COURSE STRUCTURE AND DETAILED SYLLABUS

ELECTRICAL AND ELECTRONICS ENGINEERING

B.TECH FOUR YEAR UG COURSE

(Applicable for the batches admitted from 2024-2025)

REGULATION: R24 I & II Year Syllabus

J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

Bhaskar Nagar, Yenkapally(V), Moinabad(M), Hyderabad–500075, Telangana, India

I Year I Semester (3 WEEKS MANDATORY INDUCTION PROGRAM AT THE START OF SEMESTER)									
S. NO.	**CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**	**CATEGORY**	**COMMON SUBJECT(Y/N)**	**APPROVING BOS**
1.	**M110A**	Matrices and Calculus	3	1	0	4	BS	Y	**Maths**
2.	**M110B**	Applied Physics	3	1	0	4	BS	Y	**Physics**
3.	**M112A**	Basic Electrical Engineering	3	0	0	3	PC	Y	**EEE**
4.	**M1122**	Elements of Electrical and Electronics Engineering	0	0	2	1	PC	Y	**EEE**
5.	**M115B**	Programming for Problem Solving	3	0	0	3	ES	Y	**CSE**
6.	**M1101**	Physics Laboratory	0	0	2	1	BS	Y	**Physics**
7.	**M1121**	Basic Electrical Engineering Lab	0	0	2	1	PC	Y	**EEE**
8.	**M1151**	Programming for Problem Solving Lab	0	0	2	1	ES	Y	**CSE**
9.	**M1131**	Engineering Workshop and Digital Fabrication Practices	1	0	3	2.5	ES	Y	**ME**
10.	**M11AC1**	Linguaskill for Professionals - B1	2	0	0	0	AC	Y	**English**
TOTAL			**15**	**2**	**11**	**20.5**			

I Year II Semester

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	**M120A**	Differential Equations and Vector Calculus	3	1	0	4	BS	Y	**Maths**
2.	**M120D**	Engineering Chemistry	3	1	0	4	BS	Y	**Chemistry**
3.	**M120C**	English for skill Enhancement	3	0	0	3	HS	Y	**English**
4.	**M124A**	Basic Electronics Engineering	3	0	0	3	ES	Y	**ECE**
5.	**M1241**	Basic Electronics Engineering Lab	0	0	2	1	ES	Y	**ECE**
6.	**M1232**	Computer Aided Engineering Graphics	1	0	3	2.5	ES	Y	**ME**
7.	**M1203**	English Language and Communication Skills Lab	0	0	2	1	HS	Y	**English**
8.	**M1202**	Chemistry Lab	0	0	2	1	**BS**	Y	**Chemistry**
9.	**M12AC2**	Human Values and Professional Ethics	2	0	0	0	AC	Y	**MBA**
TOTAL			**15**	**2**	**9**	**19.5**			

II Year I Semester

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M210B	Fourier And Complex Variables	3	1	0	4	BS	Y	**MATHS**
2.	M214F	Digital Electronics	3	0	0	3	ES	Y	**ECE**
3.	M212A	Electrical Circuit Analysis	3	1	0	4	PC	N	**EEE**
4.	M212B	DC Machines and Transformers	3	0	0	3	PC	N	**EEE**
5.	M212C	Electromagnetic Fields	3	0	0	3	PC	N	**EEE**
6.	M2144	Digital Electronics Lab	0	0	2	1	ES	Y	**ECE**
7.	M2121	Electrical Circuits Lab	0	0	2	1	PC	N	**EEE**
8.	M2122	DC Machines and Transformers Lab	0	0	2	1	PC	N	**EEE**
9.	M2123	Internship - I	0	0	2	1	PW	Y	**EEE**
10.	M22MC1	Environmental Science	2	0	0	0	MC	Y	**CE**
TOTAL			**17**	**2**	**8**	**21**			

II Year II Semester

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M224D	Integrated Circuit and Applications	3	1	0	4	ES	Y	**ECE**
2.	M222A	AC Machines	3	0	0	3	PC	N	**EEE**
3.	M222B	Control Systems	3	0	0	3	PC	N	**EEE**
4.	M222C	Power Systems-I	3	0	0	3	PC	N	**EEE**
5.	M222D	Power Electronics	3	0	0	3	PC	N	**EEE**
6.	M2221	Synchronous & Induction Machines Lab	0	0	2	1	PC	N	**EEE**
7.	M2222	Control Systems Lab	0	0	2	1	PC	N	**EEE**
8.	M2223	Power Electronics Lab	0	0	2	1	PC	N	**EEE**
9.	M21MC2	Gender Sensitization	2	0	0	0	MC	Y	**English**
10.	M22AC1	Linguaskill for Professionals – B2	2	0	0	0	AC	Y	**English**
TOTAL			**19**	**1**	**6**	**19**			

III Year I Semester

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M31EA	Business Economics & Financial Analysis	3	1	0	4	HS	Y	**MBA**
2.	BTEEEE1	PROFESSIONALELECTIVE-I	3	0	0	3	PE	N	**EEE**
3.	BTEEEO1	OPENELECTIVE–I	3	0	0	3	OE	Y	**EEE**
4.	M312A	Power Systems - II	3	1	0	4	PC	N	**EEE**
5.	M312C	Measurements and Instrumentaion	3	0	0	3	PC	N	**EEE**
6.	M3121	Electrical Simulation - I Lab	0	0	2	1	PC	N	**EEE**
7.	M3122	Measurements and Instrumentaion Lab	0	0	2	1	PC	N	**EEE**
8.	M3101	Life Skills and Professional Skills Lab	0	0	4	2	HS	Y	**English**
9.	M31MC3	Artificial Intelligence	2	0	0	0	MC	Y	**CSE**
10.	M31AC3	Indian Constitution	2	0	0	0	AC	Y	**English**
TOTAL			**19**	**2**	**8**	**21**			

III Year II Semester

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	BTEEEE2	PROFESSIONALELECTIVE–II	3	0	0	3	PE	N	**EEE**
2.	BTEEEE3	PROFESSIONALELECTIVE–III	3	0	0	3	PE	N	**EEE**
3.	BTEEEO2	OPENELECTIVE–II	3	0	0	3	OE	Y	**EEE**
4.	M322A	Computer Aided Power System Analysis	3	1	0	4	PC	N	**EEE**
5.	M324I	Microprocessors and Applications	3	0	0	3	PC	N	**ECE**
6.	M3221	Electrical Simulation - II Lab	0	0	2	1	PC	N	**EEE**
7.	M3242	Microprocessors and Applications Lab	0	0	2	1	PC	N	**ECE**
8.	M3213	Internship-II	0	0	2	1	PW	Y	**EEE**
9.	M32MC4	Cyber Security	2	0	0	0	MC	Y	**IT**
10.	M32AC4	Foundations of Entrepreneurship	2	0	0	0	AC	Y	**MBA**
TOTAL			**19**	**1**	**6**	**19**			

IV Year I Semester

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	BTEEEE4	PROFESSIONALELECTIVE–IV	3	0	0	3	PE	N	**EEE**
2.	BTEEEE5	PROFESSIONALELECTIVE–V	3	0	0	3	PE	N	**EEE**
3.	BTEEEO3	OPENELECTIVE–III	3	0	0	3	OE	Y	**EEE**
4.	M412A	Power System Operation and Control	3	0	0	3	PC	N	**EEE**
5.	M412B	Switchgear and Protection	3	0	0	3	PC	N	**EEE**
6.	M4122	Industry oriented Mini Project	0	0	4	2	PW	Y	**EEE**
7.	M4123	Major Project Phase - I	0	0	4	2	PW	Y	**EEE**
8.	M4121	Power System Protection Lab	0	0	2	1	PC	N	**EEE**
9.	M41MC2	Electrical Safety and Quality Management	2	0	0	0	MC	N	**EEE**
TOTAL			**17**	**0**	**10**	**20**			

IV Year II Semester

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	BTEEEE6	PROFESSIONALELECTIVE–VI	3	0	0	3	PE	N	**EEE**
2.	BTEEEO5	OPENELECTIVE–IV	3	0	0	3	OE	Y	**EEE**
3.	M422A	Non-Conventional Energy Sources	3	0	0	3	PC	N	**EEE**
4.	M4221	Major Project Phase - II	0	0	20	10	PW	Y	**EEE**
5.	M4222	Seminar	0	0	2	1	PW	Y	**EEE**
TOTAL			**9**	**0**	**22**	**20**			

Grand Total Credits: 160

PROFESSIONALELECTIVE–I

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M312D	Power Semiconductor Drives	3	0	0	3	PE	N	**EEE**
2.	M312E	Modern Control Theory	3	0	0	3	PE	N	**EEE**
3.	M312F	Fundamentals of Solar PV System	3	0	0	3	PE	N	**EEE**

PROFESSIONALELECTIVE–II

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M322C	Flexible AC Transmission Systems	3	0	0	3	PE	N	**EEE**
2.	M322D	Smart Grid Technologies	3	0	0	3	PE	N	**EEE**
3.	M322E	Power Quality Studies	3	0	0	3	PE	N	**EEE**

PROFESSIONALELECTIVE–III

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M322F	Energy Auditing, Conservation and Management	3	0	0	3	PE	N	**EEE**
2.	M322G	Electrical Machine Design	3	0	0	3	PE	N	**EEE**
3.	M322H	Wind and Solar Energy systems	3	0	0	3	PE	N	**EEE**

PROFESSIONALELECTIVE–IV

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M412C	Electrical Distribution Systems	3	0	0	3	PE	N	**EEE**
2.	M412D	IoT Applications in Electrical Engineering	3	0	0	3	PE	N	**EEE**
3.	M412E	High Voltage Engineering	3	0	0	3	PE	N	**EEE**

PROFESSIONALELECTIVE–V

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M412F	Utilization of Electrical Energy	3	0	0	3	PE	N	**EEE**
2.	M412G	Electric and Hybrid Vehicles	3	0	0	3	PE	N	**EEE**
3.	M412H	AI Techniques in Electrical Engineering	3	0	0	3	PE	N	**EEE**

PROFESSIONALELECTIVE–VI

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M422B	Power Electronics for Renewable Energy Systems	3	0	0	3	PE	N	**EEE**
2.	M422C	HVDC Transmission	3	0	0	3	PE	N	**EEE**
3.	M422D	Machine Learning Applications to Electrical Engineering	3	0	0	3	PE	N	**EEE**

OPEN ELECTIVES

S. NO.	CODE	COURSE TITLE	L	T	P	C	CATEGORY	COMMON SUBJECT(Y/N)	APPROVING BOS
1.	M312OB	Energy Engineering	3	0	0	3	OE	EEE	
2.	M322OB	Sensors and Transducers	3	0	0	3	OE	EEE	
3.	M412OB	Electrical Engineering Materials	3	0	0	3	OE	EEE	
4.	M422OB	Special Electrical Machines	3	0	0	3	OE	EEE	

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **M110A**	**MATRICES AND CALCULUS** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: Matrices and system of equations [10L]

Types of Matrices, Symmetric, Skew-symmetric, rank of a matrix by Echelon form and Normal form, Gauss elimination, Inverse of non-singular matrices by Gauss-Jordan method. System of linear equations, solving system of Homogeneous and Non-Homogeneous equations.

Module 2: Eigen values, Eigen Vectors [8 L]

Eigen values, Eigen vectors and their properties, Diagonalization of matrix. Calculation of powers of Matrix, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem.

Module 3: Quadratic Forms [8 L]

Definitions of Hermitian, Skew-Hermitian, orthogonal matrices, Unitary Matrices, Linear Transformation and Orthogonal Transformation, Quadratic forms, rank and nature of the quadratic forms, index and signature, reduction of quadratic forms into canonical form using Linear Transformation and Orthogonal Transformations.

Module 4: Mean value theorems and Functions of Multi variables [12L]

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series

Functions of Multi variables: Limits, Continuity, Partial differentiation, partial derivatives of first and second order, Jacobian, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

Module 5: Improper and Multiple Integrals [12L]

Definition of Improper Integrals, Beta functions: Properties and other forms of beta functions (statements only) and problems, Gamma functions: Properties of Gamma functions (statements only), Relation between the Beta and Gamma functions (without proofs) and Evaluation of improper integrals using Beta and Gamma functions

Evaluation of double integrals, change of order of integration, change of variables, evaluation of triple integrals, change of variables.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015

2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.

3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2019.

Reference Books

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

E-Resources

1. https://nptel.ac.in/courses/111/108/111108098/
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://nptel.ac.in/courses/111/107/111107108/
4. https://www.cheric.org/files/education/cyberlecture/e200303/e200303-301.pdf
5. https://www.whitman.edu/mathematics/calculus_online/chapter16.html

Course Objectives:

To learn

1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form Geometrical approach to the mean value theorems and their application to the mathematical problems
4. Evaluation of surface areas and volumes of revolutions of curves.

5. Evaluation of improper integrals using Beta and Gamma functions.
6. Partial differentiation, concept of total derivative
7. Finding maxima and minima of function of two and three variables.
8. Evaluation of multiple integrals and their applications

Course outcomes:

After learning the contents of this paper, the student must be able to

1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
2. Find the Eigenvalues and Eigen vectors
3. Reduce the quadratic form to canonical form using orthogonal transformations.
4. Solve the applications on the mean value theorems.
5. Evaluate the improper integrals using Beta and Gamma functions
6. Find the extreme values of functions of two variables with/ without constraints.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **M110B**	**APPLIED PHYSICS** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: 10+2 Physics

Course Objectives:

The students should be able to

1. Study the characteristics of lasers and optical fibres.
2. Understand the basic principles of quantum mechanics and band theory of solids.
3. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
4. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
5. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.

Unit-1: LASERs and Optical fibers [10L]

Module I: LASERs [5L]

Introduction, Properties of laser beam- Monochromaticity, coherence, directionality and brightness; Einstein co-efficients, Population inversion, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of lasers.

Module II: Optical fibers [5L]

Introduction, Principle and construction of an optical fiber, Total Internal reflection, Acceptance angle, Numerical aperture, Types of optical fibers (Single mode, multimode, step index, graded index), losses in optical fibers, Optical fiber communication system with block diagram and Applications of optical fibres.

Unit-2: Fundamentals of Quantum Mechanics and Band theory of solids [10L]

Module I: Fundamentals of Quantum Mechanics [6L]

Introduction to quantum physics, Black body radiation, Planck's radiation law, Photoelectric effect, de-Broglie hypothesis, Davisson and Germer's experiment, Concept of wave function, Heisenberg uncertainty principle, Time independent Schrödinger wave equation, Particle in one dimensional infinite potential well

Module II: Band theory of solids: [4L]

Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative), Bloch's theorem, Kronig-Penney model (Qualitative), E-K diagram, Effective mass of electron, Origin of energy bands- classification of solids.

Unit-3: Semiconductor Physics and Devices [9L]

Module I: Semiconductor Physics [5L]

Density of states, Intrinsic semiconductor, Intrinsic carrier concentration, Extrinsic semiconductors (Qualitative), Fermi level and its temperature dependence, Hall effect-Hall coefficient, Applications of Hall effect.

Module II: Semiconductor Devices [4L]

Direct and indirect bandgap semiconductor, Formation of PN junction, Working of PN junction diode in forward and reverse bias, V-I Characteristics, Zener diode, LED, Photo diode and Solar cell, their structure, working principle and characteristics.

Unit-4: Dielectric, Energy and Magnetic materials [10L]

Module I: Dielectric and Energy materials [5L]

Introduction, Types of polarizations-electronic, ionic and orientation polarizations; Internal field and Clausius-Mossotti, Piezoelectricity, Pyroelectricity and Ferroelectricity and their applications. Energy materials-Materials and electrolytes for super capacitors-Rechargeable ion batteries-Lithium ion and sodium ion batteries, solid fuel cells.

Module II: Magnetic materials [5L]

Introduction, Origin of magnetic moment, Bohr magneton, Classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve based on domain theory, Soft and hard magnetic materials, Properties of antiferro and ferri magnetic materials.

Unit-5: Nanoscience and Characterization techniques [9L]

Module I: Nanoscience [5L]

Introduction of nanomaterials, Surface area to Volume ratio, Quantum confinement, Top-down fabrication: Ball milling and Chemical Vapor Deposition (CVD) methods, Bottom-up fabrication: Sol-Gel and Combustion methods.

Module II: Characterization techniques [4L]

X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Scanning Tunnelling Microscope (STM), Applications of nanomaterials.

Text Books

1. M.N. Avadhanulu and P.G. Kshirsagar, TVS Aruna Murthy "A Text Book Engineering Physics", S. Chand, 2019.
2. P. K. Palanisamy, "Engineering Physics", Scitech Publications.
3. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.
4. Wahab M A, 'Solid state physics-Structure and properties of materials' Narosa publication.
5. R.L.Singhal, " Solid state physics", KNRN publication.
6. Elementary Solid State Physics , S.L. Gupta and V. Kumar, pragati prakashan, 2019.
7. A.K. Bhandhopadhya-Nano materials, New age international, 1 st edition, 2007.

Reference Books

1. P. Bhattacharya, "Semiconductor Optoelectronic Devices", Prentice Hall of India (1997).
2. S.O. Pillai, "Solid State Physics", New Age International Publishers
3. J. Singh, "Semiconductor Optoelectronics", Physics and Technology, McGraw-Hill Inc. (1995).
4. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.

E-Resources

1. http://nptel.ac.in/courses/113104012/
2. http://www.springer.com/physics/journal/340 .

3. https://www.researchgate.net/publication/259574083 Lecture Notes on Engineering Physics
4. https://www.researchgate.net/publication/292607115_Applied Physics.

Course Outcomes

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

CO1. Describe the working of various types of lasers and explain the fundamentals of fiber optics.

CO2. Apply Schrodinger time independent wave equation to show energy of a particle in 1D potential box is quantized.

CO3. Explain the working of p-n junction diode in forward bias and reverse bias.

CO4. Classify the magnetic materials into hard and soft magnetic materials based on hysteresis loop area.

CO5. Prepare nanomaterials for applications in various fields of engineering.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	1	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-	2	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **M112A**	**BASIC ELECTRICAL ENGINEERING** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Mathematics and Physics

COURSE OBJECTIVES

The students will

COB1: Apply Kirchhoff's laws to analyse complex DC circuits, demonstrating comprehension and application skills in electrical engineering.

COB2: Analyse the behaviour of AC circuits, showcasing evaluation skills in understanding electrical phenomena, including resonance.

COB3: Explain the principles of transformer operation and analyse their behaviour, applying concepts of electromagnetic induction.

COB4: Select and operate suitable DC motors and three-phase induction motors for various industrial applications, synthesizing motor principles effectively.

COB5: Demonstrate proficiency in basic electrical installations and the use of fundamental measurement instruments for practical electrical applications, ensuring strict adherence to safety protocols and standards.

UNIT 1: DC CIRCUITS AND CIRCUIT ELEMENTS [10 L]

MODULE -I: D.C CIRCUIT CONCEPTS AND CIRCUIT ELEMENTS

Voltage – current – power and energy – active and passive elements – voltage and current sources – source conversions – open circuit – short circuit – statement of Ohm’s law - Kirchhoff’s Laws – loop current method – node voltage method of solving the electrical network – resistance – laws of resistance – temperature coefficient of resistance – resistors in series and parallel – uses of resistor.

MODULE -II: ENERGY STORING ELEMENTS

Inductor – inductance – V-I relation – power – energy stored in inductor – inductors in series and parallel – uses of Inductors – capacitor – capacitance – V-I relation – power – energy stored in capacitor – capacitor in series and parallel – uses of capacitor.

UNIT 2: AC CIRCUITS [10 L]

MODULE -I: SINGLE PHASE AC CIRCUITS

Alternating quantity – cycle – time period – frequency – Amplitude – RMS – average value – form and peak factors – phase and phase difference – AC through R, L, C, RL, RC and RLC series circuits – resonance in series RLC circuit.

MODULE -II: THREE PHASE AC CIRCUITS

Phase sequence – three phase connections – relationship between line and phase value of voltage and current in star and delta connections – power in three phase circuit.

UNIT 3: STATIC ELECTRIC MACHINE [8 L]

MODULE -I: FUNDAMENTALS OF SINGLE-PHASE TRANSFORMER

Single phase transformer – Principle – constructional details – parts – types (core and shell type) – equivalent circuit - EMF equation.

MODULE -II: TRANSFORMER PERFORMANCE AND APPLICATIONS

Losses – efficiency – regulation – applications.

UNIT 4: DC AND AC MACHINES [8 L]

MODULE -I: DC MOTOR

D.C Motor – principle – constructional details – DC series – DC shunt motor – torque current and speed current characteristics – applications.

MODULE -II: THREE-PHASE INDUCTION MOTOR

Three-phase induction motor – principle – construction – generation of rotating magnetic field – torque slip characteristics.

UNIT 5: ELECTRICAL INSTALLATIONS AND MEASURING INSTRUMENTS [9 L]

MODULE -I: ELECTRICAL INSTALLATIONS: Components of LT switchgear: Switch fuse unit (SFU) – MCB – MCCB – earthing.

MODULE -II: MEASURING INSTRUMENTS: Construction – working principle of PMMC and MI type instruments – advantages – disadvantages – applications.

TEXT BOOKS

T1: D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.

T2: V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Company Ltd, 2012.

T3: L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

T4: A.K.Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanapath Rai and Sons., 10th Edition, 2007.

REFERENCE BOOKS

R1: Dr. Ramana Pilla, Dr. M. Suryakalavathi, "Basic Electrical Engineering", S. Chand & Company Ltd, 2018.

R2: V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-RESOURCES

E1: https://onlinecourses.swayam2.ac.in/nou21_ee02/preview

E2: https://nptel.ac.in/courses/108/108/108108076/

E3: https://www.electrical4u.com

COURSE OUTCOMES

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

CO1: Analyse and solve complex DC circuits using Kirchhoff's laws.

CO2: Calculate and analyse the behaviour of single-phase and three-phase AC circuits, including resonance phenomena.

CO3: Understand the principles of operation and applications of transformers in electrical systems.

CO4: Expertise in the principles and applications of DC motors and three-phase induction motors, enabling them to select and operate suitable machines for various industrial purposes.

CO5: Develop foundational skills in basic electrical installations and using fundamental measurement instruments for practical electrical applications.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO2	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO3	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO4	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO5	3	3	3	2	1	1	1	-	-	-	-	1	2	1

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE I Year-I Sem			
Course Code: M1122	ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		0	0	2	1

Pre-Requisites: NIL

COURSE OBJECTIVES

The students will

COB1: Demonstrate the practical significance of Electrical and Electronics subjects across diverse fields by applying theoretical knowledge to real-world scenarios, evaluating their impact and effectiveness.

COB2: Identify and differentiate between passive and active components within electronic circuits, demonstrating a thorough understanding of their roles and functionalities.

COB3: Proficiently utilize a multimeter to measure voltage and current in electronic circuits, showcasing practical skills and comprehension in their application.

COB4: Operate a Cathode Ray Oscilloscope (CRO) competently to measure frequency and phase characteristics of signals, demonstrating practical skills and understanding in their utilization.

COB5: Employ a function generator to generate signals and effectively operate a regulated power supply to vary supply voltages, illustrating practical skills and understanding in signal manipulation and power management.

List of Experiments

1. Understand the significance of Electrical and Electronics subjects.
2. Identify the different active and passive components.
3. Colour code of resistors, finding the types and values of capacitors.
4. Measure the voltage and current using voltmeter and ammeter.
5. Measure the voltage, current with Multimeter.
6. Study the other measurements using Multimeter.
7. Study the CRO and measure the frequency and phase of given signal.
8. Draw the various Lissajous figures using CRO.
9. Study the function generator for various signal generations.
10. Operate Regulated power supply for different supply voltages.

COURSE OUTCOMES

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

CO1: Demonstrate an understanding of the significance of Electrical and Electronics subjects through practical applications in various fields, assessing comprehension at the level of evaluation.

CO2: Identify passive and active components in electronic circuits, applying knowledge and comprehension at the level of understanding.

CO3: Utilize a multimeter proficiently to measure voltage and current, showcasing practical skills and understanding at the level of application.

CO4: Operate a Cathode Ray Oscilloscope (CRO) to measure frequency and phase of given signals, demonstrating practical skills and understanding at the level of application.

CO5: Employ a function generator for signal generation, and operate a regulated power supply for varying supply voltages, illustrating practical skills and understanding at the level of application.

AY: 2024-25 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech I Year- I Sem			
Course Code: M115B	**PROGRAMMING FOR PROBLEM SOLVING** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites:

1. Mathematical Knowledge.

2 Analytical Skills.

Course objectives:

The Student will:

1. Learn the fundamentals of computers.
2. Understand the various steps in program development.
3. Understand the syntax and semantics of C programming language.
4. Learn the usage of structured programming approach in solving problems.
5. Gain the knowledge on searching and sorting methods.

Module 1:

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of

Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: Basic concepts of a C program, Declaration, Assignment & Print statement, Types of operators and expressions, Programming examples and exercise. variables (with data types and space requirements),

Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and

precedence, Expression evaluation, Storage classes (auto, extern, static and register), type

conversion, The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and

Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switchcase, ternary operator, goto, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Module 2: ARRAYS, STRINGS, STRUCTURES AND PREPROCESSOR:

Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures. **Preprocessor**: Commonly used Preprocessor commands like include, define, undef, If, ifdef, ifndef.

Module 3: POINTERS AND FILE HANDLING IN C:

Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers inself-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type. Array of pointers,

Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Module 4: FUNCTION AND DYNAMIC MEMORY ALLOCATION:

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types..

Dynamic allocations methods- malloc(), calloc(), realloc(),free(),

Module 5: INTRODUCTION TO ALGORITHMS:

Basic searching algorithms (linear and binary search techniques), Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexity through the example programs

Textbooks

1. Ream Thareja, Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning, (3rdEdition).

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, PearsonEducation.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
5. Byron Gottfried, Schaum"sOutline of Programming with C,McGraw-Hil

E - Resources:

1. https://fresh2refresh.com/c-programming/
2. https://www.studytonight.com/c/
3. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with examples/
4. https://www.programiz.com/c-programming
5. http://www.gtucampus.com/uploads/studymaterials/Degree%20EngineeringSandipFundaments_of_C.pdf
6. http://cs.indstate.edu/~cbasavaraj/cs559/the_c_programming_language_2.pdf

Course Outcomes

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

CO1. Design the algorithms/flowcharts of C-programs

CO2 . Write the Code and test a given logic in C programming language

CO3 Decompose a problem into functions and to develop modular reusable code.

CO4. Make Use of arrays, pointers, strings and structures to write C Programs.

CO5 Apply searching and sorting algorithms

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year- I Sem			
Course Code: **M1101**	**PHYSICS LABORATORY** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD)	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: 10+2 Physics basic concepts.

List of Experiments:

1. Energy gap of P-N junction diode

To determine the energy gap of a semiconductor diode.

2. Solar Cell:

To study the V-I Characteristics of solar cell.

3. Light emitting diode and Laser Diode:

Plot V-I characteristics of light emitting diode and Laser diode.

4. Optical fiber:

Determination of Numerical Aperture of an optical fibre.

5. Hall effect:

To determine Hall co-efficient of a given semiconductor.

6. Photoelectric effect

To determine work function of a given material.

7. Dielectric Constant

To determine the Dielectric constant of the given material.

8. LCR Circuit

To determine the Quality factor of LCR Circuit (Series & Parallel).

9. R-C Circuit

To determine the time constant of R-C circuit (Growth and Decay).

10.Melde's Experiment

To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.

11. Torsional Pendulum

To determine the rigidity modulus of the material of the given wire using torsional pendulum.

12.Sonometer

To determine the frequency of AC Supply sonometer.

Note: Any 10 experiments are to be performed.

Text Books

1.Dr. Narendra, L. Mathakari,"Experiments in Applied Physics" (Physics Lab Manual 4th edition) ,

2."Engineering Physics Lab Resources" By Department of Physics JBIET.

Course Outcomes

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

1. Learn the experimental concepts on in LED, Electric and Electronics materials.
2. Get the knowledge of fundamentals of Semiconductor physics.
3. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
4. Be exposed to the phenomena of waves, oscillations and optics.
5. Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **M1121**	**BASIC ELECTRICAL ENGINEERING LAB** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD)	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Mathematics and Physics

COURSE OBJECTIVES

The students will

COB1:	Proficiently apply fundamental electrical principles, including Ohm's Law and circuit analysis techniques, to determine the values of unknown resistances.
COB2:	Demonstrate mastery in validating circuit behaviours through the application of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
COB3:	Explore resonance phenomena in series RLC circuits, identifying the frequency at which impedance is minimized and current is maximized, thus exhibiting proficiency in frequency-domain analysis.
COB4:	Equip students to evaluate the performance characteristics of DC shunt motors and single-phase transformers, enabling them to assess their suitability for specific applications in electrical systems.
COB5:	Learn the performance of Three Phase Induction Motor.

List of Experiments
(Any 10 Experiments shall be conducted)

1. Verification of Ohms Law.
2. Determination of unknown resistance.
3. Verification of KVL and KCL.
4. Resonance in series RLC circuit.
5. Calculations and verification of impedance and current of RL and RC series circuits.
6. Calculations and verification of impedance and current of RLC series circuits.
7. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
8. Load test on single phase transformer (Calculate Efficiency and Regulation).
9. Performance Characteristics of a DC Shunt Motor.
10. Torque-Speed characteristics of DC Shunt Motor.
11. Torque-Speed characteristics of Three Phase Induction Motor.
12. Performance Characteristics of Three Phase Induction Motor.

COURSE OUTCOMES

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

CO1:	Apply Ohm's Law and circuit analysis techniques to determine the value of unknown resistances, showcasing proficiency in fundamental electrical principles.
CO2:	Validate principles of circuit behaviour using Kirchhoff's Voltage Law and Kirchhoff's Current Law.
CO3:	Explore resonance phenomena in series RLC circuits, identifying the frequency at which impedance is minimized and current is maximized, showcasing proficiency in frequency-domain analysis.
CO4:	Evaluate the performance characteristics of DC shunt motors and single-phase transformers, to assess their suitability for specific applications in electrical systems.
CO5:	Evaluate the performance of Three Phase Induction Motor.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO2	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO3	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO4	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO5	3	3	3	2	1	1	1	1	1	-	-	1	2	1

AY: 2024-25 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE I Year- I Sem			
Course Code: M1151	PROGRAMMING FOR PROBLEM SOLVING LAB (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD)	L	T	P	C
		0	0	2	1

Pre-Requisites:

1. Mathematical Knowledge.

2 Analytical Skills.

Course objectives:

The Student will:

1. Work with an IDE to create, edit, compile, run and debug programs
2. Analyse the various steps in program development.
3. Develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. Develop modular, reusable, and readable C Programs using the concepts like functions, arrays etc.
5. Write programs using the Dynamic Memory Allocation concept, files

Lab Experiments:

1. a) Write a program to find the max and min from the three numbers.

b) Write a program to read marks from keyboard and your program should display equivalent

grade according to following table (if else ladder)

Marks Grade

100 – 80 Distinction

79 – 60 First Class

59 – 40 Second Class

< 40 Fail

2. Write a C program, which takes two integer operands and one operator from the user, performs the operation, and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

3. Write a program that finds if a given number is a prime number

4. Write a C program to generate the first n terms of the sequence

5. Write a C program to find the minimum, maximum and average in an array of integers.

6. Write a C program to find Addition and Multiplication of Two Matrices

7. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

8. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

9.a) Write a C program to implement binary search algorithm.

b) Write a C program to implement linear search algorithm.

10. a) Write a C program that implements the Bubble sort method.

b) Write a C program that implements the Insertion sort method.

11. Write a C program that implements the Quick sort method.

12. Write a C program that implements the Merge sort method.

13. Recursion: factorial, Fibonacci, GCD.

Case Studies:

1. Implement Hotel Management system in C with the following requirements.

Requirements:

-Provide the information on reserving rooms, book an event, check the features

- Give the login for both admin and user for proper login validation

-Add/View/Edit/Delete user records

-Calculate the bill after checkout of customers

2. Implement Library management system in C with the following requirements.

Requirements:

-To add Book Information

- Display Book Information

-List all the books of the given author

-List the title of the specified Book

-List the count of books in the library

Course Outcomes

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

CO1 Formulate the algorithms for simple problems

CO2 Examine syntax errors as reported by the compilers

CO3 Define and manipulate data with arrays, strings, and structures

CO4 Make use of pointers with different function types

CO5 Create, read, and write to and from simple text and binary files

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: EEE I Year-I Sem			
Course Code: **M1131**	**ENGINEERING WORKSHOP AND DIGITAL FABRICATION PRACTICES** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		1	**0**	**4**	**2.5**

Pre-Requisites: Basic knowledge about tools and different trades

List of Experiments.

1. To make a Half Lap joint from the given Wooden pieces.
2. To make a Dovetail joint from the given Wooden pieces.
3. To make a Rectangular Scoop using the given Sheet metal.
4. To make a Hooper using the given Sheet metal.
5. To perform Parallel and Series wiring connection.
6. To perform Stair case wiring connection.
7. To make a Square rod from a given round rod.
8. To make a S- hook from a given round rod.
9. To prepare a sand mould for the given single piece pattern.
10. To prepare a sand mould for the given Split-piece pattern.
11. To make a Straight fitting from the given metal pieces.
12. To make a V- shape fitting from the given metal pieces

Demonstration

13. 3D Printing of modeled component by varying Layer thickness.
14. 3D Printing of modeled component by varying Orientation.
15. 3D Printing of modeled component by varying Infill.

Text Books

1. K. C. John, "Mechanical Workshop Practice", PHI Publishers, 2nd Edition,2010.
2. Ben Redwood, "The 3D Printing Handbook", 3D HUBS, 2018.

Course Outcomes

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

CO1. know the importance of general safety precautions on different shop floors.

CO2. identify the basic tools and equipments used in fitting, carpentry, sheet metal, machine shop, welding and smithy.

CO3. familiarize with the production of simple models in carpentry, sheet metal, machine, welding and smithy trades.

CO4. Gain the knowledge on different 3D Printing techniques.

CO5: Perform the printing of the different components using FDM 3D printer.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO2	-	-	-	-	-	-	-	-	2	2	2	3	3	1
CO3	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO4	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO5	-	-	-	-	-	-	-	-	2	2	2	3	3	2
Average	-	-	-	-	-	-	-	-	2	2	2	3	3	2.4

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **M11AC1**	**LINGUASKILL FOR PROFESSIONALS – B1** **(**COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: NIL

COURSE OBJECTIVES:

To enable students

1. Acquire an extensive range of vocabulary related to diverse topics.
2. Enhance pronunciation skills, focusing on specific sounds and intonation patterns
3. Improve the use of various grammar concepts
4. Strengthen listening, speaking, reading, and writing skills across different proficiency levels
5. Develop practical language skills for everyday communication scenarios

Module1 **[6L]**

UNIT-1

Grammar: Subject-Object, Present Tense

Vocabulary: Words about friendship, communication, work and technology

Pronunciation: Word stress, sentence stress

UNIT-2

Everyday English: Opinions and suggestions

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Guide, Email giving news

Module 2 **[6L]**

UNIT-1

Grammar: Modals, Phrases of ability, Articles, *used to* and *usually*

Vocabulary: Words about relationship and ability

Pronunciation: Linking sounds, Intonation in question tags

UNIT -2

Everyday English: Telling a story; Offering and asking for help

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: About someone's life, online advertisement

Module3 **[6L]**

UNIT-1

Grammar: Future forms, zero and first conditionals, comparatives and superlatives

Vocabulary: Words about the natural world, environmental issues and food

Pronunciation: Sound and spelling 'a', /ʃ/, /tʃ/

UNIT-2

Everyday English: Giving reasons, results and examples; Asking and giving recommendations

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Discussion essay, Review of a restaurant or cafe

Module4 **[6L]**

UNIT-1

Grammar: Quantifiers, Reported speech

Vocabulary: Words about buildings and sharing information

Pronunciation: Sounds */t//d//k//g//h//w/*

UNIT-2

Everyday English: Offers, request, permission; generalising and being vague

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: A note with useful information, an email summary of a news story

Module 5 **[6L]**

UNIT-1

Grammar: Passive, Relative clause, Second and third conditionals

Vocabulary: Words about music and sport; expressions with *do, make* and *take*

Pronunciation: -ed ending words, mostly confused words

UNIT-2

Everyday English: Recommending, Discussing problems and reassuring

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Article, Email with advice

Text Books

1. Doff, Adrian, et al. *Empower Second Edition Student's Book with Digital Pack: B1+ Intermediate*. Cambridge University Press, 2022.

Reference Books

1. Cullen, Pauline, et al. The Official Cambridge Guide to IELTS for Academic and General Training: Student's Book with Answers. with DVD-ROM. Cambridge Univ. Press, 2014.

E-Resources

1. Cambridge English
2. English with Cambridge - YouTube
3. BBC Learning English - Learn English with BBC Learning English -Homepage
4. https://englishonline.britishcouncil.org/

Course Outcomes

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

CO1. Demonstrate a diverse vocabulary repertoire, facilitating better expression and comprehension.

CO2. Exhibit inteligible pronunciation skills, ensuring clearer oral communication.

CO3. Utilise various grammar concepts accurately and coherently.

CO4. Strengthened language skills across listening, speaking, reading, and writing.

CO5. Apply practical language skills effectively in everyday communication scenarios.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	3	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**	**-**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **M120A**	**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: First Order, First Degree ODE and its Applications [10L]

Differential equations of first order and first degree - Exact differential equation, Linear and Bernoulli differential equation, applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories.

Module 2: Second and Higher order ODE with Constant Coefficients: [10L]

Second order linear differential equations with constant coefficients: Solution of Homogenous, nonhomogeneous differential equations, non-Homogeneous terms of the type e^{ax}, sin(ax), cos (ax), polynomials in x^k, e^{ax} V(x), xV(x). Method of variation of parameters; Equations reducible to linear ODE with constant Coefficients: Euler-Cauchy equation, Legendre's equation

Module 3: Laplace Transforms: [10L]

Laplace transforms, Existence condition, Laplace transform of Elementary functions, Properties of Laplace transforms (Without Proofs), Laplace transform of special functions (Unit step function, Dirac delta function and Periodic function). Inverse Laplace transform and its properties, Convolution theorem (without proof) and its applications, solving linear differential equations with constant coefficients using Laplace transform.

Module 4: vector differential calculus: [9L]

Scalar and vector fields, vector differentiation, level surfaces, gradient of a scalar field, directional derivative, divergence and curl of a vector field, Scalar potential energy, Tangent plane and normal line. Vector Identities (without proofs).

Module 5: Vector integral calculus: [9L]

Line, surface and volume integrals. Green's theorem in a plane, Gauss-Divergence theorem and Stokes theorem(without proofs).

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5 th Edition, 2019.

Reference Books

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

E-Resources

1. https://nptel.ac.in/courses/111108098
2. https://www.math.hkust.edu.hk/~machas/differential-equations.pdf
3. https://engineeringmath.online
4. https://www.cheric.org
5. https://www.whitman.edu/mathematics/calculus_online

Course Objectives:

To learn

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

Course Outcomes:

After learning the contents of this paper, the student must be able to

1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems.
3. Use the Laplace transforms techniques for solving ODE's.
4. Evaluate the line, surface and volume integrals and converting them from one to another

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **M120D**	**ENGINEERING CHEMISTRY** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites:

Course Objectives:

The students should be able

1. To know the suitability of water for domestic and industrial purposes.
2. To acquire knowledge about different types of batteries and to understand the concepts of corrosion.
3. To facilitate successful pursuit of advanced degrees to support interdisciplinary ideas in engineering or other related fields
4. Gain the knowledge of chemical reactions those are used in the synthesis of molecules.

Module 1: Water and Its Treatment [11L]

Introduction – hardness of water – Causes of hardness - Types of hardness- temporary and permanent hardness – Units of hardness of water - Numerical problems – Estimation of hardness of water by complexometric method. Boiler troubles: scale and sludge, causes and effects. Potable water and Industrial water its specifications. Softening of water - Internal treatment of boiler feed water– Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of brackish water – Reverse osmosis. Steps involved in potable water treatment – Disinfection of water by chlorination, Breakpoint chlorination and Ozonization.

Module 2: Battery and Corrosion [12L]

Batteries [7L]

Introduction– Classification of batteries - Primary (Li-MnO_2 cell) and secondary batteries (Lithium ion battery)- Applications

Fuel cells – Methanol - Oxygen fuel cell – Engineering applications

Solar cells –Principle and applications of solar cells

Corrosion[5L]

Causes and effects of corrosion–chemical and electrochemical corrosion – mechanism of electrochemical corrosion by hydrogen evolution method, types of corrosion-galvanic and waterline corrosion. Factors influencing rate of corrosion - Corrosion control methods- Cathodic protection – Sacrificial anodic and impressed current cathodic methods - Hot dipping (Galvanizing and Tinning).

Module 3: Chemical Fuels [9L]

Fuels: Definition, Classification, Characteristics of a good fuel - Types of Calorific value (CV) – Calculation of CV using Dulong's formula, Numericals.

Soild Fuels: Coal - Composition - Proximate & Ultimate Analysis - Significance.

Liquid Fuels: Gasoline and its Composition, Cracking: Fixed bed catalytic cracking method – Knocking, Anti- Knocking agents and its significance, Octane number, Cetane number.

Gaseous Fuels: Composition, characteristics and applications of natural gas, LPG and CNG

Module 4: Polymers [10L]

Polymers: Definition–Monomer, Polymer, Polymerization. Types of polymerization – addition and condensation polymerization with examples.

Plastics: Definition - thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and Engineering Applications of PVC. Urea-Formaldehyde.

Fibers: Preparation, Properties and engineering applications of Nylon-6, 6.

Conducting Polymers- Definition, Classification, Applications.

Module 5: Engineering Materials & Drugs [8L]

Nanomaterials

Introduction, Synthesis of Sol-gel method, General Applications of Nanomaterials.

Carbon Nanotubes - Properties and applications.

Portland Cement: Chemical constituents, Manufacturing of Portland cement, Setting and Hardening and applications of cement.

Drugs: Antipyretic (Paracetamol) – Medicinal Applications

Text Books

1. Engineering Chemistry: Prof. Jaya Shree Anireddy, Wiley Publications.
2. Engineering Chemistry: P. C. Jain & M. Jain, Dhanpat Rai Publications, New Delhi.
3. Engineering Chemistry: Shashi Chawla, Dhanpat Rai Publications (2019), New Delhi.

Reference Books

1. Engineering Chemistry by M. Thirumalachary and E. Laxminarayana, Scitech Publications.
2. Text Book of Engineering Chemistry by Cengage Learning, B. Rama Devi, Ch. Venkata Ramana Reddy and Prasanth Rath.
3. Engineering Chemistry (NPTEL Web-book) by B.L. Tembe, Kamaluddin and M.S.Krishnan

E-Resources

1. https://www.imnh.isu.edu/digitalatlas/hydr/basics/main/chmtxt.
2. https://chem.libretexts.org/Core/.../Electrochemistry/Basics_of_Electrochemistry
3. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/polymers.htm
4. https://www.youtube.com/watch?v=W0-CvvAGtEM
5. https://sengerandu.wordpress.com/tutorials/physical-metallurgy/engineering-materials

Course Outcomes

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

CO1. Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.

CO2. Understand and interpret the important fundamental concepts of electrochemicalprocedures related to corrosion and its control.

CO3. Rate the fuels and suggest methods for enhancement of the quality of fuels for the required output.

CO4. Identify & recognize the role of polymers in everyday life.

CO5. Apply the Knowledge of engineering materials and drugs in daily life.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	-	-	-	-	3	2	-	-	-	-	3	-	-
CO2	3	-	-	-	-	3	2	-	-	-	-	3	-	-
CO3	3	2	-	-	-	3	3	-	-	-	-	3	-	-
CO4	1	2	-	-	-	3	2	-	-	-	-	2	-	-
CO5	3	-	-	-	-	2	3	-	-	-	-	1	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem.			
Course Code: **M120C**	**ENGLISH FOR SKILL ENHANCEMENT** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: NIL

Course Objectives:

The students should be able

1. Enhancing understanding of key concepts related to language structures and language usage.
2. Ensuring the ability to write grammatically correct and diverse sentences, free from punctuation and spelling errors.
3. Improving students' proficiency in English required for technical education.
4. Building academic competence and confidence to use language effectively.
5. Developing life skills to tackle different challenges.

Module 1 (10L)

Lesson: 'Toasted English' by R. K. Narayan

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and

Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper

Punctuation- Techniques for writing precisely – Paragraph Writing – Types, Structures

And Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

Module 2(9L)

Lesson: 'Appro JRD' by Sudha Murthy

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

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

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events

– Classifying- Providing Examples or Evidence.

Module 3 (8L)

Lesson: Elon Musk

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

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

Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for

Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of

Requisition, Email Etiquette, Job Application with CV/Resume.

Module 4(8L)

Lesson: Art and Literature by Dr. Abdul Kalam

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

Module 5(8L)

Lesson: Go, Kiss the World' by Subroto Bagchi

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports

Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Text Books

1. *"English: Language, Context and Culture"* by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

Reference Books

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

E-Resources

1. https://sharmadkm.wordpress.com/2022/12/11/toasted-english-by-r-k-narayan/
2. https://sharmadkm.wordpress.com/2022/12/20/apro-jrd-summary/
3. Cambridge English
4. BBC Learning English - Learn English with BBC Learning English - Homepage

Course Outcomes

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

CO1. Expand their vocabulary through mastery of word roots, prefixes, and suffixes.

CO2. Demonstrate proficiency in grammar fundamentals, including sentence structure and parts of speech.

CO3. Exhibit competence in reading and writing skills for effective communication in diverse contexts.

CO4. Apply critical thinking and analytical skills to analyse texts and synthesize information.

CO5. Express themselves confidently and coherently through oral presentations, discussions, and written compositions.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	3	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**	**-**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **M124A**	**BASIC ELECTRONICS ENGINEERING** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		3	**0**	**0**	**3**

Prerequisite: Applied Physics

UNIT - I

Module 1: Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances

Module 2: P-N junction diode- Principle of operation and characteristics of a P-N junction diode V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Module 1: Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters

Module 2: Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III

Module 1: Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations

Module 2: Current components of BJT, amplification factors**.** V-I characteristics, Transistor as a switch, switching times

UNIT - IV

Module 1: Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Determination of FET Parameters from the V-I characteristics

Module 2: Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET -Construction & Operation in Enhancement and Depletion modes, MOSFET as a capacitor.

UNIT – V

Special Purpose Devices: Zener Diode **-** Characteristics, Zener diode as

Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.

REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics- Principles and Applications, Cambridge, 2018.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE I Year-II Sem			
Course Code: **M1241**	**BASIC ELECTRONICS ENGINEERING LAB** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		0	**0**	**2**	**1**

List of Experiments (Twelve experiments to be done):

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Study of Rectifier characteristics with & without filters
3. Types of Clippers at different reference voltages
4. Types of Clampers at different reference voltages
5. Input and output characteristics of BJT in CB Configuration
6. Input and output characteristics of BJT in CE Configuration
7. Input and output characteristics of MOS FET in CS Configuration
8. Input and output characteristics of MOS FET in CD Configuration
9. Switching characteristics of a transistor
10. Zener diode characteristics and Zener as voltage Regulator
11. SCR Characteristics.
12. UJT Characteristics and identify negative region
13. Photo diode characteristics
14. Solar cell characteristics
15. LED Characteristics

*Design a circuit to switch on and off LED using diode/BJT/FET as a switch.

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V.
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals.
4. Multimeters, voltmeters and Ammeters.
5. Electronic Components and devices.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: EEE I Year – I			
Course Code: **M1232**	**Computer Aided Engineering Graphics** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		1	**0**	**3**	**2.5**

Pre-Requisites: Engineering Mathematics.

Module 1: Principles of Engineering Drawing, Conic Sections, Curves, Scales [12L]

Unit-I: [3L] Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance. Construction of Plane, Diagonal Scales.

Unit-II: [6L] Conic Sections including the Rectangular Hyperbola – General method only, Cycloid, Epicycloid and Hypocycloid.

Unit-III: [3L] Introduction to Computer aided drafting – views, commands and conics.

Module2: Orthographic Projections [12L]

Unit-I: [3L] Principles of Orthographic Projections – Conventions.

Unit-II: [3L] Projections of Points and Lines, Projections of Plane regular geometric figures – Circle, Square, Rectangle, Triangle, Pentagon, Hexagon.

Unit-III: [6L] Computer aided orthographic projections – points, lines and planes.

Module3:Projections of Solids [12L]

Unit-I: [6L] Projections of Right Regular Solids – Prisms and Pyramids of Square, Pentagon, Hexagon;

Unit-II: [6L] Projections of Generated Solids – Cone, Cylinder. Computer aided projections of solids.

Module 4: Sections of Solids, Development of Surfaces of Solids [12L]

Unit-I: [3L] Sectional View of Right Regular Solids – Prisms and Pyramids of Pentagon, Hexagon; Generated solids – Cylinder and Cone.

Unit-II: [6L] Development of Surfaces of Right Regular solids – Prism, cylinder pyramid and cone.

Unit-III: [3L] Computer aided sectional views, Development of surfaces.

Module 5: Isometric Projections, Orthographic Views [12L]

Unit-I: [9L] Principles of Isometric Projections, Isometric Scale, Isometric Views of Simple and Compound Solids; Conversion of Orthographic Views of simple objects to Isometric Views and Vice-versa.

Unit-II: [3L] Conversion of orthographic projection into isometric view using computer aided drafting.

Text Books

1. Bhatt N.D., Panchal V.M. & Ingle P.R., "Engineering Drawing", Charotar Publishing 2014.
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.
3. K. Venugopal & V. Prabhu Raja, "Engineering Drawing + Auto CAD", New Age International Publishers. Fifth Edition, 2011.

Reference Books

1. Narayana, K.L. & P Kannaiah, "Text book on Engineering Drawing", Scitech Publish, 2008
2. Agrawal B. & Agrawal C. M., "Engineering Graphics", TMH Publn, 2012.

E-Resources

1. https://nptel.ac.in/courses/112/103/112103019/
2. https://urlzs.com/fLJ3T
3. https://urlzs.com/zky46

Course Outcomes

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

CO1. Apply computer aided drafting tools to create 2D and 3D objects

CO2. Sketch conics and different types of solids

CO3. Appreciate the need of Sectional views of solids and Development of surfaces of solids

CO4. Read and interpret engineering drawings

CO5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	1	2	-	-	-	-	-	-	3	1	1
CO2	3	3	2	1	2	-	-	-	-	-	-	3	2	1
CO3	3	3	2	1	2	-	-	-	-	-	-	3	2	1
CO4	3	3	3	1	2	-	-	-	-	-	-	3	2	2
CO5	3	3	3	1	2	-	-	-	-	-	-	3	2	3
Average	3	3	2.4	1	2	-	-	-	-	-	-	3	1.8	1.6

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem.			
Course Code: **M1203**	**ENGLISH LANGUAGE & COMMUNICATION SKILLS LAB** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		0	**0**	**3**	**1**

Pre-Requisites: NIL

COURSE OBJECTIVES:

To train students:

1. To use accurate and appropriate pronunciation through the practice of phonetic sounds, symbols, word accent and into nation.
2. To improve their fluency in spoken English and neutralize their mother tongue influence through JAM Sessions, Role-play, etc.
3. To comprehend the speech of people of various regions through Listening practice exercises.

   To enable students to transfer information verbally with the right usage of Body language through individual and group activities.
4. To understand nuances of English language by practicing various exercises at Multi-media lab.

English Language and Communication Sills Lab (ELCS) will have two divisions:

a) **Computer Assisted Language Learning Lab (CALL)**

b) **Interactive Communication Skills Lab (ICS)**

Module 1: [9L]

CALL Lab:

General Indian English (GIE) and Interference of Mother Tongue (MTI) - Differences in British and American Pronunciation.

Introduction to Phonetics – Speech Sounds – Vowels and Consonants; Minimal Pairs

ICS Lab:

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

Module 2: **[9L]**

CALL Lab:

The Phoneme: The Syllable.

ICS Lab: Features of Good Conversation - Non-verbal Communication- Telephone Etiquette-Role Plays.

Module 3: **[9L]**

CALL Lab:

Stress-Word and Sentence Stress- Stress Shift- Strong and Weak Forms.

ICS Lab:

Introduction to a structured talk, Presentations Skills-Formal Presentations.

Module 4: **[9L]**

CALL Lab:

Intonation-Errors in Pronunciation- Neutralizing MTI

ICS Lab: Introduction to Group Discussion - Mock GD.

Module 5: **[9L]**

CALL Lab: Listening for Specific Details-Listening Comprehension Tests.

ICS Lab: Introduction to Interview Skills-Mock Interviews.

Text Books

1. ELCS Lab Manual: A Workbook for CALL & ICS Lab Activities; Orient Black Swan.

Reference Books

1. Balasubramanian. T (2009), A Textbook of English Phonetics for Indian Students. Macmillan.
2. Bansal. R.K, Harrison J.B. (2008). Spoken English. Orient Black Swan.
3. Ashraf Rizvi M (2010). Effective Technical Communication. McGraw-Hill.

E-Resources

1. https://bbamantra.com/listening/
2. https://en.wikipedia.org/wiki/Phonetics#:~:text=Phonetics%20is%20a%20branch%20of,the %20physical%20properties%20of%20speech.
3. https://www.innovativeteachingideas.com/blog/10-great-activities-to-break-the-ice-with- your-students

4. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
5. https://www.learngrammar.net/english-grammar

Course Outcomes

Upon successful completion of the course, student will be able to

Neutralize the Mother tongue influence in day to communication

CO1. Differentiate the speech sounds in English and demonstrate accurate pronunciation

CO2. Comprehend and respond to the given texts appropriately.

CO3. Improve their effective and empathetic listening ability

CO4. Communicate confidently and effectively in various contexts and different cultures.

CO5. Listen actively, speak fluently and write accurately

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	**3**	**3**	-	**2**	-	-
CO2	-	-	-	-	-	-	-	-	**3**	3	-	**2**	-	-
CO3	-	-	-	-	-	-	-	-	**3**	3	-	**2**	-	-
CO4	-	-	-	-	-	-	-	-	3	3	-	**2**	-	-
CO5	-	-	-	-	-	-	-	-	**3**	3	-	**2**	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**2**	**-**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **M1202**	**CHEMISTRY LABORATORY** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites:

List of experiments (Any 10-12 experiments)

Volumetric Analysis:

1. Preparation of standard solution of oxalic acid and standardisation of NaOH.
2. Determination of total hardness of water by complexometric method using EDTA.
3. Determination of chloride content of water by Argentometry.
4. Estimation of Ferrous ion in Mohr's salt using Permanganomerty.
5. Estimation of ferrous ion in Mohr's salt by dichrometry.

Determination of Physico-Chemical Properties:

6. Determination of viscosity of a given liquid by using Ostwald's viscometer.
7. Determination of surface tension of a given liquid using stalagmometer.
8. Determination of partition coefficient of acetic acid between n-butanol and water.

Instrumental methods of Analysis:

9. Estimation of strength of HCl by Conductometric titrations using NaOH.
10. Estimation of strength of HCl by Potentiometric titrations using NaOH.
11. Estimation of Cu^{+2} in a given sample by colorimetry.
12. Estimation of Mn^{+2} in given sample by colorimetry.

Synthesis of Nanomaterials, Polymers and drug molecules:

13. Synthesis of Iron Nanoparticles
14. Synthesis of Polymer-Bakelite.
15. Synthesis of drug molecule Aspirin.

Text Books

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg, (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma & D.S. Sharma, (Vikas publishing, N. Delhi)
3. "Text book of practical organic chemistry", Vogel's ,5th edition.
4. "Text book on Experiments and calculations in engineering chemistry", S.S. Dara

Course Outcomes

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

1. Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
2. Calculate the concentration and amount of various substances using instrumental techniques.
3. Synthesize the engineering materials like nanomaterials, polymers and drug molecules.
4. Determine the physic-chemical properties like partition co-efficient, surface tension and viscosity.
5. Determine the partition coefficient of organic compound in two immiscible liquids.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: MBA I Year – I			
Course Code: **M12AC2**	**HUMAN VALUES AND PROFESSIONAL ETHICS** (COMMON TO: CE, EEE, ME, AIML, CSM, AIDS, CSD, CSE(CS))	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites

1. Positive bent of mind.
2. Zeal to know the essence of human existence and Nature.
3. Interest to know the Scientific and philosophical approach for identification of 'I'.
4. Sensitivity towards social and environmental issues.

COURSE OBJECTIVES:

1. To enable students, appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of the above Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

Module I:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with

their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Module II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

Module III:

Understanding Harmony in the Family and Society- Harmony in Human - Human Relationship : Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

Module IV:

Understanding Harmony in the Nature and Existence - Whole existence as Co- existence:

Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self- regulation in nature. Understanding Existence as Co- existence (Sah-astitva) of mutually

interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Module V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics : Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly andeco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. KV Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications,3rd Edition.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M210B	FOURIER AND COMPLEX VARIABLES (COMMON TO: EEE & ECE)	L	T	P	C
		3	1	0	4

Pre-Requisites: Ordinary Differential Equations and Vector Calculus

COURSE OBJECTIVES

The students will

COB1:	To learn the calculation of Fourier coefficients of a periodic functions.
COB2:	To learn the calculation of Fourier transform of a function.
COB3:	To lean analytic functions and their properties.
COB4:	To learn concept of complex integration.
COB5:	To learn classifications of Singular points and residues.

UNIT 1: FOURIER SERIES [10L]

Introduction to infinite series, convergence and divergence, Periodic functions, Dirichlet's condition, Fourier Series of periodic functions, Fourier series of even and odd functions, having arbitrary periods, half range Fourier series.

UNIT 2: FOURIER TRANSFORMS [10L]

Fourier Integral Theorem (statement only), Fourier integral representation of a function, Fourier sine and cosine integral, Complex Fourier transform, Sine and Cosine transforms and their properties (without proofs), Finite Fourier Transform.

UNIT 3: FUNCTIONS OF COMPLEX VARIABLES [10 L]

Functions of a complex variable, Continuity, Differentiability, Analyticity, Singular point, Cauchy-Riemann equations in Cartesian and polar coordinates (without proofs), Harmonic and conjugate harmonic functions, Milne – Thompson method. Analyticity of Exponential, trigonometric, hyperbolic functions and their properties.

UNIT 4: INTEGRATION OF COMPLEX FUNCTION, POWER SERIES [12 L]

Line integral, evaluation along a path and by indefinite integration. Cauchy's integral theorem (without proof). Expansion of Taylor's series and Laurent series (without proofs).

UNIT 5: RESIDUES AND REAL INTEGRALS [12 L]

Classifications of singular points: Isolated singular point, removable, pole of order m, essential singularity. Residues – Evaluation of residue by formulae, Residue theorem (without proofs), Evaluation of real integrals.

TEXT BOOKS

T1:	B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
T2:	R. V. Churchill and J. W. Brown: Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

REFERENCE BOOKS

R1:	Ervin Kreyszig: Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
R2:	B. V. Ramana: Higher Engineering Mathematics, 11th Reprint, Tata McGraw-Hill, 2010.
R3:	Jain, R.K. and Iyenger, S.R.K., Advanced Engineering Mathematics, 3rd Edition, Narosa.

COURSE OUTCOMES

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

CO1:	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications.
CO2:	Solve the problems using Fourier Transforms.
CO3:	Apply Cauchy-Riemann equations to study analyticity of functions.
CO4:	Evaluate contour integrals using Cauchy's integral theorems.
CO5:	Evaluate contour integrals using residue theorem.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M214F	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

The students will

COB1:	To understand common forms of number representation in logic circuits.
COB2:	To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
COB3:	To understand the Realization of Logic Gates Using Diodes.
COB4:	To understand the concepts of combinational logic circuits and sequential circuits.
COB5:	Gain knowledge of memory device and Programmable logic devices.

UNIT 1: DIGITAL FUNDAMENTALS

NUMBER SYSTEMS

Analogue Versus Digital, Number systems: Binary, Octal, Decimal and Hexa decimal Number systems and their conversions. Number Representation in Binary- Sign bit Magnitude, 1's and 2's Complement. Floating Point Numbers- Range of Numbers and Precision, Number formats.

BINARY CODES

Codes- Weighted and Non-weighted codes and its Properties, BCD, Excess-3, Gray code and their Conversions with binary. Parity check code and Hamming code.

UNIT 2: BOOLEAN ALGEBRA AND BOOLEAN LOGIC GATES

BASIC DIGITAL CIRCUITS

Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations Boolean Algebra - Fundamental Postulates, Properties and Boolean theorems, Switching Functions- Canonical and Standard form, Minterms and Maxterms. Algebraic Simplification.

MINIMIZATION OF SWITCHING FUNCTIONS

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method-, Prime –Implicant chart, Simplification rules.

UNIT 3: COMBINATIONAL LOGIC DESIGN

ARITHMETIC CIRCUITS

Basic Building Blocks-Adders, Subtractors, BCD Adder, Serial adder, parallel adder, magnitude comparator.

MULTIPLEXERS AND DEMULTIPLEXERS

Multiplexers, Demultiplexers, Encoders, Priority Encoder, Decoders and Code converters BCD to seven segment converter, Hazards and Hazard Free Relations.

UNIT 4: SEQUENTIAL CIRCUITS

SYNCHRONOUS SEQUENTIAL CIRCUITS

Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

REGISTERS AND COUNTERS

Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

UNIT 5: FINITE STATE MACHINES

Capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines.

MEMORIES AND PROGRAMMABLE LOGIC

ROM, PROM, EPROM, EEPROM, Internal Structure and operation of RAM- Static and Dynamic. Realization of Switching functions using PLD's-ROM, PLA and PAL.

TEXT BOOKS

T1:	Zvi Kohavi &Niraj K. Jha, - Switching and Finite Automata Theory, 3rd Ed.,Cambridge, 2010.
T2:	R. P. Jain - Modern Digital Electronics, 3rd Edition, 2007- Tata McGraw-Hill.

REFERENCE BOOKS

R1:	Morris Mano, Fredriac J. Hill, Gerald R. Peterson - Introduction to Switching Theory and Logic Design –3rd Ed., John Wiley & Sons Inc.
R2:	Charles H. Roth - Fundamentals of Logic Design, 5th ED., Cengage Learning, 2004.

COURSE OUTCOMES

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

CO1:	Acquire the knowledge on numerical information in different forms and Boolean Algebra Theorems.
CO2:	Apply fundamental postulates and theorems for Minimization of Switching Functions.
CO3:	Minimize combinational functions, and design the combinational circuits.
CO4:	Design and analyse sequential circuits for various cyclic functions.
CO5:	Understand Memory operations, programmable logic devices and their use in realization of switching functions.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M212A	**ELECTRICAL CIRCUIT ANALYSIS EEE**	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: BEE

COURSE OBJECTIVES

The students will

COB1:	Enable students to apply classical network theorems for simplifying and solving electric circuits.
COB2:	Develop the ability to analyse transients' circuits and study their characteristics.
COB3:	Impart knowledge on three-phase system analysis and power measurement techniques.
COB4:	Introduce magnetic coupling and fundamental concepts of network topology.
COB5:	Impart knowledge on two port networks.

UNIT 1: NETWORK THEOREMS

Network Theorems: Superposition theorem, Thevenin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC).

UNIT 2: TRANSIENT RESPONSE ANALYSIS

Solution of First and second order networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, RL-C circuits. Initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response in case of step, impulse & Sinusoidal inputs.

UNIT 3: THREE-PHASE CIRCUITS & COUPLED CIRCUITS

Three-phase circuits: Star and delta connections, three-phase three wire and three phase four-wire systems, Analysis of balanced and unbalanced star and delta connected loads, Power in three-phase circuits. Measurement of power by two wattmeter method for balanced and Unbalanced load, Numerical problems.

Coupled Circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

UNIT 4: NETWORK TOPOLOGY

Tree and co-tree, Twigs and links, incidence matrix, properties of incidence matrix, tie-set matrix, problems based on tie-set matrix, Cut-set matrix and problems based on the cut-set matrix, Steady state AC Mesh and Nodal Analysis, Dual and Duality

UNIT 5: TWO PORT NETWORK PARAMETERS

Two Port Network and Network Functions: Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters. Transmission Parameters and hybrid parameters, interconnections of two port networks.

TEXT BOOKS

T1:	Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
T2:	Ravish R Singh, "Network Analysis and Synthesis", McGraw-Hill, 2nd Edition, 2019.

REFERENCE BOOKS

R1:	B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
R2:	James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
R3:	A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5th Edition, 2017.
R4:	Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
R5:	William Hayt H, Kimmerly Jack E and Steven Durbin M, "Engineering Circuit Analysis",

	McGraw Hill, 6th Edition, 2002.
R6:	Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

E-RESOURCES

E1:	https://archive.nptel.ac.in/courses/108/105/108105159/
E2:	https://archive.nptel.ac.in/courses/117/106/117106108/

COURSE OUTCOMES

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

CO1:	Apply classical network theorems such as Thevenin's, Norton's, and Superposition to simplify and solve DC and AC electric circuits.
CO2:	Analyze transient behavior in RL, RC, and RLC circuits and interpret their time-domain characteristics.
CO3:	Evaluate three-phase electrical systems and perform power measurement using appropriate techniques.
CO4:	Explain magnetic coupling concepts and apply the fundamentals of network topology to electric circuits.
CO5:	Analyze and characterize two-port networks using various parameter models.

CO - PO & PSO MAPPING

CO/PO &	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	2	2									3	2
CO2	3	3		3	3								3	3
CO3	3	2		3	3								3	3
CO4	3	3	3		2								2	3
CO5	3		3		2								3	2
AVG	**3**	**2.2**	**1.6**	**1.6**	**2**								**2.8**	**2.6**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M212B	**DC MACHINES AND TRANSFORMERS** **EEE**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: BEE

COURSE OBJECTIVES

The students will

COB1:	To comprehend the principles of operation, construction, and working mechanisms of D.C. generators, D.C. motors, and transformers.
COB2:	To analyze the performance characteristics, efficiency, and losses of D.C. machines and transformers under various operating conditions.
COB3:	To develop the ability to solve problems related to E.M.F., torque, speed, efficiency, and load characteristics of electrical machines.
COB4:	To familiarize students with testing methods and maintenance practices for D.C. machines and transformers.
COB5:	To understand the applications of D.C. machines and transformers in industrial and commercial systems, and their role in power systems.

UNIT 1: D.C. GENERATORS [12 L]

MODULE -I: Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – E. M.F Equation. Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

MODULE -II:

Methods of Excitation – separately excited and self-excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self-excited and remedial measures. Load characteristics and applications of shunt, series and compound generators.

UNIT 2: D.C MOTORS [10 L]

MODULE -I: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation.

MODULE -II:

Speed control of D.C. Motors - Armature voltage and field flux control methods. Motor starters (3-point and 4- point starters) .Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency.

UNIT 3: TESTING OF DC MACHINES [8 L]

MODULE -I: Methods of Testing – direct, indirect, and regenerative testing – Brake test – Swinburne's test – Hopkinson's test – Field's test - separation of stray losses in a D.C. motor test.

UNIT 4: SINGLE PHASE TRANSFORMERS [8 L]

MODULE -I: Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams and Applications

MODULE -II: Equivalent circuit - losses and efficiency – regulation - All day efficiency effect of variations of frequency & supply voltage on iron losses.

UNIT 5: TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS [9 L]

MODULE -I: Open Circuit and Short Circuit tests - Sumner's test - predetermination of efficiency and regulation-separation of losses test parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

MODULE -II: Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Scott connection and Applications.

TEXT BOOKS

T1:	P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
T2:	I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
T3:	M.N.Bandyapadhyay "Electrical Machines "Eastern economy edition,2017.
T4:	S.K.Sahdev "electrical machines Cambridge University Press is part of the University of Cambridge.,2018

REFERENCE BOOKS

R1:	Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
R2:	M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

E-RESOURCES

E1:	https://onlinecourses.swayam2.ac.in/nou21_ee02/preview
E2:	https://swayam.gov.in/nc_details/NPTEL
E3:	https://www.electrical4u.com

COURSE OUTCOMES

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

CO1:	Understand and explain the operating principles, constructional features, and performance characteristics of D.C. generators and motors.
CO2:	Analyze and calculate parameters like E.M.F., torque, speed, losses, and efficiency for D.C. machines and transformers under various operating conditions.
CO3:	Perform and interpret results from various testing methods for D.C. machines and transformers, including direct, indirect, and regenerative tests.
CO4:	Implement speed control methods, excitation techniques, and starter circuits for D.C. motors and generators.
CO5:	Demonstrate knowledge of single-phase and poly-phase transformers, including their construction, efficiency, and practical applications in power systems.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	2	3	-	2	3	-	-	-	-	-	3	3	3
CO2	3	2	3	-	2	3	-	-	-	-	-	3	3	3
CO3	2	3	3	-	2	3	-	-	-	-	-	3	3	3
CO4	3	2	3	-	2	3	-	-	-	-	-	3	3	3
CO5	3	3	3	-	2	3	-	-	-	-	-	3	3	3
AVG	**2.8**	**2.4**	**3**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M212C	**ELECTROMAGNETIC FIELDS** **EEE**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Semiconductor Physics

COURSE OBJECTIVES

The students will

COB1:	Understand electrostatic concepts like Coulomb's law, electric field, and Gauss's law for various charge distributions.
COB2:	Study electrostatic applications including dipoles, capacitance, and dielectric properties.
COB3:	Analyze steady electromagnetic fields using Biot-Savart law and Ampere's law.
COB4:	Explore magnetization, inductance, and energy in magnetic circuits and materials.
COB5:	Apply Maxwell's equations to wave propagation, power transfer, and wave polarization.

UNIT 1: ELECTROSTATICS - I [12L]

MODULE -I

Introduction - Coulomb's law – Electric field intensity – electric fields due to point, line, surface and volume charge distributions.

MODULE -II

Electric flux density – Gauss law – Electric potential – potential gradient – Divergence and divergence theorem – Poisson's and Laplace equations.

UNIT 2: ELECTROSTATICS - II [12L]

MODULE -I:

Field due to dipoles – dipole moment – Current and current density – Conductors and Dielectrics - Boundary conditions.

MODULE -II:

capacitance – Dielectric interface – Capacitance of system of conductors – Dielectric constant and Dielectric strength - Energy stored in capacitor – Energy density.

UNIT 3: MAGNETOSTATICS - I [12L]

MODULE -I

Introduction – Biot - Savart Law – Ampere's Circuital Law – Applications – Curl – Stoke's theorem– Magnetic flux – Magnetic flux density.

MODULE -II

The Scalar and Vector magnetic potentials – Force on a moving charge and current elements – Force and Torque on closed circuit.

UNIT 4: MAGNETOSTATICS - II [12L]

MODULE -I

Introduction to magnetic materials – Magnetization and Permeability – Magnetic boundary conditions – Magnetic circuit – Potential energy and forces on Magnetic materials.

MODULE -II

Inductance and mutual inductance – Inductance of solenoids, Toroid, and Coaxial Cable.

UNIT 5: MAXWELL'S EQUATION AND EM WAVE PROPAGATION [12L]

MODULE –I

Faraday's Law – Time varying magnetic field - Conduction current and Displacement current – Maxwell's equation in point and integral forms.

MODULE –II

Derivation of Wave Equation, Uniform Plane Waves - Wave propagation in Dielectrics – Propagation in good conductors – Wave propagation in free space Poynting Theorem.

TEXT BOOKS

T1:	William Hayt," Engineering Electromagnetics", McGraw Hill, New York, 7th edition,2005.
T2:	K.A.Gangadhar, "Field theory", Khanna publishers, New Delhi, 15th edition,2004.

REFERENCE BOOKS

R1:	David K Cheng, "Field and Wave Electromagnetics", Pearson Education, 2nd edition,2004.
R2:	John D. Kraus, "Electromagnetics" McGraw Hill, 5th Edition,1999
R3	N.Narayana Rao, "Elements of Engg. Electro Magnetics", Prentice Hall of India, 6th Edition, 2008.
R4	T.V.S. Arun Murthy, "Electromagnetic Fields", S. Chand, 2008.
R5	David J Griffiths, "Introduction to Electrodynamics, PHI, 3rd edition, 2008.

E-RESOURCES

E1:	https://nptel.ac.in/
E2:	https://nptel.ac.in/content/storage2/courses/108105053/pdf/(TB)(EMF)%20((EE)NPTEL).pdf

COURSE OUTCOMES

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

CO1:	Determine electric fields and potentials using Coulomb's law and Gauss's law.
CO2:	Analyse capacitance and dielectric properties in electrostatic systems.
CO3:	Apply Biot-Savart and Ampere's law to steady magnetic fields.
CO4:	Analyse magnetic materials, inductance, and magnetic energy.
CO5:	Solve wave propagation problems using Maxwell's equations.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	2	2	2	3	-	-	-	-	1	1	1	2	1
CO2	3	2	2	2	2	-	-	-	-	1	1	1	2	1
CO3	3	2	2	2	2	-	-	-	-	1	1	1	2	1
CO4	3	2	2	3	3	-	-	-	-	1	1	1	2	1
CO5	3	2	2	3	3	-	-	-	-	1	1	1	2	1
AVG	**3**	**2**	**2**	**2.4**	**2.6**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**2**	**1**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M2144	**DIGITAL ELECTRONICS LAB**	L	T	P	C
		0	**0**	**2**	**1**

List of Experiments

1. Realization of Logic circuit to generate r's Compliment using Logic Gates.
2. To study basic logic gates and verify truth tables of: AND, OR, NOT, NAND, NOR, EX-OR, EXNOR for 2 Inputs.
3. Verify truth tables of AND, OR, NOT using NAND and NOR gates
4. To realize SOP, POS expressions.
5. To realize Half Adder/Sub tractor and Full Adder/ Subtractor circuits using NAND,NOR gates and verify the truth tables
6. To study BCD to Excess-3 and vice-versa and verify truth table
7. To study binary to gray and gray to binary converter using gates and verify truth tables.
8. To design and implement encoder and decoder using logic gates and study of corresponding ICs.
9. To design and verify truth table of 4 to 1 multiplexer and 1 to 4 Demultiplexer and study of corresponding ICs.
10. Realize 2 bit comparator using gates and 4 bit Comparator IC.
11. Design and construct basic flip flops RS, JK, D and T using gates and verify truth table.
12. Design and construct JK Master-Slave Flip-Flop using gates
13. Realize Asynchronous divide by 4 and Decade counter
14. Realize synchronous Decade Up/Down Counter.
15. Realize RAM (16X4) - Perform read and write operations.

***Verify any twelve experiments**

COURSE OUTCOMES

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

CO1:	Learn the basics of gates and design simple logic circuits.
CO2:	Design different combinational circuits and verify their functionalities.
CO3:	Design sequential circuits.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech-EEE II Year-I Sem			
Course Code: M2121	**ELECTRICAL CIRCUITS LAB** **EEE**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Basic Electrical Engineering

COURSE OBJECTIVES

This course will enable students to:

COB1:	Develop the basic concepts of network analysis, which is the pre-requisite for all the electrical engineering subjects.
COB2:	Solve different complex circuits using various network reduction techniques such as Source transformation, Network theorems etc.
COB3:	Synthesize the transmission line parameters using two-port networks.
COB4:	Impart hands on experience in measurement of circuit parameters, study of circuit characteristics and simulation of time response.
COB5:	Expose on the usage of CRO, power sources, function generator etc.

Total ten experiments to be conducted from the list of following experiments

1. Verification of Mesh and Nodal analysis.
2. Verification of Super Position theorem.
3. Verification of Thevenin's & Norton's theorem.
4. Verification of Maximum Power Transfer theorem.
5. Verification of Reciprocity theorem.
6. Verification of Compensation theorem.
7. Verification of Milliman's theorem.
8. Determination of transient response of current in RL and RC circuits.
9. Determination of self, mutual inductances and coefficient of coupling.
10. Frequency response of Series and Parallel resonance circuits.
11. Determination of Z and Y parameters.
12. Determination Transmission and hybrid parameters.

COURSE OUTCOMES

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

CO1:	Become familiar with the basic circuit components and know how to connect them to make a real electrical circuit.
CO2:	Verify the laws and principles of electrical circuits; understand the relationships and differences between theory and practice.
CO3:	Gain the knowledge to solve transmission line networks and apply in designing the transmission lines.
CO4:	Carefully and thoroughly document and analyses experimental work.
CO5:	Gain practical experience related to electrical circuits; stimulate more interest and motivation for further studies of electrical circuits.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3	-	2	-	-	-	2	-	3	-	3	3
CO2	3	3	3	-	3	-	-	-	2	-	3	-	3	2
CO3	3	2	3	-	2	-	-	-	2	-	3	-	3	3
CO4	3	3	2	-	3	-	-	-	2	-	2	-	3	2
CO5	3	3	3	-	2	-	-	-	2	-	3	-	2	3
AVG	**3**	**2.8**	**2.8**	**-**	**2.4**	**-**	**-**	**-**	**2**	**-**	**2.8**	**-**	**2.8**	**2.6**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M2122	**DC MACHINES AND TRANSFORMERS LAB EEE**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: BEE, DC MACHINES AND TRANSFORMERS

COURSE OBJECTIVES

The students will

COB1:	Understand the Performance Characteristics of DC Machines.
COB2:	Determine the Efficiency and Losses in DC and AC Electrical Machines.
COB3:	Analyze and Validate Transformer Performance and Characteristics.
COB4:	Study the Speed Control and Loss Measurement in DC Machines.
COB5:	Conduct Load Tests and Performance Evaluations on Various DC Machines.

List of Experiments

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator (Determination of critical field resistance and critical speed).
2. Load test on DC shunt generator (Determination of characteristics).
3. Load test on DC series generator (Determination of characteristics).
4. Hopkinson's test on DC shunt machines (Predetermination of efficiency).
5. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies).
6. Brake test on DC compound motor (Determination of performance curves).
7. OC and SC Test on Single Phase Transformer.
8. Scott connection of a Transformer.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

1. Brake test on DC shunt motor (Determination of performance curves).
2. Load test on DC compound generator (Determination of characteristics.
3. Fields test on DC series machines (Determination of efficiency).
4. Retardation test on DC shunt motor (Determination of losses at rated speed).
5. Separation of losses in DC shunt motor.

COURSE OUTCOMES

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

CO1:	Understand and analyse the performance characteristics of DC machines.
CO2:	Calculate the efficiency and losses in DC and AC electrical machines.
CO3:	Analyze and validate the performance and efficiency of transformers.
CO4:	Implement speed control techniques and measure losses in DC machines .
CO5:	Perform load tests on DC machines to evaluate their performance and efficiency.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	2	3	2	1	1	1	3	2	2	2	3	1
CO2	3	3	2	3	2	1	1	1	2	2	2	2	3	1
CO3	3	2	1	3	3	1	1	1	2	2	2	2	3	2
CO4	3	2	3	3	3	1	1	1	2	2	3	2	3	3
CO5	3	3	2	3	2	1	1	1	3	3	2	2	3	2
AVG	**3**	**2.6**	**2**	**3**	**2.4**	**1**	**1**	**1**	**2.4**	**2.2**	**2.4**	**2**	**3**	**1.8**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: M22MC1	**ENVIRONMENTAL SCIENCE**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: NIL

COURSE OBJECTIVES

COB1:	Study about the different natural resources available and how to use them.
COB2:	Explain about biodiversity.
COB3:	Discuss about Global Environmental Problems and Global Efforts.
COB4:	Identify the global environmental problems.
COB5:	Explain about sustainable development.

UNIT 1:

MODULE -I: ECOSYSTEM AND NATURAL RESOURCES

Concept, Classification of Resources: Water resources, Land resources, land degradation, Forest resources, Mineral resources, Energy resources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, Level, values, hotspots of biodiversity, Threats to Biodiversity, Conservation of Biodiversity.

UNIT 2:

MODULE -I: GLOBAL ENVIRONMENTAL PROBLEMS AND GLOBAL EFFORTS

Deforestation, Greenhouse effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols: green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

MODULE -II: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ENVIRONMENTAL MANAGEMENT PLAN

Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP).

UNIT 3:

MODULE -I: ENVIRONMENTAL POLICY, LEGISLATION, RULES AND REGULATIONS

Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Forest Conservation Act**.**

MODULE -II: TOWARDS SUSTAINABLE FUTURE

Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

TEXT BOOKS

T1:	"Textbook of Environmental Science And Technology" by M Anji Reddy, BS Publications, 2007.
T2:	"Principles of Environmental Science and Engineering" by Rao P. Venugopala, Prentice Hall India Learning Private Limited (January 2006).

REFERENCE BOOKS

R1:	"Environmental Studies" by Benny Joseph, McGraw Hill Education 2008.
R2:	"Textbook of Environmental Studies for Undergraduate Courses" by Erach Bharucha 2005, University Grants Commission, University Press

E-RESOURCES

E1:	https://nptel.ac.in/courses/120/108/120108004/#

COURSE OUTCOMES

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

CO1:	Compare the different natural resources available and how to use them.
CO2:	Describe about biodiversity.
CO3:	Analyze the Global Environmental Problems and Global Efforts.
CO4:	Categorize the global environmental problems.
CO5:	Prioritize the Sustainable development.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M224D	INTEGRATED CIRCUIT AND APPLICATIONS (EEE)	L	T	P	C
		3	1	0	4

Pre-Requisites: Electronic Devices and Circuits, Switching Theory & Logic Design, Pulse & Digital Circuits.

UNIT 1

LINEAR APPLICATIONS OF OP-AMP

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential Amplifier. Instrumentation Amplifier, Differentiators and Integrator.

NON-LINEAR APPLICATIONS OF OP-AMP

Comparators, Schmitt Trigger, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer -Functional Diagram, Monostable, and Astable Operations-Applications. Introduction to Voltage Regulators Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT 2

ACTIVE FILTERS

Analysis of 1st and 2^{nd} order LPF & HPF Butterworth Filters, Characteristics of Band pass, Band reject Filters.

555 TIMER AND PHASE LOCKED LOOP

Functional Diagram of 555 Timer, Modes of 555 Timer-Monostable Mode and Astable Mode and Its Applications.

IC565 PLL – Block Schematic, Description of Individual Blocks, Applications.

UNIT 3

DAC CONVERTERS

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC

ADC CONVERTERS

Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT 4

Sequential Circuits Using TTL 74XX ICS All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

MEMORIES

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

UNIT 5

STATE OF ART DIGITAL ICS

Elementary knowledge on SOC,ASIC,FPGA Analog IC Design and CMOS RFIC Design.

APPLICATIONS OF DIGITAL ICS

Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/ Subtractor, Magnitude Comparators.

TEXT BOOKS

T1:	Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
T2:	Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

REFERENCE BOOKS

R1:	Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2ndEd., 2003.
R2:	Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore, Cengage Learning/ Jaico, 2009.
R3:	Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson,2009.
R4:	Linear Integrated Circuits and Applications – Salivahanan, Mc Graw Hill Education.
R5:	Modern Digital Electronics – RP Jain – 4/e – Mc Graw Hill Education, 2010.

E-RESOURCES

E1:	https://swayam.gov.in/nd1_noc19_ee38/preview

COURSE OUTCOMES

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

CO1:	Understanding of operational amplifiers with linear integrated circuits.
CO2:	Apply the knowledge of the different families of digital integrated circuits and their Characteristics.
CO3:	Analyze the functioning of various design circuits using operational amplifiers for various applications.
CO4:	Design various techniques to develop A/D and D/A convertors.
CO5:	Acquire hands-on laboratory experience on IC based project kits in above areas according to specifications.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M222A	**AC MACHINES**	L	T	P	C
	EEE	**3**	**0**	**0**	**3**

Pre-Requisites: DC MACHINES AND TRANSFORMERS

COURSE OBJECTIVES

The students will

COB1:	Provide a comprehensive understanding of the constructional details, principles of operation, and performance characteristics of poly-phase induction machines.
COB2:	Enable students to analyse and evaluate the performance of induction machines through torque equations, equivalent circuits, and testing methods.
COB3:	Impart knowledge on synchronous machines, including their construction, winding configurations, EMF equations, and methods for regulating voltage and suppressing harmonics.
COB4:	Explain the principles and techniques of parallel operation of synchronous machines and the operation of synchronous motors, including their role as synchronous condensers.
COB5:	Introduce the fundamentals of single-phase machines, their construction, working principles, and applications in various industrial and domestic settings.

UNIT 1: POLY-PHASE INDUCTION MACHINES [10 L]

MODULE -I: Constructional details of cage and wound rotor machines production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation.

UNIT 2: CHARACTERISTICS OF INDUCTION MACHINES [10 L]

MODULE -I: Torque equation-expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging, No-load Test and Blocked rotor test –Predetermination of performance-Methods of starting and starting current and Torque calculations, Applications

MODULE -II: SPEED CONTROL METHODS: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT 3: SYNCHRONOUS MACHINES: [8 L]

MODULE -I: Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance

MODULE -II: Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of Xd and Xq (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT 4: PARALLEL OPERATION OF SYNCHRONOUS MACHINES [8 L]

MODULE -I: Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactance's and Applications.

MODULE -II: SYNCHRONOUS MOTORS: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed. - Hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT 5: SINGLE PHASE MACHINES [9 L]

MODULE -I: Single phase induction motor – Constructional Features-Double revolving field theory – split-phase motors – AC series motor- Universal Motor- -Shaded pole motor and Applications.

TEXT BOOKS

T1:	P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2017.
T2:	I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
T3:	M.N.Bandyapadhyay "electrical machines "Eastern economy edition,2017
T4:	S.K.Sahdev "Electrical Machines" Cambridge University Press is part of the University of Cambridge.,2018

REFERENCE BOOKS

R1:	Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2011.
R2:	M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

E-RESOURCES

E1:	https://onlinecourses.swayam2.ac.in/nou21_ee02/preview
E2:	https://nptel.ac.in/courses/108/108/108108076/
E3:	https://www.electrical4u.com

COURSE OUTCOMES

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

CO1:	Analyze the construction, operating principles, and performance characteristics of poly-phase induction machines, including power relations and rotor dynamics.
CO2:	Evaluate the performance of induction machines using torque equations, equivalent circuits, and testing methods, and determine appropriate starting and speed control techniques.
CO3:	Examine the constructional features, winding configurations, and performance parameters of synchronous machines, including voltage regulation and harmonic suppression techniques.
CO4:	Understand the principles and techniques of parallel operation of synchronous machines and evaluate the operation of synchronous motors, including their application as synchronous condensers.
CO5:	Explain the working principles, construction, and applications of single-phase machines such as split-phase motors, shaded-pole motors, and universal motors.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	2								2	3	2
CO2	3	3	2	2	2					2		2	3	3
CO3	3	3	2	2								2	3	2
CO4	3	3	3			2				2	2	2	3	3
CO5	3	2	2				2					3	2	3
AVG	**3**	**2.8**	**2.6**	**1.2**	**0.4**	**0.4**	**0.4**			**0.8**	**0.4**	**2.2**	**2.8**	**2.6**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M222B	**CONTROL SYSTEMS** **EEE**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Electrical Circuit Analysis

COURSE OBJECTIVES

The students will

COB1:	To analyse and model control systems using Laplace transforms, block diagrams, and signal flow graphs.
COB2:	To analyse the time and steady-state behavior of control systems, including error and the effects of PD and PI control.
COB3:	To analyse control system stability using the Routh-Hurwitz criterion and root-locus technique.
COB4:	To analyse stability and performance using Bode, Nyquist, and polar plots in the frequency domain.
COB5:	To analyse state-space models, including eigenvalues, controllability, and observability, for solving time-invariant equations.

UNIT 1: INTRODUCTION [10L]

MODULE -I:

Introduction to control systems – Control theory concepts - Open loop and feedback control systems-Different examples of control systems-Mathematics modelling of control systems - Translational and rotational mechanical systems

MODULE -II:

Analysis of control systems using Laplace transforms-Block diagram reduction techniques – Signal flow graphs reduction using Mason's gain formula.

UNIT 2: TIME RESPONSE ANALYSIS [10L]

MODULE -I:

Standard test signals, Analysis of transient and steady state behavior of control systems – Time response of first order and higher order systems –Time domain specifications.

MODULE -II:

steady state response steady state error and error constants –effects of proportional derivative, proportional integral systems.

UNIT 3: STABILITY & ROOT LOCUS TECHNIQUES [10L]

MODULE -I:

Concept of Stability-Routh-Hurwitz Criterion-Relative Stability analysis.

MODULE -II:

-Root-Locus technique. Construction of Root-loci-Effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT 4: STABILITY ANALYSIS IN FREQUENCY DOMAIN [10L]

MODULE -I:

Frequency domain specifications- Relationship between time and frequency response-Bode diagrams Determination of frequency domain specifications and transfer function from the Bode diagram-Phase and Gain margin.

MODULE -II:

Stability analysis from Bode plots- Polar plots- Nyquist plots and applications of Nyquist criterion to find the stability.

UNIT 5: STATE SPACE ANALYSIS OF LINEAR CONTINUOUS SYSTEMS [10L]

MODULE -I:

Concepts of state- state variables and state vector-derivative of state model from transfer function Derivative of transfer function from state model- diagonalization.

MODULE -II:

Eigen values and Eigen Vectors solving the time invariant state equations- state transition matrix and its properties- Controllability and Observability.

TEXT BOOKS

T1:	I.J.Nagrath and M.Gopal, "Control systems Engineering", 5th edition, New Age International(P) Limited, New Delhi, 2007.
T2:	A. Anand Kumar , "Control Systems" , 2nd edition, PHI Learning Private Limited.
T3:	A. NagoorKani, "Control Systems", RBA Publications, 2006

REFERENCE BOOKS

R1:	K. Ogata, "Modern control engineering", Pearson Education, 4th edition, 2004.
R2:	Richard C. Dorf and Robert H. Bishop , "Modern Control Systems," Pearson Education, 2021.
R3:	B. C. Kuo, "Automatic Control System" Prentice Hall, 1995

E-RESOURCES

E1:	https://nptel.ac.in/courses/107106081
E2:	https://ocw.mit.edu/courses/2-04a-systems-and-controls-spring-2013/pages/lecture-notes-labs/

COURSE OUTCOMES

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

CO1:	Summarize the basic elements and structures of feedback control systems.
CO2:	Evaluate the time response, steady state response, errors of control systems.
CO3:	Analyze stability of control systems using time domain specifications.
CO4:	Develop frequency response plots to analyse control systems.
CO5:	Apply State Space Analysis for linear time invariant control systems and test controllability and observability of control systems.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	2	3	-
CO3	3	3	3	2	-	-	-	-	-	-	-	2	2	-
CO4	3	3	3	3	-	-	-	-	-	-	-	2	3	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-	2	-
AVG	**3**	**3**	**3**	**2.8**								**2**	**2.6**	

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M222C	**POWER SYSTEMS – I**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Basic Electrical Engineering

COURSE OBJECTIVES

The students will

COB1:	To understand the power generation through conventional and non-conventional sources.
COB2:	To analyze load factors and understand tariff methods and cost division in electricity generation.
COB3:	To design and analyse substation types, focusing on layouts, busbar arrangements, and the advantages of gas-insulated substations.
COB4:	To design efficient DC distribution systems with minimal voltage drop and losses.
COB5:	To design efficient AC distribution systems with minimal voltage drop and losses.

UNIT 1: POWER STATIONS THERMAL [10L]

MODULE -I: Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant.

MODULE -II: Non-Conventional Sources (Elementary Treatment): Solar Energy, Wind Energy, Fuel Cells, Ocean Energy, Tidal Energy, Wave Energy, Cogeneration, Energy conservation and storage.

UNIT 2: ECONOMICS OF POWER GENERATION [9L]

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer**.**

UNIT 3: AIR INSULATED SUBSTATION (AIS) & GAS INSULATED (GIS) SUBSTATION [10L]

MODULE -I: Classifications of Substations

Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.

Bus Bar Arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

MODULE -II: Gas Insulated Substations (GIS)

Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, busbar, construction aspects of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT 4 : D.C. DISTRIBUTION SYSTEMS [9L]

Types of D.C. Distributors—D.C. Distribution Calculations—D.C. distributor fed at one end (concentrated loading)—Uniformly loaded distributor fed at one end— Distributor fed at both ends (concentrated loading)—Uniformly loaded distributor fed at both ends— Distributor with both concentrated and uniform loading—Ring Distributor—Ring main distributors with Interconnector.

UNIT 5 : A.C Distribution Systems [8L]

A.C. Distribution Calculations— Methods of solving A.C. Distribution Problems—3-phase unbalanced loads—4-wire, star-connected unbalanced loads—Ground detectors.

TEXT BOOKS

T1:	C.L. Wadhwa, " Generation, Distribution and Utilization of Electrical Energy", 2nd Edition, New Age International, 2009.
T2:	V.K Mehta and Rohit Mehta, "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.

REFERENCE BOOKS

R1:	A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
R2:	C.L. Wadhwa, "Electrical Power Systems", 5th Edition, New Age International, 2009.
R3:	M.V. Deshpande, "Elements of Electrical Power Station Design", 3rd Edition, Wheeler Pub. 1998.
R4:	H. Cotton & H. Barber, "The Transmission and Distribution of Electrical Energy", 3rd Edition, 1970.
R5:	W.D.Stevenson, "Elements of Power System Analysis", 4th Edition, McGraw Hill, 1984.

E-RESOURCES

E1:	https://www.mechanicaltutorial.com/power-system-objective-type-questions-and-answers
E2:	https://lecturenotes.in/subject/471/power-system-1-ps-1

COURSE OUTCOMES

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

CO1:	Understand the operation of conventional and renewable electrical power generating stations.
CO2:	Evaluate the power tariff methods and Economics associated with power generation.
CO3:	Analyze the operations of AIS & GIS, Insulators.
CO4:	Apply concepts in DC distribution systems to solve problems.
CO5:	Apply concepts in AC distribution systems to solve problems.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	-	-	-	-	-	-	1	2	3	1
CO2	3	3	3	3	-	-	-	-	-	-	2	2	3	1
CO3	3	3	3	3	-	-	-	-	-	-	2	2	2	1
CO4	3	3	3	3	-	-	-	-	-	-	2	2	3	1
CO5	3	3	3	3	-	-	-	-	-	-	2	2	2	1
AVG														

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M222D	**POWER ELECTRONICS**	L	T	P	C
	EEE	**3**	**0**	**0**	**3**

Pre-Requisites: BEE

COURSE OBJECTIVES

The students will

COB1:	Develop a solid foundation in the operating principles of power semiconductor devices, including their physical structure and electrical characteristics..
COB2:	Describe the role of thyristors and other power electronic devices in rectification.
COB3:	Understand the operation of DC-DC Converters.
COB4:	Comprehend the principles of operation, structure, and applications of voltage source inverters in modern power electronics.
COB5:	Explore the role of AC-to-AC converters in power electronics systems.

UNIT 1: : POWER SWITCHING DEVICES [10 L]

MODULE -I: Concept of Power Electronics and Applications-Types of Power Electronic Converters-Power Semiconductor devices and it's V-I characteristics: Diode- Thyristor- MOSFET- IGBT.

MODULE -II: Triggering methods of SCR-commutation methods of a thyristor- Firing circuits for thyristor - R firing, RC firing, UJT firing.

UNIT 2: PHASE CONTROLLED RECTIFIERS [10 L]

MODULE -I: Single-phase half wave Controlled rectifier with R and RL Load- Single phase full wave thyristor Rectifier with R-load , RL-load and RLE-load.

MODULE -II: Three-phase full bridge thyristor rectifier with R load, RL load and RLE load- effect of load and source inductances.

UNIT 3: CHOPPERS AND DC-DC CONVERTERS [8 L]

MODULE -I: Introduction-step up chopper- step down chopper- concepts of duty ratio and average output voltage.

MODULE –II: Power circuit, Analysis and waveforms of- Buck converter, Boost converter, Buck-Boost converter.

UNIT 4: VOLTAGE SOURCE INVERTER [8 L]

MODULE -I: Introduction-principle of operation, performance parameters – single phase half wave bridge inverters with R and RL- load - single phase full wave bridge inverters with R and RL- load.

MODULE -II: 3-phase bridge Inverter with 180° mode of operation- voltage control of single phase inverters-single pulse width Modulation-Multiple pulse width modulation- sinusoidal Pulse width Modulation.

UNIT 5: AC TO AC CONVERTERS [9 L]

MODULE -I: AC voltage controllers – Principle of operation of Single phase half wave and full wave Ac voltage controller-With R and RL loads – mode of operation with Triac.

MODULE -II: Cycloconverters- principle of operation of Cycloconverters -step up cycloconverters - step down cycloconverters - relevant waveforms.

TEXT BOOKS

T1:	M. H. Rashid, "Power electronics: circuits, devices, and applications", Pearson Education India, 2009.
T2:	N. Mohan and T. M. Undeland, "Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007
T3:	P.S.Bimbhra, "Power Electronics ", Khanna Publishers.7th edition 2022.
T4:	M.D Singh, K.B.Kanchandhani. McGraw Hill Education. 2nd edition 2017

REFERENCE BOOKS

R1:	R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2007.
R2:	L. Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009.

E-RESOURCES

E1:	https://nptel.ac.in/courses/108/102/108102145/
E2:	https://nptel.ac.in/courses/108/105/108105066/
E3:	https://nptel.ac.in/courses/108/101/108101038/

COURSE OUTCOMES

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

CO1:	Understand the operation of each device under different conditions (forward bias, reverse bias, breakdown, etc
CO2:	Explain how control over the phase angle of the input AC supply can regulate the DC output voltage.
CO3:	Understand the basic principles of power conversion, including the operation of DC-DC converters and choppers
CO4:	Explain the working principles of Voltage Source Inverters, including the conversion of DC to AC voltage, the importance of modulation techniques, and the impact of switching devices.
CO5:	Explain the basic principles and operation of AC to AC converters, including the role of phase control, voltage regulation, and frequency conversion.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	2	3	3	2	3	1	-	2	-	2	-	-	3	-
CO2	2	3	3	2	2	3	-	2	-	3	-	-	3	-
CO3	1	3	2	2	3	3	-	3	-	1	-	-	3	-
CO4	3	2	2	2	3	3	-	2	-	2	-	-	2	-
CO5	3	2	1	1	2	2	-	2	-	3	-	-	3	-
AVG	**2.2**	**2.6**	**2.2**	**1.8**	**2.6**	**2.4**	**-**	**2.2**	**-**	**2.2**	**-**	**-**	**2.8**	**-**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M2221	**SYNCHRONOUS & INDUCTION MACHINES LAB EEE**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: DC MACHINES AND TRANSFORMERS, AC MACHINES

COURSE OBJECTIVES

The students will

COB1:	To understand the fundamental operating principles, performance characteristics, and testing methods for transformers, induction motors, and synchronous machines.
COB2:	To evaluate the efficiency, regulation, and equivalent circuit parameters of electrical machines through standard testing techniques.
COB3:	To explore specialized induction motor connections.
COB4:	To enhance hands-on skills in setting up experiments, performing measurements, and interpreting data for real-world applications of electrical machines.
COB5:	To correlate theoretical knowledge with experimental results, fostering a deeper understanding of electrical machine operation and preparing for industrial challenges.

List of Experiments

The following experiments are required to be conducted as compulsory experiments:

1. No-load & Blocked rotor tests on three phase Induction motor.
2. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods.
3. V' and 'Inverted V' curves of a three—phase synchronous motor.
4. Equivalent Circuit of a single-phase induction motor.
5. Determination of X_d and X_q of a salient pole synchronous machine.
6. Load test on three phase Induction Motor.
7. Regulation of three-phase alternator by Z.P.F. and A.S.A methods.
8. Measurement of sequence impedance of a three phase alternator.
9. Break test on three phase Induction motor.
10. Load test on single phase Induction Motor.

COURSE OUTCOMES

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

CO1:	Assess the efficiency, voltage regulation, and operational characteristics of transformers, induction motors, and alternators using standard testing methods.
CO2:	Determine the excitation characteristics and reactance parameters (Xd and Xq) of synchronous machines and plot 'V' and 'Inverted V' curves.
CO3:	Implement and analyse specialized Induction motor connections.
CO4:	Accurately measure sequence impedance, core losses, and equivalent circuit parameters of electrical machines for fault analysis and performance evaluation.
CO5:	Interpret experimental results to troubleshoot, design, and optimize electrical machines for industrial and research-based challenges.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	2	2	2	1	1	1	2	2	1	2	3	2
CO2	3	3	2	3	2	1	1	1	2	2	1	2	3	2
CO3	3	2	3	2	2	2	2	1	2	2	2	2	2	3
CO4	3	3	2	3	3	1	1	1	2	2	1	2	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3	3	3	3
AVG	**3**	**2.8**	**2.4**	**2.6**	**2.4**	**1.4**	**1.4**	**1.2**	**2.2**	**2.2**	**1.6**	**2.2**	**2.8**	**2.4**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M2222	**CONTROL SYSTEMS LAB** **EEE**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Control Systems

COURSE OBJECTIVES

The students will

COB1:	Familiarize with key terminologies such as stability, accuracy, robustness, and transient/steady-state response.
COB2:	Learn how to model physical systems (electrical, mechanical, thermal, and hydraulic) using mathematical techniques.
COB3:	Evaluate system behavior using techniques such as: Time response analysis (rise time, settling time, overshoot, etc.),frequency response analysis (Bode plots, Nyquist plots)and stability analysis (Routh-Hurwitz, Root Locus, Nyquist Criteria).
COB4:	Apply modern control design techniques, such as state-space control and pole placement.
COB5:	Implement control strategies in real-world applications using hardware and software tools.

List of Experiments

1. Time response of Second order system.
2. Characteristics of Synchro.
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Transfer function of DC motor.
5. Transfer function of DC generator.
6. Temperature controller using PID controller.
7. Characteristics of Magnetic amplifiers.
8. Characteristics of AC servo motor.
9. Simulation of Stability (Bode, Root Locus, Nyquist) of Linear Time Invariant system.
10. Simulation of State space model for classical transfer function and verification.

COURSE OUTCOMES

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

CO1:	Make use of simulation packages for simple control system programs.
CO2:	Analyze the stability analysis using root locus and bode plots.
CO3:	Determine the transfer function of DC motor/generator.
CO4:	Design the lead and lag compensators and Discuss the performance of servomotor and PID controller.
CO5:	Illustrate the characteristics of synchros.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	3	3	-	-	-	2	-	-	-	3	-
CO2	3	3	2	3	-	-	-	-	2	3	-	-	2	-
CO3	2	3	3	3	-	-	-	-	2	-	-	-	2	-
CO4	2	3	3	3	3	-	-	-	2	-	-	-	3	-
CO5	2	3	3	3	-	-	-	-	2	-	-	-	2	-
AVG	2.2	2.8	2.8	3	3	-	-	-	2	3	-	-	2.4	-

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M2223	**POWER ELECTRONICS LAB** **EEE**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Power Electronics

COURSE OBJECTIVES

The students will

COB1:	Learn about the characteristics and operation of different power semiconductor devices.
COB2:	Develop the ability to analyse and interpret the operation of single-phase and three-phase phase-controlled rectifiers.
COB3:	Conduct experiments to analyse the performance of various types of choppers
COB4:	Design, assemble, and test inverter circuits using components such as MOSFETs, IGBTs, diodes
COB5:	Analyze and interpret input and output waveforms of AC-to-AC converters, focusing on parameters such as voltage, frequency

List of Experiments
Any seven experiments have to be conducted.

1. Study of Characteristics of SCR, MOSFET & IGBT.
2. Gate firing circuits for SCR's.
3. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E).
4. Single Phase Half controlled converter with R load.
5. Single Phase fully controlled bridge converter with R and RL loads.
6. DC Jones chopper with R and RL Loads.
7. Single Phase Parallel inverter with R and RL loads.
8. Single Phase MC Murry Bed fort inverter.
9. Single Phase series inverter with R and RL loads.
10. Single Phase AC Voltage Controller with R and RL Loads.

Any three experiments should be conducted

1. Three Phase half-controlled bridge converter with R-load.
2. Simulation of single-phase AC voltage controller using RLE loads.
3. Simulation of single-phase full converter using RLE loads.
4. Simulation of resonant pulse commutation circuit and Buck chopper.
5. Simulation of single phase Inverter with PWM control.

COURSE OUTCOMES

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

CO1:	Demonstrate the ability to identify, characterize, and operate various power electronic devices such as diodes, transistors, SCRs, MOSFETs, and IGBTs.
CO2:	Observe and interpret input and output waveforms of phase-controlled rectifiers under various firing angle conditions.
CO3:	Conduct experiments to analyse the performance of chopper circuits under various operating conditions.
CO4:	Acquire hands-on experience in constructing and testing inverter circuits, including proper use of components like IGBTs, MOSFETs, and control circuits.
CO5:	Analyze and design AC to AC converter circuits for different operating conditions, including voltage regulation and frequency control.

CO - PO & PSO MAPPING

CO/PO & PSO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	-	2	3	-	-	-	-	-	3	3	3
CO2	3	2	3	-	2	3	-	-	-	-	-	3	3	3
CO3	2	3	3	-	2	3	-	-	-	-	-	3	3	3
CO4	3	2	3	-	2	3	-	-	-	-	-	3	3	3
CO5	3	3	3	-	2	3	-	-	-	-	-	3	3	3
AVG	**2.8**	**2.4**	**3**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M21MC2	**GENDER SENSITIZATION** (Mandatory Course) COMMON TO: ALL	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: NIL

UNIT 1: UNDERSTANDING GENDER [6L]

Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1)
Socialization: Making Women, Making Men (*Towards a World of Equals*: Unit -2)
Introduction: Preparing for Womanhood, Growing up Male, First lessons in Caste, Different Masculinities.

UNIT 2: GENDER AND BIOLOGY [6L]

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10)
Two or Many? Struggles with Discrimination.

UNIT 3: GENDER AND LABOUR [6L]

Housework: The Invisible Labour (*Towards a World of Equals*: Unit -3)
"My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)
Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT 4 : ISSUES OF VIOLENCE-I [6L]

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*
Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums
for Justice.

UNIT 5 : ISSUES OF VIOLENCE-II [6L]

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)
Blaming the Victim- "I Fought for my Life…."
Additional Reading: The Caste Face of Violence.

TEXT BOOKS

T1:	***"Towards a World of Equals: A Bilingual Textbook on Gender"*** written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

REFERENCE BOOKS

R1:	Raj Paul Singh, Anupama Singh. Gender Sensitization: Issues and Challenges: Raj Publications: 2019.

E-RESOURCES

E1:	https://www.medicalnewstoday.com/articles/232363
E2:	https://web.stanford.edu/~eckert/PDF/Chap1.pdf
E3:	https://open.lib.umn.edu/sociology/chapter/11-1-understanding-sex-and-gender/

COURSE OUTCOMES

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

CO1:	Develop a better understanding of important issues related to gender in contemporary India.
CO2:	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
CO3:	Attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO4:	Acquire insight into the gendered division of labour and its relation to politics and economics.
CO5:	Be better equipped to work and live together as equals.