MOTHER TERESA INSTITUTE OF SCIENCE AND TECHNOLOGY

AUTONOMOUS

B.Tech. in ELECTRICAL AND ELECTRONICS ENGINEERING COURSE STRUCTURE & SYLLABUS

(M24 Regulations)

Applicable from AY 2024-5 Batch

I Year I Semester

S. No.	Course Code	Course Title	L	T	P	Credits
1	M241AEE101	Matrices and Calculus	3	1	0	4
2	M241AEE102	Engineering Chemistry	3	1	0	4
3	M241AEE103	C Programming and Data Structures	3	0	0	3
4	M241AEE104	Electrical Circuit Analysis - I	3	0	0	3
5	M241AEE105	Computer Aided Engineering Graphics	1	0	4	3
6	M241AEE106	Elements of Electrical and Electronics Engineering	0	0	2	1
7	M241AEE107	Engineering Chemistry Laboratory	0	0	2	1
8	M241AEE108	C Programming and Data Structures Laboratory	0	0	2	1
		Induction Program				
		Total Credits	**13**	**2**	**10**	**20**

I Year II Semester

S. No.	Course Code	Course Title	L	T	P	Credits
1	M241AEE201	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	M241AEE202	Applied Physics	3	1	0	4
3	M241AEE203	Engineering Workshop	0	1	3	2.5
4	M241AEE204	English for Skill Enhancement	2	0	0	2
5	M241AEE205	Electrical Circuit Analysis - II	2	0	0	2
6	M241AEE206	Applied Python Programming Laboratory	0	1	2	2
7	M241AEE207	Applied Physics Laboratory	0	0	3	1.5
8	M241AEE208	English Language and Communication Skills Laboratory	0	0	2	1
9	M241AEE209	Electrical Circuit Analysis Laboratory	0	0	2	1
10	M241AEE210	Environmental Science	3	0	0	0
		Total Credits	**13**	**2**	**14**	**20**

II Year I Semester **M24**

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
1	M241AEE301	Transform Theory, Numerical Techniques & Complex Variables	3	1	0	4	4
2	M241AEE302	DC Machines &Transformers	3	1	0	4	4
3	M241AEE303	Power System -I	3	0	0	3	3
4	M241AEE304	Analog Electronic Circuits	3	0	0	3	3
5	M241AEE305	Electromagnetic Field Theory	3	0	0	3	3
6	M241AEE306	DC Machines & Transformers Laboratory	0	0	2	2	1
7	M241AEE307	Analog Electronic Circuits Laboratory	0	0	2	2	1
8	M241AEE308	Electrical Simulation tools Laboratory	0	0	2	2	1
9	M241AEE309	Gender Sensitization Laboratory	0	0	2	2	0
	Total		**15**	**02**	**08**	**25**	**20**

II Year II Semester **M24**

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
1	M241AEE401	Solid Mechanics And Hydraulic Machines	3	1	0	4	4
2	M241AEE402	Electrical Measurements and Instrumentation	3	0	0	3	3
3	M241AEE403	Induction and Synchronous Machines	3	0	0	3	3
4	M241AEE404	Digital Electronics	2	0	0	2	2
5	M241AEE405	Power system-II	3	0	0	3	3
6	M241AEE406	Digital Electronics Laboratory	0	0	2	2	1
7	M241AEE407	Electrical Measurements and Instrumentation Laboratory	0	0	2	2	1
8	M241AEE408	Induction and Synchronous Machines Laboratory	0	0	2	2	1
9	M241AEE409	Real-time Research Project/ Field Based Project	0	0	4	4	2
10	M241AEE410	Indian Constitution	3	0	0	3	0
	Total		**17**	**01**	**10**	**28**	**20**

L-Lecture T-Tutorial P-Practical D-Drawing Hours/Week C-Credits

BOARD OF STUDIES MEMBERS

S.No	Name of the Member	Signature	S.No	Name of the Member	Signature
1	Dr M SURYA KALAVATHI		5	Dr Y RAJASEKHAR REDDY	
2	Dr Y V SIVA REDDY		6	Mr D LAKSHMAN RAO	
3	Dr G SRINIVASA RAO		7	Mrs K SUJATHA	
4	Sri T VENKATA REDDY		8	Mr M NAGARAJU	

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(M24 Regulations)

Applicable from A.Y 2024-25 Batch

III Year I Semester — **M24**

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
1	M241AEE501	Power Electronics	3	1	0	4	4
2	M241AEE502	Control Systems	3	0	0	3	3
3	M241AEE503	Microprocessor and Micro controller	3	0	0	3	3
		Professional Elective–I					
4	M241AEE504 A	IoT Applications in Electrical Engineering	3	0	0	3	3
	M241AEE504 B	High Voltage Engineering					
	M241AEE504 C	Computer Aided Electrical Machine Design					
5	M241AEE505	Business Economics and Financial Analysis	3	0	0	3	3
6	M241AEE506	Microprocessor and Micro controller Laboratory	0	0	2	2	1
7	M241AEE507	Power Electronics Laboratory	0	0	2	2	1
8	M241AEE508	Advanced English Communication Skills Laboratory	0	0	2	2	1
9	M241AEE509	Python programming	2	0	0	2	1
10	M241AEE510	Intellectual Property Rights	3	0	0	3	0
		Total	**20**	**01**	**06**	**27**	**20**

III Year II Semester — **M24**

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
1	M241AEE601	**Open Elective–I**	3	0	0	3	3
		Professional Elective-II					
2	M241AEE602A	Cyber-Physical Systems	3	0	0	3	3
	M241AEE602B	Power Semiconductor Drives					
	M241AEE602C	Wind and Solar Energy systems					
3	M241AEE603	Digital Signal Processing	3	0	0	3	3
4	M241AEE604	Switch gear and protection	3	0	0	3	3
5	M241AEE605	Power System Operation and Control	3	0	0	3	3
6	M241AEE606	Power System Laboratory	0	0	2	2	1
7	M241AEE607	Control Systems Laboratory	0	0	2	2	1
8	M241AEE608	Digital Signal Processing Lab	0	0	2	2	1
9	M241AEE609	Industry Oriented Mini Project/Internship	0	0	4	4	2
10	M241AEE610	Environmental Science	3	0	0	3	0
		Total	**18**	**0**	**10**	**27**	**20**

L–Lecture T–Tutorial P–Practical D–Drawing CH–Contact Hours/Week C–Credits

BOARD OF STUDIES MEMBERS

S.No	Name of the Member	Signature	S.No	Name of the Member	Signature
1	Dr. M. SURYA KALAVATHI		5	Dr. Y. RAJASEKHAR REDDY	
2	Dr. Y. V SIVA REDDY		6	Mr. D. LAKSHMANA RAO	
3	Dr. G. SRINIVASA RAO		7	Mrs. K. SUJATHA	
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IV Year I Semester

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
							M24
1	M241AEE701	Power Electronic Applications to Renewable Energy System	3	1	0	4	4
2	M241AEE702	**Open Elective–II**	1	0	2	3	2
		Professional Elective-III					
3	M241AEE703 A	Mobile Application Development	3	0	0	3	3
	M241AEE703 B	Signals and Systems					
	M241AEE703 C	Electric and Hybrid Vehicles					
		Professional Elective-IV					
4	M241AEE704 A	HVDC Transmission	3	0	0	3	3
	M241AEE704 B	Power System Reliability					
	M241AEE704 C	Embedded Systems Applications					
5	M241AEE705	Fundamentals of Management for Engineers	3	0	0	3	3
6	M241AEE706	Simulation of Renewable Energy Systems Laboratory	0	0	4	4	2
7	M241AEE707	Project Stage - I	0	0	6	6	3
		Total	**13**	**1**	**12**	**26**	**20**

IV Year II Semester

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
							M24
1	M241AEE801	**Open Elective–III**	2	0	2	4	3
		Professional Elective-V					
2	M241AEE802 A	Power Quality & FACTS	3	1	0	3	3
	M241AEE802 B	Solar Power Batteries					
	M241AEE802 C	AI Techniques in Electrical Engineering					
		Professional Elective-VI					
3	M241AEE803 A	Smart Grid Technologies	3	0	0	3	3
	M241AEE803 B	Electrical Distribution Systems					
	M241AEE803 C	Machine Learning Applications to Electrical Engineering					
4	M241AEE804	Project Stage – II including Seminar	3	0	0	3	11
		Total	**11**	**1**	**2**	**13**	**20**

L–Lecture T–Tutorial P–Practical D–Drawing CH–Contact Hours/Week C–Credits

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LIST OF OPEN ELECTIVES OFFERED FOR M-24 REGULATION B.TECH., ELECTRICAL AND ELECTRONICS ENGINEERING PROGRAMME

OPEN ELECTIVE-I

M241AEE601A	Energy Sources of Non-Conventional
M241AEE601B	Basic power plant engineering

OPEN ELECTIVE-II

M241AEE702A	Utilization of Electric Energy
M241AEE702B	Fundamental of Electric Vehicles

OPEN ELECTIVE-III

M241AEE801A	Charging Infrastructure for Electric Vehicles
M241AEE801B	Energy Storage Systems

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5	M241AEE105	Computer Aided Engineering Graphics	1	0	4	3
6	M241AEE106	Elements of Electrical and Electronics Engineering	0	0	2	1
7	M241AEE107	Engineering Chemistry Laboratory	0	0	2	1
8	M241AEE108	C Programming and Data Structures Laboratory	0	0	2	1
		Induction Program				
		Total Credits	**13**	**2**	**10**	**20**

I Year II Semester

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2	M241AEE202	Applied Physics	3	1	0	4
3	M241AEE203	Engineering Workshop	0	1	3	2.5
4	M241AEE204	English for Skill Enhancement	2	0	0	2
5	M241AEE205	Electrical Circuit Analysis - II	2	0	0	2
6	M241AEE206	Applied Python Programming Laboratory	0	1	2	2
7	M241AEE207	Applied Physics Laboratory	0	0	3	1.5
8	M241AEE208	English Language and Communication Skills Laboratory	0	0	2	1
9	M241AEE209	Electrical Circuit Analysis Laboratory	0	0	2	1
10	*M241AEE210	Environmental Science	3	0	0	0
		Total Credits	**13**	**2**	**14**	**20**

M241AEE101: MATRICES AND CALCULUS

B.Tech. I Year I Sem. **L T P C**
3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level
Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solvingthe system of linear equations.
- 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
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

Course outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of thesystem of equations
- Find the Eigenvalues and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes

UNIT-I: Matrices **10 L**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordanmethod, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors **10 L**

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction ofQuadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Calculus **10 L**

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.

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications) **10 L**

Definitions of Limit and continuity.

Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) 8 L

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and(Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.
Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

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, 5thEditon, 2016.

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, 9thEdition,Pearson, Reprint,2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and CompanyLimited, New Delhi.

M241AEE102: ENGINEERING CHEMISTRY

B.Tech. I Year I Sem. **L T P C**
3 1 0 4

Course Objectives:

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skillsrequired to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of batterychemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials andLubricants.

Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosionand its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT - I: Water and its treatment: [8]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation

- Determination of F^- ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry& Corrosion [8]

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basicrequirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anodeand impressed current methods.

UNIT - III: Polymeric materials: [8]

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation,Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in

trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [8]

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT - V: **Engineering Materials: [8]**

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point,pour point, flash point and fire point.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

M241AEE103: C PROGRAMMING AND DATA STRUCTURES

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:

1. Understand the various steps in Program development.
2. Explore the basic concepts in C Programming Language.
3. Develop modular and readable C Programs
4. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
5. Apply data structures such as stacks, queues in problem solving
6. To understand and analyze various searching and sorting algorithms.

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

Structure of a C Program – Operators, Bit-wise operators, Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Statements.

UNIT - II

Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

UNIT - III

Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility, **Pointer Applications** – Passing an array to a function, Memory allocation functions, array of pointers**Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulationfunctions, string / data conversion.

UNIT - IV

Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

Input and Output – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

UNIT – V

Sorting- selection sort, bubble sort, insertion sort,

Searching-linear and binary search methods.

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, CengageLearning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3 Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.

M241AEE104: ELECTRICAL CIRCUIT ANALYSIS –I

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Mathematics

Course Objectives:

- To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.
- To learn steady state and transient analysis of single phase and 3-phase circuits.
- To understand Theorems and concepts of coupled circuits.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand network analysis, techniques using mesh and node analysis.
- Evaluate steady state and transient behavior of circuits for DC and AC excitations.
- Analyze electric circuits using network theorems and concepts of coupled circuits.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To gain knowledge in circuits and to Understand the fundamentals ofderived circuit laws.	3	3	3	3	3	3	1	1	2	2	1	3
To learn steady state and transient analysis of single and three phase circuits.	3	2	3	2	3	3	2	2	2	3	2	3
To understand Theorems andconcepts of coupled circuits.	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand network analysis, techniques using mesh and node analysis.	3	3	3	3	3	3	3	1	2	1	1	2
Evaluate steady state and transient behaviour of circuitsfor DC and AC excitations.	3	3	3	3	3	3	3	3	3	3	2	3
Analyse electric circuits using network theorems andconcepts of coupled circuits.	3	2	2	2	3	3	3	2	1	3	3	2

UNIT-I:

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis.

UNIT-II:

Single-Phase Circuits: RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variationof various parameters. Resonance: Series and parallel circuits, Bandwidth and Q-factor.

UNIT-III:

Network theorems: Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power

transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC).

UNIT-IV:

Poly-phase Circuits: Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

UNIT-V:

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

Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix andcut-set matrix,

TEXTBOOKS:

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGrawHill, 5th Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGrawHill, 6th Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

M241AEE105: COMPUTER AIDED ENGINEERING GRAPHICS

B.Tech. I Year I Sem.

L	T	P	C
1	0	4	3

Pre-requisites: Nil

Course Objectives:

- To develop the ability of visualization of different objects through technical drawings
- To acquire computer drafting skill for communication of concepts, ideas in the design ofengineering products

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

- Apply computer aided drafting tools to create 2D and 3D objects
- sketch conics and different types of solids
- Appreciate the need of Sectional views of solids and Development of surfaces of solids
- Read and interpret engineering drawings
- Conversion of orthographic projection into isometric view and vice versa manually and by usingcomputer aided drafting

UNIT – I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT- II:

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

UNIT – III:

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Developmentof surfaces using computer aided drafting

UNIT – V:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: - External examination is conducted in conventional mode and internal evaluation to be done byboth conventional as well as using computer aided drafting.

M241AEE106: ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech. I Year I Sem. **L T P C**

0 0 2 1

Prerequisites: Elements of Electrical Engineering

Course Objectives:

- To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
- To study the transient response of various R, L and C circuits using different excitations.
- To determine the performance of different types of DC machines and Transformers.

Course Outcomes: After learning the contents of this paper the student must be able to

- Verify the basic Electrical circuits through different experiments.
- Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
- Analyze the transient responses of R, L and C circuits for different input conditions.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach	3	2	1		2	0	0	1	2	0	1	2
To study the transient response of various R, L and C circuits using different excitations	3	2	1	1	3	0	0	0	2	0	1	1
To determine the performance of different types of DC machines and Transformers	3	2	0		3	0	0	0	1	2	1	1

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Verify the basic Electrical circuits through different experiments	3	2	1	0	1	0	0	0	2	0	2	2
Evaluate the performance calculations of Electrical Machinesan Transformers through various testing methods	3	2	1	0	3	1	0	1	1	2	1	2
Analyse the transient responses of R, L and C circuits for different input conditions	3	2	1	1	3	2	0	0	1	0	2	2

List of experiments/demonstrations:

PART-A (compulsory)

1. Verification Ohm's Law
2. Verification of KVL and KCL
3. Verification of Thevenin's and Norton's theorem

4. Verification of Superposition theorem
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Open Circuit and Short Circuit Tests on 1-phase Transformer

PART-B (any two experiments from the given list)

1. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
2. Verification of Reciprocity and Milliman's Theorem.
3. Verification of Maximum Power Transfer Theorem.
4. Determination of form factor for non-sinusoidal waveform
5. Transient Response of Series RL and RC circuits for DC excitation

TEXTBOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS:

1. P.Ramana, M.Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S.Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M.S.Sukhija, T.K.Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

M241AEE107: ENGINEERING CHEMISTRY LABORATORY

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value, surfacetension and viscosity of oils.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
- Able to perform methods such as conductometry, potentiometry and pH metry in order to findout the concentrations or equivalence points of acids and bases.
- Students are able to prepare polymers like bakelite and nylon-6.
- Estimations saponification value, surface tension and viscosity of lubricant oils.

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.

II. Conductometry: Estimation of the concentration of an acid by Conductometry.

III. Potentiometry: Estimation of the amount of Fe^{+2} by Potentiomentry.

IV. pH Metry: Determination of an acid concentration using pH meter.

V. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon – 6.

VI. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VIII. Virtual lab experiments

1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications,New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

M241AEE108: C PROGRAMMING AND DATA STRUCTURES LABORATORY

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives: Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:

1. Develop modular and readable C Programs
2. Solve problems using strings, functions
3. Handle data in files
4. Implement stacks, queues using arrays, linked lists.
5. To understand and analyze various searching and sorting algorithms.

List of Experiments:

1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a valuesupplied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program to solve Towers of Hanoi problem.
9. 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 useSwitch Statement)
10. Write a C program to find both the largest and smallest number in a list of integers.
11. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices
    ii) Multiplication of Two Matrices
12. Write a C program that uses functions to perform the following operations:
    i) To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
13. Write a C program to determine if the given string is a palindrome or not
14. Write a C program that displays the position or index in the string S where the string T begins,or – 1 if S doesn't contain T.
15. Write a C program to count the lines, words and characters in a given text.
16. Write a C program to generate Pascal's triangle.
17. Write a C program to construct a pyramid of numbers.
18. Write a C program that uses functions to perform the following operations:
    i) Reading a complex number
    ii) Writing a complex number
    iii) Addition of two complex numbers
    iv) Multiplication of two complex numbers
    (Note: represent complex number using a structure.)
19.
    i. Write a C program which copies one file to another.
    ii. Write a C program to reverse the first n characters in a file.(Note: The file name and n are specified on the command line.)

19.
   i. Write a C program to display the contents of a file.
   ii. Write a C program to merge two files into a third file (i.e., the contents of the first filefollowed by those of the second are put in the third file)

20. Write a C program that uses functions to perform the following operations on singly linkedlist.:
    i) Creation ii) Insertion iii) Deletion iv) Traversal

21. Write C programs that implement stack (its operations) using
    i) Arrays ii) Pointers

22. Write C programs that implement Queue (its operations) using
    i) Arrays ii) Pointers

23. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii)Insertion sort

24. Write C programs that use both recursive and non recursive functions to perform the followingsearching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

TEXT BOOKS:

1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, CengageLearning.
2. Let us C, Yeswanth Kanitkar
3. C Programming, Balaguruswamy.

MOTHER TERESA INSTITUTE OF SCIENCE AND TECHNOLOGY

AUTONOMOUS

B.Tech. in ELECTRICAL AND ELECTRONICS ENGINEERINGCOURSESTRUCTURE&SYLLABUS

(M24 Regulations)

Applicable from A.Y 2024-25 Batch

II Year I Semester **M24**

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
1	M241AEE301	Transform Theory, Numerical Techniques & Complex Variables	3	1	0	4	4
2	M241AEE302	DC Machines &Transformers	3	1	0	4	4
3	M241AEE303	Power System -I	3	0	0	3	3
4	M241AEE304	Analog Electronic Circuits	3	0	0	3	3
5	M241AEE305	Electromagnetic Field Theory	3	0	0	3	3
6	M241AEE306	DC Machines & Transformers Laboratory	0	0	2	2	1
7	M241AEE307	Analog Electronic Circuits Laboratory	0	0	2	2	1
8	M241AEE308	Electrical Simulation tools Laboratory	0	0	2	2	1
9	M241AEE309	Gender Sensitization Laboratory	0	0	2	2	0
	Total		**15**	**02**	**08**	**25**	**20**

II Year II Semester **M24**

S.NO	Course Code	Title of the Course	L	T	P/D	CH	C
1	M241AEE401	Solid Mechanics And Hydraulic Machines	3	1	0	4	4
2	M241AEE402	Electrical Measurements and Instrumentation	3	0	0	3	3
3	M241AEE403	Induction and Synchronous Machines	3	0	0	3	3
4	M241AEE404	Digital Electronics	2	0	0	2	2
5	M241AEE405	Power system-II	3	0	0	3	3
6	M241AEE406	Digital Electronics Laboratory	0	0	2	2	1
7	M241AEE407	Electrical Measurements and Instrumentation Laboratory	0	0	2	2	1
8	M241AEE408	Induction and Synchronous Machines Laboratory	0	0	2	2	1
9	M241AEE409	Real-time Research Project/ Field Based Project	0	0	4	4	2
10	M241AEE410	Indian Constitution	3	0	0	3	0
	Total		**17**	**01**	**10**	**28**	**20**

L-Lecture T-Tutorial P-Practical D-Drawing Hours/Week C-Credits

BOARD OF STUDIES MEMBERS

S.No	Name of the Member	Signature	S.No	Name of the Member	Signature
1	Dr M SURYA KALAVATHI		5	Dr Y RAJASEKHAR REDDY	
2	Dr Y V SIVA REDDY		6	Mr D LAKSHMAN RAO	
3	Dr G SRINIVASA RAO		7	Mrs K SUJATHA	
4	Sri T VENKATA REDDY		8	Mr M NAGARAJU	

M241AEE301: Transform Theory, Numerical Techniques & Complex Variables

B.Tech II Year I Sem **L T P C**
3 1 0 4

Pre-requisites: Mathematics courses of Second year of study.

Course Objectives:

- To learn Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
- Various numerical methods to find roots of polynomial and transcendental equations.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Solving ordinary differential equations of first order using numerical techniques
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.

Course outcomes:

- After learning the contents of this paper the student must be able to Express any periodic function in terms of sine and cosine
- Find the root of a given polynomial and transcendental equations.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given first order ODE's
- Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems

UNIT-I: Fourier Series

Definition of periodic function, Dirichlet's Conditions - Fourier expansion of periodic functions in a given interval, Determination of Fourier coefficients – Fourier series of even and odd functions, Half-range Fourier series

UNIT-II: Fourier Transforms

Fourier Transforms: Fourier integral theorem - Fourier sine and cosine integrals, Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT-III: Numerical Methods

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton Raphson method and Regula-Falsi method. Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation , Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8th rules.

UNIT-IV: COMPLEX Differentiation

Functions of a complex variable: Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions, Construction of analytic functions using Milne – Thompson method.

UNIT-V: Complex Integration

Line integral, Evaluation along a path and by indefinite integration, Cauchy's integral theorem, Cauchy's integral formula, Generalized integral formula. Singularities: Poles and Residues, Evaluation of residues by Cauchy Residue theorem

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS:

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill, 2004.

M241AEE302: DC MACHINES & TRANSFORMERS

B.Tech. II Year I Sem.

L	T	P	C
3	1	0	4

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2

Course Objectives:

- To study and understand different types of DC machines and their performance evaluation through various testing methods.
- To understand the operation of single and ploy-phase Transformers
- To analyze the performance of transformers through various testing methods.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the different types of a DC generator & its operation and working..
- Understand the different types of a DC motor & its operation and working.
- To analyze the performance of dc machines though starting methods and various testing methods.
- To study and understand the performance of single transformer
- Analyze single and three phase transformer and their performance through testing

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To study and understand different types of DC machines and their performance evaluation through various testing methods.	3	2	3	0	1	1	3	0	2	1	2
To understand the operation of single and ploy-phase Transformers	3	3	3	2	2	1	3	0	2	2	2
To analyse the performance of transformers through various testing methods	3	2	3	2	2	2	3	0	2	1	3

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Understand the different types of a DC generator & its operation and working.	3	3	2	1	2	-	-	-	-	-	2	3	2	1
Understand the different types of a DC motor & its operation and working.	3	2	2	1	1	-	-	-	-	-	2	3	2	1
To analyze the performance of dc machines though starting methods and various testing methods.	3	2	2	2	2	1	1	-	-	-	2	3	2	2
To study and understand the performance of single transformer	2	3	3	1	2	-	-	-	-	-	3	3	2	2
Analyze single and three phase transformer and their performance through testing	2	2	2	1	1	1	1	-	-	-	3	3	2	2

UNIT-I:

D.C. GENERATORS: Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation.

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

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-II:

D.C MOTORS: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series andcompound motors – Armature reaction and commutation. Speed control of D.C. Motors - Armature voltage and field flux control methods.

Testing of D.C. machines - Losses – Constant & Variable losses –calculation of efficiency – condition for maximum efficiency.

UNIT-III:

STARTERS AND TESTING OF DC MACHINES: Motor starters (2- point, 3- point and 4- point starters) 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-IV:

SINGLE PHASE TRANSFORMERS: Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams and Applications. Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency &supply voltage on iron losses.

UNIT-V:

TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS: Open Circuit and Short Circuit tests - Sumpner'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.

Poly-phase transformers - Poly-phase connections- Y/Y, Y/Δ, Δ/Y,Δ/Δ and open Δ, Scott connection and Applications.

TEXT BOOKS:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

M241AEE303: POWER SYSTEM-I

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2
Electrical Machines-I & Electrical Machines-II

Course Objectives:

- To understand the power generation through conventional and non-conventional sources.
- To illustrate the economic aspects of power generation and tariff methods.
- To know about overhead line insulators, substations and AC & DC distribution systems.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the power generation through conventional and non-conventional sources.
- Illustrate the economic aspects of power generation and tariff methods.
- Study and understand the overhead transmission lines and line insulators
- Analyse the operations of AIS & GIS, Insulators and Distribution systems
- Study and understand the about AC & DC distribution systems

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To understand the power generation through conventional and non-conventional sources	3	3	3	0	1	3	2	3	0	1	2
To illustrate the economic aspects of power generation and tariff methods	3	3	2	0	1	3	2	2	1	1	2
To know about overhead line insulators, substations and AC & DC distribution systems	3	3	2	0	1	3	2	3	0	1	1

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Understand the power generation through conventional and non-conventional sources	3	3	2	1	1	-	-	-	-	1	2	3	2	1
Illustrate the economic aspects of power generation and tariff methods	3	3	2	1	1	-	-	-	-	1	2	3	2	2
Study and understand the overhead transmission lines and line insulators	3	3	3	2	1	-	-	-	-		1	3	1	1
Analyse the operations of AIS & GIS, Insulators and Distribution systems	3	3	2	1	2	-	-	-	-		2	3	2	2
Study and understand the about AC & DC distribution systems	3	3	2	1	2	-	-	-	-	1	2	3	1	2

UNIT-I:

GENERATION OF ELECTRIC POWER:

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

Non-Conventional Sources (Elementary Treatment):

Solar Energy, Wind Energy, Fuel Cells, Ocean Energy, Tidal Energy, Wave Energy, Cogeneration, Energy conservation and storage.

UNIT-II:

ECONOMICS OF POWER GENERATION: 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-III:

OVER HEAD TRANSMISSION LINES: Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors- transposition, bundled conductors, and effect of earth on capacitance,skin and proximity effects.

OVERHEAD LINE INSULATORS: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators, Sag and tension calculations.

UNIT-IV:

SUBSTATIONS:

AIR INSULATED SUBSTATIONS (AIS): 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.

GAS INSULATED SUBSTATIONS (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-V:

DC DISTRIBUTION: Classification of Distribution Systems. - Comparison of DC vs. AC and Under-Ground vs. Over- Head Distribution Systems. - Requirements and Design features of Distribution Systems. -Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

A.C. DISTRIBUTION: Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

TEXT BOOKS:

1. C.L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", 2nd Edition, New AgeInternational, 2009.
2. V.K Mehta andRohit Mehta, "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.

REFERENCE BOOKS:

1. 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.
2. C.L. Wadhwa, "Electrical Power Systems", 5th Edition, New Age International, 2009.
3. M.V. Deshpande, "Elements of Electrical Power Station Design", 3rd Edition, Wheeler Pub. 1998.
4. H.Cotton & H. Barber, "The Transmission and Distribution of Electrical Energy", 3rd Edition, 1970.
5. W.D.Stevenson, "Elements of Power System Analysis", 4th Edition, McGraw Hill, 1984.

M241AEE304: ANALOG ELECTRONIC CIRCUITS

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

1. To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
4. To introduce the basic building blocks of linear integrated circuits.
5. To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: Upon completing this course, the students will be able to

1. Know the characteristics, utilization of various components.
2. Understand the biasing techniques
3. Design and analyze various rectifiers, small signal amplifier circuits.
4. Design sinusoidal and non-sinusoidal oscillators.
5. Designs OP-AMP based circuits with linear integrated circuits.

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To introduce components such as diodes, BJTs and FETs their switching characteristics, applications	2	2	2	2	-	-	-	-	-	-	1
Learn the concepts of high frequency analysis of transistors.	3	3	3	2	-	-	-	-	-	-	1
To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.	3	3	3	2	-	-	-	-	-	-	1
To introduce the basic building blocks of linear integrated circuits	3	3	3	2	-	-	-	-	-	-	1
To introduce the concepts of waveform generation and introduce some special function ICs.	3	3	3	2	-	-	-	-	-	-	1

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Know the characteristics, utilization of various components.	2	2	2	2	-	-	-	-	-	-	1	3	2	3
Understand the biasing techniques	2	3	3	2	-	-	-	-	-	-	1	2	1	2
Design and analyze various rectifiers, small signal amplifier circuits.	3	3	3	2	-	-	-	-	-	-	1	2	1	2
Design sinusoidal and non-sinusoidal oscillators.	3	3	3	2	-	-	-	-	-	-	1	2	2	2
Designs OP-AMP based circuits with linear integrated circuits	3	3	3	2	-	-	-	-	-	-	1	2	2	3

UNIT-I:

Diode and Bipolar Transistor Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers;Small signal equivalent circuits,

UNIT-II:

FET Circuits: FET Structure and VI Characteristics, MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequencyequivalent circuit.

UNIT-III:

Multi-Stage and Power Amplifiers: Direct coupled and RC Coupled multi-stage amplifiers;

Differential Amplifiers, Power amplifiers - Class A, Class B, Class C

UNIT-IV:

Feedback Amplifiers: Concepts of feedback - Classification of feedback amplifiers - General characteristics of Negative feedback amplifiers - Effect of Feedback on Amplifier characteristics - Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations - Simple problems.

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators -Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V:

Operational Amplifiers: Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square- wave andtriangular- wave generators.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition 2010
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 2003.

REFERENCE BOOKS:

1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.
2. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
3. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
4. P. R. Gray, R. G. Meyer and S. Lewis, “Analysis and Design of Analog IntegratedCircuits”, John Wiley & Sons, 2001.

M241AEE305: ELECTROMAGNETIC FIELD THEORY

B.Tech. II Year I Sem. **L T P C**
3 0 0 3

Prerequisites: Mathematics & Applied Physics

Course Objectives:

- To introduce the concepts of electric field and magnetic field.
- To know Applications of electric and magnetic fields in the development of the theory for power transmission linesand electrical machines.
- To study about electromagnetic waves.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the basic laws of static electric field and their applications.
- Understand the conductors, dielectric and capacitance..
- Understand the basic laws of static magnetic field, magnetic forces and their applications.
- Analyze time varying electric and magnetic fields.
- Understand the propagation of EM waves

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To introduce the concepts of electric field and magnetic field	3	1	1	0	3	3	3	0	0	1	0
To know Applications of electric and magnetic fields in the development of the theory for power transmission linesand electrical machines.	3	3	2	2	2	3	0	1	1	1	0
To study about electromagnetic waves	3	3	1	2	2	2	0	1	0	1	1

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Understand the basic laws of static electric field and their applications	3	3	3	3	3	-	-	-	-	1	2	3	2	2
Understand the conductors, dielectric and capacitance.	3	2	2	2	1	-	-	-	-	-	2	2	2	1
Understand the basic laws of static magnetic field, magnetic forces and their applications	3	2	2	1	2	-	-	-	-	1	1	3	3	2
Analyze time varying electric and magnetic fields.	3	3	3	1	1	-	-	-	-	-	1	3	2	1
Understand the propagation of EM waves	3	2	2	2	3	-	-	-	-	-	1	3	2	1

UNIT-I:

STATIC ELECTRIC FIELD: Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb's law, Electricfield intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law andits applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT-II:

CONDUCTORS, DIELECTRICS AND CAPACITANCE: Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation.

UNIT-III:

STATIC MAGNETIC FIELDS AND MAGNETIC FORCES: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.

Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self-inductances and mutual inductances.

UNIT-IV:

TIME VARYING FIELDS AND MAXWELL'S EQUATIONS: Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces.

UNIT-V:

ELECTROMAGNETIC WAVES: Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.

TEXT BOOKS:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

REFERENCE BOOKS:

1. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
2. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
4. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
5. E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.
6. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers,International Edition, 1971.
7. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.

M241AEE306: DC MACHINES &TRANSFORMERS LABORATORY

B.Tech. II Year I Sem. **L T P C**
0 0 2 1

Prerequisites: Electrical Machines- I

Course Objectives:

- To expose the students to the operation of DC Generators.
- To know the operation of various types of DC Motors.
- To examine the performance of Single and Three Phase Transformers.

Course Outcomes: After learning the contents of this paper the student must be able to

- Assess the Performance characteristics of different DC generators
- Assess the Performance characteristics of different DC motors
- Analyze the different testing methods of dc machines.
- Start and control the Different DC Machines
- Evaluate the performance ofDifferent Transformers using different testing methods

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To expose the students to the operation of DC Generators	3	3	3	3	3	3	1	2	2	1	3
To know the operation of various types of DC Motors.	3	2	3	2	3	3	2	2	3	2	3
To examine the performance of Single and Three Phase Transformers	3	2	3	1	3	3	1	2	2	2	3

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Assess the Performance characteristics of different DC generators	3	3	3	3	3	3	3	3	3	2	3	3	3	2
Assess the Performance characteristics of different DC motors	3	3	3	3	3	3	3	3	3	2	3	3	2	1
Analyze the different testing methods of dc machines.	3	3	3	3	2	3	3	1	2	2	3	3	3	2
Start and control the Different DC Machines	3	3	3	3	3	3	2	2	1	1	2	3	3	1
Evaluate the performance of Different Transformers using different testing methods	3	2	2	2	3	3	3	1	3	3	2	3	3	2

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. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star- Delta, Delta-Delta, Delta-star, Star-Star)

In addition to the above eight experiments, at least any two of the experiments from the following list arerequired 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.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-PhaseTransformer
7. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

TEXT BOOKS:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, “Electrical Machines”, Oxford, 2017.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.

M241AEE307: ANALOG ELECTRONIC CIRCUITS LABORATORY

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Analog Electronic Circuits

Course Objectives:

- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such as smallsignal, cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Design OP-AMP based circuits with linear integrated circuits.

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To introduce components such as diodes, BJTs and FETs their switching characteristics, applications	3	2	3	2	-	-	-	-	-	3	1
Learn the concepts of high frequency analysis of transistors.	3	2	3	2	-	-	-	-	-	3	1
To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.	3	2	3	2	-	-	-	-	-	3	1
To introduce the basic building blocks of linear integrated circuits.	3	2	3	2	-	-	-	-	-	3	1
To introduce the concepts of waveform generation and introduce some special function ICs.	3	2	3	2	-	-	-	-	-	3	1

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Know the characteristics, utilization of various components.	3	2	3	2	-	-	-	-	-	3	1	2	2	3
Understand the biasing techniques	3	2	3	2	-	-	-	-	-	3	1	1	2	2
Design and analyze various rectifiers, small signal amplifier circuits	3	2	3	2	-	-	-	-	-	3	1	2	3	3
Design sinusoidal and non-sinusoidal oscillators.	3	2	3	2	-	-	-	-	-	3	1	2	2	2
Design OP-AMP based circuits with linear integrated circuit	3	2	3	2	-	-	-	-	-	3	1	2	2	2

List of Experiments:

1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamic resistance of theDiode.
2. Determine the Ripple factor, %Regulation PIV and TUF of the given Rectifier with & without filter.
3. Obtain the I/O Characteristics of CE configurations of BJT. Calculate h-parameters from the Characteristics.

4. Obtain the I/O Characteristics of CB configurations of BJT. Calculate h-parameters from the Characteristics.
5. Obtain the I/O Characteristics of CC configurations of BJT. Calculate h-parameters from the Characteristics.
6. Obtain the Drain and Transfer characteristics of CD,CS configuration of JFET. Calculate gm, rd fromthe Characteristics Adder and Subtractor using Op Amp.
7. Inverting and Non-inverting Amplifiers using Op Amps
8. Adder and Subtractor using Op Amp
9. Integrator Circuit using IC 741.
10. Differentiator circuit using Op Amp.
11. Current Shunt Feedback amplifier
12. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for givenfrequency.
13. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.
14. Design transformer coupled class A power amplifier and draw the input and output waveforms, find itsefficiency

- Experiments related to MOSFET may be included

M241AEE308: ELECTRICAL SIMULATION TOOLS LABORATORY

B.Tech. II Year I Sem. **L T P C**
0 0 2 1

Course Objectives:

- To understand basic block sets of different simulation platform used in electrical/electronic circuit design.
- To understand use and coding in different software tools used in electrical/ electronic circuit design.
- To understand the simulation of electric machines/circuits for performance analysis.

Course Outcomes: After learning the contents of this paper the student must be able to

- Develop knowledge ofsoftware packages to model and program to Electrical systems
- Develop knowledge ofsoftware packages to model and program to electronics systems
- Model different Electrical systemsand analyze the results
- Model different electronic systems and analyze the results
- Articulate importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To understand basic block sets of different simulation platform used in electrical/electronic circuit design	3	3	3	3	3	3	2	1	2	2	1
To understand use and coding in different software tools used in electrical/ electronic circuit design	3	3	3	1	1	3	1	1	2	2	1
To understand the simulation of electric machines/circuits for performance analysis	3	3	2	1	2	3	2	2	1	2	3

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Develop knowledge of software packages to model and program to Electrical systems	3	3	1	3	2	3	2	1	2	2	3	3	2	2
Develop knowledge of software packages to model and program to electronics systems	3	3	1	3	2	3	2	1	2	2	3	3	2	1
Model different Electrical systems and analyze the results	3	2	2	1	2	1	1	2	2	2	3	3	2	1
Model different electronic systems and analyze the results	3	2	2	1	2	1	1	2	2	2	3	3	1	1
Articulate importance of software packagesused for simulation in laboratory experimentation by analyzing the simulation results	3	2	0	0	2	0	1	2	0	2	3	3	2	1

Students should be encouraged to use open-source software's such as **SCILAB, ORCAD, LTSPICE, Ngspice, Octave, Solve Elec, Simulide, CircuitLab, QElectroTech, Circuit Sims, DcAcLab, Every Circuit, DoCircuits**etc. for carrying out the lab simulation listed below.

Use of Professional Licensed versions of softwares**like MATLAB, LabVIEW, NI Multisim, PSpice, PowerSim, TINA** etc. is also allowed.

Use of **'Python'** platform for simulating components/ circuit behavior.

Suggested List of Laboratory Experiments:

The following experiments need to be performed from various subject domains.

1. Introduction to basic block sets of simulation platforms. Basic matrix operations, Generation of standard test signals
2. Solving thelinear and nonlinear differential equations
3. Measurement of Voltage, Current and Power in DC circuits.
4. Verification of different network theorems with dependent and independent sources using suitable simulation tools.
5. Verification of performance characteristics of basic Electronic Devices using suitable simulation tools.
6. Analysis of series and parallel resonance circuits using suitable simulation tools
7. Obtaining the response of electrical network for standard test signals using suitable simulation tools.
8. Modeling and Analysis of Low pass and High pass Filters using suitable simulation tools
9. Performance analysis of DC motor using suitable simulation tools
10. Modeling and analysis of Equivalent circuit of transformer using suitable simulation tools.
11. Analysis of single-phase bridge rectifier with and without filter using suitable Simulation tools.
12. Modeling and Verification of Voltage Regulator using suitable simulation tools.
13. Modeling of transmission line using simulation tools.
14. Performance analysis of Solar PV model using suitable simulation tools

M241AEE309: GENDER SENSITIZATION LABORATORY

(An Activity-based Course)

B.Tech. II Year I Sem. **L T P C**

0 0 2 0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized 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.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and

Unaccounted work.

-Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

- ***Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".***

ESSENTIAL READING: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

M241AEE401: SOLID MECHANICS AND HYDRAULIC MACHINES

B.Tech. II Year II Sem. **L T P C**
3 1 0 4

Course Objectives:

- To identify an appropriate structural system and work comfortably with basic engineering mechanics and types of loading & support conditions that act on structural systems.
- To Understand the meaning of centers of gravity, centroids, moments of Inertia and rigid body dynamics.
- To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery.

Course Outcomes: After learning the contents of this paper the student must be able to

- Solve problems dealing with forces, beam and cable problems and understand distributed force systems.
- Solve friction problems and determine moments of Inertia and centroid of practical shapes.
- Apply Solve problems involving projectile motion or constant acceleration.
- .Apply knowledge of mechanics in addressing problems in hydraulic machinery and its principles that will be utilized in Hydropower development and for other practical usages.
- Evaluate turbine efficiency based on fluid properties

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To identify an appropriate structural system and work comfortably with basic engineering mechanics and types of loading & support conditions that act on structural systems.	3	3	3	1	1	3	1	1	0	2	1
To Understand the meaning of centers of gravity, centroids, moments of Inertia and rigid body dynamics.	3	2	3	0	2	3	2	2	0	3	2
To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery.	3	2	3	0	2	3	1	1	0	2	2

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Solve problems dealing with forces, beam and cable problems and understand distributed force systems	2	2	2	2	-	-	-	-	-	-	1	3	3	3
Solve friction problems and determine moments of Inertia and centroid of practical shapes.	2	3	3	2	-	-	-	-	-	-	1	2	2	2
Apply Solve problems involving projectile motion or constant acceleration.	3	3	3	2	-	-	-	-	-	-	1	2	2	3
Apply knowledge of mechanics in addressing problems in hydraulic machinery and its principles that will be utilized in Hydropower development and for other practical usages.	3	3	3	2	-	-	-	-	-	-	1	2	2	2
Evaluate turbine efficiency based on fluid properties	3	3	3	2	-	-	-	-	-	-	1	2	2	2

UNIT–I:

INTRODUCTION OF ENGINEERING MECHANICS: Basic concepts of System of Forces-Coplanar Forces-Components in Space-Resultant- Moment of Forces andits Application - Couples and Resultant of Force System-Equilibrium of System of Forces-Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems - Vector cross product, Types of friction - Limiting friction - Laws of Friction - static and Dynamic Frictions - Angle of Friction -Cone of limiting friction

UNIT–II:

CENTROID AND CENTER OF GRAVITY: Centroids - Theorem of Pappus- Centroids of Composite figures - Centre of Gravity of Bodies - Area momentof Inertia:-polar Moment of Inertia-Transfer-Theorems - Moments of Inertia of Composite Figures.

SIMPLE STRESSES AND STRAINS ANALYSIS: Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity - Types of stresses and strains- Hooke's law - stress - strain diagram for mild steel - Working stress - Factor of safety - Lateral strain, Poisson's ratio and volumetric strain - Pure shear and Complementary shear - Elastic modulii, Elasticconstants and the relationship between them

UNIT–III:

KINEMATICS & KINETICS: Introduction - Rectilinear motion - Motion with uniform and variable acceleration-Curvilinear motion- Components of motion- Circular motion Kinetics of a particle - D'Alembert's principle - Motion in a curved path - work, energy and power. Principleof conservation of energy - Kinetics of a rigid body in translation, rotation - work done - Principle of work-energy - Impulse- momentum.

UNIT-IV:

BASICS OF HYDRAULIC MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency Elements of a typical Hydropower installation - Heads and efficiencies

UNIT-V:

TURBINES & PUMPS: Classification of turbines - Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube - Classification, functions and efficiency. Governing of turbines, Performance of turbines

Pump installation details - classification - work done - Manometric head - minimum starting speed - losses and efficiencies - specific speed. Multistage pumps - pumps in parallel

TEXT BOOKS:

1. M.V. Seshagirirao and Durgaih, "Engineering Mechanics", University Press.
2. P.N Modi and Seth, "Fluid Mechanics and Hydraulic Machinery", standard Book House

REFERENCE BOOKS:

1. B. Bhattacharya, "Engineering Mechanics", Oxford University Publications.
2. Hibbler, "Engineering Mechanics (Statics and Dynamics)", Pearson Education.
3. Fedrinand L. Singer, "Engineering Mechanics" Harper Collings Publishers.
4. A.K.Tayal, "Engineering Mechanics", Umesh Publication.
5. Domkundwar & Domkundwar, "Fluid mechanics & Hydraulic Machines", Dhanpat Rai & C
6. R.C.Hibbeler, "Fluid Mechanics", Pearson India Education Servieces Pvt. Ltd
7. D.S.Kumar, "Fluid Mechanic & Fluid Power Engineering", Kataria & Sons Publications Pvt. Ltd.
8. Banga & Sharma, "Hydraulic Machines" Khanna Publishers.

M241AEE402: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

B.Tech. II Year II Sem. **L T P C**
3 0 0 3

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2, Analog Electronics Electro Magnetic Fields.

Course Objectives:

- To introduce the basic principles of all measuring instruments.
- To deal with the measurement of voltage, current, Power factor, power, energy and magneticmeasurements.
- To understand the basic concepts of smart and digital metering.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand differenttypes of measuringinstruments, theirconstruction, operation and characteristics.
- Apply the knowledge about potentiometers And instrumenttransformers to usethem effectively
- Analyze the different types of single phase and three phase energy meters
- Analyze the different types of DC & AC bridges
- Apply the knowledge of smart and digital metering for industrialapplications

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To introduce the basic principles of all measuring instruments	3	1	3	2	3	3	1	0	2	1	3
To deal with the measurement of voltage, current, Power factor, power, energy and magnetic measurements.	3	2	2	2	2	2	2	0	1	2	3
To understand the basic concepts of smart and digital metering	3	1	2	2	2	2	2	0	1	2	3

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Understand different types of measuring instruments, their construction, operation and characteristics.	3	2	2	1	2	-	-	-	-	2	3	3	2	1
Apply the knowledge about potentiometers And instrument transformers to use them effectively	3	2	2	1	1	-	-	-	-	2	3	3	2	1
Analyze the different types of single phase and three phase energy meters	3	2	3	2	2	-	-	-	-	1	2	3	1	2
Analyze the different types of DC & AC bridges	3	3	3	2	2	-	-	-	-		2	3	2	1
Apply the knowledge of smart and digital metering for industrialapplications	3	2	2	2	2	-	-	-	-	2	3	3	1	1

UNIT - I:

INTRODUCTION TO MEASURING INSTRUMENTS: Classification - deflecting, control and damping torques - Ammeters and Voltmeters - PMMC, moving iron type instruments - expression for the deflecting torque and control torque - Errors and compensations, extension of rangeusing shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type - extension of range of E.S. Voltmeters.

UNIT-II:

POTENTIOMETERS & INSTRUMENT TRANSFORMERS: Principle and operation of D.C. Crompton's potentiometer - standardization - Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization - applications. CT and PT - Ratioand phase angle errors

UNIT-III:

MEASUREMENT OF POWER & ENERGY: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques - Extension of range of wattmeter using instrument transformers - Measurement of active and reactive powers in balanced and unbalanced systems.

Single phase induction type energy meter - driving and braking torques - errors and compensations - testing by phantom loading using R.S.S. meter. Three phase energy meter - tri-vector meter, maximum demand meters.

UNIT-IV:

DC & AC BRIDGES: Method of measuring low, medium and high resistance - sensitivity of Wheat- stone's bridge - Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance - loss of charge method.

Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge. Measurement of capacitance and loss angle -Desaunty's Bridge - Wien's bridge - Schering Bridge.

UNIT-V:

TRANSDUCERS: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

INTRODUCTION TO SMART AND DIGITAL METERING: Digital Multi-meter, True RMS meters, Clamp- on meters, Digital Energy Meter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope.

TEXTBOOKS:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.

REFERENCE BOOKS:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd.,2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice - Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition,Wheeler Publishing, 2011.

M241AEE403: INDUCTION AND SYNCHRONOUS MACHINES

B.Tech. II Year II Sem. **L T P C**

3 0 0 3

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2 & Electrical Machines-I

Course Objectives:

- To deal with the detailed analysis of poly-phase induction motors & Alternators.
- To understand operation, construction and types of single-phase motors and their applications in household appliances and control systems.
- To introduce the concept of parallel operation of alternators.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the types, construction and operation. of poly phase induction machines
- Analyze the characteristics and speed control methods of induction machines.
- Examine theoperation and regulation of synchronous machines
- Analyze performance of synchronous machines
- Understand the different types of special machines

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To deal with the detailed analysis of poly-phase induction motors & Alternators	2	1	2	0	1	0	2	1	1	2	3
To understand operation, construction and types of single-phase motors and their applications in house hold appliances and control systems	2	1	2	0	1	2	2	2	1	2	3
To introduce the concept of parallel operation of alternators	2	1	2	1	1	3	2	2	2	3	3

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Understand the types, construction and operation. of poly phase induction machines	3	2	2	2	1	1	-	-	-	1	3	3	1	1
Analyze the characteristics and speed control methods of induction machines	3	3	1	2	2	-	-	-	-	2	3	3	2	2
Examine the operation and regulation of synchronous machines	3	2	1	2	2	1	-	-	-	2	3	3	2	2
Analyze performance of synchronous machines	3	3	2	1	3	-	-	-	-	1	3	3	2	1
Understand the different types of special machines	3	2	1	2	2	-	-	-	-	2	3	3	1	1

UNIT-I:

POLY-PHASE INDUCTION MACHINES: 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-II:

CHARACTERISTICS OF INDUCTION MACHINES: 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.

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-III:

SYNCHRONOUS MACHINES: 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 – experimental determination - phasor diagram – load characteristics.

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 X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT-IV:

PARALLEL OPERATION OF SYNCHRONOUS MACHINES: 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.

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-V:

SINGLE PHASE MACHINES: Single phase induction motor - Constructional Features-Double revolving field theory – split-phase motors – AC series motor- Universal Motor- -Shadedpole motor and Applications.

TEXT BOOKS:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

M241AEE404: DIGITAL ELECTRONICS

B.Tech. II Year II Sem.

L	T	P	C
2	0	0	2

Prerequisites: Analog Electronics

Course Objectives:

- To learn fundamental concepts of digital system design and common forms of number representations and their conversions.
- To understand the logical operations using combinational logic circuits .
- To implement and design logical operations using combinational logic circuits .
- To implement and design logical operations using sequential logic circuits.
- To understand the semiconductor memories and programmable logic devices.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the knowledge on Boolean algebra and logic gates.
- Understand the combinational circuits for various digital applications
- Design combinational circuits for various digital applications
- Analyze and design sequential circuits for digital applications
- Acquire the knowledge on Semiconductor Memories

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To learn fundamental concepts of digital system design and common forms of number representations and their conversions.	2	1	1	1	1	-	-	-	-	-	1
To understand the logical operations using combinational logic circuits .	2	1	2	2	1	-	-	-	-	-	1
To implement and design logical operations using combinational logic circuits .	2	1	3	2	1	-	-	-	-	-	1
To implement and design logical operations using sequential logic circuits.	2	3	3	2	1	-	-	-	-	-	1
To understand the semiconductor memories and programmable logic devices.	2	2	2	2	1	-	-	-	-	-	1

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Understand the knowledge on Boolean Algebra And Logic	2	2	3	3	1	-	-	-	-	-	1	2	-	2
Understand the combinational circuits for various digital applications	2	2	3	3	1	-	-	-	-	-	1	2	-	2
Design combinational circuits for various digital applications	2	2	1	2	3	-	-	-	-	-	1	2	-	2
Analyze and design sequential circuits for digital applications	3	2	2	2	2	-	-	-	-	-	1	2	-	2
Acquire the knowledge on Semiconductor Memories	3	2	3	2	2	-	-	-	-	-	1	2	-	2

UNIT-I:

Fundamentals of Digital Systems and Logic Families: Digital signals, Digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, Examples of IC gates, Number systems-binary, Signed binary, Octal hexadecimal number, Binary arithmetic, One's and Two's complements arithmetic.

UNIT-II:

Combinational Circuits-I: Standard representation for logic functions, K-map representation and simplification of logic functions using K- map, Minimization of logical functions, Don't care conditions, Multiplexer, De-Multiplexer

UNIT-III:

Combinational Circuits-II: Adders, Subtractors, Carry look ahead adder, Digital comparator, Parity checker/generator, Code converters, Priority encoders, Decoders/Drivers for display devices, Q-M method of function realization.

UNIT-IV:

Sequential Circuits: Introduction to flip-flops, SR, JK, T and D type's flip-flops, Shift registers, Conversion of flip-flops, Ring counter, Ripple (Asynchronous) counters, Synchronous counters.

UNIT-V:

Semiconductor Memories and Programmable Logic Devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read-only memory (ROM), ROM types, Read and write memory (RAM) types, Programmable logic array, Programmable array logic, Field Programmable Gate Array (FPGA).

TEXT BOOKS:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, "A Textbook of Digital Electronics", S.Chand, 2005
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

M241AEE405: POWER SYSTEM-II

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites: Power Systems -I & Electro Magnetic Fields

Course Objectives:

- To study the performance of transmission lines and travelling waves.
- To understand the concept of voltage control, compensation methods and per unit representation of power systems.
- To know the methods of overvoltage protection, Insulation coordination, Symmetrical components and fault calculation analysis.

Course Outcomes: After learning the contents of this paper the student must be able to

- Analyze the performance of transmission line
- Examine the Voltage Control, Power Factor Improvement and Compensation techniques
- Understand theapplication of per unitquantities and travelling waves.
- Design over voltage protection, insulation coordination
- Determine the fault currents for Symmetrical and unbalanced faults

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To study the performance of transmission lines and travelling waves	3	3	3	1	1	3	3	0	1	2	2
To understand the concept of voltage control, compensation methods and per unit representation of power systems.	3	3	2	1	1	3	2	0	1	2	2
To know the methods of overvoltage protection, Insulation coordination, Symmetrical components and fault calculation analysis.	3	3	2	1	1	3	3	1	1	1	2

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Analyze the performance of transmission line	3	3	3	2	2	-	-	-	-	2	2	3	2	2
Examine the Voltage Control, Power Factor Improvement and Compensation techniques	3	3	3	2	2	-	-	-	-	2	2	2	2	2
Understand the application of per unit quantities and travelling waves.	3	3	3	1	1	-	-	-	-	1	2	3	1	1
Design over voltage protection, insulation coordination	3	3	2	2	2	-	-	-	-	2	3	3	2	2
Determine the fault currents for Symmetrical and unbalanced faults	3	3	2	1	2	-	-	-	-	2	2	3	2	1

UNIT - I:

PERFORMANCE OF LINES: Representation of lines, short transmission lines, medium length lines, nominal T and PI- representations, long transmission lines. The equivalent circuit representation of a long Line, A, B, C, D constants, Ferranti Effect.

Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and

Communication lines.

UNIT-II:

VOLTAGE CONTROL & POWER FACTOR IMPROVEMENT: Introduction - methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers, power factor improvement methods.

COMPENSATION IN POWER SYSTEMS: Introduction - Concepts of Load compensation - Load ability characteristics of overhead lines - Uncompensated transmission line - Symmetrical line - Radial line with asynchronous load - Compensation of lines.

UNIT-III:

PER UNIT REPRESENTATION OF POWER SYSTEMS: The one-line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unit system.

TRAVELLING WAVES ON TRANSMISSION LINES: Production of travelling waves, open circuited line, short-circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.

UNIT-IV:

OVERVOLTAGE PROTECTION AND INSULATION COORDINATION: Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counter poise, surge absorbers, insulation coordination, volt-time curves.

UNIT-V:

SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS: Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

TEXT BOOKS:

1. C.L. Wadhwa, “Electrical Power Systems”, New Age International Pub. Co, Third Edition, 2001.
2. D.P. Kothari and I.J. Nagrath, “Modern Power System Analysis”, Tata Mc Graw Hill Pub. Co., New Delhi, Fourth edition, 2011.

REFERENCE BOOKS:

1. 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.
2. John J. Grainger & W.D. Stevenson, “Power System Analysis”, Mc Graw Hill International,1994.
3. Hadi Scadat, “Power System Analysis”, Tata Mc Graw Hill Pub. Co. 2002.
4. W.D. Stevenson, “Elements of Power system Analysis”, McGraw Hill International Student Edition.

M241AEE406: DIGITAL ELECTRONICS LAB0RATORY

B.Tech. II Year II Sem. **L T P C**
0 0 2 1

Prerequisites: Analog Electronics & Digital Electronics

Course Objectives:

- To learn basic techniques for the design of digital circuits and number conversion systems.
- To implement simple logical operations using combinational logic circuits.
- To understand combinational logic circuits,
- To implement and design sequential logic circuits.
- To understand the semiconductor memories and logic families.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the working of logic families and logic gates.
- Design and implement Combinational logic circuits.
- Design and implement Sequential logic circuits.
- Analyze and design sequential circuits for digital applications
- Analyze different types of semiconductor memories.

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To learn basic techniques for the design of digital circuits and number conversion systems.	3	2	3	1	1	-	-	-	-	3	1
To implement simple logical operations using combinational logic circuits.	3	3	3	2	2	-	-	-	-	3	1
To understand combinational logic circuits,	3	1	3	2	2	-	-	-	-	3	1
To implement and design sequential logic circuits.	2	2	1	2	2	-	-	-	-	3	1
To understand the semiconductor memories and logic families	3	1	1	1	2	-	-	-	-	3	1

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Understand the working of logic families and logic gates.	2	2	2	3	3	-	-	-	-	3	1	2	2	-
Design and implement Combinational logic circuits.	2	1	3	1	2	-	-	-	-	3	1	2	2	-
Design and implement Sequential logic circuits.	2	1	3	1	2	-	-	-	-	3	1	2	2	-
Analyze and design sequential circuits for digital applications	2	1	3	1	2	-	-	-	-	3	1	2	2	-
Analyze different types of semiconductor memories.	1	1	2	1	1	-	-	-	-	3	1	3	3	-

List of Experiments:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND/NOR gates
4. Design a 4 - bit Adder / Subtractor
5. Design and realization a 4 - bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4-bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
8. Design and realization Asynchronous and Synchronous counters using flip-flops
9. Design and realization 8x1 using 2x1 mux

10. Design and realization 2-bit comparator
11. Verification of truth tables and excitation tables
12. Realization of logic gates using DTL, TTL, ECL, etc.,

TEXT BOOKS:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, “A Textbook of Digital Electronics”, S.Chand, 2005
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

M241AEE407: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY

B.Tech. II Year II Sem. **L T P C**
0 0 2 1

Prerequisites: Measurements and Instrumentation

Course Objectives:

- To calibrate Watt, Energy and PF Meter and determination of three phase active & reactive powers.
- To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges.
- To determine the ratio and phase angle errors of Instrument transformers.

Course Outcomes: After learning the contents of this paper the student must be able to

- Choose and test measuring of energy meter and power factor meter.
- Perform Accurate Calibration and Testing of PMMC meters.
- Analyze the unknown Resistance, Inductance and Capacitance using AC and DC bridges.
- Examine the real and reactive power in a three phase circuit.
- Understand the dielectric oil test.

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To calibrate Watt, Energy and PF Meter and determination of three phase active & reactive powers.	3	3	3	3	3	2	1	2	2	1	3
To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges.	3	2	3	2	3	2	2	2	3	2	3
To determine the ratio and phase angle errors of Instrument transformers	3	2	3	1	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Choose and test measuring of energy meter and power factor meter	3	3	3	2	2	2	1	1	2	1	2	3	2	2
Perform Accurate Calibration and Testing of PMMC meters	3	3	2	2	2	1		2	2	2	3	3	2	1
Analyze the unknown Resistance, Inductance and Capacitance using AC and DC bridges.	3	2	2	1	2	2	1	2	2	3	2	3	2	2
Examine the real and reactive power in a three phase circuit	3	3	3	2	1	1		2	2	2	3	3	1	1
Understand the dielectric oil test.	3	2	2	2	2	2	1	1	1	3	2	2	1	1

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

1. Calibration and Testing of single-phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer - Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge - Measurement of resistance - Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 - Phase reactive power with single-phase wattmeter.

8. Measurement of displacement with the help of LVDT.

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

1. Calibration LPF wattmeter - by Phantom testing.
2. Measurement of 3-phase power with single watt meter and two CTs.
3. C.T. testing using mutual Inductor - Measurement of % ratio error and phase angle of given CT by Null method.
4. PT testing by comparison – V. G. as Null detector - Measurement of % ratio error and phase angle of the given PT
5. Resistance strain gauge - strain measurements and Calibration.
6. Transformer turns ratio measurement using AC bridges.
7. Measurement of % ratio error and phase angle of given CT by comparison.

TEXT BOOKS:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.

REFERENCE BOOKS:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd.,2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice - Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition,Wheeler Publishing, 2011.

M241AEE408: INDUCTION AND SYNCHRONOUS MACHINES LABORATORY

B.Tech. II Year II Sem. **L T P C**
0 0 2 1

Prerequisites: Electrical Machines-I & Electrical Machines-II

Course Objectives:

- To understand the operation of Induction, Synchronous machines and Transformers.
- To study the performance analysis of Induction and Synchronous Machines through various testing methods.
- To analyze the performance of single and 3-phase phase transformer with experiments.

Course Outcomes: After learning the contents of this paper the student must be able to

- Assess the testing of single phase transformers.
- Analyze the performance of induction motor.
- Evaluate the regulation of alternators.
- Understand and develop equivalent circuit for induction machine
- Examine the performance of synchronous motor

Course Objectives	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
To understand the operation of Induction, Synchronous machines and Transformers	3	3	3	1	1	3	2	3	2	1	3
To study the performance analysis of Induction and Synchronous Machines through various testing methods	3	3	3	1	1	3	2	3	1	2	3
To analyse the performance of single and 3-phase phase transformer with experiments	3	3	3	2	1	2	1	3	1	1	3

Course Outcomes	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
Assess the testing of single phase transformers	3	3	2	2	2	2	2	1	2	2	2	3	2	1
Analyze the performance of induction motor	3	2	2	1	3	1	1	-	2	1	3	3	2	2
Evaluate the regulation of alternators	3	3	2	2	2	2		1	2	2	3	3	2	1
Understand and develop equivalent circuit for induction machine	3	2	1	1	2	1	1	-	1		2	3	1	1
Examine the performance of synchronous motor	3	2	2	1	3	2	1	1	2	2	3	3	2	2

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

1. Sumpner's test on a pair of single-phase transformers
2. No-load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three -phase alternator by synchronous impedance & m.m.f. methods
4. 'V' and 'Inverted V' curves of a three–phase synchronous motor.
5. Equivalent Circuit of a single-phase induction motor
6. Determination of Xd and Xq of a salient pole synchronous machine

7. Load test on three phase Induction Motor
8. Regulation of three-phase alternator by Z.P.F. and A.S.A methods

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

1. Separation of core losses of a single-phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single-phase Transformers
4. Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
5. Measurement of sequence impedance of a three-phase alternator.
6. Vector grouping of Three Transformer
7. Scott Connection of transformer

TEXT BOOKS:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, “Electrical Machines”, Oxford, 2017.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.

M241AEE410: INDIAN CONSTITUTION

B.Tech. II Year II Sem

L	T	P	C
3	0	0	0

Course Objectives: Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
4. Discuss the passage of the Hindu Code Bill of 1956.

UNIT - 1 History of Making of the Indian Constitution- History of Drafting Committee.
UNIT - 2 Philosophy of the Indian Constitution- Preamble Salient Features
UNIT - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

SUGGESTED READING:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.