B.Tech. – I Year I Semester (for Group-B Branches) ECE, EEE, CSE, AI&ML

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Engineering Physics	3	0	0	3
2	BS&H	Linear Algebra & Calculus	3	0	0	3
3	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	Engineering Science	Engineering Graphics	1	0	4	3
5	Engineering Science	Introduction to Programming	3	0	0	3
6	Engineering Science	IT Workshop	0	0	2	1
7	BS&H	Engineering Physics Lab	0	0	2	1
8	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	BS&H	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total			**13**	**00**	**15**	**20.5**

University College of Engineering Kakinada
Jawaharlal Nehru Technological University Kakinada
B. Tech. I Year Syllabus
Engineering Physics
(Common for all branches)
(R23 Regulation)

L	T	P	C
3	0	0	3

PREAMBLE

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

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

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 the structural analysis through X-ray diffraction techniques.
4	To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
5	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.
6.	To Understand the Physics of Semiconductors and their working mechanism, Concepts utilization of transport phenomenon of charge carriers in semiconductors.

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 and Powder techniques (L2).
CO3	**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 and their temperature dependence (L2).
CO4	**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).
CO5	**Classify** the crystalline solids (L2).**Outline** the properties of charge carriers in semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Apply** the concept of effective mass of electron (L3).

Engineering Physics

(Common for all branches)

(R23 Regulation)

L	T	P	C
3	0	0	3

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

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

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

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 – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

Unit-III: Dielectric and Magnetic Materials **8hrs**

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

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Unit-IV: Quantum Mechanics and Free electron theory **10hrs**

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

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

Unit – V: Semiconductors **10hrs**

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 – dependence of Fermi energy on carrier concentration and temperature - Drift and Diffusion currents – Einstein's equation - Hall effect and its Applications.

Text books:

1. "A Text book of Engineering Physics" - M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S.Chand Publications, 11th Edition 2019.
2. "Engineering Physics" - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
3. "Engineering Physics" - P.K.Palanisamy SciTech publications.

Reference Books:

1. "University Physics with Modern Physics" - Young Hugh D. and Freedman Roger .A Pearson Education, 2014
2. "Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
3. "Engineering Physics" - B.K. Pandey and S. Chaturvedi, Cengage Learning
4. "Engineering Physics" - M.R. Srinivasan, New Age international publishers (2009).

Designation	Name	Organization	Signature
Chairperson	Dr. G. Padmaja Rani	JNTUK	
Internal member	Dr. P.Dakshina Murthy	JNTUK	
External member	Dr. V.R.K. Murthy	IITMadras	AttendedVirtually
External member	Dr. D. Haranath	NIT-Warangal	Attended Virtually
External member	Dr. K. Venkateswara Rao	JNTUH	AttendedVirtually

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Jawaharlal Nehru Technological University Kakinada
B.Tech. I Year Syllabus
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Course Objectives:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The students will enabled to

CO1: Acquire a comhrensive idea for the concepts of wave optics phenomena for their utility to design an instrument with enhanced accuracy

CO2: Understand the influence of electric and magnetic fields as response parameters for their device utility

CO3: Analyze the gravitational fields, resonance and wave propagation in stretched strings

CO4: Understand the ideological utility perspectives of quantum mechanics for its domain of viability in human life, for the device perspective of semiconductor materials as sensors etc.,

CO6: Utilize the knowledge regarding the impact of doping in extrinsic semiconductor to realise tunable Conductivity, i.e., both in realistic and virtual modes.

University College of Engineering Kakinada
Jawaharlal Nehru Technological University Kakinada
B.Tech. I Year Syllabus
Engineering Physics Laboratory
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L	T	P	C
0	0	2	1

(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 using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductor by four probe method.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart & Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susptibility by Kundt's tube method.
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.

References:

1. "A Text Book of Practical Physics" - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.
2. "Practical physics" by G.L.Squire, Cambridge University press, Fourth edition,2001

URL:*www.vlab.co.in*

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives: To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

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

CO1: Apply the basic concepts of semiconductor devices
CO2: Illustrate the formation of p-n junction and how it can be used in diodes,Transistors in different modes of operation.
CO3: Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons..
CO4: Classify different number systems and apply to generate various codes. Design different types of combinational logic circuits.

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of Electronics , Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

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. 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, Comparators, Code converters

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021. 2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010. 2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002. 3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

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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 & 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.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and 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 Mc Graw Hill, 2009 3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

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

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I Year - I Semester	IT Workshop (Common to all branches of Engineering)	L	T	P	C
		0	0	2	1

Course Objectives:

The main objectives of the course are to

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

Course Outcomes:

A student after completion of the course will be able to

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

PC Hardware & Software Installation

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

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: Installation of MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Installation of 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: Installation of 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 follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there isno 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 JRE for 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 in word.

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, Track Changes.

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.

LOOKUP/VLOOKUP

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

18/11/2023

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:

1. Comdex Information Technology Course Tool Kit, Vikas Gupta, WILEY Dream Tech, 2003
2. The Complete Computer Upgrade and Repair Book, Cheryl A Schmidt, WILEY Dream Tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

I Year - I Semester	INTRODUCTION TO PROGRAMMING (Common to All branches of Engineering)	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course are to

- Introduce students to the fundamentals of computer programming.
- Provide hands-on experience with coding and debugging.
- Foster logical thinking and problem-solving skills using programming.
- Familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- 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: Analyse 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.

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) and Unconditional statements: goto,Break and Continue.

UNIT III:

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings and string Operations

UNIT IV:

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

UNIT V:

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters, Recursive functions. Scope and Lifetime of Variables, Basics of File Handling

18/11/2023

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

I Year - I Semester	COMPUTER PROGRAMMING LAB (Common to All branches of Engineering)	L	T	P	C
		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:
A student after completion of the course will be able to

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.

UNIT I
Suggested Experiments/Activities

WEEK 1
Objective: Getting familiar with the programming environment on the computer and writing the first program.

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 using input and Output Statements
iv) Simple Arithmetic Operations

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.

Tutorial 2: Problem-solving - Algorithms and Flow charts –

Lab 1: Converting algorithms/flow charts into C Source code.
Developing the algorithms/flowcharts for the following sample programs

i) Simple statistics Operations- Sum and average etc
ii) Conversion of Fahrenheit to Celsius and vice versa
iii) Simple and Compound 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:

QShar 15/11/2023

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 hero's formulae
iv) Distance travelled by an object

UNIT II
Suggested Experiments/Activities:

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.

Tutorial 4: Operators Precedence and 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".

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.
i) Find the max and min of four numbers using if-else.
ii) Generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Simulate a calculator using switch case.
v) Find the given year is a leap year or not etc

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 goto, break and continue including when each of these statements is more appropriate to use.

Tutorial 6: Loops: while, do-while and for loops

Lab 6: Iterative problems e.g., series and sequences

i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sin and cos series
iv) Checking a number is palindrome or not
v) Construct a pyramid of numbers.

UNIT III
Suggested Experiments/Activities:
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.

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.

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
Suggested Experiments/Activities:

WEEK 9:

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

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

Tutorial 10: Self-Referential Structures, Linked lists

Lab10 : linked lists

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

UNIT V

Suggested Experiments/Activities:

WEEK 11:

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

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

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

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

WEEK 12:

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

Lab 12: Recursive functions

i) Generate Fibonacci series.
ii) Find the lcm of two numbers.
iii) Find the factorial of a number.
iv) Ackermann function
v) 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

Tutorial 13: Call by reference, dangling pointers

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

i) Swap two numbers using call by reference.
ii) Demonstrate Dangling pointer problem
iii) Copy one string into another using pointer.
iv) 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.

Lab 14: File operations

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

Text Books:

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,

R23

University Engineering College(A): J N T University Kakinada

Department of Mathematics

I Year I Semester

LINEAR ALGEBRA AND CALCULUS

(Common to All Branches)

COURSE OBJECTIVES
The main objective of this course is to provide the learner with variety of linear algebra techniques to solve linear systems, orthogonal representation of the quadratic surfaces and apply its knowledge in optimization problems. It aims further to calculate areas, surfaces and volumes in various coordinate systems.

COURSE OUTCOMES		
Upon completion of the course, the student will be able to:		**Cognitive Level**
CO1	Compute rank and inverse of a matrix and hence solves linear system of equations both homogeneous and non-homogeneous.	K2 or K3
CO2	Calculate eigen values and eigen vectors and hence orthogonalize the given matrix and represent given quadratic form into canonical form.	K2 or K3
CO3	Find the mean value of a given function and use it to estimate the bounds of a given function.	K2 or K3
CO4	Compute change in the dependent variable with respect to many independent variables and Jacobians. Apply the knowledge in optimizing functions of several variables.	K2 or K3
CO5	Compute double and triple integrals of functions of several variables and must be able to change the coordinate systems from polar, spherical and cylindrical coordinates.	K2 or K3

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

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

Members of BoS:

Dr. V.Ravindranath (Chairman)	Dr. T.V.S. Sekhar (Member)	Dr. Ch. Ramireddy (Member)	Dr. T. Hymavathi (Member)	Dr.G.V.S.R. Deekshitulu (Member)	Dr. S.K.Vali (Member)	Dr.K.Sobhan Babu (Member)

R23

University Engineering College(A): J N T University Kakinada

Department of Mathematics

SYLLABUS

UNIT I

Matrices:

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

UNIT II

Eigenvalues, 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 Orthogonal Transformation.

UNIT III

Calculus:

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

UNIT IV

Partial differentiation and Applications (Multi variable calculus):

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers

UNIT V

Multiple Integrals (Multi variable Calculus):

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

TEXT BOOKS

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

REFERENCE BOOKS

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.

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Department of Mathematics

2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition.
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014, Third Edition (Reprint 2021)
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, Twenty Two Edition(Reprint 2022).

WEB RESOURCES

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

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L: 2 T: 0 P/D: 4

ENGINEERING GRAPHICS

(Common to All branches of Engineering)

Course Objectives:

- To enable the students with various concepts like dimensioning, conventions and standards 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 solids and Developments of surfaces.
- To make the students understand the viewing perception of a solid object in Isometric and 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: 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 and Constructing regular polygons by general methods.
Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.
Scales: Plain scales, diagonal scales and vernier scales.
Practicing on a sketching book for few examples (*Not for end examination*).

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

PR
HMCD

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.
Practicing on a sketching book for few examples(*Not for end examination*)..

UNIT III

Projections of Solids: Types of solids: Polyhedra 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.
Practicing on a sketching book for few examples(*Not for end examination*)..

UNIT IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.
Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.
Practicing on a sketching book for few examples(*Not for end examination*)..

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*).
Practicing on a sketching book for few examples (*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, Dhananjay Jolhe, Tata McGraw Hill, 2017.
4. Engineering Design and Visualization, Jon M. Duff and William A. Ross, CENGAGE Learning, India edition, 2009.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

013
7/12/23

R23 COURSE STRUCTURE

I B.Tech I Semester

S.No	Course No	Course Name	P. Os	Category	L	T	P	Credits
1		Engineering Physics		BS&H	3	0	0	3
2		Linear Algebra & Calculus		BS&H	3	0	0	3
3		Basic Electrical & Electronics Engineering		Engineering Science	3	0	0	3
4		Engineering Graphics		Engineering Science	1	0	4	3
5		Introduction to Programming		Engineering Science	3	0	0	3
6		IT Workshop		Engineering Science	0	0	2	1
7		Engineering Physics Lab		BS&H	0	0	2	1
8		Electrical & Electronics Engineering Workshop		Engineering Science	0	0	3	1.5
9		Computer Programming Lab		Engineering Science	0	0	3	1.5
10		NSS/NCC/Scouts & Guides/Community Service		BS&H	-	-	1	0.5
				Total	**13**	**00**	**15**	**20.5**

I B.Tech II Semester

S.No	Course No	Course Name	P. Os	Category	L	T	P	Credits
1		Communicative English		BS&H	2	0	0	2
2		Engineering Chemistry / Chemistry / Fundamental Chemistry		BS & H	3	0	0	3
3		Differential Equations & Vector Calculus		Engineering Science	3	0	0	3
4		Basic Civil & Mechanical Engineering		Engineering Science	3	0	0	3
5		Electrical Circuit Analysis - I		Professional Core	3	0	0	3
6		Communicative English Lab		BS&H	0	0	2	1
7		Engineering Chemistry / Chemistry / Fundamental Chemistry Lab		BS&H	0	0	2	1
8		Engineering Workshop		Engineering Science	0	0	3	1.5
9		Electrical Circuits Lab		Professional Core	0	0	3	1.5
10		Health and wellness, Yoga and Sports		BS&H	-	-	1	0.5
				Total	**14**	**00**	**11**	**19.5**

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			Attended Online	

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech I Semester

COURSE CODE – R2011XXYY	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (For EEE Branch only)	CATEGORY Engineering Science	L-T-P 3-0-0	CREDITS 3

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

		Knowledge Level (K)#
CO1	Apply basic concepts of electrical circuits to solve the different electrical network problems	3
CO2	Apply magnetic field concepts to analyse the various types of magnetic circuit problems	3
CO3	Choose different electrical wiring schemes, compute electricity bill for domestic consumers using tariff methods and understand safety measures.	3
CO4	Explain basic concepts of semiconductor physics necessary for electronic devices	2
CO5	Illustrate the characteristics of various electronic devices	3

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

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

(Please fill the above with Levels of Correlation, viz., L, M, H)

UNIT	CONTENTS	Contact Hours
	PART A: BASIC ELECTRICAL ENGINEERING	
UNIT - 1	**Introduction to Electrical Circuits** Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchhoff'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.	8
UNIT - 2	**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.	8

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			Attended Online	

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UNIT - 3	**Electrical Wiring, Electricity Bill & Safety Measures** **Electrical Wiring:** Simple Lamp circuits, stair case wiring scheme, godown wiring scheme, types of service mains, types of electrical wiring, cost estimation of indoor wiring, wiring layout of workshop/ electrical laboratory. **Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc., Types of 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.	8
	PART B: BASIC ELECTRONICS ENGINEERING	
UNIT - 4	**Review of Semi-Conductor Physics** Electrons and holes in an intrinsic semiconductor, conductivity of a semiconductor, carrier concentrations in an intrinsic semiconductor, donor and acceptor impurities, charge densities in a semiconductor, Fermi Dirac function, Fermi level in intrinsic and extrinsic semiconductors, continuity equation, Hall effect and its applications.	8
UNIT - 5	**Junction Diode Characteristics** Energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, law of junction, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.	8
UNIT-6	**Special Semiconductor Devices** Operation and V-I characteristics of Zener Diode, Breakdown mechanisms, Zener diode as voltage regulator; LED, Photodiode, Tunnel diode, SCR and UJT.	8
	Total	

Part A: BASIC ELECTRICAL ENGINEERING

Textbooks:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition
2. Electrical Wiring Estimating and Costing –Dr. S. L. Uppal-Khanna Publishers-1987

Reference Books:

1. Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023.
2. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, First Edition, 2019

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Part B: BASIC ELECTRONICS ENGINEERING

Textbooks:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition, 2007
2. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.

Reference Books:

1. Albert Paul Malvino, David J. Bates, Electronic Principles, 8th edision, McGraw Hill 2015.
2. David A. Bell, Electronic Devices and Circuits, Oxford University Press.

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			Attended Online	

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech I Semester

COURSE CODE – R2011XXYY	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (For EEE Branch only)	CATEGORY Engineering Science	L-T-P 0-0-3	CREDITS 1.5

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

		Knowledge Level (K)#
CO1	Study and identification of various electrical circuit components	2
CO2	Measure and verify voltage, current and power in an electric circuit	2
CO3	Choose and assemble various wiring schemes, calculate electrical energy and measure earth resistance for domestic premises	3
CO4	Solder active & passive components in a circuit, assemble electronic components and understand the usage of CRO	2
CO5	Illustrate the characteristics of various electronic devices	3

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

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

(Please fill the above with Levels of Correlation, viz., L, M, H)

Note: Minimum Six Experiments to be performed from each Part

PART A: ELECTRICAL ENGINEERING LAB

S. No.	List of Experiments	Contact Hours
1.	Identification of various types of resistors and capacitors and understand the usage of digital multi-meter.	
2.	Study various types of electrical cables/wires, switches, fuses, fuse carriers, MCB, ELCB, RCCB and MCCB with their specifications and usage.	
3.	Measurement of voltage, current and power in a DC circuit.	
4.	Verification of KCL and KVL	
5.	Measurement of Earth Resistance using Megger	
6.	Calculation of Electrical Energy for Domestic Premises	
7.	Wiring of backup power supply for domestic Installations including inverter, battery, and load.	
8.	Hospital wiring/Tunnel wiring.	

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		MND	Attended Online	

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PART B: ELECTRONICS ENGINEERING LAB

S. No.	List of Experiments	Contact Hours
1.	Soldering Practice- Simple circuits using active and passive components.	
2.	Assembling electronic components on breadboard.	
3.	Understanding the usage of CRO and Measurement of ac signal parameters using CRO with function generator	
4.	Plot V–I characteristics of Zener diode	
5.	Plot V-I characteristics of PN junction diode	
6.	Plot V-I characteristics of Light Emitting Diode (LED)	
7.	Plot V-I characteristics of UJT	
8.	Plot V-I Characteristics of SCR	

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech

COURSE CODE – R2011XXYY	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to CE, ME, ECE CSE, AIML PE, CHE (Except EEE))	CATEGORY Engineering Science	L-T-P 3-0-0	CREDITS 3

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

		Knowledge Level (K)#
CO1	Apply basic concepts of electrical circuits to solve the different electrical network problems	3
CO2	Explain the operation of different electrical machines	2
CO3	Compute electricity bill for domestic consumers using tariff methods and understand safety measures	3
CO4	**Collect COs from the ECE department**	
CO5		
CO6		

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

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

(Please fill the above with Levels of Correlation, viz., L, M, H)

Note: Only elementary concepts of the topics are to be considered for the preparation of question paper.

UNIT	CONTENTS	Contact Hours
	PART A: BASIC ELECTRICAL ENGINEERING	
UNIT - 1	**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. **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,	10

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			Attended Online	

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	Concept of reactance and Impedance, Concept of power factor, Active power, reactive power and apparent power. (Simple numerical problems)	
UNIT - 2	**Machines** Principle of operation of DC Generator, EMF Equation, Types of Field Excitation, Open Circuit Characteristics of DC generator, Principle of operation of Three Phase Induction Motor, Single Phase Transformer. (Simple numerical problems on DC Generator.)	8
UNIT - 3	**Electricity Bill & Equipment Safety Measures** **Electricity Bill:** Power rating of household appliances including air conditioners, PCs, Laptops,Printers, etc. Types of Tariff, Calculation of electricity bill for domestic consumers. **Equipment Safety Measures:** Working principle of Fuse and Miniature Circuit Breaker(MCB). Electric Shock,Safety Precautions to avoid shock, concept of Earthing	6
	PART B: BASIC ELECTRONICS ENGINEERING	
UNIT - 4	**Collect syllabus from the ECE department**	
UNIT - 5		
UNIT-6		
	Total	

Part A:

Textbooks:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition.
2. Principles of Electrical Engineering and Electronics by Mehta V.K. & Mehta Rohit, S. Chand Limited 2006.
3. A Textbook of Electrical Technology – Volume I by B. L. Theraja, A. K. Theraja, S. Chand Limited· 2005.
4. A Textbook of Electrical Technology - Volume II by B. L. Theraja, A. K. Theraja S. Chand Limited 2005.
5. Electrical wiring, estimation & costing by Uppal S.L. Khanna Publishers 1987.

Reference Books:

1. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
2. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Pearson Publications, 2018, Second Edition.
3. Principles of Power By V. K. Mehta, Rohit Mehta · S. Chand 2005

Part B:

Textbooks:

Reference Books:

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			Attended online	

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (AUTONOMOUS) :: JNTUK,KAKINADA
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech

COURSE CODE – R2011XXYY	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to CE, ME, ECE CSE, AIML PE, CHE (Except EEE))	CATEGORY BSC	L-T-P 0-0-3	CREDITS 1.5

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

		Knowledge Level (K)#
CO1	Measure and verify voltage, current and power in an electric circuit	2
CO2	Illustrate the Open Circuit Characteristics of DC generator.	3
CO3	Choose and assemble various wiring schemes, calculate electrical energy and measure earth resistance for domestic premises	3
CO4	**Collect from the ECE department**	
CO5	**Collect from the ECE department**	

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

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

(Please fill the above with Levels of Correlation, viz., L, M, H)

Note: Minimum Six Experiments to be performed from each part

PART A: ELECTRICAL ENGINEERING LAB

S. No.	List of Experiments	Contact Hours
1.	Verification of KCL and KVL	
2.	Measurement of voltage, current, power in DC circuit	
3.	Measurement of voltage, current, power, power factor in AC circuit	
4.	Open Circuit Characteristics of DC generator	
5.	Measurement of earth resistance	
6.	Calculation of Electrical Energy for Domestic Premises	
7.	Hospital wiring	
8.	Wiring of backup power supply for domestic installations including inverter, battery and load.	

Dr. R. Srinivasa Rao (Member)	Dr. K. Venkata Reddy (Member)	Dr. M. Nageswara Rao (Member)	Dr. Ch.V.V.S. Bhaskar Reddy (Member)	Dr. K. Ravindra (Chairman)
			Attended Online	

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PART B: ELECTRONICS ENGINEERING LAB

Collect syllabus from the ECE department

S. No.	List of Experiments	Contact Hours
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

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