

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, TELANGANA, INDIA

काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६०१५, तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

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B.TECH. SYLLABUS (I & II SEMESTERS)

ACADEMIC YEAR: 2026-27

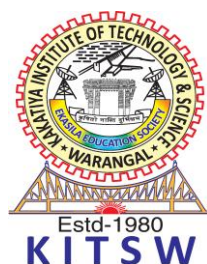
ELECTRONICS AND COMMUNICATION ENGINEERING (VLSI DESIGN & TECHNOLOGY)

Undergraduate Rules and Regulations-2026 (URR26)

In accordance with the National Education Policy 2020

w.e.f. AY 2026-27

Regulations Governing the
Choice Based Credit System and
Multiple Entry and Multiple Exit Options
with
Competency-Focused Outcome Based Curriculum (CF-OBC)



DEPARTMENT OF ECIE

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL - 506 015

TELANGANA

(UGC Autonomous Institute Under Kakatiya University, Warangal)

Semester – I Scheme

Abbreviations

L	Lecture Hour	E	Total Engagement in Hours
T	Tutorial Hour	C	Credit Assigned
P	Practical Hour		

ISEMESTER (For Stream - I: CSE, EEE, ECE, ECV)

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	
-	IKSC	U26IK100	AICTE Mandated Student Induction Programme (Universal Human Values - I)					-
1	BSC	U26MH101	Differential Calculus and Ordinary Differential Equations	2	1	-	3	3
2	BSC	U26PY102X	Engineering Physics (from Pool-I)	2	1	-	3	3
3	ESC	U26VL103	Programming for Problem Solving with C	2	1	-	3	3
4	ESC	U26EE104X	Basic Electrical Engineering (from Pool - II)	2	1	-	3	3
5	PCC	U26VL105	Electronic Measurements and Sensors	2	1	-	3	3
6	BSC	U26PY106X	Engineering Physics Laboratory (from Pool-III)	-	-	2	2	1
7	ESC	U26VL107	Programming for Problem Solving with C Laboratory	-	-	2	2	1
8	ESC	U26EE108X	Basic Electrical Engineering Laboratory (from Pool - IV)	-	-	2	2	1
9	PCC	U26VL109	Electronic Measurements and Simulation Laboratory	-	-	2	2	1
10	AEC	U26AE110	IDEA Lab Makerspace	-	-	2	2	1
Total:				10	5	10	25	20
Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)				NIL				

S. No.	Course Code	Course Title	S. No.	Course Code	Course Title
Pool - I			Pool - III		
1.	U26PY102A	Engineering Physics (for CE)	1.	U26PY106A	Engineering Physics Laboratory (for CE)
2.	U26PY102B	Engineering Physics (for ME)	2.	U26PY106B	Engineering Physics Laboratory (for ME)
3.	U26PY102C	Engineering Physics (for EEE/ECE/ECV)	3.	U26PY106C	Engineering Physics Laboratory (for EEE/ECE/ECV)
4.	U26PY102D	Engineering Physics (for CS/IT)	4.	U26PY106D	Engineering Physics Laboratory (for CS/IT)
Pool - II			Pool - IV		
1.	U26EE104A	Basic Electrical & Electronics Engineering (for CE/ME)	1.	U26EE108A	Basic Electrical & Electronics Engineering Laboratory (for CE/ME)
2.	U26EE104B	Basic Electrical Engineering (for ECE/ECV)	2.	U26EE108B	Basic Electrical Engineering Laboratory (for ECE/ECV)
3.	U26EE104C	Basic Electrical Engineering (for EEE)	3.	U26EE108C	Basic Electrical Engineering Laboratory (for EEE)
4.	U26EE104D	Basic Electrical & Electronics Engineering (for CS/IT)	4.	U26EE108D	Basic Electrical & Electronics Engineering Laboratory (for CS/IT)

Semester – II

Scheme

Abbreviations

L	Lecture Hour	E	Total Engagement in Hours
T	Tutorial Hour	C	Credit Assigned
P	Practical Hour		

II SEMESTER (For Stream - I: CSE, EEE, ECE, ECV)

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	
1	BSC	U26MH201	Matrix Theory and Vector Calculus	2	1	-	3	3
2	BSC	U26CY202X	Engineering Chemistry (from Pool - VII)	2	1	-	3	3
3	ESC	U26VL203	Data Structures through C	2	1	-	3	3
4	HSMC	U26MH204	English Communication and Report Writing	2	1	-	3	3
5	PCC	U26VL205	Electronic Devices and Circuits	2	1	-	3	3
6	BSC	U26CY206X	Engineering Chemistry Laboratory (from Pool - VI)	-	-	2	2	1
7	ESC	U26VL207	Data Structures through C Laboratory	-	-	2	2	1
8	VAC	U26VA208	Sports & Yoga	-	-	2	2	1
9	PCC	U26VL209	Electronic Devices and Circuits Laboratory	-	-	2	2	1
10	ESC	U26ME210	Engineering Graphics through CAD Laboratory	-	-	2	2	1
Total:				10	5	10	25	20
Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)								

S. No.	Course Code	Course Title	S. No.	Course Code	Course Title
Pool - VII			Pool - VIII		
1.	U26CY202A	Engineering Chemistry (for CE)	1.	U26CY206A	Engineering Chemistry Laboratory (for CE)
2.	U26CY202B	Engineering Chemistry (for ME)	2.	U26CY206B	Engineering Chemistry Laboratory (for ME)
3.	U26CY202C	Engineering Chemistry (for EEE/ECE)	3.	U26CY206C	Engineering Chemistry Laboratory (for EEE/ECE/ECV)
4.	U26CY202D	Engineering Chemistry (for CS/IT)	4.	U26CY206D	Engineering Chemistry Laboratory (for CS/IT)
5.	U26CY202F	Engineering Chemistry (for ECV)			

Bridge Courses for Exit:

Successful completion of two subjects (6-Credits) during 2-months internship at the institute
OR
Successful completion of two suitable skill based courses (external) to qualify for Certification

A. After First Year: (UG Certificate in ECE (VLSI D&T))

- (i) The candidate should pass any two of the following additional courses (ITI Level) during the 2-Months internship at institute

Exit Options to Qualify for UG Certificate in ECE (VLSI D&T): Any Two (02) Courses during the 2 - Months internship								
S. No .	Category	Course Code	Course Title	L	T	P	E	C
1	PCC	U26VL212X	Digital Electronics	2	-	2	4	3
2	PCC	U26VL213X	Operational Amplifiers and Applications	2	-	2	4	3
3	PCC	U26VL214X	Communication Systems	2	-	2	4	3
4	PCC	U26VL215X	Any other course approved by BoS Chair and Dean AA	2	-	2	4	3

(OR)

- (ii) Any two suitable skill based courses to qualify for Certification.

Exit Options to Qualify for UG Certificate in ECE (VLSI D&T): Any Two (02) Skill based Courses :-								
S. No .	Category	Course Code	Course Title	L	T	P	E	C
1	SEC	U26SE212XVL	Consumer Electronics	-	-	6	6	3
2	SEC	U26SE214XVL	Electronics Servicing and Maintenance	-	-	6	6	3
3	SEC	U26SE215XVL	Electronic Testing & Assembly Operator https://www.nsic.co.in/documents/pdfs/ntsc/ntsc_hyd_detail_09092024_electronic.pdf	-	-	6	6	3
4	SEC	U26SE216XVL	Python https://www.nsic.co.in/documents/pdfs/ntsc/ntsc_hyd_SOFTWARE_ModuleI_28072025.pdf	-	-	6	6	3
5	SEC	U26SE217XVL	Any other skill based course approved by BoS Chair and Dean AA	-	-	6	6	3

Semester – I

Syllabi

DIFFERENTIAL CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS			
Class: B. Tech. I – Semester		Branch: Common to all branches	
Course Code:	U26MH101	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: examine the convergence of a series and interpret mean value theorems. CO2: apply partial differentiation to functions of several variables in solving various engineering problems. CO3: apply appropriate methods of differential equations of first order and first degree to solve real life engineering problems. CO4: analyze the solutions of higher order linear differential equations with constant coefficients			
UNIT-I			9 Hrs
Infinite Series: Sequences, Series, General properties of series, Series of positive terms, Comparison tests-Limit form, Integral test, D’Alembert’s Ratio test, Cauchy’s root test Differential Calculus and its applications: Fundamental theorems-Rolle’s theorem (Geometrical interpretation), Lagrange’s mean value theorem (Geometrical interpretation), Cauchy’s mean value theorem, Taylor’s theorem (Generalized mean value theorem), Expansions of functions- Maclaurin’s series, Taylor’s series, Maxima and Minima-Conditions, Practical problems (rectangle, right circular cylinder, cone)			
UNIT-II			9 Hrs
Partial differentiation and its applications: Functions of two or more variables, Partial derivatives, Total derivative, Change of variables, Jacobians, Functional relationship, Geometrical Interpretation-Tangentplane and Normal to a surface, Taylor’s theorem for function of two variables (without proof), Errors and approximations, Total differential, Maxima and minima of functions of two variables, Lagrange’s method of undetermined multipliers, Differentiation under the integral sign			
UNIT-III			9 Hrs
Differential equations of first order (DE): Reorientation of differential equation of first order and first degree (Formation a differential equation, variables separable method, homogeneous equations, Linear equations), Exact differential equations, Equations reducible to exact equations Applications of differential equations of first order: Orthogonal trajectories - Orthogonal trajectories of the family of curves $f(x, y, c)=0$, Physical applications-Motion of a boat across a stream, Resisted motion, Velocity of escape from the earth, Simple electric circuits - RL series circuit, Newton’s law of cooling, Rate of decay of Radio-active materials, Rate of growth of population			
UNIT-IV			9 Hrs
Linear differential equations: Linear differential equations with constant coefficients, Rules for finding complementary function, Inverse operator, Rules for finding the particular integral ($Q=e^{ax}$, $\sin(ax+b)$ or $\cos(ax+b)$, x^m and $e^{ax}V(x)$), Method of variation of parameters, Linear dependence of solutions			

Applications of linear differential equations: Simple harmonic motion, Simple pendulum, Oscillations of spring, Oscillatory electrical circuit-LCR circuit, Electro-mechanical analog

Textbook(s):

1. Grewal, B.S., *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 44th ed., 2017.

Reference Book(s):

1. Shanti Narayan, Dr. Mittal P.K, *Differential Calculus*, S. Chand & Co., New Delhi, 1st ed., Reprint 2014.
2. Kreyszig E, *Advanced Engineering Mathematics*, Inc, U.K, John Wiley & sons, 10th ed., 2020.
3. S.S. Sastry, *Engineering Mathematics, Vol.II*, Prentice Hall of India, 3rd ed., 2014.

Web and Video link(s):

1. <https://youtu.be/4EYko9rdF7g?si=WUu12>; NPTEL Video Lecture on Infinite series by Prof. S.K.Ray, Professor of Mathematics, IITK Kanpur.
2. https://youtu.be/0apMXhWG_W8?si=M-abw2Gq3buX5HLM; NPTEL Video Lecture on Fundamental mean value theorems by Prof. Jithendra Kumar, Professor of Mathematics, IITK Kharagpur.
3. <https://youtu.be/6r5jfT8xrXM?si=ryLXYVJr4-iUkdIV>; NPTEL Video Lecture on Exact Differential Equations, Prof. Jithendra Kumar, Professor of Mathematics, IIT Kharagpur.
4. https://youtu.be/kbGhrqV9AOM?si=yGyK_V7kJKGa3OaR; NPTEL Video Lecture on Orthogonal Trajectories of family of curves by Prof. Aditya Sharma, Professor of Physics, IISE Bhopal.
5. <https://youtu.be/btOCUmJkrrg?si=zq3nB00kplm7b5se>; NPTEL Video Lecture on Higher Order Linear Differential Equations, Prof. Jithendra Kumar, Professor of Mathematics, IIT Kharagpur.

Course Articulation Matrix (CAM):				U26MH101: DIFFERENTIAL CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS										
CO		PO 1	PO 2	PO 3	PO 4	PO 5	P O 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO1	U26MH101.1	2	2	1	1	-	-	-	1	1	-	1	2	2
CO2	U26MH101.2	2	2	1	1	-	-	-	1	1	-	1	2	2
CO3	U26MH101.3	2	2	1	1	-	-	-	1	1	-	1	2	2
CO4	U26MH101.4	2	2	1	1	-	-	-	1	1	-	1	2	2
U26MH101		2	2	1	1	-	-	-	1	1	-	1	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	Examine the convergence of a series and interpret mean value theorems.	SDG4	Quality Education	Develops analytical thinking, mathematical reasoning, and problem-solving skills essential for quality technical education.
CO2	Apply partial differentiation to functions of several variables in solving various engineering problems.	SDG9	Industry, Innovation and Infrastructure	Supports engineering design, optimization, modelling, and innovation in industrial and technological applications.
CO3	Apply appropriate methods of differential equations of first order and first degree to solve real-life engineering problems.	SDG9	Industry, Innovation and Infrastructure	Differential equation models are widely used in transportation, environmental systems, population studies, and engineering infrastructure.

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO4	Analyze the solutions of higher order linear differential equations with constant coefficients.	SDG9	Industry, Innovation and Infrastructure	Helps in analyzing dynamic systems, control systems, electrical/mechanical engineering applications, and technological advancement.

ENGINEERING PHYSICS			
Class: B. Tech. I – Semester		Branch: ECV	
Course Code:	U26PY102F	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: evaluate properties of lasers and optical fibre parameters CO2: determine static electric field and magnetic field using Maxwell's equations and determine the properties of dielectric and magnetic materials CO3: analyze V-I characteristics of semiconductor diodes CO4: calculate ripple factor & efficiency of diode rectifier circuits and analyze transistor input /output characteristics			
UNIT-I			9 Hrs
Applied Optics and Lasers: Principles of interference, Diffraction phenomena and applications (qualitative); Basic principles and characteristics of lasers, Absorption, Spontaneous and stimulated emission, Population inversion, Pumping methods, Optical resonator; Types of lasers- Ruby laser, He-Ne laser; Applications of lasers Fiber Optics: Introduction, Total internal reflection, Optical fiber construction, Numerical aperture and acceptance angle; Types of optical fibers - Step index and graded index, Single and multimode, V-number; Power losses in optical fibers (qualitative), Fiber optic communication system			
UNIT-II			9 Hrs
Electricity and Magnetism: Basic laws of electricity and magnetism, Electric displacement, Maxwell's equations Dielectric and Magnetic materials: Dielectrics, Dielectric constant, Dielectric polarization, Types of polarization; Magnetic materials- Permeability, Magnetization, Susceptibility, Ferro, Antiferro and ferri magnetic materials, Hysteresis, Soft and hard magnetic materials and applications			
UNIT-III			9 Hrs
Semiconductor Physics: Classification of solids based on energy band theory- Conductors, Semiconductors and Insulators, Intrinsic semiconductors- Carrier generation and recombination, Intrinsic conductivity; Extrinsic semiconductors- p-type and n-type (qualitative), Extrinsic conductivity, Variation of Fermi energy level with temperature and impurity concentration, Drift and diffusion currents; Hall effect (qualitative) Semiconductor Diodes: Formation of a PN junction, Forward and reverse bias, PN junction diode, Diode current equation, V-I characteristics, Zener diode, Zener diode as voltage regulator, Light emitting diode (LED) and Photodiode			
UNIT-IV			9 Hrs
Rectifiers: Types of rectifiers- Half-wave rectifier, Full-wave rectifier, Ripple factor, Filters-L, C, LC(L-section) and CLC (π - section) Bipolar Junction Transistors (BJTs): Transistor structure, Representation of NPN and PNP transistors, Transistor operation, Transistor configurations - Common base (CB), Common emitter (CE) and Common collector (CC); α , β , γ parameters and their relations			
Textbook(s): 1. M. Avadhanulu and Kshirsagar, TVS Arun Murthy, <i>A Text Book of Engineering Physics</i> , S. Chand & Company Ltd, 11th ed., 2018 (Unit-I, II- Chapter 5, 6, 40, 41, 44 & 47)			

2. S. Salivahanan, N. Suresh Kumar, *Electronic devices and circuits*, Mc Graw Hill, 3rd ed., 2017.
(Unit-III, IV -Chapter 4, 5, 6 & 18)

Reference Book(s):

1. Bhattacharya and Bhaskaran, *Engineering Physics*, Oxford University Press, 1st ed., 2013.
2. V. Rajendran, *Engineering Physics*, Mc Graw Hill, 2013.
3. R.K. Gaur and S.L.Gupta, *Engineering Physics*, Dhanpath Rai and Sons publications, 2013.
4. David Halliday, Robert Resnick & S Krane, *Physics Volume I&II*, Wiley India Limited, 5th edition, 2014.
5. K.B.Raina, S.K.Bhattacharya, T. Joneja, *Electrical Engineering Materials and Electronic Components*, S.K.Kataria & Sons Publisher, 2005.

Web and Video link(s):

1. https://onlinecourses.nptel.ac.in/noc24_ph28/preview; NPTEL video lecture on Concepts in Magnetism and Superconductivity by Prof. Arghya Taraphder IIT Kharagpur.
2. https://onlinecourses.nptel.ac.in/noc24_lw07/preview; NPTEL video lecture on Introduction to Law on Electricity by Prof. Uday Shankar, IIT Kharagpur.
3. https://onlinecourses.nptel.ac.in/noc24_ph45/preview; NPTEL video lecture on Introduction to LASER by Prof. M. R. Shenoy, IIT Delhi.
4. https://onlinecourses.nptel.ac.in/noc24_ee143/preview; NPTEL video lecture on Semiconductor Devices and Circuits by Prof. Sanjiv Sambandan, IISc Bangalore.

Course Articulation Matrix (CAM):		U26PY102F: ENGINEERING PHYSICS												
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26PY102F.1	2	1	-	-	-	1	-	1	1	1	1	2	2
CO2	U26PY102F.2	2	1	-	-	-	1	-	1	1	1	1	2	2
CO3	U26PY102F.3	2	1	-	-	-	1	-	1	1	1	1	2	2
CO4	U26PY102F.4	2	1	-	-	-	1	-	1	1	1	1	2	2
U26PY102F		2	1	-	-	-	1	-	1	1	1	1	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	evaluate properties of lasers and optical fibre parameters	SDG 4	Quality Education	Understanding laser characteristics and optical fibre parameters equips students with advanced knowledge in photonics and communication technologies. This promotes quality education by developing analytical skills, enhancing scientific literacy, and preparing learners for careers in modern technological fields.
		SDG 7	Affordable and Clean Energy	Laser and optical fibre technologies contribute to energy-efficient communication systems by enabling high-speed data transmission with minimal power loss. Optical fibre networks consume less energy compared to conventional communication methods, while laser applications support renewable energy technologies, precision manufacturing, and energy-saving devices.

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
		SDG 9	Industry, Innovation and Infrastructure	Laser technology and optical fiber communications form the backbone of modern telecommunications and medical diagnostics, contributing to affordable, reliable access to information and healthcare services.
CO2	determine static electric field and magnetic field using Maxwell's equations; determine the properties of dielectric and magnetic materials	SDG 4	Quality Education	Develops scientific understanding of material behavior required for engineering education and technical competency.
		SDG 7	Affordable and Clean Energy	Enables selection of efficient materials for electrical systems that reduce losses and improve energy efficiency.
		SDG9	Industry, Innovation and Infrastructure	Provides knowledge of advanced electrical and magnetic materials that are fundamental for designing efficient electrical devices, modern infrastructure systems, and innovative technological applications.
CO3	analyze V-I characteristics of semiconductor diodes	SDG 4	Quality Education	Enhances understanding of semiconductor fundamentals crucial for electronics education and skill development.
		SDG 7	Affordable and Clean Energy	Supports development of energy-efficient semiconductor devices used in renewable energy and power electronics applications.
		SDG9	Industry, Innovation and Infrastructure	Enables application of semiconductor devices in industrial electronics, automation, and smart infrastructure systems.
CO4	calculate ripple factor & efficiency of diode rectifier circuits and analyze transistor input /output characteristics	SDG 4	Quality Education	Builds analytical skills in circuit design and power electronics required for engineering education.
		SDG 7	Affordable and Clean Energy	Supports efficient power conversion and regulation techniques used in sustainable energy systems.
		SDG9	Industry, Innovation and Infrastructure	Enables design of reliable rectifier and transistor circuits for industrial and technological applications.
		SDG11	Sustainable Cities and Communities	Contributes to electrical systems used in smart infrastructure and sustainable urban energy solutions.

PROGRAMMING FOR PROBLEM SOLVING WITH C			
Class: B. Tech. I – Semester		Branch: ECV	
Course Code:	U26VL103	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: enumerate programming development steps, design an algorithm and draw flow chart for a given application CO2: apply logical skills for problem solving using control structures and arrays CO3: develop string operations and modular programming with functions CO4: analyse and implement structures, unions, pointers and files in C programming			
UNIT-I			9 Hrs
Introduction to Programming: Components of a computer, concept of hardware and software, Art of programming through algorithms and flowcharts Overview of C: History of C, Importance of C, Basic structure of C programs Constants, Variables and Data Types: Character set, C tokens, Declaration of variables, Defining symbolic constants Managing Input and Output Operations: Reading a character, Writing a character, Formatted input, Formatted output Operators and Expressions: Arithmetic, Relational, Increment, Decrement, Conditional, Logical, Bit-wise, Special operators, Arithmetic expressions, Evaluation of expressions, Operator precedence and associativity			
UNIT-II			9 Hrs
Decision Making and Branching: Simple if statement, if-else statement, Nesting of if-else statements, else if ladder, switch statement, Conditional operator, goto statement Decision Making and Looping: while statement, do-while statement, for statement, Nested loops, Jumps in loops Arrays: One-dimensional arrays, Declaration of one-dimensional arrays, Initialization of one-dimensional arrays, Linear search, Two-dimensional arrays, Initializing two dimensional arrays, Multi-dimensional arrays, Dynamic arrays			
UNIT-III			9 Hrs
Character Arrays and Strings: Declaring and initializing string variable, Reading strings from terminal, Writing strings to screen, String handling functions, Table of strings Modular Programming with User Defined Functions: Need for user-defined functions, Elements of user-defined functions, Definition of functions, Return values and their types, Function calls, Function declaration, Category of functions, Nesting of functions Recursion, The scope, visibility and lifetime of variables (storage classes)			
UNIT-IV			9 Hrs
Structures and Unions: Defining a structure, Declaring and initializing structure variables, Accessing structure members, Array of structures, Structures within structures, Unions Pointers: Understanding pointers, Declaring and initializing pointer variables, Pointer expressions, Pointers and arrays, Pointers and character strings, Pointers to functions, Pointers and structures, Array of pointers File Management in C: Defining and opening a file, Closing a file, Input and output operations on sequential text files, Random access to files			

Textbook(s):

1. E. Balagurusamy, *Programming in ANSI C*, 8th ed., New Delhi, India: McGraw Hill Education (India), 2022.

Reference Book(s):

1. P. Deitel and H. Deitel, *C How to Program: With Case Studies Introducing Applications Programming and Systems Programming*, 9th ed., Harlow, England: Pearson Education Limited, 2022.
2. B. W. Kernighan and D. M. Ritchie, *The C Programming Language*, 2nd ed., New Delhi, India: Pearson Education India, 2015.
3. R. Thareja, *Programming in C*, 3rd ed., New Delhi, India: Oxford University Press, 2023
4. Y. Kanetkar, *Let Us C*, 19th ed., New Delhi, India: BPB Publications, 2022.
5. A. K. Sharma, *Computer Fundamentals and Programming in C*, 2nd ed., Hyderabad, India: Universities Press, 2018.

Web and Video link(s):

1. <https://nptel.ac.in/courses/106105171>; NPTEL Video Lecture on Problem Solving through Programming in C by Prof. Anupam Basu, Professor of CSE, IIT Kharagpur.
2. <https://nptel.ac.in/courses/106104128>; NPTEL Video Lecture on Introduction to Programming in C by Prof. Satyadev Nandakumar, Professor of CSE, IIT Kanpur.

Course Articulation Matrix (CAM):				U24VL103: PROGRAMMING FOR PROBLEM SOLVING WITH C										
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U24VL103.1	2	1	1	1	-	-	-	1	-	1	2	1	2
CO2	U24VL103.2	2	2	2	1	-	-	-	1	-	1	2	2	2
CO3	U24VL103.3	2	2	3	1	-	-	-	1	-	1	2	2	2
CO4	U24VL103.4	2	2	3	2	-	-	-	1	-	1	2	2	2
U24VL103		2	1.75	2.25	1.25	-	-	-	1	-	1	2	1.75	2

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	enumerate programming development steps, design an algorithm and draw flow chart for a given application	SDG4	Quality Education	Writing a C program begins with understanding algorithms and flowcharts – these teach learners how to break any problem into logical, sequential steps before touching a keyboard. This systematic thinking is the essence of quality technical education. When a student declares a variable, assigns a data type, and uses printf() / scanf() for formatted I/O, they are learning how a computer receives, stores, and communicates information – skills directly applicable to any software career. Operators and expressions in C train students to translate real-world mathematical and logical problems into executable instructions. These concepts make C programming education a powerful vehicle for building digital literacy and technical competence, perfectly aligned with SDG 4's goal of ensuring inclusive, equitable, and quality education that equips youth with relevant skills for employment and life.
CO2	apply logical skills for problem solving using control structures and	SDG9	Industry, Innovation and Infrastructure	In C programming, control structures like if-else and switch are the decision-making engines of every industrial software system – from automated assembly lines to embedded controllers in machines. for and while loops enable repetitive tasks such as reading data from sensors in a loop, continuously monitoring a system state, or iterating over a production dataset. Arrays in C allow storage and manipulation of large datasets in contiguous

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
	arrays			memory – a technique central to writing efficient firmware for industrial microcontrollers. Linear search in C is a direct implementation of the most basic data retrieval algorithm used in low-level embedded systems where advanced libraries are unavailable. Writing these constructs in C – a language used in 70%+ of critical infrastructure software – directly develops the skills that power industrial innovation and technological infrastructure, the heart of SDG 9.
CO3	develop string operations and modular programming with functions	SDG3	Good Health & Well-Being	In C, character arrays and string functions like strlen(), strcpy(), strcmp(), and strcat() are the primary tools for handling text-based patient data – names, diagnoses, prescriptions – in medical device firmware written in C. User-defined functions in C promote modular programming, where each function handles one specific task (e.g., calculate_bmi(), check_heartrate()), making medical software reliable, testable, and maintainable – critical in life-saving devices. Recursion in C is used in algorithms like binary search for patient records and tree traversal in medical data structures. Storage classes (auto, static, extern, register) control memory efficiently in embedded health devices like ECG monitors, pulse oximeters, and insulin pumps – where every byte of memory matters. C remains the dominant language in medical device programming, making this unit directly relevant to SDG 3.
CO4	Analyse and implement structures, unions, pointers and files in C programming	SDG11	Sustainable Cities & Communities	Advanced programming concepts such as data structures, pointers, and file handling form the foundation for developing reliable software systems and modern computing infrastructure. In C, a struct groups related data under one name – for example, a struct citizen can hold name, ID, address, and utility usage together, exactly how urban management systems model real-world entities. Pointers in C enable dynamic and efficient memory access – critical in C programs that run on resource-constrained urban devices like smart meters, traffic signal controllers, and embedded public transport systems. Pointers to structures allow linked-list based data structures used in city-wide route management and network topology of infrastructure. File I/O in C using fopen(), fread(), fwrite(), and fclose() enables persistent data storage – logging power consumption, water usage, or traffic counts to files that city planners use for sustainable decision-making. union saves memory in embedded city devices by sharing memory across different data types. Together, these advanced C concepts are the building blocks of the embedded and systems software that makes smart, sustainable cities possible – directly supporting SDG 11.

BASIC ELECTRICAL ENGINEERING			
Class: B. Tech. I – Semester		Branch: Common to ECE & ECV	
Course Code:	U26EE104B	Credits:	3
Hours/Week (L-T-P-E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i>			
CO1: apply network reduction techniques, Kirchhoff's laws, mesh & nodal analysis to determine resistance, voltage, current & power in electrical circuits CO2: apply suitable network theorems to analyze DC circuits and evaluate the rms, average value, peak factor, form factor of sine wave CO3: evaluate the impedance, voltage, current & power in 1- ϕ AC circuits, resonant frequency, bandwidth & quality factor of series resonant circuits CO4: analyse various two-port networks in terms of impedance, admittance, transmission line, inverse-transmission line, hybrid and and inverse-hybrid parameters			
UNIT-I			9 Hrs
DC circuits: Network elements, Linear & non-linear elements, Active & passive elements, Unilateral & bilateral elements, Ohm's law, Power, Energy, Kirchhoff's laws, Resistances connected in series and parallel, Voltage divider rule & Current divider rule DC circuit analysis: Source transformation, Star-Delta conversion, Mesh analysis & Nodal analysis			
UNIT-II			9 Hrs
DC network theorems (Independent sources only): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem & Millman's theorem. Introduction to AC circuits: R.M.S value, Average value, Peak factor and form factor of a sine wave, Concept of phasor, Phase and phase difference, Rectangular and polar form representation.			
UNIT-III			9 Hrs
1-ϕ AC circuits: Sinusoidal steady state analysis of R, L, C, Series RL, RC, RLC circuits, Parallel RL, RC & RLC circuits, Concept of reactance, Impedance, Susceptance, Admittance, Complex power, Real power, Reactive power and Power factor. Series Resonance, Quality factor, Bandwidth & Selectivity. 3-ϕ AC circuits (Qualitative treatment only): Generation of 3- ϕ voltages, Advantages, Disadvantages, Applications of a three-phase system, Voltage & current relationships of line and phase values for balanced star and delta connections.			
UNIT-IV			9 Hrs
Two port networks: Characterizations of linear time invariant two port networks - open circuit impedance parameters, short circuit admittance parameters, transmission parameters, inverse-transmission parameters, hybrid parameters, inverse-hybrid parameters, symmetry and reciprocity conditions in terms of two-port parameters, inter-relationship between parameters, inter connections of two-port networks, ladder network, bridged-T, parallel-T and lattice-T networks, terminated two-port networks			
Textbook(s): 1. K. Uma Rao, <i>Basic Electrical Engineering</i> , Pearson Education, Delhi, 5th ed., 2011. (Part-I-Chapters 1 to 5) 2. A. Sudhakar, Shyammohan S. Palli, <i>Circuits and Networks</i> , McGraw-Hill Education, 5th ed., 2015. (Chapter 15)			
Reference Book(s): 1. B.L.Thereja, A.K.Thereja, <i>Electrical Technology Vol. I & II</i> , S. Chand & Company Ltd., 2005.			

2. Edward Hughes, *Electrical & Electronics Technology*, Pearson Education, 10th ed., 2010.
3. D. P. Kothari and I. J. Nagrath, *Basic Electrical Engineering*, Tata McGraw Hill, 2010.
4. Chakravarthy A, Sudhipanath and Chandan Kumar, *Basic Electrical Engineering*, Tata McGraw Hill Ltd, 2009.

Web and Video link(s):

1. <https://nptel.ac.in/courses/108/105/108105112>; NPTEL Video Lecture on Fundamentals of Electrical Engineering by Prof. Debapriya Das, Professor of EED, IITK Kharagpur.

Course Articulation Matrix (CAM):		U26EE104B: BASIC ELECTRICAL ENGINEERING												
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26EE104B.1	2	1	-	-	-	-	1	1	1	1	1	2	1
CO2	U26EE104B.2	2	2	-	-	-	-	1	1	1	1	1	2	1
CO3	U26EE104B.3	3	3	1	1	1	1	1	1	1	1	1	2	1
CO4	U26EE104B.4	3	3	1	1	1	1	1	1	1	1	1	2	1
U26EE104B		2.5	2.25	1	1	1	1	1	1	1	1	1	2	1
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	apply network reduction techniques, Kirchhoff's laws, mesh & nodal analysis to determine resistance, voltage, current & power in electrical circuits	SDG 7	Affordable and Clean Energy	Understanding fundamental DC circuit analysis techniques is essential for the design and analysis of power distribution networks and electronic systems. This knowledge enables engineers to create more efficient and reliable electrical systems, contributing to the sustainable and affordable utilization of electrical energy.
CO2	apply suitable network theorems to analyze DC circuits and evaluate the rms, average value, peak factor, form factor of sine wave	SDG 7	Affordable and Clean Energy	The application of network theorems simplifies complex circuit analysis, leading to optimized designs for DC power systems. Furthermore, understanding the characteristics (RMS, average value) of AC waveforms is fundamental for efficient power transmission and conversion, directly impacting energy management and loss reduction.
CO3	evaluate the impedance, voltage, current & power in 1- ϕ AC circuits, resonant frequency, bandwidth & quality factor of series and parallel resonant circuits	SDG 7	Affordable and Clean Energy	Analyzing single-phase AC circuits and resonance phenomena is crucial for designing efficient power systems. Understanding power factor and resonant circuits helps in developing solutions for power factor correction and efficient power transfer, which are vital for reducing energy waste and improving the reliability of electrical grids.
CO4	analyse various two-port networks in terms of impedance, admittance, transmission, hybrid and inverse-hybrid parameters	SDG 9	Industry, Innovation and Infrastructure	Two-port network theory is fundamental to the analysis and design of complex electrical infrastructure, including communication systems, power transmission lines, and filter networks. This knowledge supports the development and modernization of robust industrial and infrastructural electrical systems, fostering innovation in these critical sectors.

ELECTRONIC MEASUREMENTS AND SENSORS			
Class: B. Tech. I – Semester		Branch: ECV	
Course Code:	U26VL105	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i>			
CO1: describe the principle of operation of measurement system, PMMC type analog meter & DMM and distinguish the significant features of CRO, DSO, frequency selective wave analyzer & spectrum analyzer CO2: utilize DC & AC bridge circuits and develop system transfer function for a given transducer based on transducer order CO3: identify passive & active transducers based on the sensing principles and select appropriate transducer for measurement of displacement, force, temperature, pressure, acceleration & flow CO4: identify the advanced sensors based on sensing principles and utilize DAQ system & data transmission techniques for sensor applications			
UNIT-I			9 Hrs
Measurement System: Measurement system– Block diagram, Example, Definitions of static & dynamic characteristics, Types of errors Indicating Devices: Analog meter– PMMC principle, I/p-O/p expression of PMMC ammeter, Measurement of current & voltage using PMMC meter; Digital meter– Resolution & accuracy of digital meter, Block diagram & working principle of Digital Multimeter (DMM)			
UNIT-II			9 Hrs
Display Devices (Block diagram approach): Principle of operation of oscilloscopes– Cathode ray oscilloscope (CRO), Digital storage oscilloscope (DSO); Principle of operation of analyzers– Frequency selective wave analyzer, Spectrum analyzer DC and AC Bridge Circuits: Measurement of R, L, C & frequency using bridge circuits– Wheatstone bridge, Maxwell’s bridge, Schering bridge, Wien’s bridge			
UNIT-III			9 Hrs
Transducers: Definition, Ideal requirements of transducer, Transducer classification Transducers and Applications (Schematic approach): Strain gauge (SG) transducer– Piezoresistive effect, SG full bridge configuration circuit; Temperature transducers– RTD, Thermistor, Thermocouple (TC) transducer; Capacitive transducers– Variable gap, Variable area, Variable dielectric types; Piezoelectric transducer (PZT), Light dependent resistor (LDR), Photodiode, Linear variable differential transformer (LVDT) type displacement transducer, Hall-effect transducer			
UNIT-IV			9 Hrs
Advanced Sensors (Schematic approach): Humidity sensors– Capacitive & Electrical conductivity types; Microphones– Fiber-optic & Piezoelectric types; Level sensors– Thin-film, Capacitive & Ultrasonic types; Motion detectors– Capacitive occupancy & PIR types; Gyroscope sensor, Active-pixel sensor, Charge-coupled device Image sensor			

Textbook(s):

1. D. V. S. Murty, *Transducers and Instrumentation*, 2nd ed. New Delhi: PHI Learning Pvt. Ltd., 2008. (Chapters 1,4,6,7&10)
2. Jacob Fraden, *Hand book of Modern sensors physics, designs, and applications*, 3rd ed. New York: AIP Press, 2004. (Chapters 5,6,7,8,12& 13)
3. Albert D. Helfrick, Cooper William D, *Modern Electronic Instrumentation and Measurement Techniques*, 2nd ed. New Delhi: PHI Learning Pvt. Ltd., 1997. (Chapters 4,5,6,7,8&9)

Reference Book(s):

1. B.C. Nakra and K.K Choudhary, *Instrumentation Measurement and Analysis*, 2nd ed. New Delhi: Tata McGraw Hill, 2006.
2. P. Pruthviraj, B. Bhudaditya, S. Das and K. Chiranjib, *Electrical and Electronic Measurement and Instrumentation*, 2nd ed. New Delhi: McGraw Hill Education, 2011.
3. Arun K. Ghosh, *Introduction to Transducers*, 4th ed. New Delhi: Prentice Hall of India, 2015.
4. Sawhney A.K, *Electrical and Electronic Measurement and Instrumentation*, 10th ed. New Delhi: Dhanpat Rai & Sons, 1994.
5. B.G. Liptak, *Instrument Engineers Hand Book*, Vol. I & Vol. II, 4th ed. Philadelphia: Chilton book co., 2006.

Web and Video link(s):

1. https://onlinecourses.nptel.ac.in/noc22_ee112; NPTEL Video Lecture on Electrical Measurement and Electronic Instruments by Prof. Avishek Chatterjee, Professor of Electrical Engineering, IIT Kharagpur.
2. https://onlinecourses.nptel.ac.in/noc21_ee32; NPTEL Video Lecture on Sensors and Actuators by Prof. Hardik Jeetendra Pandya, Professor of Department of Electronic Systems Engineering, IISc Bangalore.

Course Articulation Matrix (CAM):			U26VL105: ELECTRONIC MEASUREMENTS AND SENSORS											
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VL105.1	3	2	2	1	2	2	2	-	2	1	2	2	2
CO2	U26VL105.2	3	2	2	1	2	2	2	-	2	1	2	2	2
CO3	U26VL105.3	3	2	2	1	2	2	2	-	2	1	2	2	2
CO4	U26VL105.4	3	2	2	1	2	2	2	-	2	1	2	2	2
U26VL105		3	2	2	1	2	2	2	-	2	1	2	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	describe the principle of operation of measurement system, PMMC type analog meter & DMM and distinguish the significant features of CRO, DSO, frequency selective wave analyzer & spectrum analyzer	SDG4	Quality Education	develops foundational knowledge in electrical and electronic instrumentation, measurement techniques, and signal analysis. Learning about PMMC meters, DMMs, CROs, DSOs, and spectrum analyzers strengthens technical competency, practical laboratory skills, and engineering education outcomes essential for quality technical education.
CO2	utilize DC & AC bridge circuits and develop system transfer function for	SDG9	Industry, Innovation and	DC/AC bridge circuits and transducers are fundamental components in industrial measurement, automation,

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
	a given transducer based on transducer order		Infrastructure	process control, and sensor systems. Developing transfer functions enables accurate system modeling, monitoring, and innovation in smart instrumentation and industrial technologies.
CO3	identify passive & active transducers based on the sensing principles and select appropriate transducer for measurement of displacement, force, temperature, pressure, acceleration & flow	SDG9	Industry, Innovation and Infrastructure	Transducers are essential components in industrial automation, smart systems, healthcare devices, environmental monitoring, robotics, and process industries. Selecting appropriate sensors supports reliable monitoring, efficient infrastructure, and technological innovation.
CO4	identify the advanced sensors based on sensing principles and utilize DAQ system & data transmission techniques for sensor applications	SDG13	Climate Action	Advanced sensing and DAQ technologies are important in environmental monitoring, pollution measurement, weather data collection, and climate observation systems, helping in data-driven environmental management and sustainability initiatives.

ENGINEERING PHYSICS LABORATORY			
Class: B. Tech. I – Semester		Branch: ECV	
Course Code:	U26PY106F	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: measure diameter of wire and hollow tubes using Vernier callipers and screw gauge CO2: determine the width of a narrow slit and wavelength of laser using diffraction phenomenon and numerical aperture of an optical fiber CO3: calculate the dielectric constant of a material and plot the hysteresis curve of ferromagnetic material CO4: determine forward voltage and currents from V-I characteristics of semiconductor diodes; identify cut-off, saturation and active regions of NPN transistor			
LIST OF EXPERIMENTS			
1. Linear Measurements using Vernier callipers and screw gauge 2. Determination of wavelength of He-Ne laser using reflection diffraction grating 3. Determination of wavelength of He-Ne laser using transmission diffraction grating 4. Numerical aperture and acceptance angle of an optical fiber 5. Determination of dielectric constant of materials using parallel plate capacitor 6. Magnetic hysteresis – B-H curve tracing using CRO 7. Study of V-I characteristics of PN junction diode 8. Study of V-I characteristics of LED 9. Determination of energy band gap of given semiconductor material 10. Determination of Hall coefficient and carrier density of given semiconducting material using Hall effect setup 11. Study of characteristics of half-wave and full-wave rectifier 12. Study of common emitter characteristics of NPN transistor			
Textbook(s): 1. M. Avadhanulu and Kshirsagar, TVS Arun Murthy, <i>A Text Book of Engineering Physics</i> , S. Chand & Company Ltd, 11th ed., 2018. (Chapter 5, 6, 40, 41, 44 & 47) 2. S Salivahanan, N Suresh Kumar, <i>Electronic devices and circuits</i> , Mc Graw Hill, 3rd ed., 2017. (Chapter 4, 5, 6 & 18)			
Reference Book(s): 1. Bhattacharya and Bhaskaran, <i>Engineering Physics</i> , Oxford University Press, 1st ed., 2013. 2. V. Rajendran, <i>Engineering Physics</i> , Mc Graw Hill, 2013. 3. R.K. Gaur and S.L.Gupta, <i>Engineering Physics</i> , Dhanpath Rai and Sons publications, 2013. 4. David Halliday, Robert Resnick & S Krane, <i>Physics Volume I&II</i> , Wiley India Limited, 5th ed., 2014. 5. K.B.Raina, S.K.Bhattacharya, T. Joneja, <i>Electrical Engineering Materials and Electronic Components</i> , S.K.Kataria & Sons Publisher, 2005.			
Laboratory Manual: 1. Manual for <i>Engineering Physics Laboratory</i> , Prepared by the faculty of Dept. of PS, KITSW. 2. A.K.Katiyar, C.K.Pandey, <i>Engineering Physics Theory and Practical</i> , Wiley India Pvt. Ltd, 2nd ed., 2017.			

Course Articulation Matrix (CAM):				U26PY102F: ENGINEERING PHYSICS LABORATORY										
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26PY102F.1	2	1	1	-	1	1	1	1	2	-	1	2	1
CO2	U26PY102F.2	2	1	-	-	1	1	1	1	2	-	1	2	1
CO3	U26PY102F.3	2	1	-	-	1	1	1	1	2	-	1	2	1
CO4	U26PY102F.4	2	1	-	1	1	1	1	1	2	1	1	2	1
U26PY102F		2	1	1	1	1	1	1	1	2	1	1	2	1
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	measure diameter of wire and hollow tubes using Vernier callipers and screw gauge	SDG4	Quality Education	Develops practical laboratory skills, measurement accuracy, and technical competency essential for effective engineering education.
CO2	determine the width of a narrow slit and wavelength of laser using diffraction phenomenon and numerical aperture of an optical fiber	SDG9	Industry, Innovation and Infrastructure	Strengthens understanding of optical communication technologies that support industrial innovation and modern engineering infrastructure.
CO3	calculate the dielectric constant of a material and plot the hysteresis curve of ferromagnetic material	SDG7	Affordable and Clean Energy	Promotes understanding of semiconductor and solar energy devices that contribute to sustainable and clean energy technologies.
CO4	determine forward voltage and currents from V-I characteristics of semiconductor diodes; identify cut-off, saturation and active regions of NPN transistor	SDG9	Industry, Innovation and Infrastructure	Enhances knowledge of material characterization techniques essential for technological advancement and engineering innovation.

PROGRAMMING FOR PROBLEM SOLVING WITH C LABORATORY			
Class: B. Tech. I – Semester		Branch: ECV	
Course Code:	U26VL107	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	24 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: develop programs using operators and decision making statements CO2: apply loops and arrays to develop a program of an application CO3: implement string operations and develop modular programs using user-defined functions, recursion, and storage classes CO4: develop programs using structures, unions, pointers and files			
LIST OF EXPERIMENTS			
1. To develop the Programs using input output functions, operators (arithmetic, relational and conditional) 2. To develop the Programs using operators (bit-wise, logical, increment and decrement) 3. To develop the Programs using conditional control structures: if, if-else, nested if 4. To develop the Programs using else if ladder, switch and goto statements 5. To develop the Programs using loop control structures: while 6. To develop the Programs using loop control structures: do-while and for 7. To develop the Programs on one-dimensional array and two-dimensional array 8. To develop the Programs on String operations and string handling functions 9. To develop the Programs on different types of functions, parameter passing using call-by-value & call-by-address, recursion and storage classes 10. To develop the Programs using structures, unions, pointers to arrays and pointers to strings 11. To develop the Programs using array of pointers and pointers to structures 12. To develop the Programs on File operations and file handling functions for sequential text files			
<u>Text Book(s):</u> 1. Balagurusamy, <i>Programming in ANSI C</i> , 8th ed., New Delhi, India: McGraw Hill Education (India), 2022.			
<u>Reference Book(s):</u> 1. P. Deitel and H. Deitel, <i>C How to Program: With Case Studies Introducing Applications Programming and Systems Programming</i> , 9th ed., Harlow, England: Pearson Education Limited, 2022. 2. B. W. Kernighan and D. M. Ritchie, <i>The C Programming Language</i> , 2nd ed., New Delhi, India: Pearson Education India, 2015. 3. R. Thareja, <i>Programming in C</i> , 3rd ed., New Delhi, India: Oxford University Press, 2023 4. Y. Kanetkar, <i>Let Us C</i> , 19th ed., New Delhi, India: BPB Publications, 2022. 5. A. K. Sharma, <i>Computer Fundamentals and Programming in C</i> , 2nd ed., Hyderabad, India: Universities Press, 2018.			

Web and Video link(s):

1. <https://nptel.ac.in/courses/106105171>; NPTEL Video Lecture on Problem Solving through Programming in C by Prof. Anupam Basu, Professor of CSE, IIT Kharagpur.
2. <https://nptel.ac.in/courses/106104128>; NPTEL Video Lecture on Introduction to Programming in C by Prof. Satyadev Nandakumar, Professor of CSE, IIT Kanpur.

Laboratory Manual:

1. Manual for Programming for Problem Solving with C Laboratory, Prepared by the faculty of Dept. of IT, KITSW.

Course Articulation Matrix (CAM):					U26VL107: PROGRAMMING FOR PROBLEM SOLVING WITH C LABORATORY									
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VL107.1	1	1	1	1	1	-	1	1	1	-	2	1	2
CO2	U26VL107.2	1	2	2	2	1	-	1	1	1	-	2	2	2
CO3	U26VL107.3	1	2	3	2	1	-	1	1	1	-	2	2	2
CO4	U26VL107.4	1	2	3	2	1	-	1	1	1	-	2	2	2
U24VL107		1	2.25	2.25	1.75	1	-	1	1	1	-	2	1.75	2

CO-SDG Alignment Matrix				
CO	CO Statement The student should be able to...	Relevant SDG	SDG Description	Mapping Justification
CO1	develop programs using operators and decision making statements	SDG 4	Quality education	Unit I introduces the absolute fundamentals of programming – I/O, operators, and decision-making – which are the entry point to computational literacy for every learner. Mastering bitwise, relational, and conditional constructs develops precise logical thinking that SDG 4 promotes: inclusive, quality education that equips individuals with foundational digital skills relevant to today's economy.
CO2	apply loops and arrays to develop a program of an application	SDG 9	Industry, Innovation and Infrastructure	Control flow structures – branching and iteration – are the building blocks of every industrial software system. Switch-case logic powers embedded firmware, protocol handlers, and state machines used in industrial automation. Loop constructs drive data processing pipelines, sensor polling, and real-time monitoring systems. These experiments develop the programming capability needed to build the innovative, reliable software infrastructure that SDG 9 calls for.
CO3	implement string operations and develop modular programs using user-defined functions, recursion, and storage classes	SDG 4	Quality education	Unit III marks the transition to structured, modular thinking – arrays, strings, functions, and recursion represent the intellectual leap from writing instructions to designing programs. Understanding parameter passing (by value vs address), scope via storage classes, and recursive decomposition develops higher-order analytical skills. This directly advances SDG 4's goal of

CO-SDG Alignment Matrix				
CO	CO Statement The student should be able to...	Relevant SDG	SDG Description	Mapping Justification
				fostering deep, transferable learning outcomes in technical education.
CO4	develop programs using structures, unions, pointers and files	SDG 9	Industry, Innovation and Infrastructure	Structures, pointers, and file handling are the cornerstones of systems-level and application programming used across industrial software. Structures model real-world entities in embedded systems and device drivers; pointer arithmetic is essential for OS kernel development and memory-efficient applications; file I/O enables persistent data storage in every production system. These skills directly contribute to building the robust digital infrastructure that SDG 9 envisions.

BASIC ELECTRICAL ENGINEERING LABORATORY			
Class: B. Tech. I – Semester		Branch: ECE & ECV	
Course Code:	U26EE108B	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: validate electrical circuits using mesh and nodal analysis CO2: validate network theorems CO3: determine the impedance of series RL & RC circuits at various operating frequencies CO4: determine line & phase quantities for balanced 3-Ø Star and Delta connection			
LIST OF EXPERIMENTS			
1. Verification of Kirchoff's laws 2. Verification of voltage divider rule and current divider rule 3. Verification of Mesh and Nodal Analysis 4. Verification of Superposition Theorem 5. Verification of Thevenin's Theorem 6. Verification of Maximum power transfer Theorem 7. Determination of internal parameters of a choke coil 8. Impedance calculations and phasor representation of RL series circuit 9. Impedance calculations and phasor representation of RC series circuit 10. Frequency response of series RLC circuit 11. Voltage and current relationships between line & phase quantities for balanced 3-phase star & delta connections 12. Determination of transmission line parameters and hybrid parameters of Two-port network			
<u>Textbook(s):</u> 1. K. Uma Rao, Basic Electrical Engineering, Pearson Education, Delhi, 5th ed., 2011. (<i>Part-I-Chapters 1 to 5</i>) 2. A. Sudhakar, Shyammohan S. Palli – Circuits and networks, McGraw-Hill Education, 5th ed., 2015. (<i>Chapter 15</i>)			
<u>Reference Book(s):</u> 1. B.L.Thereja, A.K.Thereja, Electrical Technology Vol. I & II, S.Chand & Company Ltd, 2005. 2. Edward Hughes, Electrical & Electronics Technology, Pearson Education, 10th ed., 2010. 3. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, 2010. 4. Chakravarthy A, Sudhipanath and Chandan Kumar, Basic Electrical Engineering, Tata McGraw Hill Ltd, 2009.			
<u>Web and Video link(s):</u> 1. https://nptel.ac.in/courses/108/105/108105112 ; NPTEL Video Lecture on Fundamentals of Electrical Engineering by Prof. Debapriya Das, Professor of EED, IITK Kharagpur.			
<u>Laboratory Manual:</u> 1. Manual for <i>Basic Electrical Engineering Laboratory</i> , Prepared by the faculty of Dept. of EEE, KITSW.			

Course Articulation Matrix (CAM):		U26EE108B: BASIC ELECTRICAL ENGINEERING LABORATORY												
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26EE108B.1	2	1	-	-	-	-	1	1	1	1	1	2	1
CO2	U26EE108B.2	2	2	-	-	-	-	1	1	1	1	1	2	1
CO3	U26EE108B.3	3	3	1	1	1	1	1	1	1	1	1	2	1
CO4	U26EE108B.4	3	3	1	1	1	1	1	1	1	1	1	2	1
U26EE108B		2.5	2.25	1	1	1	1	1	1	1	1	1	2	1
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	validate electrical circuits using mesh and nodal analysis	SDG 7	Affordable and Clean Energy	Understanding circuit analysis techniques enables efficient design and operation of electrical systems, contributing to reliable and energy-efficient utilization of electrical power.
CO2	validate network theorems	SDG 7	Affordable and Clean Energy	Application of network theorems helps simplify circuit analysis, leading to optimized electrical system design and improved energy management practices.
CO3	determine the impedance of series RL & RC circuits at various operating frequencies	SDG 7	Affordable and Clean Energy	Analysis of AC and resonant circuits supports the development of efficient power systems, improved power factor correction, and effective utilization of electrical energy.
CO4	determine line & phase quantities for balanced 3-Ø Star and Delta connection	SDG 9	Industry, Innovation and Infrastructure	Knowledge of three-phase systems and network topology analysis contributes to the design, operation, and modernization of electrical infrastructure and industrial power networks.

ELECTRONIC MEASUREMENTS AND SIMULATION LABORATORY			
Class: B. Tech. I – Semester		Branch: ECV	
Course Code:	U26VL109	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: measure AC voltage / current using a PMMC based instrument CO2: determine unknown values of resistance, inductance, and frequency using Wheatstone's bridge, Wien's bridge, & Maxwell's bridge circuits CO3: develop LabVIEW based Virtual-Instrumentation (VI) programs using controls & indicators, loop structures, arrays, & matrices for engineering data processing tasks CO4: design & implement a LabVIEW-based Data acquisition (DAQ) program to acquire, condition, & display real-time sensor data for engineering applications			
LIST OF EXPERIMENTS			
1. Conversion of PMMC type ammeter to voltmeter and Range extension of PMMC type Ammeter 2. Measurement of A.C. voltage using PMMC meter 3. Measurement of resistance using Wheatstone bridge circuit setup 4. Measurement of frequency using Wien's bridge circuit setup 5. Measurement of inductance using Maxwell's bridge circuit setup 6. LabVIEW Programme on Controls and Indicators 7. LabVIEW Programme on Matrices 8. LabVIEW Programme on Loops (For Loop and While Loop Structures) 9. LabVIEW Programme on Arrays (1-D and 2-D Arrays) 10. LabVIEW Programme for Acquiring Real-Time Sensor Data (DAQ-based Virtual Instrumentation)			
<u>Textbook(s):</u> 1. A. K. Sawhney, <i>A Course in Electrical and Electronic Measurements and Instrumentation</i> , Dhanpat Rai & Co., New Delhi.			
<u>Reference Book(s):</u> 1. Jovitha Jerome, <i>Virtual Instrumentation using LabVIEW</i> , PHI Learning Pvt. Ltd., New Delhi, 2010.			
<u>Web and Video link(s):</u> 1. https://nptel.ac.in/courses/108105153 ; NPTEL Video Lecture on Electrical Measurement and Electronic Instruments, Professor of EEE, IIT Kharagpur.			
<u>Laboratory Manual:</u> 1. Manual for <i>Electronic Measurements and Simulation Laboratory</i> , Prepared by the faculty of Dept of ECIE, KITSW.			

Course Articulation Matrix (CAM):				U26VL109: ELECTRONIC MEASUREMENTS AND SIMULATION LABORATORY										
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VL109.1	3	2	2	2	2	1	-	1	2	1	-	2	2
CO2	U26VL109.2	3	3	2	3	2	1	-	1	2	1	-	2	2
CO3	U26VL109.3	2	2	3	2	3	1	-	1	2	1	1	2	2
CO4	U26VL109.4	2	2	3	3	3	2	2	1	2	2	1	2	2
U26VL109		2.5	2.25	2.5	2.5	2.5	1.25	0.5	1	2	1.25	0.5	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	measure AC voltage / current using a PMMC based instrument	SDG4	Quality Education	Hands-on conversion/extension of meter ranges builds quality technical education and skill development
		SDG7	Affordable and Clean Energy	Accurate voltage/current measurement supports efficient design and monitoring of electrical and energy systems, contributing to affordable and clean energy practices
CO2	determine unknown values of resistance, inductance, and frequency using Wheatstone's bridge, Wien's bridge, & Maxwell's bridge circuits	SDG4	Quality Education	Precise determination of resistance, inductance and frequency strengthens practical measurement competence
		SDG7	Affordable and Clean Energy	underpins efficient design/testing of electrical components used in energy systems
		SDG12	Responsible Consumption and Production	Reliable bridge-based calibration reduces material wastage and rework in component testing, supporting responsible production practices
CO3	develop LabVIEW based Virtual-Instrumentation (VI) programs using controls & indicators, loop structures, arrays, & matrices for engineering data processing tasks	SDG4	Quality Education	Developing LabVIEW programmes using controls, loops, arrays and matrices builds quality, industry-relevant computing and instrumentation skills
		SDG9	Industry, Innovation and Infrastructure	directly supports innovation in automation, virtual instrumentation and digital infrastructure aligned with Industry 4.0
CO4	design & implement a LabVIEW-based Data acquisition (DAQ) program to acquire, condition, & display real-time sensor data for engineering applications	SDG4	Quality Education	Real-time sensor data acquisition imparts advanced practical skills in instrumentation
		SDG9	Industry, Innovation and Infrastructure	equips students to build innovative, automated sensing and monitoring systems that strengthen resilient industrial and infrastructure applications

IDEA LAB MAKERSPACE			
Class: B. Tech. I – Semester		Branch: Common to all branches	
Course Code:	U26AE110	Credits:	1
Hours/Week (L-T-P-E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to ...</i> CO1: develop technical skills such as 3D printing, Laser engraving, Wood carving and Robotics CO2: apply the techniques and principles of welding, carpentry and foundry to produce required prototype/model CO3: design and build a IoT based and PCB system for a given application CO4: engage in project-based learning which reinforces theoretical knowledge through practical application			
S. No.	CREATIVE FABRICATION TECHNOLOGY	LIST OF EXPERIMENTS	
1.	3D Printing	Prepare a key chain on 3D printer with the given dimensions	
2.		Prepare a Spur Gear on 3D printer with the given dimensions	
3.	Laser Engraving	Perform key chain by using CO ₂ laser cutting machine	
4.	Welding	Prepare a Single V-Butt joint on mild steel plates using AC arc welding machine	
5.	CNC Wood Router	Perform wood carving using CNC (Computer numerical Control) Wood Router	
6.	Carpentry	Prepare a half lap dovetail joint	
7.	Foundry	Prepare a sand mould using single piece pattern	
8.	Injection Moulding	Prepare a plastic product using Injection moulding machine	
9.	Printed Circuit Board (PCB)	Design and fabricate a PCB (Printed Circuit Board) for a given application	
10.	Internet of Things (IoT)	Measure the temperature and humidity by using DHT11 sensor and Arduino UNO	
11.		Create a Smart Plant Watering System using IoT (Internet of Things) technology	
12.	Robotics	Perform basic pick-and-place operation using robot	
Course Project		• Students are required to create an affordable prototype as their final project for the end semester exam (ESE), based on the knowledge and skills acquired during the course. • Students have to present and submit their prototypes to demonstrate their ability to apply classroom learning practically, showcasing their creativity and technical aptitude.	
Textbook(s): 1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy., <i>Elements of Workshop Technology</i> , Media Promoters and publishers Pvt. Ltd, India, Vol-I-2008 & Vol-II-2010.			

Reference Book(s):

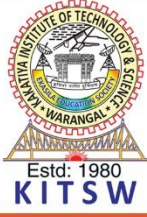
1. Ian Gibson, David Rosen, Brent Stucker, Mahyar Khorasani, *Additive Manufacturing Technologies-3D Printing, Rapid Prototyping, and Direct Digital Manufacturing*, Springer Nature, 2nd ed. 2021.
2. R.S. Khandpur, *Printed Circuit Boards: Design, Fabrication, Assembly and Testing*, New Delhi Tata Mc Graw Hill, 2008.
3. Sudeep Mishra, Anandarupmukherjee and Arijit Roy, *Introduction to IoT*, New Delhi: University Cambridge Press, 2021.

Laboratory Manual:

1. Manual for *IDEA LAB MAKERSPACE*, Prepared by the faculty of Dept. of ME, KITSW, Revised version 4, July-2026.

Course Articulation Matrix (CAM):				U26AE110: IDEA LAB MAKERSPACE										
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO1	U26AE110.1	2	2	1	1	2	1	1	1	1	1	1	1	2
CO2	U26AE110.2	2	2	1	1	2	1	1	1	1	1	1	1	2
CO3	U26AE110.3	2	2	1	1	2	1	1	1	1	1	1	1	2
CO4	U26AE110.4	2	2	1	1	2	1	1	1	1	1	1	1	2
U26AE110		2	2	1	1	2	1	1	1	1	1	1	1	2

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	develop technical skills such as 3D printing, Laser engraving, Wood carving and Robotics	SDG 4	Quality Education	Development of modern fabrication and automation skills enhances technical competency, creativity, innovation and employability of students through hands-on learning and skill-oriented education
CO2	apply the techniques and principles of welding, carpentry and foundry to produce required prototype/model	SDG 9	Industry, Innovation and Infrastructure	Practical exposure to manufacturing and prototyping techniques promotes industrial skills, innovation capability and infrastructure-oriented engineering practices required for sustainable industrial development
CO3	design and build a IoT based and PCB system for a given application	SDG 11	Sustainable Cities and Communities	IoT and embedded system development supports smart technologies, automation, efficient resource monitoring and sustainable solutions for modern industries & communities
CO4	engage in project-based learning which reinforces theoretical knowledge through practical application	SDG 8	Decent Work and Economic Growth	Project-based learning improves problem-solving, teamwork, innovation and practical engineering skills, preparing students for productive employment and entrepreneurship in emerging technologies



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

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काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६०१५, तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

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Semester – II Syllabi

MATRIX THEORY AND VECTOR CALCULUS			
Class: B. Tech. II – Semester		Branch: Common to all branches	
Course Code:	U26MH201	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: analyze eigen value problems using matrix theory CO2 : apply basic concepts of multiple integrals in evaluating physical quantities of real-life engineering problems CO3: apply differential operators on vector and scalar point functions CO4: solve line, surface, volume integrals and correlate these with applications of Green, Stoke and Gauss divergence theorems			
UNIT-I			9 Hrs
Matrices: Rank of a Matrix, Elementary transformations of a matrix, Gauss Jordan method of finding the inverse, Normal form of a matrix, Consistency of linear system of equations, System of linear homogenous equations, Eigen values, Eigen vectors, Properties of Eigen values, Cayley Hamilton's theorem, Reduction to diagonal form, Factorization method (LU Decomposition) Applications of Eigen value problems: Stretching of an elastic membrane, Eigen value problems arising from Markov processes, Eigen value problems arising from population models, Leslie model			
UNIT-II			9 Hrs
Multiple Integrals and Beta, Gamma functions: Double Integrals, change of order of integration, Double Integrals in polar coordinates, Area enclosed by plane curves, Triple integrals, Volumes of solids, Calculation of Mass for a plane lamina, Beta function, Gamma function, Relation between Beta and Gamma functions (without proof)			
UNIT-III			9 Hrs
Vector Calculus and its Applications: Vector Space, Linear dependent and independent vectors, Differentiation of vectors, Curves in space, Tangent, Principal normal, Binormal, Curvature, Torsion, Velocity and acceleration, Scalar and vector point functions, Del applied to scalar point functions - Gradient, Geometrical interpretation, Directional derivative, Del applied to vector point functions -Divergence, Curl, Physical interpretation of divergence, Physical interpretation of curl, Del applied twice to point functions, Del applied to products of point functions, Decomposition of vector valued functions			
UNIT-IV			9 Hrs
Integration of Vectors: Line integral, Surfaces-Surface integral, flux across a surface, Green's theorem in the plane (without proof), Stoke's theorem (Relation between line and surface integrals) (without proof), Volume integral, Gauss divergence theorem (Relation between surface and volume integrals) (without proof), irrotational fields, solenoidal fields			
Textbooks: 1. Grewal, B.S., <i>Higher Engineering Mathematics</i>, Khanna Publishers, Delhi, 44th ed., 2017. (Chapters 2,7,8) 2. Kreyszig E, <i>Advanced Engineering Mathematics</i>, Inc, U.K, John Wiely &sons, 10th ed., 2020. (Chapter 8(8.2))			

Reference Book(s):

1. Spiegel M, *Vector Analysis*, Schaum's Series, McGraw Hill, 2nd ed., 2017.
2. S.S. Sastry, *Engineering Mathematics, Vol.II*, Prentice Hall of India, 3rd ed., 2014.
3. Gilbert Strang, *Introduction to Linear Algebra*, Wellesley-Cambridge Press, 5th ed., 2014.

Web and Video link(s):

1. <https://youtu.be/L4crGhtEX14?si=hyjAPgDheJOHxTYZ>; NPTEL Video Lecture on Matrix Analysis with Applications/Dr.S.K.Gupta and Dr.Sanjeev Kumar/IIT Roorkee
2. https://youtu.be/ksS_yOK1vTk?si=CNNA58OIuszubPiX; NPTEL Video Lecture on Integral and Vector Calculus./Prof.Hari Shankar Mahato / IIT Kharagpur

Course Articulation Matrix (CAM):				U26MH201 MATRIX THEORY AND VECTOR CALCULUS										
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26MH201.1	2	2	1	1	-	-	-	1	1	-	1	2	2
CO2	U26MH201.2	2	2	1	1	-	-	-	1	1	-	1	2	2
CO3	U26MH201.3	2	2	1	1	-	-	-	1	1	-	1	2	2
CO4	U26MH201.4	2	2	1	1	-	-	-	1	1	-	1	2	2
U26MH201		2	2	1	1	-	-	-	1	1	-	1	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	analyze eigen value problems using matrix theory	SDG4	Quality Education	If the work focuses on mathematical learning, computational methods, or improving higher education and research in mathematics and engineering.
CO2	apply basic concepts of multiple integrals in evaluating physical quantities of real-life engineering problems	SDG9	Industry, Innovation and Infrastructure	Multiple integrals are applied in engineering fields such as fluid mechanics, thermodynamics, and structural analysis to evaluate physical quantities in real-world systems. In Computer Science and Engineering (CSE) and AI & ML, they are used in image processing, computer graphics, data modeling, probability distributions, and optimization techniques.
CO3	apply differential operators on vector and scalar point functions	SDG9	Industry, Innovation and Infrastructure	Applying differential operators on scalar and vector point functions is essential in fluid dynamics, electromagnetism, engineering analysis, and computational modeling. These mathematical tools are widely used in scientific research, technological development, and modern engineering applications.
CO4	solve line, surface, volume integrals and correlate these with	SDG9	Industry, Innovation and Infrastructure	Line, surface, and volume integrals along with Green's, Stoke's, and Gauss divergence theorems are widely used in

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
	applications of Green, Stoke and Gauss divergence theorems			engineering, fluid mechanics, electromagnetics, and computational science. In Computer Science and Engineering, these concepts are applied in computer graphics, image processing, simulation techniques, artificial intelligence, and data visualization.

ENGINEERING CHEMISTRY			
Class: B. Tech. II Semester		Branch: ECV	
Course Code:	U26CY202F	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: apply electrochemical principles for energy storage and conversion applications CO2: implement water analysis techniques and corrosion control methods for engineering materials CO3: utilize spectroscopic techniques to identify chemical compounds and apply polymer materials in engineering practices CO4: select appropriate nanomaterial synthesis techniques based on the required application and material properties.			
UNIT-I			9 Hrs
Electrochemical Energy Systems: Specific conductance, Equivalent conductance, Effect of dilution, Conductometric titrations-Acid base titrations-Strong acid vs strong base, Weak acid vs strong base, Strong acid vs weak base and Weak acid vs weak base, Electrode potential, pH meter, Principle of pH measurements, Electrodes, pH meters, Nernst equation, Potentiometric titrations -Acid base titrations, Biosensors Batteries: Primary and secondary batteries-Lead-acid battery and Li-ion battery Fuel cells: Hydrogen-oxygen fuel cell			
UNIT-II			9 Hrs
Water Technology and Corrosion: Introduction, Hardness of water, Estimation of hardness of water by complexometry, Alkalinity, Determination of alkalinity, Numerical problems, Determination of fluoride by spectrophotometry, Ion-exchange method, Desalination of brackish water, Reverse osmosis (RO), Electro dialysis, Quality parameters of potable water (BIS and WHO) Corrosion: Introduction, Dry corrosion, Wet corrosion, Pilling-Bedworth rule, Effect of purity, Relative areas of anodic and cathodic parts, Nature of surface film, Humidity, pH and temperature on corrosion, Cathodic protection, Impressed current cathodic protection, Sacrificial anodic protection, Electroplating			
UNIT-III			9 Hrs
Spectroscopy: Introduction to spectroscopy Microwave spectroscopy- Principle, Selection rules, Applications Infra-red spectroscopy- Principle, Selection rules, Applications UV Spectroscopy- Lambert-Beer's law and its applications Polymers: Polymer, Monomer, Condensation polymerization, Thermo-setting and thermo plastic resins, Applications of bakelite and poly vinyl chloride (PVC)			
UNIT-IV			9 Hrs
Engineering Materials - Nanomaterials: Introduction, Size dependent properties-Surface area, Electrical, Optical and catalytic properties; Synthesis of nanomaterials-Top down and bottom-up approaches, Synthesis by sol-gel and precipitation method; Nanoscale materials-Fullerenes, Carbon nanotubes, 2D nanomaterials-graphene, Properties and applications; Biosensors			
Textbook(s): 1. Jain and Jain, <i>Engineering Chemistry</i> , Dhanpat Rai Publishing Company, 17th ed., 2019.			

Reference Book(s):

1. J. C. Kuriacose and J. Rajaram, *Chemistry in Engineering and Technology (vol. I & vol. II)*, Tata Mc Graw-Hills Education Pvt. Ltd., 2010.
2. Shashi Chawla, *Text book of Engineering Chemistry*, Dhanpat Rai Publishers, 3rd ed., 2003.
3. S. S. Dara, S. S. Umare, *A Text book of Engineering Chemistry*, S. Chand & Company Ltd., 12th ed., 2010.

Web and Video link(s):

1. <https://elearn.nptel.ac.in/shop/iit-workshops/completed/battery-cell-technology-materials-and-industrial-applications/?v=c86ee0d9d7ed>; NPTEL Video Lecture on Battery technology by Dr. Kothandaraman, Professor of Chemistry, IIT Madras & Dr. Raghunathan, Professor of Chemical engineering, IIT Madras

Course Articulation Matrix (CAM):		U26CY202F: ENGINEERING CHEMISTRY												
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26CY202F.1	2	-	-	-	1	1	1	1	-	1	-	2	2
CO2	U26CY202F.2	2	-	-	-	1	1	1	1	-	1	-	2	2
CO3	U26CY202F.3	2	2	2	2	1	1	-	1	1	-	-	2	2
CO4	U26CY202F.4	2	2	1	1	1	2	1	1	1	-	-	2	2
U26CY202F		2	2	1.5	1.5	1	1.25	1	1	1	1	-	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	apply the concepts of electro chemical energy systems for batteries and fuel cells	SDG7	Affordable and Clean Energy	Electro chemical energy systems such as batteries and fuel cells provide clean, reliable, and efficient energy storage and reduce dependence on fossil fuels, promote renewable energy utilization.
CO2	interpret suitable techniques of water analysis and corrosion treatment of solid materials	SDG3	Good Health and well being	Water analysis techniques help identify contaminants and ensure safe drinking water, thereby protecting human health and preventing water-borne diseases. Corrosion treatment of solid materials improves the safety and durability of pipelines, storage systems, and medical equipment.
CO3	appraise spectroscopic techniques of chemical analysis and applications of polymers	SDG9	Industry, Innovation and Infrastructure	Spectroscopic technique develops knowledge of modern spectroscopic techniques used in industrial chemical analysis and quality control. It enhances understanding of polymer applications in advanced materials and manufacturing industries.
CO4	summarize the synthesis of nanomaterials and their applications	SDG9	Industry, Innovation and Infrastructure	Nanomaterials develop understanding of nanomaterial synthesis and their industrial applications in advanced technologies. It promotes innovation in materials science, electronics, healthcare, and manufacturing sectors.

DATA STRUCTURES THROUGH C			
Class: B. Tech. – II Semester		Branch: ECV	
Course Code:	U26VL203	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: analyze and implement array operations by utilizing dynamic memory allocation & evaluating their time and space complexities CO2: analyze and implement stack & queue data structures by utilizing array representations & evaluating their applications & operational complexities CO3: analyze and implement various types of linked lists by utilizing dynamic memory allocation techniques & evaluating their operational complexities CO4: develop various sorting algorithms, analyze their time complexities and apply hashing techniques with collision resolution methods & comparing their efficiencies			
UNIT-I			9 Hrs
Data Structures: Basic terminology, Classification of data structures, Applications and operations on data structures, Time and space complexity Arrays: Operations on arrays-traversing an array, Inserting an element in an array, Deleting an element from an array, Searching an element using binary search and their complexities Dynamic Memory Allocation: Memory allocation functions, Dynamic memory allocation for single and two dimensional arrays, Three dimensional and n-dimensional arrays, Passing arrays to functions and pointers			
UNIT-II			9 Hrs
Stacks: Stacks, Array representation of stacks, Operations on a stack-push and pop, Multiple stacks, Applications of stacks- recursion, Fibonacci series, Tower of Hanoi, Evaluation of expressions (Infix to postfix conversion, Evaluation of postfix expression) Queues: Queues, Array representation of queues, Double ended queues, Circular queues Queues: Queues, Array representation of queues, Double ended queues, Circular queues Priority Queue			
UNIT-III			9 Hrs
Linked Lists: Basic terminologies, Linked list versus arrays, Memory allocation and de-allocation for a linked list, Singly linked list, Circular linked list, Doubly linked list, Circular doubly linked list (Linked list operations- traversing, searching, inserting, deleting), Representing stack and queue using linked list, Skiplist			
UNIT-IV			9 Hrs
Sorting Techniques: Selection sort, Insertion Sort, Shell sort and Radix sort, Time complexities of sorting, Two way insertion sort, Comparison of sorting techniques Hashing: Hashing techniques, Collision resolution techniques, Closed hashing, Open hashing, Comparison of collision resolution techniques			
Textbook(s): 1. D.Samantha, <i>Classic Data Structure</i> , Prentice Hall India New Delhi, 2nd ed., 2009.			
Reference Book(s): 1. R. Thareja, <i>Data Structures Using C</i> , Oxford University Press, New Delhi, India, 2nd ed., 2014.			

2. E. Balagurusamy, *Data Structure Using C*, McGraw Hill Education, New Delhi, India: 1st ed., 2017.
3. R. F. Gilberg and B. A. Forouzan, *Data Structures: A Pseudocode Approach with C*, Cengage Learning, Boston, MA, USA, 2nd ed., 2007.

Web and Video link(s):

1. <https://nptel.ac.in/courses/106106130>; NPTEL Video Lecture on Programming and Data Structures Dr. N. S. Narayana Swamy, CSE, IIT Madras.

Course Articulation Matrix (CAM):				U26VL203: DATA STRUCTURES THROUGH C										
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VL203.1	2	2	2	1	-	-	1	-	1	-	1	2	1
CO2	U26VL203.2	2	2	2	2	-	-	1	-	1	-	2	2	2
CO3	U26VL203.3	2	2	2	2	-	-	1	-	1	-	2	2	2
CO4	U26VL203.4	2	2	2	2	-	-	1	-	1	-	2	2	2
U26VL203		2	2	2	1.75	-	-	1	-	1	-	1.75	2	1.75
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	analyze and implement array operations by utilizing dynamic memory allocation & evaluating their time and space complexities	SDG 4	Quality Education	Unit I introduces foundational thinking skills – algorithmic analysis, complexity trade-offs, and memory management – that are core to inclusive, quality technical education (SDG 4). Teaching students <i>how to reason about efficiency</i> equips them with problem-solving competencies that transcend programming languages and support lifelong learning in computing.
CO2	analyze and implement stack & queue data structures by utilizing array representations & evaluating their applications & operational complexities	SDG 9	Industry, Innovation and Infrastructure	Stacks and queues are the structural backbone of real-world software infrastructure – OS process scheduling, compiler design (infix→postfix parsing), undo/redo systems, and network packet buffering. Recursion and the Tower of Hanoi build the algorithmic innovation skills that drive SDG 9's goal of fostering resilient, modern industrial systems through technology.
CO3	analyze and implement various types of linked lists by utilizing dynamic memory allocation techniques & evaluating their operational complexities	SDG 4	Quality Education	Linked lists require students to reason about pointer manipulation, memory deallocation, and abstract data representation – demanding higher-order thinking that reflects SDG 4's emphasis on deep, quality learning. The progression from arrays to dynamic structures builds adaptable knowledge, and topics like skip lists and merging

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
				extend learners toward self-directed inquiry beyond the classroom.
CO4	develop various sorting algorithms, analyze their time complexities and apply hashing techniques with collision resolution methods & comparing their efficiencies	SDG 9	Industry, Innovation and Infrastructure	Sorting and hashing are workhorses of industry-grade systems – database indexing, search engines, cryptographic hashing, and load balancing all rely on these techniques. Collision resolution directly models the design challenges engineers face building scalable, fault-tolerant infrastructure. This unit's focus on performance trade-offs and real-world applicability aligns strongly with SDG 9's innovation and infrastructure mandate.

ENGLISH COMMUNICATION AND REPORT WRITING			
Class: B.Tech. II-Semester		Branch: Common to all branches	
Course Code:	U26MH204	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: apply basic grammar principles in speech and writing, read fast, form new words, make coherent paragraphs and adapt the real value of life CO2: create effective letters, e-mails, reply to Memos and do the given tasks with confidence CO3: analyze the given texts and write clear and unambiguous reports CO4: deduct the superfluous information from lengthy text, prepare SoP (Statement of Purpose) effectively and solve critical problems in life with emotional balance			
UNIT-I			9 Hrs
SPEAKING ACTIVITIES Self-Introduction- News Paper Reading (reading aloud)-Pronunciation check-Presentation, Narration/ Oral Description of a story/incident/event with the clues (JAM) GRAMMAR Tenses: Definition and identification through examples-Main and Sub Tenses-Present Tense-Structures through examples-usage- Correct use of Tenses with a focus on Present Tense-exercises for practice VOCABULARY Word formation: Prefixes-Suffixes- Definition & Examples-Sentence Formation with newly READING SKILL Reading: Definition: Sub skills of Reading- Emphasis on Skimming-Definition-Purpose-How to skim through the text- Exercises for practice WRITING PRACTICES Report Writing: Definition-Purpose- Qualities of a good Report-Types-Format Paragraph Writing: Definition-Organizing Principles of paragraphs-Making a paragraph through hints/ graphs and pictures-Coherence-Linking Devices- Systematic Development of Ideas LIFE SKILLS: Ethical Values and Humanity The Last Leaf: A Short Story by O. Henry - Discussion based on collaborative interaction - Comprehension of Grammar, Vocabulary and Content			
UNIT-II			9 Hrs
SPEAKING ACTIVITIES Group Discussion-Narration/ Oral Description of a story/incident/event with the clues provided (JAM)--Debate GRAMMAR Tenses: Past Tense-Sub Tenses-Structures- Correct use of Past Tense- exercises for practice Subject-Verb Agreement: Identification with examples-Rules-Exercises for practice Reported Speech: Definition-Rules-Examples-Transformation Process-Exercises for practice Sentence Correction: Emphasis on Concord, Reported Speech and Present and Past Tenses-Sentence Structures VOCABULARY			

Synonyms-Antonyms-Single-Word Substitutes- Definition-Examples-Popular Abbreviations READING STRATEGY Reading Strategy-Emphasis on Scanning the Text- Definition of Scanning-Purpose advantages- Examples, Exercises and Practice through Team work WRITING PRACTICES Report Writing:Technical Reports-Purpose-Format-significance of abstract/Executive Summary Letter Writing: Effective Letter Writing Techniques-Information Seeking Letters-Job Application Letters- Apology Letters -Resume and Cover letter LIFE SKILLS: Determination How I Became a Public Speaker: An essay by George Bernard Shaw Discussion based on collaborative interaction - Comprehension of Grammar, Vocabulary and Content	
UNIT-III	9 Hrs
SPEAKING ACTIVITIES Self-Introduction through videos- Narration/ Oral Description of a story/incident/event with the clues provided (JAM)- Poster presentations / Power-Point presentations GRAMMAR Tenses: Future Tense- Sub Tenses-Structures- Correct use of Future Tense- exercises for practice Nouns-Prepositions-Adverbs-Adjectives-Definition-Identification-Exercises for practice Sentence Correction based on correct use of Future Tense- Nouns- Prepositions-Adverbs – Adjectives VOCABULARY Phrasal Verbs- Technical Words-Latin Words READINGS TRATEGY Intensive Reading: purpose-Types of Comprehension Questions-Examples, Exercises and Practice through Team work WRITING PRACTICES Report Writing: Informational Reports- Inspection Reports –Feasibility Reports- Purpose - Format-Content-Exercises for Practice LIFE SKILLS: Positive Attitude Be the Best of Whatever You Are: A Poem by Douglas Malloch Discussion based on collaborative interaction - Comprehension of Content	
UNIT-IV	9 Hrs
SPEAKING ACTIVITIES Extempore speech on the given topic- Visual Presentation- Group Discussion on the topic given well in advance- Providing the required inputs- Story telling of one's choice GRAMMAR Tenses: Revision-Exercises for Practice Clauses: Definition-Identification through examples-Objective/Purpose- Types-Conjunctions- Transformation of Sentences Sentence Correction (Based on Parts of Speech)-Clauses-Tenses VOCABULARY Appropriate Use of Words in Communication-Commonly Confused Words ACTIVE READING and NOTE-MAKING Note-Making-Definition-Purpose-Effectiveness	

WRITING PRACTICES

Report Writing: Progress Report-Purpose- Format-Content-Exercises for Practice

Précis Writing: Definition-Purpose-Uses-Examples and Exercises-Practice through Teamwork

Preparing Statement of Purpose (SoP)

LIFE SKILLS: Emotional Balance

“A Poison Tree”: Poem by William Blake

Discussion based on collaborative interaction - Comprehension of Content

Textbook(s):

1. Sanjay Kumar & Pushp Lata, *English Language and Communication Skills for Engineers*, As per the latest AICTE syllabus, Oxford University Press, 1st ed., 2018
2. *Language and Life: A Skill's Approach*, Based on the latest AICTE model curriculum Orient Black swan Private Limited 2nd Edition 2019.

Reference Book(s):

1. Thomson A.J., Martinet A.V., *A Practical English Grammar*, Oxford University Press, 3rd ed., 1997.
2. Thomson A.J. Martinet A.V., *A Practical English Grammar*, Exercise 2, Oxford University Press, 3rd ed., 1997.
3. Standard Allen W., *Living English Structure*, Pearson India Education Pvt Ltd., 5th ed., 2009.

Web and Video link(s):

1. https://onlinecourses.nptel.ac.in/noc20_hs56/Preview; NPTEL Video Lecture on Technical English for Engineers by Ais haIcbal, IIT Madras.
2. https://onlinecourses.swayam2.ac.in/cec21_lg13/preview; NPTEL Video Lecture on Indian Writing in English by Dr. Bindu Ann Philip, St Mary's College Trissur.

Course Articulation Matrix (CAM):				U26MH204: ENGLISH COMMUNICATION AND REPORT WRITING										
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26MH204.1	-	-	-	-	-	1	-	2	2	2	2	2	2
CO2	U26MH204.2	-	-	-	-	-	1	-	2	2	2	2	2	2
CO3	U26MH204.3	-	-	-	-	-	1	-	2	2	2	2	2	2
CO4	U26MH204.4	-	-	-	-	-	1	-	2	2	2	2	2	2
U26MH204		-	-	-	-	-	1	-	2	2	2	2	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	apply basic grammar principles in speech and writing, read fast, form new words, make coherent paragraphs and adapt the real value of life	SDG3	Good health and Well-being	This aligns with SDG-3 as it partially contributes to the negative impact of mental imbalance on health through the irrational fears of Johnsy who is certain of her death when the last leaf falls down
		SDG5	Gender equality	This also aligns with SDG-5 as it highlights women accomplishments on par with men by exposing Johnsy and Sue as painters who come out of their home town to stay in another place and work along with men for

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
		SDG4	Quality education	societal exposure This aligns with SDG-4 as its primary focus is on enhancing the quality of language in speech and writing by strengthening grammar, vocabulary and writing skills.
CO2	create effective letters, e-mails, reply to Memos and do the given tasks with confidence	SDG4	Quality education	This aligns with SDG-4 as its aim is to enhance reading and writing skills by helping students write letters and resumes effectively applying grammar rules and using relevant vocabulary
		SDG8	Decent work and Economic growth	This aligns with SDG-8 as it indirectly contributes to economic growth and helps students become aware of the inevitability of strengthening their resume by improving their skills
CO3	analyze the given texts and write clear and unambiguous reports	SDG4	Quality Education	This aligns with SDG-4 as it focuses on enhancing the speaking, reading and writing skills of students to prove their abilities and the best communicators in society and work place by exhibiting professionalism in the usage of language
CO4	deduct the superfluous information from lengthy text, prepare SoP (Statement of Purpose) effectively and solve critical problems in life with emotional balance	SDG4	Quality Education	This aligns with SDG-4 as it orientates the students towards reading and writing, and improves critical and critical thinking Though not completely, it aligns with SDG-16 as it emphasizes the need to give up anger which is the most potential enemy of man to enjoy peace and become morally strong
		SDG16	Peace, Justice and Strong institutions	

ELECTRONIC DEVICES AND CIRCUITS			
Class: B. Tech. II – Semester		Branch: ECV	
Course Code:	U26VL205	Credits:	3
Hours/Week (L-T-P- E):	2-1-0-3	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: analyze BJT amplifiers using h-parameter models CO2 : analyze frequency response of multistage BJT & single stage FET amplifiers CO3: evaluate performance of feedback amplifiers based on topology CO4: estimate frequency of oscillator circuits & power efficiency of large signal amplifiers			
UNIT-I			9 Hrs
Bipolar Junction Transistor (BJT): Review of BJT characteristics; Bias stability- Need for biasing, Operating point, Thermal runaway, Stability factor; Methods of BJT biasing- Fixed bias, Collector to base bias, Self-bias Small Signal Low Frequency Transistor Amplifier Circuits: BJT small signal low frequency h parameter model, Analysis of transistor amplifier circuits using h-parameters, Analysis of single stage CE transistor amplifier circuits, Hybrid- π (pi) Common emitter transistor model			
UNIT-II			9 Hrs
Multistage Amplifiers: Different coupling schemes used in cascading of amplifiers, Choice of transistor configurations in cascading, Effect of cascading on gain and bandwidth, Frequency response of RC coupled amplifier, Emitter follower, Darlington connection Junction Field Effect Transistor (JFET): Construction and operation, Characteristic parameters of JFETs, Drain & transfer characteristics, FET as a switch, Analysis of single stage FET amplifier, Metal Oxide Semiconductor Field Effect Transistor (MOSFET) – Structure and operation of Enhancement MOSFET and Depletion MOSFET			
UNIT-III			9 Hrs
Feedback Amplifiers: Basic concept of feedback; Negative feedback amplifiers- Characteristics, Effect of negative feedback, Topologies; Analysis of voltage series, Voltage shunt, Current series and Current shunt feedback amplifiers			
UNIT-IV			9 Hrs
Oscillators: Conditions for oscillations (Barkhausen criterion), RC and LC oscillators, Crystal Oscillator Large Signal Amplifiers: Classification based on biasing, Series fed and transformer coupled Class A amplifier, Class B power amplifier, Push-pull and complementary symmetry Class B amplifiers, Cross over distortion, Class-AB power amplifier			
Textbook(s): 1. S. Salivahana and N. Suresh Kumar, <i>Electronic Devices and Circuits</i> , McGraw Hill Education, New Delhi, 5th ed., 2022.			
Reference Book(s): 1. Jacob Millman and C.C. Halkias, <i>Integrated Electronics</i> , Tata McGraw-Hill, New Delhi, 2nd ed., 1991. 2. Robert L. Boylestad, Louis Nashelsky, <i>Electronic Devices and Circuit Theory</i> , Pearson education, New Delhi, 10th ed., 2013.			

3. Donald A Neamen, *Electronic Circuits Analysis and Design*, Tata McGraw-Hill, New Delhi, 3rd ed., 2009.

Web and Video link(s):

1. <https://www.youtube.com/watch?v=PSdHf6yozyc>; NPTEL Video Lecture on Transistor Biasing by Prof. T.S.Natarajan, Department of physics, IIT Madras
2. <https://www.youtube.com/watch?v=BSR26SU3R2U>; NPTEL Video Lecture on RC coupled amplifiers frequency response by Prof. D.C. Dube, Department of Physics, IIT Delhi
3. <https://www.youtube.com/watch?v=xHNDrbB-iWY>; NPTEL Video Lecture on positive feedback and oscillations by Dr.Chitralkha Mahanta, Department of Electronics and Communication Engineering, IIT Guwahati
4. <https://www.youtube.com/watch?v=4m49vM0Ryt8>; NPTEL Video Lecture on Field Effect Transistors Prof. T.S.Natarajan, Department of physics, IIT Madras

Course Articulation Matrix (CAM):			U26VL205: ELECTRONIC DEVICES AND CIRCUITS											
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VL205.1	3	2	1	1	1	2	2	1	1	–	2	2	2
CO2	U26VL205.2	3	3	1	1	2	2	2	1	1	–	2	2	2
CO3	U26VL205.3	2	3	2	2	1	2	2	1	1	–	2	2	2
CO4	U26VL205.4	2	3	2	2	1	3	2	1	1	1	2	2	2
U26VL205		2.5	2.5	2.75	1.5	1.67	1.25	2	1	1	1	2	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	analyze BJT amplifiers using h-parameter models	SDG4	Quality Education	Develops fundamental analog electronics knowledge
CO2	analyze frequency response of multistage BJT & single stage FET amplifiers	SDG9	Industry, Innovation & Infrastructure	Supports electronic circuit analysis for industrial systems
CO3	evaluate performance of feedback amplifiers based on topology	SDG9	Industry, Innovation & Infrastructure	Feedback amplifiers are essential in modern electronic systems
CO4	estimate frequency of oscillator circuits & power efficiency of large signal amplifiers	SDG9	Industry, Innovation & Infrastructure	Oscillators and power amplifiers are key building blocks in communication systems

ENGINEERING CHEMISTRY LABORATORY			
Class: B. Tech. II Semester		Branch: ECV	
Course Code:	U26CY206F	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	36 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: apply titration techniques to calculate the concentration of acid and base solutions. CO2: apply volumetric analysis methods to estimate hydroxide ions and alkalinity in water samples CO3: assess the quality of water by determining its total hardness and dissolved oxygen content CO4: implement suitable techniques for the synthesis and characterization of nanomaterials and polymers			
LIST OF EXPERIMENTS			
1. Estimation of hydroxide ion by acidimetry 2. Estimation of alkaline species present in the given water sample 3. Determination of viscosity of the given liquid by Ostwald's viscometer 4. Determination of rate of corrosion of mild steel in the presence and absence of inhibitor. 5. Determination of hardness of water by complexometric method 6. Determination of dissolved oxygen in water sample 7. Estimation of chloride ion in water sample by argentometry method 8. Standardization of weak acid (acetic acid) by conductometry using sodium hydroxide (NaOH) and standard hydrochloric acid (HCl) 9. Standardization of strong acid (HCl) by potentiometry using standard sodium hydroxide (NaOH) 10. Colorimetric analysis-verification of Lambert-Beer's law 11. Estimation of ferrous (Fe^{2+}) ion in the given solution using potassium permanganate 12. Synthesis of polymer (phenol- formaldehyde)			
<u>Textbook(s):</u> 1. Mendham, J., Denney, R.C., Barnes, J.D. and Thomas, M.J.K., <i>Vogel's Textbook of Quantitative Chemical Analysis</i> , Pearson Education, 6th ed., 2009. 2. Sivasankar, B., <i>Engineering Chemistry</i> , Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2nd ed., 2013.			
<u>Reference Book(s):</u> 1. J.C. Kuriacose and J. Rajaram, <i>Chemistry in Engineering and Technology (Vol. I)</i> , Tata Mc. Graw-Hills Education Pvt. Ltd., 2010. 2. Sharma, B.K., <i>Instrumental Methods of Chemical Analysis</i> , Goel Publishing House, Meerut, 24th ed., 2005.			
<u>Laboratory Manual:</u> 1. Manual for <i>Engineering Chemistry Laboratory (for ECV)</i> , Prepared by the Dept. of PS, KITSW.			

Course Articulation Matrix (CAM):		U26CY206F: ENGINEERING CHEMISTRY LABORATORY												
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26CY206F.1	2	1	-	-	-	1	1	-	1	-	1	1	1
CO2	U26CY206F.2	2	1	-	-	2	1	1	-	1	-	1	1	1
CO3	U26CY206F.3	2	1	-	-	2	1	2	1	1	-	1	1	1
CO4	U26CY206F.4	2	1	-	-	-	1	1	-	1	-	1	1	1
U26CY206F		2	1	-	-	2	1	1.25	1	1	-	1	1	1
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement	Relevant SDG	SDG Description	Mapping Justification
	<i>The student should be able to</i>			
CO1	calculate molarities of acids and bases	SDG3	Good Health and Well-being	Molarity calculations are essential in preparing chemical and pharmaceutical solutions with correct concentrations. This supports laboratory safety, medical applications, and the prevention of health hazards caused by improper chemical handling.
CO2	estimate hydroxide ion and alkalinity of water sample	SDG6	Clean water and sanitation	Estimating hydroxide ion concentration and alkalinity of water helps in assessing water quality and suitability for domestic, agricultural, and industrial use. These analyses are essential for maintaining safe water standards, controlling water pollution, and ensuring effective water treatment processes.
CO3	determine total hardness and oxygen dissolved in water	SDG6	Clean water and sanitation	Determining total hardness and dissolved oxygen in water helps assess water quality and suitability for domestic, industrial, and environmental use. Monitoring these parameters supports safe drinking water, effective wastewater management, and protection of aquatic ecosystems.
CO4	prepare nano materials and polymers	SDG9	Industry, Innovation and Infrastructure	Preparation of nanomaterials and polymers promotes technological innovation and the development of advanced engineering materials. These materials are widely used in electronics, healthcare, energy storage, construction, and manufacturing industries, supporting sustainable industrial growth and modern infrastructure development.

DATA STRUCTURE THROUGH C LABORATORY			
Class: B. Tech. II – Semester		Branch: ECV	
Course Code:	U26VL207	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	24 Hrs	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i>			
CO1: develop and test basic data structures and array operations, including dynamic memory allocation to evaluate their performance and complexity CO2: apply the linear data structures such as stacks and queues and perform various operations using LIFO or FIFO order respectively CO3: solve problems using various linked list representations for efficiently storing and retrieving the data CO4: apply different sorting techniques on unsorted data and sort them in an order, able to store the data using hashing techniques to retrieve the data very effectively			
LIST OF EXPERIMENTS			
Experiment-1:			
(i) Program to implement initialization of array and perform traversal operations in both the directions. (ii) Program to implement searching operation on array using Linear Search (iii) Program to display the count of occurrences of every number in an array			
Experiment-2:			
(i) Program to implement searching operation on array using Binary Search (ii) Program to implement insertion operation on array (iii) Program to implement deletion operations on array			
Experiment-3:			
(i) Program to implement initialization of arrays and traversal operation with DMA (ii) Program to implement matrix addition and subtraction with DMA (iii) Program to implement matrix multiplication with DMA			
Experiment-4:			
(i) Program to implement stack operations (ii) Program to convert infix expression into postfix			
Experiment-5:			
(i) Program to evaluate given postfix expression (ii) Program to define recursive function to solve tower of hanoi puzzle (iii) Program to display the Fibonacci series with the help of recursive function (iv) Program to implement MultiStack			
Experiment-6:			
(i) Program to implement queue operations using arrays (ii) Program to implement circular queue operations using arrays (iii) Program to implement double ended queue operations using arrays			
Experiment-7:			
(i) Program to create single linked list and implement its operations			
Experiment-8:			
(i) Program to create circular linked list and implement its operations (ii) Program to create double linked list and implement its operations			

Experiment-9:
(i) Program to create circular double linked list and implement its operations
Experiment-10:
(i) Program to implement stack operations using linked list (ii) Program to implement queue operations using linked list
Experiment-11:
(i) Program to implement selection sort (ii) Program to implement insertion sort
Experiment-12:
(i) Program to implement shell sort (ii) Program to implement radix sort (iii) Program to implement hash table
Textbook(s):
1. D. Samantha, <i>Classic Data Structure</i> , Prentice Hall India New Delhi, 2nd ed., 2009.
Reference Book(S):
1. R. Thareja, <i>Data Structures Using C</i> , Oxford University Press, New Delhi, India, 2nd ed., 2014. 2. E. Balagurusamy, <i>Data Structure Using C</i> , McGraw Hill Education, New Delhi, India: 1st ed., 2017. 3. R. F. Gilberg and B. A. Forouzan, <i>Data Structures: A Pseudocode Approach with C</i> , Cengage Learning, Boston, MA, USA, 2nd ed., 2007.
Web and Video link(s):
1. https://nptel.ac.in/courses/106106130 ; NPTEL Video Lecture on Programming and Data Structures Dr. N. S. Narayana Swamy, CSE, IIT Madras.
Laboratory Manual:
1. Manual for <i>Data Structure Through C Laboratory</i> , Prepared by the faculty of Dept. of IT, KITSW.

Course Articulation Matrix (CAM):					U26VL207: DATA STRUCTURE THROUGH C LABORATORY									
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VL207.1	2	2	2	1	-	-	1	1	1	-	1	2	1
CO2	U26VL207.2	2	2	2	2	-	-	1	1	1	-	2	2	2
CO3	U26VL207.3	2	2	2	2	-	-	1	1	1	-	2	2	2
CO4	U26VL207.4	2	2	2	2	-	-	1	1	1	-	2	2	2
U26VL207		1	2.25	2.25	1.75	-	-	1	1	1	-	1.75	2	1.75

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	develop and test basic data structures and array operations, including dynamic memory allocation to evaluate their performance and complexity	SDG 4	Quality Education	These experiments build core computational thinking – traversal, searching, and dynamic memory management. Comparing linear vs binary search introduces algorithmic reasoning and efficiency trade-offs, directly reflecting SDG 4's goal of equipping learners with relevant, practical technical skills. DMA-based matrix operations further develop

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to...</i>	Relevant SDG	SDG Description	Mapping Justification
				disciplined, structured problem-solving essential for quality engineering education.
CO2	apply the linear data structures such as stacks and queues and perform various operations using LIFO or FIFO order respectively	SDG 9	Industry, Innovation and Infrastructure	Stacks, queues, and expression evaluation are the structural foundation of compilers, OS schedulers, and runtime systems – real industrial infrastructure. Infix-to-postfix conversion mirrors how compilers parse code; queues model network packet management and CPU job scheduling. Recursion (Tower of Hanoi, Fibonacci) drives innovation in algorithm design, aligning strongly with SDG 9's emphasis on resilient, modern technological infrastructure.
CO3	solve problems using various linked list representations for efficiently storing and retrieving the data	SDG 4	Quality education	Linked list variants demand abstract thinking about pointers, dynamic memory, and node relationships – among the most cognitively demanding topics in undergraduate CS. Mastering singly, circular, doubly, and circular-doubly linked lists builds deep structural understanding, reflecting SDG 4's focus on high-quality, skill-building education. Reimplementing stacks and queues via linked lists reinforce conceptual reuse and flexible thinking.
CO4	apply different sorting techniques on unsorted data and sort them in an order, able to store the data using hashing techniques to retrieve the data very effectively	SDG 9	Industry, Innovation and Infrastructure	Sorting algorithms and hash tables are indispensable in industry-grade systems – database query optimization, search engine indexing, caching layers, and load balancers all depend on them. Radix sort is used in network routing; hash tables power key-value stores like Redis and DNS lookups. These experiments directly develop skills for building scalable, innovative digital infrastructure, the core of SDG 9.

SPORTS & YOGA			
Class: B. Tech. II – Semester		Branch: Common to All Branches	
Course Code:	U26VA206	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	36 Hrs.	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: demonstrate Physical Fitness by performing Yoga Asanas CO2: demonstrate Physical Fitness through various games & Sports CO3: demonstrate Sportsman spirit and ethics CO4: demonstrate Physical, Psychological, Social and Emotional balance			
LIST OF EVENTS			
Event-1			
BASKET BALL: <i>Passing, Dribbling, Shooting, Blocking, Rebounding, Offense/ Defense</i>			
Event-2			
FOOT BALL: <i>Dribbling, Passing, Receiving, Shooting, Ball Control, Heading, Tracking Marking, Movement off the Ball. Develop a program to implement contrast stretching</i>			
Event-3			
VOLLEY BALL: <i>Serving, Passing (upper hand / under hand), Setting, Blocking, Spiking</i>			
Event-4			
BADMINTON: <i>Proper Grip, Footwork, Stance, Serving, Basic Strokes</i>			
Event-5			
CHESS: <i>Tactics, Calculation, Visualization, Opening, Evaluation, Ending games, Strategy</i>			
Event-6			
CARROMS: <i>Proper Flicking technique, Angle Awareness, Controlling force, Focus and Consistency, Visualize the shot, Body Alignment and Posture, Watch your Wrist. Use the Right Finger</i>			
Event-7			
TABLE TENNIS: <i>Grip, Stance, Footwork, Basic Stokes, Serving</i>			
Event-8			
CRICKET: <i>Batting, Bowling, Fielding, Wicket Keeping</i>			
Event-9			
HAND BALL: <i>Gripping, Catching, Passing, Dribbling, Faking, Shooting</i>			
Event-10			
KABADDI: <i>Offensive (Raiding) Skills, Defensive (Tackling) Techniques</i>			
Event-11			
KHO-KHO: <i>Chasing (Attacking), Running (Evading) Techniques</i>			
Event-12			
YOGA: <i>Surya Namaskar, Thirkonasanam, Vajrasanam, Shashankasanam, Navukasanam, Chakrasanam, Dhanurasanam, Pranayamam</i>			
Textbook(s): 1. B.K.Chaturvedi, <i>Rules and Skills of Games and Sports</i>, Goodwill Publishing House, New Delhi. 2. Aladar Kogler, <i>Yoga For Every Athlete, Secrets of an Olympic Coach</i>, JAICO Publishing House, Hyderabad. 3. Yograj Thani, <i>Coaching Successfully Basket Ball</i>, Sports Publication, New Delhi.			

4. Jake Downey, *Badminton for Schools*, S. Chand & Company Ltd, New Delhi.
5. Dave James, *Volleyball for Schools- Photographs by Gordon Ruck*, S. Chand & Company Ltd, New Delhi.
6. O.P. Sharma, *Football Skills & Rules*, Khel Sahitya Kendra Publisher, New Delhi.

Reference Book(s):

1. Dr. Sakure Girish Madhav Rao, *Foundation of Physical Education and Sports*, Sports Publication, New Delhi.

Course Articulation Matrix (CAM):				U22VA206: SPORTS & YOGA										
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VA206.1	-	-	1	-	-	2	1	2	-	-	1	1	1
CO2	U26VA206.2	-	-	1	-	-	2	1	2	1	-	1	1	1
CO3	U26VA206.3	-	-	1	-	-	2	1	2	-	-	1	1	1
CO4	U26VA206.4	-	-	1	-	-	2	1	2	-	1	1	1	1
U26VA206.1		-	-	1	-	-	2	1	2	2	1	1	1	1
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement	Relevant SDG	SDG Description	Mapping Justification
	<i>The student should be able to</i>			
CO1	demonstrate Physical Fitness by performing Yoga Asanas	SDG13	Climate Action	Promoting eco-friendly sports practices, minimal resource usage, outdoor yoga, and sustainable lifestyle habits. Promoting teamwork, leadership, inclusiveness, equal participation, and collaboration in sports and group yoga sessions.
		SDG5	Gender Equality	
CO2	demonstrate Physical Fitness through various games & Sports	SDG3	Good Health & Well-being	Designing personalized fitness routines, yoga modules, and wellness programs to meet individual health needs.
CO3	demonstrate Sportsman spirit and ethics	SDG16	Peace, Justice & Strong Institutions	Encouraging discipline, fairness, inclusivity, respect, mental balance, and ethical conduct through sportsmanship and yogic values.
CO4	demonstrate Physical, Psychological, Social and Emotional balance	SDG3	Good Health & Well-being	Understanding the role of physical fitness and yoga in improving societal health, work-life balance, and community well-being.
		SDG11	Sustainable Cities & Communities	

ELECTRONIC DEVICES AND CIRCUITS LABORATORY			
Class: B. Tech. II – Semester		Branch: ECV	
Course Code:	U26VL209	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-1	CIE:	40%
Total Number of Teaching Hours:	36 Hrs.	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: measure parameters of semiconductor diode circuits CO2: determine gain and frequency response of BJT & FET amplifier circuits CO3: estimate the performance of voltage series feedback amplifier and oscillator circuits through experimental analysis CO4: evaluate the performance of class-A power amplifier circuit in terms of efficiency			
LIST OF EXPERIMENTS			
1. Evaluate Zener diode characteristics and test its application as a voltage regulator 2. Determine ripple factor for Half-wave & Full-wave rectifier circuits with and without filters 3. Measure current gain, input and output resistance of BJT in Common Emitter (CE) configuration 4. Determine Q-point (I_C , V_{CE}) & stability factor for fixed bias circuit 5. Determine Q-point (I_C , V_{CE}) & stability factor for voltage divider bias circuit 6. Determine h-parameters of transistor in CE configuration using experimental observations 7. Measure voltage gain, lower cutoff frequency, upper cutoff frequency & bandwidth of RC coupled amplifier 8. Determine drain current (I_D), pinch-off voltage, transconductance (g_m), voltage gain of single stage JFET amplifier 9. Design a voltage series feedback amplifier with given specifications and determine voltage gain & bandwidth 10. Determine frequency of oscillations of RC phase shift oscillator 11. Determine frequency of oscillations of Hartley oscillator 12. Measure the efficiency of Class-A power amplifier			
<u>Textbook(s):</u> 1. S. Salivahanan and N.Suresh Kumar, <i>Electronic Devices and Circuits</i> , McGraw Hill Education, New Delhi, 5th ed., 2022.			
<u>Reference Book(s):</u> 1. Jacob Millman and C.C.Halkias, <i>Integrated Electronics</i> , Tata McGraw-Hill, New Delhi, 2nd ed., 1991. 2. Robert L.Boylestad, Louis Nashelsky, <i>Electronic Devices and Circuit Theory</i> , Pearson education, New Delhi, 10th ed., 2013. 3. Donald A Neamen, <i>Electronic Circuits Analysis and Design</i> , Tata McGraw-Hill, New Delhi, 3rd ed., 2009.			
<u>Web and Video link(s):</u> 1. https://www.youtube.com/watch?v=PSdHf6yozyc ; NPTEL Video Lecture on Transistor Biasing by Prof. T.S.Natarajan, Department of physics, IIT Madras. 2. https://www.youtube.com/watch?v=BSR26SU3R2U ; NPTEL Video Lecture on RC coupled amplifiers frequency response by Prof. D.C. Dube, Department of Physics, IIT Delhi.			

3. <https://www.youtube.com/watch?v=xHNDrbB-iWY>; NPTEL Video Lecture on positive feedback and oscillations by Dr.Chitrlekha Mahanta, Department of Electronics and Communication Engineering, IIT Guwahati.
4. <https://www.youtube.com/watch?v=4m49vM0Ryt8>; NPTEL Video Lecture on Field Effect Transistors Prof. T.S.Natarajan, Department of physics, IIT Madras.

Laboratory Manual:

1. Manual for *Electronic Devices and Circuits Laboratory*, Prepared by the faculty of Dept. of ECIE, KITSW.

Course Articulation Matrix (CAM):		U26VL209: ELECTRONIC DEVICES AND CIRCUITS LABORATORY												
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	U26VL209.1	3	2	1	2	3	-	-	-	1	-	-	2	2
CO2	U26VL209.2	3	3	2	2	3	-	-	-	1	-	-	2	2
CO3	U26VL209.3	2	3	2	3	3	-	-	-	1	-	-	2	2
CO4	U26VL209.4	2	2	2	2	2	-	-	-	1	-	-	2	2
U26VL209		2.5	2.5	1.75	2.25	2.75	-	-	-	1	-	-	2	2
3 - HIGH, 2 - MEDIUM, 1 - LOW														

CO-SDG Alignment Matrix				
CO	CO Statement <i>The student should be able to</i>	Relevant SDG	SDG Description	Mapping Justification
CO1	measure parameters of semiconductor diode circuits	SDG4	Quality Education	Enhances practical knowledge and laboratory skills in electronics engineering
CO2	determine gain and frequency response of BJT & FET amplifier circuits	SDG9	Industry, Innovation and Infrastructure	Supports development of electronic systems using BJT and FET which are used in industrial applications
CO3	estimate the performance of voltage series feedback amplifier and oscillator circuits through experimental analysis	SDG9	Industry, Innovation and Infrastructure	Promotes innovation in electronic circuit design and communication systems
CO4	evaluate the performance of class-A power amplifier circuit in terms of efficiency	SDG7	Affordable and Clean Energy	Efficient amplifier operation contributes to energy-efficient electronic systems

ENGINEERING GRAPHICS THROUGH CAD			
Class: B. Tech. II- Semester		Branch: Common to all Branches	
Course Code:	U26ME210	Credits:	1
Hours/Week (L-T-P- E):	0-0-2-2	CIE:	40%
Total Number of Teaching Hours:	36 Hrs.	ESE:	60%
Course Learning Outcomes (COs) <i>After completion of this course, the students should be able to,</i> CO1: draw projections of points and straight lines CO2: develop the projections of planes using Auto CAD CO3: construct the projections of solids and sections of solids using Auto CAD CO4: create orthographic and isometric projections; develop the simple electrical, electronic circuit & 3D model using Auto CAD			
LIST OF EXPERIMENTS			
1. Draw the simple geometries (Polygons, circle and semi-circle) 2. Draw the Projection of points in different quadrants 3. Draw the Projection of straight lines in simple position and inclined to one plane 4. Draw the Projection of straight lines inclined to both the planes & traces 5. Draw the Projection of planes 6. Draw the Projection of solids- Simple position (Axis perpendicular to HP or VP) 7. Draw the projections of solids inclined to both the planes 8. Draw the Sections of solids 9. Draw the Orthographic projections of given objects 10. Draw the Isometric view from the given orthographic views 11. Draw the given Electrical and Electronics circuit diagrams 12. Draw the given 3D object for engineering applications			
<u>Textbook(s):</u> 1. Bhatt N.D., <i>Elementary Engineering Drawing</i> , Charotar Publishing House, India, 2017. 2. Kulkarni D. M., Rastogi A. P., and Sarkar A., <i>Engineering Graphics with AutoCAD</i> , PHI publisher, revised edition, July 2010.			
<u>Reference Book(s):</u> 1. Dhananjay A Jolhe, <i>Engineering Drawing</i> , Tata Mc Graw- Hill, 2008. 2. Venugopal K. <i>Engineering Graphics with Auto CAD</i> , New Age International Publishers Ltd., Hyderabad, 2012. 3. Luzadder W.J and Duff J.M, <i>Fundamentals of Engineering Drawing</i> , Prentice-Hall of India, 1995.			
<u>Web and Video link(s):</u> 1. https://onlinecourses.nptel.ac.in/noc20_me79/preview ; NPTEL video link for Engineering drawing and computer graphics By Prof. Rajaram Lakkaraju, IIT Kharagpur.			
<u>Laboratory Manual:</u> 1. Manual for <i>Engineering Graphics through CAD Laboratory</i> , Prepared by the faculty of Dept. of ME, KITSW.			

Course Articulation Matrix (CAM): U26ME210 ENGINEERING GRAPHICS THROUGH CAD														
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO1	U26ME210.1	2	1	1	-	2	1	-	1	2	-	1	2	1
CO2	U26ME210.2	2	1	1	-	2	1	-	1	2	-	1	2	1
CO3	U26ME210.3	2	1	1	-	2	1	-	1	2	-	1	2	1
CO4	U26ME210.4	2	1	1	-	2	1	-	1	2	-	1	2	1
U26ME210		2	1	1	-	2	1	-	1	2	-	1	2	1

CO	CO Statement – The student should be able to...	Relevant SDG	SDG Description	Mapping Justification
CO1	Draw projections of points and straight lines	SDG 4	Quality Education	Develops fundamental engineering graphics knowledge, spatial visualization skills, and technical competencies required for quality engineering education.
CO2	Develop the projections of planes using CAD	SDG 4	Quality Education	Enhances students' proficiency in CAD-based drafting and graphical communication, promoting modern technology-enabled learning.
		SDG 9	Industry, Innovation and Infrastructure	Introduces the use of CAD tools employed in industrial design and infrastructure-related engineering applications.
CO3	Construct the projections of solids and sections of solids using CAD	SDG 4	Quality Education	Strengthens analytical thinking, visualization, and engineering drawing skills through practical CAD applications.
		SDG 9	Industry, Innovation and Infrastructure	Supports engineering design and manufacturing practices by enabling the creation and interpretation of complex engineering models.
CO4	Create orthographic and isometric projections; develop simple electrical, electronic circuits and 3D models using CAD	SDG 4	Quality Education	Promotes advanced technical skills, creativity, and lifelong learning through modern engineering software and design practices.
		SDG 9	Industry, Innovation and Infrastructure	Facilitates innovation and industrial development by equipping learners with CAD-based design, modeling, and visualization skills used in engineering industries.