-	2	3	3	3
CO5	3	3	3	3	2	1	-	-	1	-	-	2	3	3	3

List of Experiments:

Any 10 experiments of the following are required to be conducted

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order system
7. Lag and lead compensation – Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. Verification of system stability using Root locus, Bode Plot & Nyquist Plot
12. Verification of time response analysis for a given system
13. Verification of controllability and observability for a given system.

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Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A40207	**Scientific Programming Languages (Skill Enhancement Course)**	**0**	**1**	**2**	**2**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Remember the concepts of electrical circuits, basics of electronics and electrical machines	**L1**
CO2	Understand the fundamental concepts of Python and MATLAB programming	**L2**
CO3	Apply the Python and MATLAB programming concepts to develop various electrical circuits, electronic circuits and electrical machines	**L3**
CO4	Analyze the characteristics of various electrical circuits, electronic circuits and electrical machines	**L4**
CO5	Design various electrical and electronics related applications using Python and MATLAB programming languages	**L5**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	1	-	-	1	-	2	2	3	3	3
CO2	3	3	3	3	2	1	-	-	1	-	2	2	3	3	3
CO3	3	3	3	3	2	1	-	-	1	-	2	2	3	3	3
CO4	3	3	3	3	2	1	-	-	1	-	2	2	3	3	3
CO5	3	3	3	3	2	1	-	-	1	-	2	2	3	3	3

UNIT I

Python Programming-I: Basic Input, output functions, variables and user defined functions – print the sum of given numbers, display specific numbers from the given range, define a function with multiple return values; **Loops, Conditionals and Strings** –print the patterns using loops, print mathematical tables, string manipulations; **Lists and Tuples** –operations on lists, creations of tuples.

UNIT II

Python Programming-II: Sets and Dictionaries –display the letters present in the string, sort given list of strings, generate a dictionary that contains numbers, and check the existence of a given key in dictionary; **Files and Classes** –sorting words in a file and put them in another file, find most frequent words in a text, Creation of classes with various attributes, Computation of area and perimeter of a circle using class; **Arrays and GUI** –create, display, append, insert and reverse the order of the items in the array, Add, transpose and multiply two matrices, create a temperature converter using tkinter.

Experiments:

1. Conversion from one coordinate system to another coordinate system using Python commands.
2. Calculation of Force, Electric field and Potential at a given point using Python commands.
3. Calculation of ripple factor for a given rectifier: Half-wave/Full-wave/Bridge circuit using Python program.
4. Obtain the characteristics for the given circuit using Maximum power transfer theorem.
5. Verification of Millman's, Thevenin and Norton theorems using Python program.
6. Obtain the characteristics of RLC filter using Python program.
7. Modelling of an electrical circuit using Python program.
8. Apply Nodal analysis and Mesh analysis for a given electrical circuit using Python program.
9. Conversion between Star-Delta configurations and generate three phase voltage waveforms for Star and Delta configurations using Python commands.
10. Generate Continuous and Discrete time signals for elementary functions using Python program.
11. Calculation of the equivalent circuit parameters and efficiency of a Transformer at different loads using Python commands.
12. Obtain the characteristics of MOSFET and Bipolar transistor using Python program.

UNIT III

MATLAB Programming-I: Introduction to MATLAB, Command window, Command History, Workspace, Creation of script file; Data structures; Data types - Numerical type, Logical type, Characters, Strings, Dates, Times, Structures, Arrays, Function handles; Basic Programming concepts- Variables, Operators, MATLAB expressions, Regular expressions, Lists, Program control statements, Symbol reference, MATLAB functions.

UNIT IV

MATLAB Programming-II: M-file programming – Program development, Working with M-files, M-file scripts and functions, function arguments, function handles, calling functions; Types of functions – Anonymous functions, Nested functions, Sub functions, Private functions, overloaded functions; Data import and export.

UNIT V

MATLAB Programming-III: Error handling; Classes and objects; Scheduling program execution with timers; Improving program performance and efficiency.

Experiments:

1. Nodal and Mesh analysis of a given electrical network using MATLAB programming.
2. Calculation of Maximum Power dissipation of a given circuit using MATLAB programming.
3. Obtain transient response of the given circuit using MATLAB programming.
4. Determination of transfer function, Poles and zeros of a given circuit using MATLAB programming.
5. Determination of frequency response of a given circuit using MATLAB programming.
6. Determination of transmission parameters of a given cascaded network using MATLAB programming.
7. Generation of Full wave rectifier waveform using MATLAB programming.
8. Determination of diode characteristics using MATLAB programming
9. Determination of output characteristics of BJT and NPN transistor using MATLAB programming.
10. Design of a single phase transformer with the given specifications using MATLAB programming.
11. Design of an Induction motor with the given specifications using MATLAB programming.

12. Determination of mmf required for the air gap of a machine using MATLAB programming.

Textbooks:

1. Y. Daniel Liang, Introduction to programming using Python, 1st Edition,Pearson Publications, 2017.
2. SheetalTaneja, Python Programming: A Modular Approach,1st Edition Pearson Publications, 2017.
3. MATLAB: The Language of Technical Computing, Math works Inc, 2005.
4. John O. Attia, Electronics and Circuit Analysis using MATLAB, CRC Press, 1999.

Reference Books:

1. Ashok NamdevKamathane and Amit Ashok Kamathane, Programming and Problem Solving with Python , 1st Edition, McGraw Hill Education (India) Private Limited, 2017.
2. Brett Slatkin (C), Effective Python: 59 Specific Ways to Write Better Python, I/C, 1st Edition Pearson Publications, 2015.
3. MATLAB: A Practical Introduction to Programming and Problem Solving, 3rd Edition, Stormy Attaway, Elsevier, 2013
4. D. K. Chaturvedi, Electrical Machines Lab Manual with MATLAB Programs, 1st Edition, Laxmi Publications, 2020.

Web Resources:

1. https://pyspice.fabrice-salvaire.fr/releases/v1.6
2. https://wiki.python.org/moin/PythonBooks

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS) ANANTHAPURAMU– 515002 (A.P) INDIA

Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Subject Code	Title of the Subject	L	T	P	C
23A49901	**Design Thinking & Innovation (Common to All Branches)**	**1**	**0**	**2**	**2**

Course Outcomes:

CO	Statements	Blooms Level
CO1	Define the concepts related to design thinking	**L1, L2**
CO2	Explain the fundamentals of Design Thinking and innovation	**L1, L2**
CO3	Apply the design thinking techniques for solving problems in various sectors	**L3**
CO4	Analyze to work in a multidisciplinary environment	**L4**
CO5	Evaluate the value of creativity	**L5**
CO6	Formulate specific problem statements of real time issues	**L3, L6**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	-	-	1	-	2	2	2	3	3
CO2	3	3	2	2	2	1	-	-	1	-	2	2	2	3	3
CO3	3	3	2	2	2	1	-	-	1	-	2	2	2	3	3
CO4	3	3	2	2	2	1	-	-	1	-	2	2	2	3	3
CO5	3	3	2	2	2	1	-	-	1	-	2	2	2	3	3
CO6	3	3	2	2	2	1	-	-	1	-	2	2	2	3	3

UNIT – I: Introduction to Design Thinking

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

UNIT – II: Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT – III: Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT – IV: Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT – V: Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown,*Change by design*, Harper Bollins (2009)
2. Idris Mootee,*Design Thinking for Strategic Innovation,* 2013, John Wiley & Sons.

Reference Books:

1. David Lee,*Design Thinking in the Classroom,* Ulysses press
2. Shrutin N Shetty,*Design the Future*, Norton Press
3. William Lidwell,*Universal Principles of Design*- Kritinaholden, Jill Butter.
4. Chesbrough.H, The *Era of Open Innovation* – 2013

Online Learning Resources:

1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/
3. https://swayam.gov.in/nd1_noc19_mg60/preview

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS) ANANTHAPURAMU– 515002 (A.P) INDIA

Department of Electrical and Electronics Engineering

II B.Tech II Semester (R23)

Title of the Subject-23A49903
COMMUNITY SERVICE PROJECT ……Experiential learning through community engagement

Introduction

Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.

Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.

Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

To sensitize the students to the living conditions of the people who are around them,

To help students to realize the stark realities of society.

To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability

To make students aware of their inner strength and help them to find new /out of box solutions to social problems.

To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.

To help students to initiate developmental activities in the community in coordination with public and government authorities.

To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social

problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

Every student should put in 6 weeks for the Community Service Project during the summer vacation.

Each class/section should be assigned with a mentor.

Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc

A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.

The logbook has to be countersigned by the concerned mentor/faculty in charge.

An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.

The final evaluation to be reflected in the grade memo of the student.

The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.

Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.

Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.

The Community Service Project is a twofold one –

- First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
- Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
  - Agriculture
  - Health
  - Marketing and Cooperation

- Animal Husbandry
- Horticulture
- Fisheries
- Sericulture
- Revenue and Survey
- Natural Disaster Management
- Irrigation
- Law & Order
- Excise and Prohibition
- Mines and Geology
- Energy
- Internet
- Free Electricity
- Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

Positive impact on students' academic learning

Improves students' ability to apply what they have learned in "the real world"

Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.

Improved ability to understand complexity and ambiguity

Personal Outcomes

Greater sense of personal efficacy, personal identity, spiritual growth, and moral development

Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

Reduced stereotypes and greater inter-cultural understanding

Improved social responsibility and citizenship skills

Greater involvement in community service after graduation

Career Development

Connections with professionals and community members for learning and career opportunities

Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

Stronger relationships with faculty

Greater satisfaction with college

Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

Satisfaction with the quality of student learning

New avenues for research and publication via new relationships between faculty and community

Providing networking opportunities with engaged faculty in other disciplines or institutions

A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

Improved institutional commitment.

Improved student retention

Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

Satisfaction with student participation

Valuable human resources needed to achieve community goals.

New energy, enthusiasm and perspectives applied to community work.

Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially relevant

themes. Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social

Entrepreneurship General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important

days Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality

Development Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –
    i. Agriculture
    ii. Health
    iii. Marketing and Cooperation
    iv. Animal Husbandry

v. Horticulture
vi. Fisheries
vii. Sericulture
viii. Revenue and Survey
ix. Natural Disaster Management
x. Irrigation
xi. Law & Order
xii. Excise and Prohibition
xiii. Mines and Geology
xiv. Energy

Role of Students:

Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.

For conducting special camps like Health related, they will be coordinating with the Governmental agencies.

As and when required the College faculty themselves act as Resource Persons.

Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.

And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.

An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. **Preliminary Survey (One Week)**
   - A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
   - A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
   - The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2. **Community Awareness Campaigns (One Week)**
   - Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmesto be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.

1. Awareness Program on Good Touch and Bad Touch(Sexual abuse)
2. Awareness Program on Socially relevant themes. Programs for Women Empowerment

Government Guidelines and Policy Guidelines

1. Women's Rights
2. Domestic Violence
3. Prevention and Control of Cancer
4. Promotion of Social

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3. Yoga
4. Tree plantation
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    ii. Health
    iii. Marketing and Cooperation
    iv. Animal Husbandry
    v. Horticulture
    vi. Fisheries
    vii. Sericulture
    viii. Revenue and Survey
    ix. Natural Disaster Management
    x. Irrigation
    xi. Law & Order
    xii. Excise and Prohibition
    xiii. Mines and Geology
    xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- AsandwhenrequiredtheCollegefacultythemselvesactasResourcePersons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
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