ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2022-23 onwards

Department of Electrical and Electronics Engineering



For

B.Tech. - Four Year Degree Programme

(MR22 Regulation)

Department of Electrical and Electronics Engineering

MALLA REDDY ENGINEERING COLLEGE

(Autonomous)

(An UGC Autonomous Institution, Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad). Accredited 3rd time by **NAAC with 'A++'** Grade, **NBA Tier –I** Accredited

Maisammaguda, Dhulapally (Post ViaKompally), Secunderabad - 500 100.

Website: www.mrec.ac.in E-mail: principal@mrec.ac.in

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)
MR21 – ACADEMIC REGULATIONS (CBCS)
for B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year ***2022-23*** onwards

The B.Tech. Degree of Jawaharlal Nehru Technological University Hyderabad, Hyderabad shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

VISION

To be a premier center of professional education and research, offering quality programs in a socio-economic and ethical ambience.

MISSION

- To impart knowledge of advanced technologies using state-of-the-art infrastructural facilities.
- To inculcate innovation and best practices in education, training and research.
- To meet changing socio-economic needs in an ethical ambience.

DEPARTMENT VISION

- To become a reputed centre for imparting quality education and research in the field of Electrical and Electronics Engineering with human values, ethics and social responsibility.

DEPARTMENT MISSION

- To impart quality education and research to undergraduate and postgraduate students in Electrical and Electronics Engineering.
- To produce professionally competent and ethically committed engineers to meet changing socio-economic needs.
- To impart knowledge of advanced technologies for continual improvement in teaching, learning and research.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	Graduates will utilize analytical skills, problem solving skills and design skills which are necessary for a successful career in the diverse fields of Electrical and Electronics Engineering.
PEO 2	Graduates will be receptive to new technologies and attain professional competence through lifelong learning such as post graduate programmes, research, publications and other professional activities.
PEO 3	Graduates will possess excellent communication, team work skills, leadership qualities, along with good professional and ethical attitude.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1	Apply fundamental knowledge to identify, formulate, design and investigate various problems of electrical and electronic circuits, power electronics, power systems and renewable energy systems for specific requirements.
PSO2	Demonstrate proficiency in use of modern software tools & hardware to engage in life-long learning and to successfully adapt in multi-disciplinary environments.
PSO3	Solve ethically and professionally various Electrical Engineering problems in societal and environmental context and communicate effectively.

PROGRAMME OUTCOMES (POs)

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B.Tech.

ELECTRICAL AND ELECTRONICS ENGINEERING

MR22 COURSE STRUCTURE and SYLLABUS

(Students Joined in AY 2022-23)

MALLA REDDY ENGINEERING COLLEGE

COURSE STRUCTURE – B.Tech. Electrical and Electronics EngineeringProgramme.
(MR22 Regulations - Effective from Academic Year 2022 – 22 onwards)

SEMESTER – I							
S. No	**Category**	**Course Code**	**Name of the Subject**	**Contact hours/week**			**Credits**
				L	**T**	**P**	
1.	HSMC	C0H01	English	3	-	-	3
2.	BSC	C0B03	Linear Algebra and Applied Calculus	3	1	-	4
3.	ESC	C0501	Programming for Problem Solving	3	-	-	3
4.	PCC	C0201	Basic Electrical and Electronics Engineering	3	-	-	3
5.	ESC	C0502	Programming for Problem Solving Lab	-	-	2	1
6.	HSMC	C0H02	English Language and Communication Skills Lab	-	-	2	1
7.	ESC	C0302	Engineering Workshop	-	-	2	1
8.	PCC	C0202	Basic Electrical and Electronics Engineering Lab	-	-	2	1
			Total	**12**	**1**	**8**	**17**
			Total Contact Hours	**21**			

SEMESTER – II							
S. No	**Category**	**Course Code**	**Name of the Subject**	**Contact hours/week**			**Credits**
				L	**T**	**P**	
1.	BSC	C0B17	Engineering Chemistry	3	1	-	4
2.	ESC	C0305	Engineering Graphics	2	-	2	3
3.	BSC	C0B10	Applied Physics	3	1	-	4
4.	BSC	C0B04	Advanced Calculus	3	1	-	4
5.	ESC	C0401	Analog Electronics	3	-	-	3
6.	ESC	C0553	Basic Python Programming Lab	-	1	2	2
7.	BSC	C0B11	Applied Physics Lab	-	-	2	1
8.	BSC	C0B18	Engineering Chemistry Lab	-	-	2	1
9.	ESC	C0402	Analog Electronics Lab	-	-	2	1
			Total	**14**	**4**	**10**	**23**
			Total Contact Hours	**28**			

MALLA REDDY ENGINEERING COLLEGE

COURSE STRUCTURE – B.Tech. Electrical and Electronics Engineering Programme.
(MR22 Regulations - Effective from Academic Year 2022 – 22 onwards)

SEMESTER – III							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	BSC	C0B08	Complex Variables and Numerical Methods	3	-	-	3
2	ESC	C0403	Digital Electronics	3	-	-	3
3	ESC	C0314	Solid Mechanics and Hydraulic Machines	3	-	-	3
4	PCC	C0203	Electrical Circuit Analysis and Synthesis	2	1	-	3
5	PCC	C0204	Electromagnetic Fields	3	-	-	3
6	ESC	C0561	Fundamentals of Data Structures Lab	-	1	2	2
7	ESC	C0407	Digital Electronics Lab	-	-	2	1
8	PCC	C0205	Electrical Circuits Lab	-	-	4	2
9	MC	C00M2	Environmental Science	2	-	-	-
Total				16	2	8	**20**
Total Contact Hours				**26**			

SEMESTER – IV							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	HSMC	C0H08	Business Economics and Financial Analysis	3	-	-	3
2	ESC	C0460	Signals and Systems	3	-	-	3
3	PCC	C0206	Power Generation and Distribution Systems	3	-	-	3
4	PCC	C0207	DC Machines and Transformers	2	1	-	3
5	PCC	C0208	Control Systems	2	1	-	3
6	ESC	C0461	Basic Simulation Lab	-	-	3	1.5
7	PCC	C0209	DC Machines and Transformers Lab	-	-	3	1.5
8	ESC	C0555	Object Oriented Programming Lab	-	-	2	1
9	MC	C00M1	Gender Sensitization	-	-	2	-
10	PROJ	C02P1	Real-time Research Project/ Field Based Project	-	-	2	1
Total				13	2	12	**20**
Total Contact Hours				**27**			

MALLA REDDY ENGINEERING COLLEGE
B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING
(MR22 Regulations - Effective from Academic Year 2022 – 22 onwards)

SEMESTER-V							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1.	PCC	C0210	Power Transmission Systems	2	1	-	3
2.	PCC	C0211	AC Machines	2	1	-	3
3.	PCC	C0212	Power Electronics	3	-	-	3
5.	PEC-I	C0221	High Voltage Engineering	3	-	-	3
		C0222	Graphical Programme and Applications				
		C0223	Advanced Control Systems				
		C0224	Digital Control Systems				
		C0225	Fundamentals of Nanoscience				
6.	OEC-I		Open Elective – I	3	-	-	3
7.	PCC	C0213	AC Machines Lab	-	-	3	1.5
8.	PCC	C0214	Control Systems Lab	-	-	3	1.5
9.	ESC	C0563	Fundamentals of Database Management Systems Lab	-	1	2	2
10.	MC	C00M3	Quantitative Aptitude and Verbal Reasoning - I	1	1	-	-
11.	MC	C00M6	Intellectual Property Rights	3	-	-	-
			Total	**17**	**4**	**8**	**20**
			Total Contact Hours	**29**			

SEMESTER-VI							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1.	PCC	C0215	Power System Analysis	3	-	-	3
2.	PCC	C0216	Electrical Measurements and Instrumentation	3	-	-	3
3.	ESC	C0410	Microprocessors and Microcontrollers	3	-	-	3
4	PEC-II	C0226	Electrical Drives	3	-	-	3
		C0227	Electrical Machine Design				
		C0228	Electrical Estimation & Costing				
		C0229	SMPS and UPS				
		C0230	Bio Medical Instrumentation				
5	OEC-II		Open Elective – II	3	-	-	3
6	HSMC	C0H03	English Communication and Presentation Skills Lab	-	-	2	1
7	PCC	C0217	Electrical Measurements and Instrumentation Lab	-	-	2	1
8	PCC	C0218	Power Electronics Lab	-	-	2	1
9	MC	C00M4	Quantitative Aptitude and Verbal Reasoning - II	1	1	-	-
10	MC	C00M5	Constitution of India	3	-	-	-
11	PROJ	C00P1	Industry oriented Mini project / Internship			4	2
			Total	**19**	**1**	**10**	**20**
			Total Contact Hours	**30**			

MALLA REDDY ENGINEERING COLLEGE
B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING
(MR22 Regulations - Effective from Academic Year 2022 – 22 onwards)

SEMESTER-VII							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1.	PCC	C0219	Switchgear and Protection	3	-	-	3
2.	PCC	C0220	Power System Operation and Control	3	-	-	3
3.	PEC-III	C0231	Non-Conventional Energy Sources	3	-	-	3
		C0232	Electrical Hybrid Vehicles				
		C0233	Electrical Distribution Systems				
		C0234	Modern Power Converters				
		C0235	Power Systems Transients				
4.	PEC-IV	C0236	Utilization of Electrical Energy	3	-	-	3
		C0237	HVDC and FACTS				
		C0238	Electrical Energy Conservation and Auditing				
		C0239	Power System Reliability				
		C0240	PLC and their Applications				
5.	OEC-III		Open Elective - III	3	-	-	3
6.	ESC	C0462	Microprocessors and Microcontrollers Lab	-	-	2	1
7.	PCC	C0241	Power Systems Lab	-	-	2	1
8.	PROJ	C00P2	Project Stage-I	-	-	6	3
			Total	**15**	**-**	10	**20**
			Total Contact Hours	**25**			

SEMESTER-VIII							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	HSMC	C0H09	Management Fundamentals	3	-	-	3
2	PEC-V	C0242	Electrical Power Quality	3	-	-	3
		C0243	Special Machines				
		C0244	Supervisory Control and Data Acquisition				
		C0245	Industrial Electrical System				
		C0246	Wearable Electronics				
3	PEC-VI	C0247	Wind and Solar Energy Systems	3	-	-	3
		C0248	Electrical Smart Grid				
		C0249	AI Applications in Electrical Engineering				
		C0250	Neural Network and Fuzzy Logic				
		C0251	Automotive Electrical and Electronics Systems				
4	PROJ	C00P3	Project Stage-II including Seminar	-	-	22	11
			Total	**6**	**0**	**26**	**20**
			Total Contact Hours	**32**			

SEMESTER – I

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I / II Semester		
Code: C0H01	ENGLISH (Common for CE, EEE, ME, ECE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI, IT and Mi.E)	L	T	P
Credits: 3		3	-	-

Course Objectives:

The objective of this course is to improve the English Language and Literary competence of the students. The course provides requisite insights into grammar, vocabulary, prose, and short stories. Further, it also helps in developing the skills of Reading and Writing. The course also equips students to study their academic subjects more effectively using the theoretical and practical components of the English language and literature.

MODULE – I

Speech : "Go Kiss the World" by Subroto Bagchi
Poem : "Leisure" by W. H. Davies
Vocabulary : Formation of Words, Roots, Prefixes, Suffixes
Grammar : Articles and Prepositions
Reading :Skimming and Scanning
Writing :Introduction to Writing Skills, Characteristics of Effective Writing

MODULE – II

Short story : "Gift of Magi" by O' Henry
Poem : "No Man is an Island" by John Donne
Vocabulary : One Word Substitutions; Synonyms and Antonyms
Grammar :Degrees of Comparison, Active and Passive Voice
Reading : Intensive Reading and Extensive Reading
Writing : Paragraph Writing- Cohesive devices; Jumbled Sentences; Punctuation

MODULE – III

Essay : "Lucidity, Simplicity, Euphony" by W. Somerset Maugham
Poem : "We wear the Mask" by Paul Laurence Dunbar
Grammar :Tense and Aspect
Vocabulary : Homonyms, Homophones, Homographs
Reading : Reading for Topic and Theme
Writing : Letter Writing

MODULE – IV

Short story : "The Night Train at Deoli" by Ruskin Bond
Poem : "Gift of India" by Sarojini Naidu
Grammar :Question Tags; Concord
Vocabulary : Idiomatic Expressions; Phrasal Verbs

Reading : Reading for Interpretation
Writing : Essay Writing, Describing, Defining and Classifying

MODULE – V
Essay : "Toasted English" by R. K. Narayan
Poem : "If" by Rudyard Kipling
Grammar : Direct and Indirect Speech, Misplaced Modifiers
Vocabulary : Redundancies and Clichés
Reading : Reading for Specific Purposes, Reading Comprehension practice
Writing : Paraphrasing & Summarizing,

Prescribed Textbook:

Reference Books:

1. Azar, Betty and Stacy A, Hagen**.** *Understanding and Using English Grammar*. 4th edition, Foundation Books, 2009.
2. Chaudhuri, Santanu S. *Learn English: A Fun Book of Functional Language***,** *Grammar and Vocabulary.* Tata McGraw Hill Education, New Delhi, 2013.
3. Eastwod, John. *Oxford Guide to English Grammar.* 4th edition,Oxford University Press, 1994.
4. Field, Marion**.** *Improve Your Written English*. 5th Edition. How to Books, UK, 2009.
5. Leech, Geoffrey and Svartvik, J. *A Communicative Grammar of English*. 3rd edition, Routledge, 2013.

Related Websites:

1. http://www.slideshare.net/aszardini/word-formationroot-words-prefixes-and-suffixes
2. http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd.
3. http://www.zsme.tarnow.pl/jezykiobce/wp-content/uploads/2013/11/writing-letters1.pdf.

Course Outcomes:

After completion of the course, students will be able to:

1. Use written and spoken English considerably well for academic purposes.
2. Communicate in Enrich accurately and fluently.
3. Employ extensive and intensive reading skills.
4. Gain confidence in writing for academic and real life situations.
5. Use standard grammar, punctuation, and spelling in technical documents.
6.

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	**ProgrammeOutcomes(POs)**														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	1	-	-	-	-	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-
CO3	-	1	-	1	-	-	-	-	-	2	-	2	-	-	-
CO4	-	-	-	-	1	1	-	-	1	2	-	2	-	-	-
CO5	-	-	-	-	1	-	-	-	1	2	-	2	-	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0B03	Linear Algebra and Applied Calculus (Common For ECE & EEE)	L	T	-
Credits: 4		3	1	-

Prerequisites: Matrices, Differentiation and Integration.

Course Objectives:

1. To learn types of matrices, Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if exist.
2. To learn concept of Eigen values and Eigen vectors of a matrix, diagonalization of a matrix, Cayley Hamilton theorem and reduce a quadratic form into a canonical form through a linear transformation.
3. To learn the concept of the mean value theorems, partial differentiation and maxima and minima.
4. To learn methods of solving differential equations and its applications to basic engineering problems.
5. To learn series solution of the given differential equations.

MODULE I:Matrix Algebra [12 PERIODS]

VECTOR SPACE, BASIS, LINEAR DEPENDENCE AND INDEPENDENCE (ONLY DEFINITIONS)

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew- Hermitian; orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; solving system of Homogeneous and Non-Homogeneous linear equations, LU – Decomposition Method.

MODULE II: Eigen Values and Eigen Vectors [12 Periods]

Eigenvalues , Eigen vectors 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: Nature, rank, index and signature of the Quadratic Form, Linear Transformation and Orthogonal Transformation, Reduction of Quadratic form to canonical forms by Orthogonal Transformation Method. Singular Value Decomposition

Module -III: Differential Calculus [12 Periods]

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

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

Module –IV: Ordinary Differential Equations [12 Periods]

First Order and First Degree ODE: Exact Differential Equations, Non Exact Differential Equations,Orthogonal trajectories, Newton's law of cooling, Law of natural growth and decay.

Second and Higher Order ODE with Constant Coefficients: Introduction-Rules for finding complementary function and particular integral. Solution of Homogenous, non-homogeneous

differential equations, Non-Homogeneous terms of the type e^{ax} , sin(ax), cos (ax), polynomials in x, e^{ax} V(x), x V(x), Method of variation of parameters.

Module – V: Series Solutions to the Differential Equations [12 Periods]

Motivation for series solution, Ordinary point and regular singular point of a differential equation, series solution to differential equation around zero, Frobenious Method about zero.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R K Jain Srk Iyengar ,Advanced engineering mathematics, Narosa publications.
3. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley publications.
4. Richard Bellman, Introduction to matrix Analysis, Siam, second Edition.

References Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,
   Reprint, 2008.
3. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, AffiliatedEast–West press, Reprint 2005.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

E – RESOURCES:

1. https://www.youtube.com/watch?v=sSjB7ccnM_I (Matrices – System of linear Equations)
2. https://www.youtube.com/watch?v=h5urBuE4Xhg (Eigen values and Eigen vectors)
3. https://www.youtube.com/watch?v=9y_HcckJ96o (Quadratic forms)
4. http://www.math.cmu.edu/~wn0g/noll/2ch6a.pdf(Differential Calculus)
5. https://www.intmath.com/differential-equations/1-solving-des.php(DifferentialEquations)

NPTEL:

1. https://www.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy_2iUCG87BLKl8eISe4fHKdE2_j2B_T&index=5 (Matrices – System of linear Equations)
2. https://www.youtube.com/watch?v=wrSJ5re0TAw (Eigen values and Eigen vectors)
3. https://www.youtube.com/watch?v=yuE86XeGhEA (Quadratic forms)

Course Outcomes:

1. The student will be able to find rank of a matrix and analyze solutions of system of linear equations.
2. The student will be able to find Eigen values and Eigen vectors of a matrix, diagonalization a matrix, verification of Cayley Hamilton theorem and reduce a quadratic form into a canonical form through a linear transformation.
3. The student will be able to verify mean value theorems and finding maxima and minima of function of two variables.

4. Formulate and solve the problems of first and higher order differential equations
5. The student will be able to solve series solution of given differential equation.

CO- PO Mapping

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	**3**	**2**	**2**	**3**	**3**	-	-	-	**2**	-	-	**3**
CO2	**3**	**2**	**2**	**3**	**2**	-	-	-	**2**	-	-	**3**
CO3	**3**	**2**	**2**	**3**	**2**	-	-	-	**2**	-	-	**2**
CO4	**3**	**2**	**2**	**3**	**3**	-	-	-	**2**	-	-	**2**
CO5	**3**	**2**	**2**	**3**	**3**	-	-	-	**2**	-	-	**2**

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0501	**Programming for Problem Solving** (Common for CE, EEE, ME, ECE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI, IT and Mi.E)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

1. Understand the basic terminology, write, compile and debug programs in computer programming
2. Implement different control statements for solving problems.
3. Understand the concept of structured program and arrays.
4. Implement the idea of strings and pointers.
5. Analyse the usage of structures and different file operations.

MODULE I: Fundamentals and Introduction to 'C' Language [10 Periods]

Introduction Fundamentals– Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to 'C' Language: – Background, C-tokens- Keywords, Identifiers, Basic data types, Variables, Constants, Preprocessor directives-include, define, Managing Input / Output functions - formatted input / output functions, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Simple C Programming examples.

MODULEII: Conditional Statements and Repetition Statements [09 Periods]
Conditional Statements: Simple if statement, if-else statement, if-elseif- ladder, nested if-else, Dangling else problem, switch statements.

Repetition statements – while, for, do-while statements, nested looping, other statements related to looping – break, continue, goto, Simple C Programming examples.

MODULE III: Designing Structured Programs and Arrays [10 Periods]
Designing Structured Programs-Introduction to function, Advantages, user defined functions, inter function communication-call by value, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion – recursive functions-Towers of Hanoi problem.

Arrays: Basic Concepts, Types of arrays, applications- Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods, arrays and functions.

MODULE IV: Strings and Pointers [09 Periods]

Strings: Concepts, String Input / Output functions, arrays of strings, string manipulation functions, string conversion, C program examples.

Pointers – Basic Concepts, Pointers for inter function communication-call by reference, pointers to pointers, Pointer arithmetic, array of pointers, pointers to array, applications, pointers to void, pointers to functions, Dynamic memory allocation functions.

MODULE V: Structures and File Handling [10 Periods]

Structures – Declaration, definition and initialization of structures, accessing structure elements, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, difference between structures and union, typedef, bit fields, enumerated types, C programming examples.

Files – Basic Concept of a file, file input / output operations, text files and binary files, file status functions (error handling), Random file access functions, command –line arguments.
C program examples.

TEXTBOOKS

1. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, PHI/Pearson Education

REFERENCES

1. C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
2. C for Engineers and Scientists, H. Cheng, Mc. Graw-Hill International Edition
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

E–RESOURCES

1. http://oxford university press.ac.in/eBooks/ Programming in C.
2. https://www.journals.elsevier.com/science-of-computer-programming
3. http://www.ejournalofsciences.org
4. http://onlinecourses.nptel.ac.in/iiitk_cs-101
5. http://onlinevideolecture.com/ebooks/?subject=C-Programming

Course Outcomes:

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

1. Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language).

2. Apply different types of control structures to code and test a given logic in C programming language.
3. Decompose a problem into functions and to develop modular reusable code and Use arrays to formulate algorithms and programs for Searching and sorting problems.
4. Develop programs that make use of concepts such as strings, pointers.
5. Analyze structures, file operations and command line arguments.

CO- PO Mapping

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	3	2	2
CO2	3	2	1	-	-	-	-	-	-	-	-	1	3	2	1
CO3	3	3	1	-	-	-	-	-	-	-	-	1	3	2	1
CO4	3	1	-	-	-	-	-	-	-	-	-	2	3	2	1
CO5	3	3	1	-	-	-	-	-	-	-	-	2	3	2	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0201	ELECTRICAL AND ELECTRONICS ENGINEERING (Common for all branches)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

MODULE I: DC Circuits **9 Periods**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws - Series, parallel, series-parallel, star-to-delta and delta-to-star transformation-analysis of simple circuits with dc excitation. Superposition, Thevenin's and Maximum Power Transfer Theorems with DC excitation.

MODULE II: AC Circuits **9 Periods**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

MODULE III: Introduction to Electrical Machines **10 Periods**

A: DC Machines : Construction & Principle of Operation of DC Generators – E.M.F Equation. Principle of operation DC Motors – Back E.M.F. - Torque equation – Brake Test - Characteristics.

B: AC Machines: Construction and Principle of operation of Transformer- EMF Equation. Construction and Principle of Operation of 3 Phase Induction Motors -Brake test on 3-Phase Induction Motor – Applications.

MODULE IV: P-N Junction Diode **10 Periods**

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator.

Rectifiers : P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier.

Filters : Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

MODULE V: Bipolar Junction Transistor (BJT): **10 Periods**

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CC configurations

Junction Field Effect Transistor and MOSFET: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.

Text Books

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, **" Basic Electrical and Electronics Engineering"**, S.Chand and Company Limited, New Delhi, 1st Edition, 2017.
2. R.L.Boylestad and Louis Nashlesky, **"Electronic Devices & Circuit Theory"**, Pearson Education, 2007.

References

1. V.K. Mehtha and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S.Chand & Co., 2009.
2. Jacob Milliman, Christos C .Halkias, Satyabrata Jit (2011), "Electronic Devices and Circuits", 3 rd edition, Tata McGraw Hill, New Delhi.
3. Thomas L. Floyd and R. P. Jain, "Digital Fundamentals", Pearson Education, 2009.
4. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 2008.
5. Nagrath I.J. and D. P. Kothari, "Basic Electrical Engineering", Tata McGraw Hill, 2001.
6. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Education, New Delhi, 2nd Edition, 2005.

E - Resources

1. https://www.electrical4u.com/ohms-law-equation-formula-and-limitation-of-ohms-law/
2. https://www.eeweb.com/passives
3. http://nptel.ac.in/courses/108108076/
4. http://nptel.ac.in/downloads/108105053/

Course Outcomes:

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

1. Apply KCL, KVL and network theorems to analyse DC circuit.
2. Analyze the single-phase AC Circuits, the representation of alternating quantities and determining the power and power factor in these circuits.
3. Comprehend the construction and Operation of DC and AC machines.
4. Understand the operation of PN Junction diode and its application in rectifier circuits.
5. Compare the different configurations of BJT and draw the V-I characteristics of BJT, JFET and MOSFET.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	**Programme Outcomes (POs)**														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0502	Programming for Problem Solving Lab (Common for CE, EEE, ME, ECE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI, IT and Mi.E)	L	T	P
Credits: 1		-	-	2

Prerequisites: NIL

Course Objectives:

1. Understand the various steps in Program development
2. Identify syntax and semantics of C Programming Language
3. Illustrate the usage of structured programming approach in solving problems.
4. Develop programs that make use of arrays, strings and pointers in C language
5. Analyse structures and different file operations

Software Requirements:C

List of Programs:

1. a. Practice various Internal and External DOS Commands.
   b. Write sample examples of C programs to implement basic operations.
2. a. Write a C program to find smallest and largest of given three numbers.
   b. Write a C program to find the roots of a quadratic equation.
   c. Write a C program to check whether given character is alphabet, digit or special symbol
3. a. Write a C program to find the sum of individual digits of a positive integer.
   b. Write a C program to generate the first 'n' terms of the sequence.
   [A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.]
4. a. Write a C program to find whether the given number is palindrome, perfect, Armstrong or strong.
   b. Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.
5. Write C programs that use both recursive and non-recursive functions
   a. To find the factorial of a given integer.
   b. To find the GCD (greatest common divisor) of two given integers.
6. a. Write a C program to find both the largest and smallest number in a list of integers.
   b. Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search.
   c. Write a C program that uses recursive and non -function to search for a Key value in a given sorted list of integers using Binary search.
7. a. Write a C program that implements the Bubble sort method to sort a given array of integers in ascending order.
   b. Write a C program that implements the Selection sort method to sort a given list of names in ascending order.

8. Write a C program to perform the following:
   a. Addition of Two Matrices
   b. Multiplication of Two Matrices.
9. Write a C program that uses functions to perform the following operations:
   a. To insert a sub-string into given main string from a given position.
   b. To delete n characters from a given position in a given string.
   c. To find substring in a given string
10. a. Write a C program to determine if the given string is a palindrome or not
    b. Write a C program to count the lines, words and characters in a given text.

11. a. Write a C program to swap two numbers, which implement call by value and call by reference.
    b. Write a C program to display the below student details using structures

Roll Number	Name	Gender	Branch	Attendance percentage
501	John	Male	CSE	77.3
502	Alice	Male	ECE	80.5
503	Sam	Female	IT	90.7

    c. Write a C program to find grade of a student using structures.

12. a. Write a C program which copies one file to another
    b. Write a C program to find sum of two numbers using command line arguments

13. a. Develop a mini project which implement the Library Management System
    b. Develop a mini project which implement the Student Record System

TEXT BOOKS:

a. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press
b. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
c. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:

a. C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
b. C for Engineers and Scientists, H. Cheng, Mc. Graw-Hill International Edition
c. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

Course Outcomes:

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

1. Make use various programming constructs and to develop C programs

2. Implement different Operations on arrays, strings, functions, pointers in C programming language.
3. Analyze structures, unions and file in C language to develop Programs.

CO- PO Mapping

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	3	2	
CO2	3	2	1	-	-	-	-	-	-	-	-	1	3	3	1
CO3	2	3	1	-	-	-	-	-	-	-	-	1	3	2	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I / II Semester		
Code: C0H02	English Language and Communication Skills Lab (Common for CE, EEE, ME, ECE, CSE, CSE (C S), CSE (AI and ML), CSE (DS), CSE (IOT), AI, IT and Mi.E)	L	T	P
Credits: 1		-	-	2

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Course Objectives:

The course aims to develop students' intelligibility in their pronunciation of English - speech Sounds, word accent, intonation and rhythm. It also helps to improve the fluency in spoken English and make them aware of nuances of major skills, namely, listening and speaking skills. It also trains students to understand nuances of both verbal and non-verbal communication during all activities. The course enables the learners to develop their confidence levels so as to Participate in discussions, debates and public speaking. Listening Skills:

Objectives:

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives:

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Just A Minute (JAM) Sessions.

Syllabus: English Language and Communication Skills Lab has two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab

Module - I:

CALL Lab : Introduction to Phonetics – Speech Sounds – Vowels and Consonants

ICS Lab : Ice-Breaking activity and JAM session; Listening: listening for sounds in context, for ideas;Speaking: ideation and translation of ideas into sentences.

Module - II:

CALL Lab : Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

ICS Lab : Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette; Listening: listening for specific purposes, for details; Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

Module - III:

CALL Lab : Word accent and Listening Comprehension-reading aloud meaningfully.

ICS Lab : Descriptions- Narrations- Giving Directions and guidelines; Listening: listening for intelligible English; Speaking: formal and informal conversations, register.

Module - IV:

CALL Lab : Intonation and Common errors in Pronunciation- reading aloud (evaluating through recording).

ICS Lab : Extempore- Public Speaking, Oral Presentation Skills; Listening: note taking and listening for speaker's tone/attitude; Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

Module - V:

CALL Lab : Reduction of Mother Tongue Interference and Conversation Practice

ICS Lab : Information Transfer, Debate

Minimum requirement of infrastructural facilities for EL Lab:
1. Computer Assisted Language Learning (CALL) Lab:
The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):
Computer network with Lan with minimum 60 multimedia systems with the following specifications:
a) P – IV Processor b) Speed – 2.8 GHZ c) RAM – 512 MB Minimum
d) Hard Disk – 80 GB e) Headphones of High quality
2. Interactive Communication Skills (ICS) Lab: The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.
Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the textbook which are loaded on the systems):

Prescribed Lab Manual:
Rani, Sudha. *English Language Communication Skills Laboratory*. 5th edition, Pearson Publication, 2014.

Reference Books:

1. Roach, Peter. English Phonetics and Phonology. 4th edition, Cambridge University Press, 2009.
2. Hughes, John and Mallett, Andrew. *Successful Presentations DVD and Student's Book Pack*. Oxford University Press, 2013.
3. Hancock, Mark. *English Pronunciation in Use* (Intermediate). 2nd edition, Cambridge University Press, 2009.
4. Karia, Akash. *Public Speaking Mastery: Speak Like a Winner*. Kindle edition, 2013.
5. Lucas, Stephen. *The Art of Public Speaking*. 11th edition,Tata McGraw Hill, 2011.

Websites:

1. http://www.mindtools.com/CommSkll/ActiveListening.htm
2. http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
3. http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf

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

1. Understand the nuances of language through audio- visual experience and group activities.
2. Hone the accent for intelligibility
3. Realize the importance of listening skills and speaking skills and their application in real life situations.
4. Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.
5. Speak with clarity and confidence; thereby enhance employability skills of the students.

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	-	1	-	1	2	2	-	1	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
CO3	-	-	-	-	-	-	1	-	1	2	-	2	-	-	-
CO4	-	-	-	-	-	-	-	1	1	2	-	2	-	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0302	ENGINEERING WORKSHOP (Common for CE, EEE, ME,ECE and Min.E)	L	T	P
Credits: 1		-	-	2

COURSE OBJECTIVES:

To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.

I. TRADES FOREXERCISES:

At least two exercises from each trade:

1.Carpentry 2.Fitting 3. Tin-Smithy
4.House-wiring 5.Foundry 6.Arcwelding

II. TRADES FOR DEMONSTRATION &EXPOSURE

1. Machineshop
2. Plumbing
3. Wood workinglathe
4. Identification of ElectronicComponents
5. Black smithy
6. ComputerPeripherals

COURSE OUTCOMES

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

1. Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish workassignments.
2. Assembling together of part and removing metals to secure the necessary joint by using fitting andwelding.
3. Understand the hardware components of housewiring.
4. Understand the manufacturing process using machineshop.
5. Analyze the different types of computer Peripherals

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	1	-	3	-	-	3	-	2	-
CO2	3	-	-	-	2	2	1	-	3	-	-	3	-	2	-
CO3	3	-	-	-	2	2	1	-	3	-	-	3	-	2	-
CO4	3	-	-	-	2	2	1	-	3	-	-	3	-	2	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0202	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB (Common for all branches)	L	T	P
Credits: 1		-	-	2

Course Objectives:

To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyze the performance of DC Motors, AC Motors and Transformers.

List of Experiments:

1. Verification of Kirchhoff's Laws.
2. Verification of Maximum Power Transfer Theorem.
3. Determination of Phase Angle for RC series circuit.
4. Brake Test on DC-Shunt Motor. Determination of Performance curves
5. Load Tests on Single Phase Transformer
6. Brake Test on Three Phase Induction Motors. Determination of Performance curves
7. V-I Characteristics of PN junction Diode
8. V-I Characteristics of Zener Diode
9. Half Wave Rectifier and Full Wave rectifier.
10. Input and Output characteristics of BJT with CE configuration
11. Input and Output characteristics of BJT with CB configuration
12. Input and Output Characteristics of JFET.

Course Outcomes:

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

1. Experimentally verify the basic circuit theorems, KCL and KVL
2. Measure power, power factor and phase angle in RC circuits experimentally.
3. Acquire hands on experience of conducting various tests on dc shunt motor, single phase transformers and three phase induction motors and obtaining their performance indices using standard analytical as well as graphical methods
4. Draw the characteristics of different semiconductor devices like PN junction Diode, Zener Diode, BJT and JFET by conducting suitable experiments.
5. Experimentally verify the working of half and full wave rectifier by using PN Junction diodes.

CO- PO Mapping

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	2	-	1	1	2	1	1	1	3	1	1
CO2	3	-	2	-	2	-	2	1	2	1	1	1	3	1	1
CO3	3	2	2	2	2	-	2	1	2	1	1	1	3	1	1
CO4	3	1	2	-	2	-	1	1	2	1	1	1	3	1	1
CO5	3	1	2	-	2	-	2	1	2	1	1	1	3	1	1

SEMESTER – II

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech II Semester		
Code: C0B17	Engineering Chemistry (Common for ALL)	L	T	P
Credits: 4		3	1	-

Course objectives:

The purpose of this course is to emphasize the relevance of fundamentals of chemical sciences in the field of engineering and to provide basic knowledge on atomic- molecular orbital's, electrochemistry, batteries, corrosion and the role of water as an engineering material in domestic-industrial use. They will also impart the knowledge of stereochemistry, understanding the chemical reaction pathway mechanisms and synthesis of drugs. Listing out various types of fuels and understanding the concept of calorific value and combustion.

Module I: Water and its treatment **[10 Periods]**

Introduction to water, hardness of water, causes of hardness, expression of hardness, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale &Sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment - Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization.Desalination by Reverse osmosis and its significance.

Module II: Molecular structure and Theories of Bonding: **[10 Periods]**

Introduction to Molecular orbital Theory. Linear Combination of Atomic Orbital's (LCAO), significance of bonding and anti-bonding molecular orbital, Conditions for the formation of molecular orbital's. Molecular orbital energy level diagrams of diatomic molecules -, N_2,$O_2$and F_2. Introduction to coordination compounds-ligand-coordination number (CN) - spectrochemical series. Salient features of crystal field theory, Crystal field splitting of transition metal complexes in octahedral ($[CoF_6]^{3-}$ and $[Co(CN)_6]^{3-}$) and tetrahedral ($[NiCl_4]^{2-}$ and $[Ni(CO)_4]$) fields - magnetic properties of complexes. Band structure of solids and effect of doping on conductance.

Module III: Electrochemistry and Corrosion **[17 Periods]**

A. Electrochemistry:

Introduction to Electrochemistry-Conductance(Specific and Equivalent) and units. Types of cells-electrolytic & electrochemical cells (Galvanic Cells)-Electrode potential-cell potential (EMF).Electrochemical series and its applications, Nernst equation its applications and numerical problems. Reference electrodes - Calomel Electrode and Glass electrode-determination of pH using glass electrode. Batteries: Primary (dry cells) and secondary (Lead-Acid cell, Ni-Cd cell) - applications of batteries. Fuel cells: Hydrogen - Oxygen fuel cell and its applications.

B. Corrosion: **[7 Periods]**

Causes and effects of corrosion: Theories of corrosion - Chemical & Electrochemical corrosion, Pilling-Bedworth rule,Types of corrosion: Galvanic and Water-line corrosion. Factors affecting rate of corrosion-Nature of metal and Nature of Environment, Corrosion control methods - Cathodic protection (Sacrificial anodic and impressed current cathodic methods). Surface coatings: Methods of metallic coatings - hot dipping (Galvanization),Electroplating (Copper) andElectroless plating (Nickel).

Module IV: Stereochemistry, Reaction mechanism& synthesis of drug molecules and NMR spectroscopy: **[12 Periods]**

Introduction to Isomers - classification of isomers - structural (chain, positional & functional) and stereoisomerism-geometrical (cis-trans & E-Z system) - characteristics of geometrical isomerism, optical isomerism (chirality - optical activity, specific rotation, enantiomers and diastereomers) of tartaric acid and lactic acid. Conformational isomerism ofn-Butane. Introduction to bond cleavage (homo & hetero cleavage) - reaction intermediates and their stability. Types of organic reactions - Mechanism of substitution (SN^1& SN^2) and (E_1&E_2) reactions with suitable example. Ring opening (Beckmann rearrangement), oxidation and reduction (Cannizaro reaction), cyclization (Components of Diels-Alder reaction-Mechanism of Diels-Alder reaction with suitable example) reactions. Synthesis of Paracetamol, Aspirin and their applications.

Introduction to Spectroscopy, Basic concepts of nuclear magnetic resonance spectroscopy, chemical shift and spin-spin splitting.

UNIT-V Fuels and Combustion **[8 Periods]**

Fuels: 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.

Combustion: Definition, Calorific value of fuel – HCV, LCV; Calculation of air quantity required for combustion of a fuel. Determination of calorific value by Junkers gas calorimeter-Numerical problems on combustion.

Text Books:

1. P.C.Jain and Monica Jain, "**A Text Book of Engineering Chemistry"**, DhanpatRai Publications, New Delhi, 16th Edition 2014.
2. S.S. Dara and S.S. Umare, "**A Text Book of Engineering Chemistry"**, S Chand Publications, New Delhi, 12th Edition 2010.
3. A.Jaya Shree, "Text book of Engineering Chemistry", Wiley, New Delhi, 2018.

Reference Books:

1. B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath,**"Text Book of Engineering chemistry"**,Cengage Learning India Pvt.Ltd,2016.
2. M.G. Fontana and N. D. Greene, "**Corrosion Engineering"**, McGraw Hill Publications,

New York, 3rd Edition, 1996.
3. K. P. C. Volhardt and N. E. Schore, **"Organic Chemistry: Structure and Function"**, 5thEdition, 2006.

Course Outcomes with BLOOM's

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

Course Outcome

CO1 Understand water treatment, specifically hardness of water and purification of water by various methods.

CO2 Analyze microscopic chemistry in terms of atomic and molecular orbital's splitting and band theory related to conductivity

CO3 Apply knowledge of electrochemical cell concept with respect to fuel cells, batteries, theories of corrosion. Applications of corrosion control methods.

CO4 Acquire basic knowledge on the concepts of stereochemistry, chemical reaction mechanisms that are used in the synthesis of drug molecules, interpretation of NMR in organic molecules and their uses in medical field.

CO5 Acquire the knowledge of various fuels and identify a better fuel source of less pollution.

CO- PO Mapping

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	2	1	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	1	-	2	-	-	-	-	-	-	-	-
CO4	3	1	1	1	2	1	3	-	-	-	-	-	-	-	-
CO5	3	3	3	1	-	-	3	-	-	-	-	-	-	-	-

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. I /II Semester		
Code:C0305	ENGINEERINGDRAWINNG (CommonforAll)	L	T	P
Credits:3		2	-	2

PREREQUISITES: NIL

Course Objectives:

To develop in students, graphic skills for communication of concepts and ideas of engineering products.

MODULEI:

Introduction to Engineering Drawing, Principles of Engineering Graphics and their significance, Lettering.

Geometrical Constructions: Regular polygons only. Conic Sections: Ellipse, Parabola, Hyperbola– General method only Cycloidal Curves and Involute, tangents & normal for the curves.

Scales: Plane Scale, Diagonal scale, Vernier Scale.

MODULEII:

Orthographic Projections: Principles of Orthographic Projections – Conventions – First and Third Angle projections.

Projection of Points: Projection of points including all four quadrants.

Projection of Lines: Projection of Lines - parallel, perpendicular, inclined to reference planes and Traces.

MODULEIII:

Projection of Planes: Axis inclined to both the reference plane.

Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone by rotating object method. Axis inclined to both the reference plane.

MODULEIV:

Section of Solids: Sectioning of single solid with the cutting plane inclined to one plane and perpendicular to the other-true shape of section.

Development of Surfaces: Development of lateral surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

MODULEV:

Isometric Projections: Principles of Isometric Projection – Isometric Scale, Isometric Views– Conventions –Plane Figures, Simple Solids.

Transformation of Projections: Conversion of Isometric Views to Orthographic Views and vice versa–simple objects.

TEXTBOOKS

1. K.L.Narayana, S. Bheemanjaneyulu “Engineering Drawing with Auto CAD-2016” New Age InternationalPublishers,1st Edition, 2018.
2. N.D. Bhat, “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2014.

REFERENCES

1. K.L.Narayana,P.Kannaiah,“EngineeringDrawing”,SciTechPublishers.2ndEdition,2017
2. K.Venugopal,“EngineeringDrawing”,NewAgeInternationalPublishers,3rdEdition,2014.
3. K.V.Natarajan, “AtextbookofEngineeringGraphics”,DhanalakshmiPublishers,2015.
4. M.S. Kumar, “Engineering Graphics”, D.D. Publications, 2011.
5. Trymbaka Murthy, “Computer Aided Engineering Drawing", I.K. international Publishing House, 3rdEdition, 2011.

E-RESOURCES

1. http://nptel.ac.in/courses/112103019/
2. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
3. https://www.wiziq.com/tutorials/engineering-drawing
4. http://freevideolectures.com/Course/3420/Engineering-Drawing
5. http://www.worldcat.org/title/journal-of-engineering-graphics/oclc/1781711
6. http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics nit jalandhar (EG MECI102)

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B10	Applied Physics (Common for ECE and EEE)	L	T	P
Credits: 4		3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:

1. To outline the dual nature of matter
2. To elaborate the significance of the Kronig-Penney model in classifying the materials
3. To illustrate the working of p-n junction diode, photodiode, LED and solar cell
4. To interpret the Maxwell equations.
5. To compare the working of Ruby laser, He-Ne laser and semiconductor laser, besides illustrating the working principle of optical fibre and elaborate its applications.

Module – I: Quantum mechanics [8 Periods]

Introduction, Plank's theory of black body radiation, deduction of Wien's displacement law and Ralygien's law; Louis de Broglie's concept of matter waves; Davisson and Germer experiment; G P Thomson Experiment; Heisenberg's uncertainty principle – and its application (electron cannot exist inside the nucleus); Schrodinger's time-independent wave equation; Physical significance and properties of wave function; Particle in a one-dimensional infinite potential well.

Module – II: Band theory of solids [8 Periods]

Introduction, Postulates and drawbacks' of Classical and Quantum free electron theory, Fermi Dirac distribution function; Density of energy states; Bloch theorem; Qualitative treatment of Kronig - Penney model; E Vs k relationship; Origin of energy band gap; Classification of materials into Conductors, Semiconductors and insulators; Concept of Effective mass.

Module –III: Semiconductor Physics [13 Periods]

A: Introduction, Intrinsic and Extrinsic Semiconductors; Expression for carrier concentration in intrinsic and extrinsic semiconductors; Variation of Fermi energy level in Intrinsic and extrinsic semiconductors with respect to temperature and doping concentration.

B: Direct and indirect bandgap semiconductors; Carrier generation and Recombination; Drift and Diffusion mechanisms; Equation of Continuity; P-N Junction diode, Energydiagram, V-I Characteristics; Construction and Working of Photodiode, LED & Solar cell and their applications.

Module – IV: Electromagnetic Theory [10 Periods]

Gradient of Scalar field; Divergence and Curl of Vector field and their Physical Significance; Gauss's Law of electrostatics and Gauss law of magnetostatics; Ampere's law and its modification; Faraday's law of electromagnetic induction; Induced E.M.F in a conductor; Lenz's Law; Maxwell equations in differential form; wave equation for free space

Module – V : LASER [12 Periods] Introduction, Characteristics of LASER; Aborption, Spontaneous and Stimulated emission; Einstein's coefficients derivation; Population inversion; Pumping mechanisms; Basic components of a LASER system; Types of Laser systems; Ruby LASER, He-Ne LASER,

Semiconductor diode LASER (Homo junction and hetero junction); Applications of LASER - Computers, Medical, Military.

Optical Fibers: Introduction to Optical fibers; Total Internal Reflection; Acceptance angle and acceptance cone, Numerical aperture; types of optical fibers; Losses in optical fibers - absorption losses, scattering losses and bending losses; Applications of optical fibers - Communications, Level Sensor, LASER angioplasty.

Course Outcomes:

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

1. Explain the dual nature of the matter and evaluate the energy of a particle trapped in 1D infinite potential well.
2. Classify the materials into conductors, semiconductors and insulators based on the outcomes of Kronig - Penney model.
3. Analyze the working of semiconductor devices like PN junction diode, Photodiode, LED and Solar cell.
4. Deduce Maxwell equations in differential form.
5. Compare and contrast Ruby, He-Ne, Semiconductor Lasers and discover the working principle of optical fibers besides and elucidating their applications.

Text Books:

1. K Vijaya Kumar, S Chandralingam, "Modern Engineering Physics'' Volume I & II, S. Chand, 1st Edition, 2017.
2. Jasprit Singh, "Semiconductor Optoelectronics: Physics and Technology", McGraw-Hill, 1995.
3. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India Revised Edition, 2014.

Reference Books:

1. P K Palanisamy, **"Engineering Physics"**, SciTech Publication, 4th Edition, 2014.
2. R K Gaur and SL Gupta, "**Engineering Physics**" Dhanpat Rai Publications, Eighth Revised Edition, 2006.
3. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
4. P. Bhattacharya, "**Semiconductor Optoelectronic Devices**", Prentice hall of India,1997.
5. S J Adams, "Electromagnetic Theory", Adams Press, 2013.

e-RESOURCES

1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.livescience.com/33816-quantum-mechanics-explanation.html
3. https://nptel.ac.in/courses/115/102/115102025/

Journals :

1. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094
2. http://www.springer.com/physics/journal/340

NPTEL VIDEOS:

1. http://nptel.ac.in/courses/113104012/
2. https://www.youtube.com/watch?v=9seDKvbaoHU&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0&index=29
3. https://nptel.ac.in/courses/108/108/108108122/
4. https://nptel.ac.in/courses/115/101/115101005/

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code:C0B04	Advanced Calculus (Common for EEE & ECE)	L	T	P
Credits:4		3	1	-

Pre-requisites: Differentiation and integration,

Course Objectives: To Learn

1. The Methods of solving Partial differential equations.
2. The Beta and Gamma functions.
3. The Evaluation of multiple integrals and their applications in the allied fields.
4. The physical quantities involved in engineering problems related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

MODULE -I: Partial Differential Equations [12 Periods]

Formation of partial differential equations by eliminating arbitrary constants or arbitrary function, solutions of first order linear(Lagrange) equations, solutions of non linear first order equations (four standard types). Equations reducible to linear, Charpits Method.

MODULE – II: Beta and Gamma Functions [12 Periods]

Introduction to Improper Integrals, Definition of Beta and Gamma function, properties and other forms. Relation between Beta and Gamma function, Evaluation of Improper Integrals.

MODULE - III: Multiple Integrals [12 Periods]

(A) Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form),.

(B) Evaluation of Triple Integrals. Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Finding areas using double integrals and Volumes using double and triple integrals.

MODULE - IV: Vector Differentiation [12 Periods]

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Scalar potential functions. Solenoidal and Irrotational vectors. Vector Identities.

MODULE – V: Vector Integration [12 periods]

Line, Surface and Volume Integrals. Green Theorem, Gauss Divergence Theorem and Stokes Theorem (without proofs) and their applications.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R K Jain Srk Iyengar ,Advanced engineering mathematics, Narosa publications.
3. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley publications.

Reference Books:

1. Kanti B.Datta, **Mathematical Methods of Science and Engineering**, Cengage Learning
2. Alan Jeffrey, **Mathematics for Engineers and Scientists**, 6th Ed, 2013, Chapman & Hall.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Ed, Pearson, Reprint, 2002.
4. S. L. Ross, **Differential Equations**, 3rd Ed., Wiley India, 1984.
5. ***Amarnath*** T, **An Elementary Course in** *Partial Differential Equations*, Narosa Publishing House 2nd Ed, 2012.

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

1. Identify whether the given partial differential equation can be solvable with the methods or not.
2. Solve the problems which are not solvable with the usual methods and solve using Beta and Gamma functions.
3. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped.
4. Finds the directional derivatives, angle between vectors understands the physical interpretation of vector, solenoidal and irrotational vectors.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

E-Resources:

a. **Concerned Website links**

1. https://mat.iitm.ac.in/home/sryedida/public_html/caimna/pde/first/partial.html
2. https://homepage.tudelft.nl/11r49/documents/wi4006/gammabeta.pdf
3. https://math.libretexts.org/Bookshelves/Calculus/Book%3A_Calculus_(OpenStax)/15%3A_Multiple_Integration/15.2%3A_Double_Integrals_over_General_Regions
4. https://math.libretexts.org/Bookshelves/Calculus/Book%3A_Calculus_(Apex)/12%3A_Functions_of_Several_Variables/12.06%3A_Directional_Derivatives
5. https://learn.lboro.ac.uk/archive/olmp/olmp_resources/pages/workbooks_1_50_jan2008/Workbook29/29_3_int_vec_thms.pdf

b. **NPTEL :**

1. https://www.digimat.in/nptel/courses/video/111105093/L01.html (PDE)
2. https://www.youtube.com/watch?v=JoyvDWZ0aMY (Beta & Gamma Functions)
3. https://www.youtube.com/watch?v=mIeeVrv447s (Multiple Integrals)
4. https://www.youtube.com/watch?v=M_Irtxhbq3E (Vector Differentiation)
5. https://www.youtube.com/watch?v=EtA0CK8SwkI (Vector Integral Theorems)

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	3	3	-	-	-	2	-	-	3
CO2	3	2	2	3	2	-	-	-	2	-	-	3
CO3	3	2	2	3	2	-	-	-	2	-	-	2
CO4	3	2	2	3	3	-	-	-	2	-	-	2
CO5	3	2	2	3	3	-	-	-	2	-	-	2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0401	ANALOG ELECTRONICS (Common for EEE & ECE)	L	T	P
Credits: 3		3	-	-

Pre-Requisites: Applied Physics, Basic Electrical and Electronic Engineering.

Course Objectives: This course provides the knowledge of Transistor and FET Biasing Techniques, Amplifiers particularly Single Stage Amplifiers and also provides knowledge of study about different amplifiers and understand small signal analysis of different transistor configurations and study about feedback and oscillators.

MODULE I: BJT Biasing & FET Biasing [10 Periods]

BJT Biasing: Need for biasing, operating point, load line analysis, bias stabilization techniques: fixed bias, collector to base bias, self - bias, Stabilization against variations in I_{CO}, V_{BE} and β for the self -bias circuit, bias compensation techniques, thermal runaway and thermal stability.

FET Biasing: Biasing techniques: Fixed bias, Source self - bias, Voltage divider bias.

MODULE II: BJT Small Signal Analysis [10 Periods]

Small signal low frequency transistor Amplifier circuits: h-Parameter representation of a Transistor, Analysis of single stage transistor Amplifier (CE, CB, & CC) using h-parameters: voltage gain, current gain, input impedance and output impedance. Comparison of transistor configurations in terms of Ai,Ri, Av, Ro. Analysis of CE Amplifier with Emitter resistance and Emitter follower, Millers theorem and its Dual. Simplified h-parameter Model.

MODULE III: Single Stage Amplifiers [10 Periods]

A: Classification of Amplifiers, Distortion in Amplifiers, Low Frequency response of common emitter Amplifiers, Common Base Amplifiers and Common Collector Amplifier.

B: Small signal JFET model, JFET Amplifiers: Common Drain Amplifier, Common Source Amplifier and Common Gate Amplifier. Gain band width product. Analysis of Common Source Amplifier with resistive load.

MODULE IV: Feedback Amplifiers [10 Periods]

Feedback concept and types, Transfer Gain with feedback, General Characteristics of Negative Feedback Amplifiers, Types of Negative Feedback Connections, Method of Identifying Feedback Topology, Stability of Feedback Amplifier.

MODULE V: Oscillators [10 Periods]

Constituents of an Oscillator, Barkhausen Criterion, Classification of Oscillators, Sine Wave Feedback Oscillators of LC Type - General Form of Oscillator Circuit, Hartley Oscillator, Colpitts Oscillator Sine Wave Feedback Oscillator of RC type - RC Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, Frequency Stability. Design of an RC Phase - Shift Oscillator.

Text Books:

1. Jacob Milliman, Christos C. Halkias, SatyabrataJit, "Electronic Devices and Circuits", McGraw Hill (India), 3rd edition, 2013.
2. Shalivahana N. Suresh Kumar, A. Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill (India), 3rd edition, 2007.

Reference Books:

1. Robert Boylestad, LowisNashelsky, "Electronic Devices and Circuit Theory", Prentice Hall of India, 5th Edition, 1993.
2. G. K. Mithal, "Electronic Devices and Circuits", Khanna Publications, 22nd Edition, 1999.

E-Resources:

1. http://electronicsforu.com/
2. https://www.elektormagazine.com/
3. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?reload=true&punumber=101
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=16
5. http://nptel.ac.in/courses/117101106/6

Course Outcomes:

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

1. Study different biasing techniques and design the DC bias circuits using BJT & FET
2. Understand the small signal analysis of different transistor configurations.
3. Understand the design of single stage Amplifiers
4. Understand the design of Feedback amplifiers and their frequency response.
5. Understand the design of various oscillators such as RC Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, LC Oscillator etc

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	2	2	1	-	1	-	3	2	3	3	2
CO2	2	3	1	2	2	-	2	-	2	-	1	1	3	2	2
CO3	3	2		1	1	2	1	-	2	-	2	2	2	3	2
CO4	2	3	2	1	2	2	1	-	3	-	2	3	3	2	2
CO5	1	2	2	3	2	3	3	-	2	-	2	3	2	2	3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0553	**Basic Python Programming Lab** (Common for CE, EEE, ME, ECE, MiE)	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives: To be able to introduce core programming basics and program design with functions using Python programming language, understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.

Software Requirements: Python

List of Programs:

1. a) Write a program to demonstrate different number data types in Python.
   b) Write a program to perform different Arithmetic Operations on numbers in Python.
2. a) Write a program to create, concatenate and print a string and accessing sub-string from a given string.
   b) Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, append, and remove lists in python.
4. Write a program to demonstrate working with tuples in python.
5. Write a program to demonstrate working with dictionaries in python.
6. a) Write a python program to find largest of three numbers.
   b) Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : c/5 = f-32/9]
7. a) Write a Python script that prints prime numbers less than 20.
   b) Write a python program to find factorial of a number using Recursion.
8. a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
   b) Write a python program to define a module and import a specific function in that module to another program.
9. a) Write a program that defines and print a matrix.
   b) Write a program to perform addition of two square matrices.
   c) Write a program to perform multiplication of two square matrices.
10. a) Write a function dups to find all duplicates in the list.
    b) Write a function unique to find all the unique elements of a list.
11. a) Write a program to print each line of a file in reverse order.
    b) Write a program to compute the number of characters, words and lines in a file.
12. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

TEXT BOOKS:

1. Vamsi Kurama, "Python Programming: A Modern Approach", Pearson Publications.
2. Mark Lutz," Learning Python", Orielly Publishers

REFERENCES:

1. Allen Downey, “Think Python”, Green Tea Press
2. W. Chun, “Core Python Programming”, Pearson.
3. Kenneth A. Lambert, “Introduction to Python”, Cengage

Course Outcomes:

At the end of the course, students will be able to
1. **Develop** simple applications using python.
2. **Make use of** functions in python scripts.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
Cos	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	1	1	-	-	-	-	-	-	1	1	-	-
CO2	-	1	2	3	-	-	-	-	-	-	-	3	-	1	1
CO3	1	1	1	1	2	1	1	-	-	-	-	3	-	2	3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I/II Semester		
Code: C0B11	Applied Physics Lab (Common for EEE, ECE,AI&ML, CSE (AI & ML), CSE (Cyb. Sec.), CSE (IoT), CSE (Data Science) ,CSE and IT)	L	T	P
Credits: 1		-	-	2

Course objectives:

The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

List of Experiments:

1 **Planck's constant**
To determine Planck's constant using Photo electric effect.
2 **Energy band –gap of a semiconductor**
To determine the energy band gap of a semiconductor.
3 **V-I and P-I characteristics of light emitting diode**
Plot V-I and P-I characteristics of light emitting diode.
4 **Laser diode**
To study the Characteristics of Laser diode.
5 **Solar Cell**
To study the V-I Characteristics of solar cell.
6 **LCR Circuit**
To determination of resonant frequency, bandwidth and quality factor of RLC circuit.
7 **Numerical Aperture of an Optical fiber**
To determine the Numerical aperture of the given fiber.
8 **Bending Loss of a Fiber**
To determine the bending loss of the given fiber.
9 **Light Dependent Resistance (LDR)**
To determine the characteristics of a LDR.
10 **Stewart and Gee's experiment**
Determination of Magnetic field along the axis of current carrying circular coil.
11 **B-H Curve**
To study the magnetization of ferromagnetic material in presence of magnetic field.
12 **Sonometer**
To verify the frequency of AC Supply.
13. Construction of fundamental logic gates using discrete components and verification of truth tables
14. Verification of truth tables of fundamental logic gates using ICs
15. Construction of fundamental logic gates using universal logic gates.

Course Outcomes:

At the end of the course, students will able to

1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working, application and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Understand measurement technology.
5. Use new instruments and real time applications in engineering studied

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B18	Engineering Chemistry Lab (Common for ALL)	L	T	P
Credits: 1		-	-	2

Course objectives:

To provide the students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

List of Experiments:

1. Calibration of Volumetric apparatus.
2. Estimation of Total Hardness of water by EDTA Method.
3. Estimation of an acid by P^Hmetry.
4. Estimation of alkalinity of water.
5. Estimation of strength of an acid by Conductometry.
6. Estimation of strength of an acid by Potentiometry.
7. Estimation of Mn^{+2}ion in $KMnO_4$ by Colorimetry.
8. Determination of viscosity of given liquids by Ostwald's viscometer.
9. Determination of surface tension of given sample using stalagmometer.
10. Estimation of iron (II) by dichrometry.
11. Determination of rate constant of hydrolysis of methyl acetate.
12. Preparation of Aspirin.

Course outcomes:

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

1. Acquire knowledge about the chemistry lab, kind of experiments that can be performed and the precautions to perform four types of titrations & understand the principle involved in the applications of the method.
2. Learn and apply basic technique used in chemistry laboratory for estimation hardness & alkalinity of water.
3. Understand about mineral analytic technique for estimation of ions/metal ions in minerals.
4. Apply instrumental techniques such as colorimetry, conductometry & potentiometry.
5. Learn to determine physical properties like free chlorides in water, viscosity & surface tension.

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0402	ANALOG ELECTRONICS LAB (Common for EEE & ECE)	L	T	P
Credits: 1		-	-	2

Course Objectives: To design different amplifiers, Feedback amplifiers and Oscillator circuits according to the given specifications.

PART - A: Implement the following Simulation using Multisim or Any equivalent open source software

1. Common Source Amplifier.
2. Common Gate Amplifier.
3. Voltage Shunt Feedback Amplifier
4. Wein Bridge Oscillator using Transistors.
5. Hartley Oscillator Using Transistors.
6. Colpitt's Oscillator Using Transistors.

PART - B: To be performed Using Discrete Electronic Components

1. Common Emitter Amplifier.
2. Common Collector Amplifier.
3. Common Drain Amplifier.
4. Voltage Series Amplifier.

5.Current Series Amplifier

6. RC Phase Shift Oscillator using Transistors.

Course Outcomes:

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

1. Design Amplifiers Circuits.
2. Design Oscillator Circuits.
3. Analyze Feedback topology for amplifiers.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO1	2	3	3	3	3	-	2	-	-	1	1	2	3	3	1
CO2	2	3	3	3	3	-	2	-	-	1	1	2	3	3	1
CO3	2	3	3	3	2	-	1	-	-	1		2	3	3	1

SEMESTER - III

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. IIISemester		
Code: C0B08	Complex Variables and Numerical Methods (Common for ECE & EEE)	L	T	P
Credits:3		3	-	-

Prerequisites: Differentiation, Partial differentiation, Integration

Course Objectives:

1. To learn the concept ofanalyticity of a function
2. To learn the concept of evaluation of Integrals
3. To learn the Power series expansions of complex functions and evaluation of contour integrals.
4. The various numerical techniques which are indispensable tools to solve many algebraic and transcendental equations and Interpolation.
5. Numerical methods of solving the ordinary differential equations and Numerical Integration.

MODULE I Functions of Complex variable 12 Periods

Introduction, Complex functions and its representation on Argand plane, Concepts of limit, Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions, Milne – Thompson method.

MODULE II Complex Integration 9 Periods

Line integral, Evaluation along a path and by indefinite integration, Cauchy's integral theorem, Cauchy's integral formula, Generalized integral formula.

MODULE III Power series expansions of complex functions& Contour Integration 13 Periods

(A) Radius of convergence, Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point, Isolated singular point, pole of order m, essential singularity.

(B) Residue, Evaluation of residue by formula and by Laurent series, Residue theorem, Evaluation of integrals by indentation Improper real integrals (a) $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{0}^{2\pi} f(\cos\theta,\sin\theta)d\theta$

MODULE IV Algebraic and Transcendental equations and Interpolation 14 Periods

(A) Solution of Algebraic and Transcendental Equations: Introduction-Errors, types of errors. Bisection Method, Method of False Position. The Iteration Method – Newton-Raphson Method

(B) Interpolation: Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences – Symbolic relations and separation of symbols, Differences of a polynomial-Newton's formulae for interpolation, Central difference interpolation Formulae – Gauss Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

MODULE V Numerical solution of Ordinary Differential Equations and Numerical Integration 12 Periods

Introduction, Solution by Taylor's series method, Picard's Method of successive Approximations, Euler's Method, Modified Euler's Method, Runge-Kutta Methods.

Numerical Integration: Trapezoidal Rule, Simpson's 1/3rd Rule, Simpson's 3/8 Rule

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R K Jain SRK Iyengar ,Advanced engineering mathematics, Narosa publications.
3. M . K Jain, S R K Iyengar, R.K Jain, Numerical Methods for Scientific and Engineering Computation, New age International publishers.

References

1. Murray Spiegel, Complex variables by Schamus outline series.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley publications.
3. S.S.Sastry, **Introductory Methods of Numerical Analysis**,5th Edition,PHI Learning Private Limited

E- Resources

1. http://nptel.ac.in/courses/104101002/downloads/lecturenotes/module1/chapter6.pdf (Numerical Differentiation and Integration)
2. https://www.youtube.com/watch?v=6vs-pymcsqk (Regula Falsi Method and Newton Raphson Method)
3. https://www.youtube.com/watch?v=1pJYZX-tgi0 (Interpolation)
4. https://www.youtube.com/watch?v=Atv3IsQsak8&pbjreload=101 (Numerical Solution of ODE)
5. https://www.youtube.com/watch?v=iviiGB5vxLA (Numerical Integration)
6. https://www.youtube.com/watch?v=HVHtGVOQySI (Functions of Complex Variables)
7. https://www.youtube.com/watch?v=v4yV2t4KBhs (Complex Integration)

Course Outcomes

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

1. Apply the concept ofanalyticity of a function
2. Evaluate of Integrals
3. Find Power series expansions of complex functions and evaluation of contour integrals.
4. Find the root of a given equation by various methods and estimate the value for the given data using interpolation
5. Find the numerical solutions for a given ODE's and evaluations of integrals using numerical techniques.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	-	-	-	2	-	-	1	3	2	2
CO2	2	2	2	3	2	-	-	-	2	-	-	1	2	2	2
CO3	2	2	2	3	2	-	-	-	2	-	-	1	2	2	2
CO4	3	2	2	3	3	-	-	-	2	-	-	2	3	2	2
CO5	2	2	2	3	3	-	-	-	2	-	-	2	2	2	2

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. IIISemester		
Code: C0403	DIGITAL ELECTRONICS	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

This course introduces various number systems and conversion from one number system to other and also to understand different binary codes**,** the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques. Understanding the combinational logic design of various logic and switching devices and their realization**,** the basic flip flops and sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations and to analyze a given sequential circuit by using state tables and state diagrams.

MODULE I Number systems& Binary codes 8 Periods

Number systems: Number Systems, Radix conversions, complement of numbers.

Binary codes: Binary codes, Weighted and non-Weighted codes, BCD code, gray code, excess 3 codes - Error detecting code, Error Correcting code, Hamming Code.

MODULE II Boolean Algebra& Boolean functions 10 Periods

Boolean Algebra: Postulates and Theorems - Canonical and Standard forms: SOP and POS forms, Minterms and Maxterms –Logic gates: NOT, OR, AND, NOR, NAND, XOR, XNOR - Universal gates

MODULE III Combinational Logic Circuits 10 Periods

A:Arithmetic circuits: Half adder, full adder, half subtractor, full subtractor, binary adder, Carry look ahead adder, BCD adder

B:Code conversion circuits, Comparator, Decoder, Encoder, Priority Encoder, Multiplexers and Design, De – Multiplexers, ROM, PLA, PAL.

MODULE IV Sequential Logic Circuits - I 10 Periods

Introduction –Latches and Flip flops: Basic Flip flop circuit, RS, D, JK and T Flip-flops – Triggering of Flip flops: Master Slave Flip flop, edge triggered flip flop – Conversion of one type of Flip flop to another,Setup time, hold time.

Registers and Counters: Shift Register, Universal Shift Register, Applications of Registers,Asynchronous counter, Synchronous counter, Mod-N Counter, binary up/down counter, Ripple counter, Johnson counter.

MODULE IV Sequential Logic Circuits - II 9 Periods

Analysis of Sequential Logic circuit: State Diagram, state table, reduction of state table, state Assignment –- Design procedure of sequential circuits using state diagram, state table and Flip flops. Example design Sequence detector.

Finite State Machine: Introduction, FSM capabilities and Limitations, Mealy and Moore models – minimization of completely specified and incompletely specified sequential Machines. Partition techniques and Merger charts

Text Books

1. ZviKohavi, **"Switching and Finite Automata Theory"**,TMH, 2nd edition, 2006.
2. Morris Mano,**"DigitalDesign"**,PHI, 3rd Edition, 2009.

3. A.AnandKumar,**"Switching Theory and Logic Design"**,PHI 2nd Edition, 2014.
4. John F.Wakerly, **"Digital Design Principles & Practices"**, PHI/ Pearson Education Asia, 3rd Ed., 2005.

References

1. Stephen Brown and ZvonkaVramesic, **"Fundamentals of Digital Logic with VHDL Design"**,McGraw Hill, 2nd Edition, 2008.
2. William I. Fletcher, **"An Engineering Approach to Digital Design"**, PHI, 1st Edition, 2009.

E- Resources

1. https://www.researchgate.net/publication/264005171_Digital_Electronics
2. https://www.cl.cam.ac.uk/teaching/0708/DigElec/Digital_Electronics_pdf.pdf
3. http://ieeexplore.ieee.org/abstract/document/753678/
4. http://docshare01.docshare.tips/files/20257/202573063.pdf
5. http://nptel.ac.in/courses/117106086/1
6. http://nptel.ac.in/courses/117105080/
7. http://nptel.ac.in/courses/117106114/

Course Outcomes

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

1. Perform radix conversions
2. Minimize a given boolean function by using k-map or tabular method
3. Design a combinational circuit
4. Design a sequential circuit by using various flipflops
5. Analyze and minimize the circuitry of a given sequential circuit and will be able to design a sequence detector

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: C0314	SOLID MECHANICS AND HYDRAULIC MACHINES (Common for EEE and Min.E.)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

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

MODULE–I: INTRODUCTION OF ENGINEERING MECHANICS:

Basic concepts of System of Forces-Coplanar Forces–Components in Space–Resultant-Moment of Forces and its 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- Support reactions different beams for different types of loading – concentrated, uniformly distributed and uniformly varying loading. Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction –Cone of limiting friction

MODULE–II: CENTROID AND CENTER OF GRAVITY:

Centroids – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies – Area moment of 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, Elastic constants and the relationship between them

MODULE–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. Principle of conservation of energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum.

MODULE-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

MODULE-V: TURBINES & PUMPS:

Classification of turbines – Pelton wheel – Francis's 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 machinery.

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.

E – Resources

1. nptel.ac.in/courses/112105183/
2. www.nptelvideos.in/2012/11/fluid-mechanics.htm
3. nptel.ac.in/courses/112104117/
4. www.sanfoundry.com/best-reference-books-fluid-mechanics-and-machinery/
5. https://www.elsevier.com/journals
6. nptel.ac.in/courses/112105183/

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

1. Solve problems dealing with forces, beam and cable problems and understand distributed force systems.
2. Solve friction problems and determine moments of Inertia and centroid of practical shapes.
3. Solve the problems and determine the work energy and power.
4. 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.
5. Determine the efficiency of turbines – Manometric head – minimum starting speed the Turbines

CO- PO Mapping (3/2/1indicatesstrengthofcorrelation) 3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	-	2	2	-	-	1	-	-	1	-	2	-	-	-
CO2	2	3	3	2	1	-	-	-	-	1	-	2	-	-	-
CO3	3	2	2	3	-	-	-	-	-	3	-	2	1	-	-
CO4	3	3	2	2	1		2	-	-	-	-	1	1	-	-
CO5	3	3	2	2	1	1	2	-	-	-	-	1	1	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: C0203	ELECTRICAL CIRCUIT ANALYSIS AND SYNTHESIS	L	T	P
Credits: 3		2	1	-

Prerequisites: Basic Electrical and Electronics Engineering

Course Objectives: This course deals about the network theorems and three phase circuits. It also emphasis on network parameters, synthesis and transient analysis of electrical network. It is the foundation for all courses of the Electrical and Electronics Engineering discipline.

MODULE I Network Theorems (AC and DC) 10 Periods

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation and Tellegen's theorems - Statement of theorems and numerical problems

MODULE II Resonance and Three Phase Circuits 12 Periods

Resonance: Resonance – Series & parallel circuits, concept of bandwidth and Q factor.

Locus diagrams: Series R-L, R-C, R-L-C Circuits.

Three Phase Circuits: Introduction to three phase circuits – types of connection - Star and delta– Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced three phase circuits.

MODULE III Two Port Network Parameters 13 Periods

A: Open circuit impedance (Z) network parameters, Short circuit admittance(Y) network parameters –Transmission (ABCD)

B: Inverse Transmission ($A^1B^1C^1D^1$) and Hybrid parameters – Relationship between two port network parameters – Reciprocity and Symmetry concepts of two port network parameters.

MODULE IV Transient Analysis (Both AC & DC Networks) 13 Periods

Introduction - Initial conditions of all elements-Transient response of Series R-L, R-C and R-L-C circuits (Independent Sources Only) – Solution using Laplace transform approach.

MODULE V Network Synthesis 13 Periods

Hurwitz Polynomials, Positive Real Functions, Frequency Response of Reactive One-Port network, Synthesis of Reactive One Port by Foster's Method, Synthesis of Reactive One Port By Cauer Method, Synthesis of RL, RC and LC One Port Networks by Foster and Cauer Methods.

Text Books

1. William H. Hayt and Jack E. Kimmerly, **"Engineering Circuit Analysis"**, McGraw Hill Company, 6th Edition, 2005.
2. Joseph Edminister and Mahmood Nahvi, **" Electric Circuits"**, Schaum Outline Series, Tata McGraw Hill, 3rd Edition, 1999.

References

1. Vanvalken burg, "**Network Analysis**", Prentice Hall of India, 3 rd Edition, 1994.
2. A. Chakrabarthy, "**Circuit Theory**", Dhanpat Rai & Co., 6 th Edition, 2010.
3. N. N. Parker Smith, "**Problems in Electrical Engineering**", Prentice Hall of India, 9th Edition, 1981.
4. Sudhakar A. and Shyammohan S.P., "**Circuits and Networks: Analysis and Synthesis"**, Tata McGraw Hill, New Delhi, 2004.
5. Arumugam M. and Premkumar N., **"Electric Circuit Theory"**, Kanna Publishers, New Delhi, 1991.

E - Resources

1. http://www.ece.ucsb.edu/Faculty/rodwell/Classes/ece2c/resources/two_port.pdf
2. http://nptel.ac.in/courses/117106108/

3. http://nptel.ac.in/courses/108102042/
4. https://www.vssut.ac.in/lecture_notes/lecture1423722706.pdf

Course Outcomes

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

1. Analyze electrical circuits using network theorems and magnetic circuits.
2. Apply the concepts of three phase electrical circuits to electrical machines and power systems and understand the resonance concepts.
3. Evaluate the different parameters of a given two port electrical network.
4. Analyze the transient response of a network for the given input.
5. Construct the electrical circuit for the given impedance, admittance functions.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: C0204	ELECTROMAGNETIC FIELDS	L	T	P
Credits: 3		3	-	-

Prerequisites: Applied Physics.

Course Objectives: This course deals about the electrostatics, electric potential, energy density and their applications. It emphasis on magneto statics, magnetic flux density scalar and vector potential and its applications. It also deals with the time varying fields along with their mathematical formulations.

MODULE I Introduction to Electrostatics 10 Periods

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems– Divergence theorem –Stroke's theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge –Electric Potential– Properties of potential function – Potential gradient – Gauss' s law – Application of Gauss's Law – Maxwell's first law. Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

MODULE II Conductors, Dielectric & Capacitance 10 Periods

Electric dipole – Dipole moment – potential and EFI due to an electric dipole. Conductors and Insulators. Introduction to permanent magnets, their characteristics and applications. Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

MODULE III Magneto Statics, Ampere's Circuital Law 10 Periods

A: Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Relation between magnetic flux, magnetic flux density and Magnetic field intensity (MFI) – MFI due to a straight current carrying filament

B: MFI due to circular, square and solenoid current – Carrying wire –and MFI – Maxwell's second Equation. Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Maxwell's third equation.

MODULE IV Force in Magnetic Fields, Magnetic Potential 9 Periods

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

MODULE V Inductance, Time Varying Fields 9 Periods

Self and Mutual inductance – Neumann's formulae – determination of self-inductance of a solenoid, toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Time varying fields – Faraday's laws of electromagnetic induction – Maxwell's fourth equation – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields

– Displacement current – Poynting Theorem and Poynting vector.

Text Books

1 William H. Hayt& John. A. Buck, **"Engineering Electromagnetics"**, McGraw-Hill Companies, 7th Edition, 2012.

2 Mathew N. O. Sadiku, **"Principles of Electromagnetics"**, Oxford University Press Inc. 4th Edition, First India Edition, 2009.

References

1. J P Tewari, **" Electromagnetics"**, Khanna Publishers, 2nd Edition, 2005.
2. J. D Kraus,**" Electromagnetics"**, Mc Graw-Hill Inc, 4th Edition, 1992.
3. S. Kamakshaiah, **"Electromagnetic Fields"**, Right Publishers, 2007.
4. K.A. Gangadhar, P.M. Ramanathan, **"Electromagnetic Field Theory (Including Antennas and Wave Propagation)"**, Khanna Publications, 16th Edition, 2007**.**
5. Bhag Singh Guru and Hüseyin R. Hiziroglu, **"Electromagnetic Field Theory Fundamentals"**, Cambridge University Press, 2nd Revised Edition, 2009.

E - Resources

1. http://www.tandfonline.com/toc/tewa20/current
2. https://www.eeweb.com/passives
3. nptel.ac.in/courses/108106073/

Course Outcomes

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

1. State and apply the laws of electromagnetic fields to practical circumstances.
2. Determine the electric field intensity resulting from various configurations of charge distribution.
3. Analyze the concepts of magneto static field and solve the magneto static field problems using laws associated with it.
4. Apply the concept of magnetic fields to compute magnetic potential in scalar and vector forms.
5. Apply the concept of electro dynamic fields and analyze the behavior of conductors using laws associated with it.

CO-PO Mapping

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: C0561	FUNDAMENTALS OF DATA STRUCTURES LAB (Common for CE, EEE, ME, ECE, MiE)	L	T	P
Credits: 2		-	1	2

Prerequisites: C Programming.

Course Objectives:

This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.

Software Requirements: Turbo C / C++

List of Programs:

1 Write a program to perform the following operations on matrix
   a) Addition
   b) Subtraction
   c) Multiplication

2 Write a program to create one dimensional array, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements

3 Write a program to create a single linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.

4 Write a program to create a circular linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.

5 Write a program to create a double linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.

6 Write a program to implements stack operations using Arrays

7 Write a program to implements stack operations using Linked list

8 Write a program to implements Linear Queue operations using Arrays

9 Write a program to implements Linear Queue operations using Linked list

10 Write a program to implements Circular Queue operations using Arrays

11 Write a program to implements Double-ended Queue operations using Arrays

12 Write a program to create a Binary Search Tree (BST) and perform insert and search operations on it.

TEXTBOOKS

1. Jean Paul Tremblay, Paul G Sorenson, "**An Introduction to Data Structures with Applications**", Tata McGraw Hills, 2nd Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan, "**Data Structures: A Pseudo code approach with C**", Thomson (India), 2nd Edition, 2004.

REFERENCES

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, "**Fundamentals of Data Structure in C**", University Press (India), 2nd Edition, 2008..
2. A. K. Sharma, "**Data Structures using C**", Pearson, 2nd Edition, June, 2013.
3. R. Thareja, "**Data Structures using C**", Oxford University Press, 2nd Edition, 2014.

Course Outcomes:

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

1. Identify the appropriate recursive algorithms and analyze the performance of algorithms.
2. Understand and implement single, double, and circular linked-lists.
3. Implement linear data structures such as Stacks and Queues using array and linked-list representations.
4. Implement non linear data structures such as trees and graphs.

CO-PO MAPPING

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	2	3	-	-	-	-	-	-	-	-	-	2	3	-
CO3	-	2	3	-	-	-	-	-	-	-	-	-	-	3	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: C0407	DIGITAL ELECTRONICS LAB	L	T	P
Credits: 1		-	-	2

Course Objectives:
To get programming knowledge on Verilog/VHDL programming of different digital circuits and CMOS circuits.

List of Experiments:
Introduction to Verilog/VHDL and Design of all the logic gates

1. Design of Half adder, Full adder using 3 modeling styles
2. Design of Half Subtractor, Full Subtractor using 3 modeling styles
3. Design of 4X16 Decoder using two 3x8 Decoders
4. Design of 8-to-3 encoder (without and with priority).
5. Design of Multiplexer &Demultiplexer.
6. Design of comparator
7. Design of 4-bit binary to gray converter viceversa,
8. Design of BCD to Excess-3 code converter and viceversa
9. Design of flip flops: SR, D, JK, T.
10. Design of 4-bit binary up/down counter.
11. Design of Johnson counter.

Equipment required for laboratory

1. Computers – Dual Core.
2. Software – Verilog/VHDL or any equivalent software

Course Outcomes:

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

1. To develop the Verilog/VHDL code.
2. Design basic combinational circuits.
3. Design flipflops, basic sequential circuits.

Xx

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: C0205	ELECTRICAL CIRCUITS LAB	L	T	P
Credits: 2		-	-	4

Course Objectives:

To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics and simulation of time response.

List of Experiments:

1. Verification of Thevenin's & Norton's Theorems.
2. Verification of maximum Power Transfer Theorem for the Given 'T' Network.
3. Verification of Super Position Theorem.
4. Verification of Compensation Theorem.
5. Verification of Reciprocity Theorem for DC Excitation.
6. Experimental determination of Quality Factor, Bandwidth and resonant frequency.
7. Experimental Determination of Z & Y Parameters.
8. Experimental determination of Transmission & Hybrid Parameters for the given two port network.

Simulation Experiments:

9. Determination of branch currents in a given electrical circuit.
10. Determination of node voltages of a given electrical network.
11. Determination of transient response of a given RL & RC Circuit.
12. Determination of load current and voltage for a given electrical Network.

Course Outcomes

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

1. Reduce the given complex circuit to simple circuit by applying theorems and can verify the theoretical and practical outputs.
2. Find the impedance value of the given circuit at which the maximum power is transferred and also confirms with the practical results.
3. Design a circuit to accept or reject a particular frequency using resonance principle.
4. Estimate the parameters of the given network.
5. Find the magnitudes of voltages and currents in the given circuit.

CO-PO Mapping

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: C00M2	ENVIRONMENTAL SCIENCE	L	T	P
Credits: NIL		2	-	-

Prerequisites: Nil

Course Objectives:
An interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences, including geo systems, biology, chemistry, economics, political science and international processes. The ability to work effectively as a member of an interdisciplinary team on complex problem of environment.

Module I: Ecosystems 5 Periods
Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains,food webs and ecological pyramids. Flow of energy.
Activity: Plantation.

Module II: Natural resources, Biodiversity and Biotic resources 9 Periods
A: Natural Resources:
Classification of Resources: Living and Non-Living resources, Renewable and non-renewable resources. Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources–case studies. Energy resources: growing energy needs, introduction to renewable and non renewableenergy sources.
B: Biodiversity and Biotic resources:
Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and intrinsic values. Threats to Biodiversity (habitat loss, poaching of wildlife, man-wild life conflicts). Conservation of Biodiversity (In-situ and Ex-situ conservation),
Activity: case studies.

Module III Environmental Pollution And Control 7 Periods
A: Classification of pollution and pollutants, Causes, effects and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Point and non-point sources of pollution, Major pollutant of water and their sources, drinking water quality standards.

B: Soil Pollution, Soil as sink for pollutants, Impact of modern agriculture on soil, degradation of soil. Marine Pollution: Misuse of International water for dumping of hazardous waste, Coastal pollution due to sewage and marine disposal of industrial effluents. E-waste and its management. Activity: Field visit.

Module IV Global Environmental Problems and Global effects 6 Periods

Green houseeffect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions/Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

Activity: Poster Making.

Module V Towards sustainable future 5 Periods

Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism(CDM).

Text Books

1. R.Rajagopalan,**"Environmental Studies from crisis to cure"**, Oxford University Press 2nd Edition, 2005.
2. Anubha Kaushik, C.P.Kaushik, **"Environmental studies"** New age International Publishers,4th Edition,2012

References

1. ErachBharucha,**"Environmental studies"** University Grants Commission, and University Press,I Edition, 2005.
2. M. Anji Reddy **"Text book of Environmental Science and Technology"** 3rd Edition, 2007
3. Richard T.Wright,**"Environmental Science: towards a sustainable future"** PHL Learning, Private Ltd. New Delhi, 2nd Edition., 2008
4. Gilbert McMasters and Wendell P.Ela,**"Environmental Engineering and science"**,3rd Edition, PHI Learning Pvt. Ltd.,2008.

E- Resources

1. http://www.gdrc.org/uem/ait-terms.html (Glossary of Environmental terms).
2. http://www.environmentalscience.org/ (Environmental sciences Lectures series).
3. Journal of earth science and climatic change (OMICS International Journal).
4. Journal of pollution effects & control (OMICS International Journal).
5. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).
6. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html(NPTEL online video courses IIT lectures).

Course Outcomes

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

1. To enable the students to realize the importance of ecosystem, its structure, services. To make the students aware of Different natural functions of ecosystem, which helps to sustain the life on the earth.
2. To use natural resources more efficiently.
3. To make the students aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
4. To educate the students regarding environmental issues and problems at local, national and international level.
5. To know more sustainable way of living

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1	-	1	2	1	-	-	-	-	-	-	-	-
CO2	2	3	2	3	1	3	-	2	-	-	-	-	-	-	-
CO3	3	3	2	3	2	2	-	1	-	-	-	-	-	-	-
CO4	3	2	2	1	2	1	-	-	-	-	-	-	-	-	-
CO5	2	1	1	-	-	1	3	3	-	-	-	-	-	-	-

SEMESTER-IV

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech IV Semester		
Code:C0H08	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

EEA is a think beyond program which will make the student to examine the application of microeconomics theory as applied to the manager's responsibilities in an organization. To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making. This course should emphasize the quantitative and qualitative applications of economic principle to business analysis

MODULE-I Business Environment and Managerial Economics 10 Periods

A. **Business Environment**: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Latest trends in Business Environment (Entrepreneurship).

B. **Managerial Economics:** Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand, Types, Significance of Elasticity of Demand, Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

MODULE – II Theory of Production and Cost Analysis 10 Periods

A. **Theory of Production:** Production Function – ISOquants and ISOcosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

B. **Cost Analysis:** Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

MODULE – III Market structures and Pricing Policies 9 Periods

A. **Introduction to Markets & Market structures:** Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

B. **Pricing Policies & Methods:** Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, PLC based pricing methods.

MODULE – IV Capital and Capital Budgeting 9 Periods

A. **Capital:** Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

B. **Capital Budgeting** : Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

MODULE – V Financial Accounting and Ratios 10 Periods

A. **Financial Accounting:** Introduction, Accounting principles, Accounting Cycle, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

B. Financial Analysis Through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

Text Books

1. Aryasri, **"Managerial Economics and Financial Analysis"**, TMH, 2nd edition, 2005.
2. Varshney &Maheswari, **"Managerial Economics"**, 5th edition Sultan Chand, 2003.

References

1. H. Craig Peterson & W. Cris Lewis, **"Managerial Economics"**, PHI, 4 Ed.
2. Domnick Salvatore, **"Managerial Economics In a Global Economy"**, Thomson, 4th Edition.
3. Raghunatha Reddy &Narasimhachary, **"Managerial Economics& Financial Analysis"**, 4TH edition Scitech.
4. S.N.Maheswari& S.K. Maheswari, **"Financial Accounting"**, 6th edition Vikas.
5. Dwivedi, **"Managerial Economics"**, Vikas, 6th Edition.

E- Resources

1. http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm
2. http://nptel.ac.in/courses/110105067/
3. http://nptel.ac.in/courses/110107073/
4. http://nptel.ac.in/courses/110101005/
5. http://nptel.ac.in/courses/109104073/

Course outcomes:

After completion of the course, students will be able to:

1. Understand the concepts of managerial economics and their application in evaluating the demand.
2. Evaluate the production function and identifies the least cost combination to control the costs of production.
3. Understand the structures of various market types and their pricing policies.
4. Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques.
5. Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	1	-	3	3	-	-	-
CO2	3	-	-	2	1	-	-	-	-	-	-	3	-	-	-
CO3	-	1	-	-	2	-	-	-	-	-	3	3	-	-	-
CO4	2	1	-	-	3	-	-	-	-	-	-	3	-	-	-
CO5	-	1	-	-	2	-	-	-	-	-	3	3	-	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech IV Semester		
Code:C0460	SIGNALS AND SYSTEMS	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:
This course is introducing the basic concepts of signals and introduce the Fourier series for the analysis of periodic signals, the Fourier transform for the analysis of non-periodic signals and familiarize the concept of sampling and different types of sampling techniques. This course also introduces the LTI system and the concepts of convolution and correlation applied for the signal analysis, the concept of Laplace transform, its properties and its applications for continuous time domain signals, the concept of Z- transform, its properties and its applications for discrete time domain signals

MODULE-I Introduction to Signals 10 Periods
Definition, Classification of Signals (continuous - time and discrete - time), Elementary signals (continuous - time and discrete - time).
Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of orthogonal functions, Orthogonality in Complex functions.
Fourier series: Overview of Fourier series.

MODULE-II Fourier Transforms &Sampling 10 Periods
Fourier Transforms: Derivation of Fourier Transform from Fourier Series, Existence of Fourier Transform, Fourier Transform of Standard signals, Properties of Fourier Transform, Fourier Transform of periodic signals, and Introduction to Hilbert Transform.
Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of Sampling – Impulse Sampling, Natural and Flat Top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing.

MODULE-III LTI System, Convolution and Correlation 10 Periods
A: Signal Transmission through Linear Systems: System Definition, Classification of systems, Properties of LTI systems, Transfer Function of an LTI system, Filter Characteristics of Linear System, Distortionless Transmission through a system.
B: Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem.

MODULE-IV Laplace Transforms 10 Periods
Unilateral and Bilateral Laplace Transform, Relation between Laplace Transform and Fourier Transform, Laplace Transform of some commonly used signals and its Region of Convergence (ROC), Properties of Laplace Transform, Inverse Laplace Transform, Solution of Differential equations using Laplace Transform, Laplace Transform of signals using waveform synthesis.

MODULE-V Z–Transforms 8 Periods
One sided and Bilateral Z-Transform, Z-Transform of some commonly used signals and its Region of Convergence (ROC), Properties of Z-Transform, Inverse Z-Transform- Long

Division, Partial Fraction and Residue Methods.

Text Books

1. B. P. Lathi, **"Signals Systems & Communications"**, BSP, 2nd Edition, 2013.
2. P Ramakrishna Rao and Shankar Parkriya, **"Signals and Systems"**, MGH International, 2nd Edition, 2013.

References

1. A.V. Oppenheim, A. S. Willsky, S.H. Nawab, **"Signals and Systems"**, PHI, 2nd Edition, 2014.
2. A. Anand Kumar, **"Signals and Systems"**, PHI, 3rd Edition, 2013.
3. Simon Haykin and Van Veen, **"Signals & Systems"**, Wiley, 2nd Edition, 2007.

E-Resources

1. http://www.tutorialspoint.com/signals_and_systems/
2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/
3. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?reload=true&punumber=78
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8919
5. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=82
6. http://nptel.ac.in/courses/117104074
7. http://nptel.ac.in/courses/117101055

Course Outcomes

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

1. Represent any arbitrary signals in terms of complete sets of orthogonal functions and understand the principles of impulse functions, step function and signum function.
2. Express periodic signals in terms of Fourier series and aperiodic signals in terms of Fourier transform.
3. Understand the principle of linear system, filter characteristics of a system and its bandwidth, the concepts of auto correlation and cross correlation and power Density Spectrum.
4. Express continuous time domain signals in terms of Laplace Transform ie. complex frequency domain (s-plain) and waveform synthesis.
5. Express discrete time domain signals in terms of Z-Transform and its Region of Convergence.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: C0206	POWER GENERATION AND DISTRIBUTION SYSTEMS	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Chemistry, Electrical Circuit Analysis and Synthesis

Course Objectives: This course deals about the layout of different types of power stations and various power distribution systems. It also emphasis on the importance of economic aspects & tariff.

MODULE I Power Stations 10 Periods

Thermal Power Stations: Layout of Thermal Power Station (TPS). Brief description of functional parts: Air-preheater, Economizer, Super heater, Boilers, Turbines, Condensers, Cooling towers, Chimney and electrostatic precipitators.

Nuclear Power Stations: Nuclear Fission and Chain reaction - Nuclear fuels - Principle of operation of Nuclear reactor. Reactor Components: Moderators, Control rods, Reflectors and Coolants. Radiation hazards: Shielding and Safety precautions. Types of Nuclear reactors and brief description of PWR, BWR and FBR.

MODULE II Hydroelectric and Gas Power Stations 10 Periods

Hydroelectric Power Stations: Elements of hydro electric power station – Types - Concept of pumped storage plants - Storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area - Heads and efficiencies.

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only).

MODULE III Air & Gas Insulated Substations 9 Periods

A: 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.

B: Introduction to Gas insulated substations, Single line diagram of gas insulated substations, bus bar, Construction aspects of GIS, Maintenance and Advantages of GIS, Comparison of Air insulated substations and Gas insulated substations.

MODULE IV D.C. and A.C Distribution Systems 10 Periods

Classification of Distribution Systems - Comparison of DC vs AC Distribution Systems, 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. 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.

MODULE V Economic Aspects of Power Generation & Tariff Methods 9 Periods

Define - Load curve, Load duration and Integrated load duration curves - Load, Demand, Diversity, Capacity, Utilization and Plant Use Factors- Coincidence factor, Contribution factor and Loss factor - Relationship between the Load factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics. - Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and

Running Costs. Desirable Characteristics of a Tariff Method. Tariff Methods: Flat Rate, Block-Rate, two-part, three –part and power factor tariff methods and Numerical Problems**.**

Text Books

1. V.K Mehta and Rohit Mehta, **"Principles of Power Systems",** S.Chand& Company Ltd, New Delhi, 2004.
2. PSR. Murty**, "Electrical Power Systems",**Butterworth-Heinemann Publications, 2017.

References

1. R. K. Rajput, **"A Text Book of Power System Engineering"**, Laxmi Publications (P) Limited, 2nd Edition, 2016.
2. S.N.Singh , **"Electrical Power Generation, Transmission and Distribution"** , PHI Learning Pvt. Ltd., 2nd Edition, 2008.
3. C.L.Wadhwa, **"Electrical Power Systems"**, New Age international (P) Limited, 6th Edition, 2010.
4. Dr.B.R.Gupta, **"Generation of Electrical Energy"** , S.Chand& Company Ltd, 6th Edition, 2008.
5. G.Ramamurthy, **"Handbook of Electrical power Distribution"**, Universities Press, 2013.

E - Resources

1. https://www.electrical4u.com/power-plants-types-of-power-plant/
2. http://spectrum.ieee.org/energy
3. http://nptel.ac.in/courses/108102047/

Course Outcomes

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

1. Understand the layouts of Thermal Power station, Nuclear Power Plant and Gas Power plant.
2. Demonstrate the operation of hydro electric power plants and turbines.
3. Comprehend about various types of substations and its equipment.
4. Analyze the voltage drops in DC and AC distribution systems.
5. Evaluate the cost of generation and tariff.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: C0207	DC MACHINES AND TRANSFORMERS	L	T	P
Credits: 3		2	1	-

Prerequisites: Electrical Circuits Analysis and Synthesis, Electro Magnetic Fields.

Course Objectives:

This course introduces the basic concepts of rotating machines. It emphasis on construction and operation of DC generators, DC Motors, Single phase transformers, Auto transformer and poly phase transformers. It also deals about the methods to evaluation the performance of DC Generators, DC Motors and Single phase transformers.

MODULE I Electro Magnetic Induction & Basic Concepts in Rotating Machines **12 Periods**

Introduction to magnetic circuits – Magnetically induced EMF and force – AC operation of magnetic circuits – Hysteresis & Eddy Current Loss. Energy in magnetic systems – Field energy & Mechanical force – Single and Multiple excited systems. MMF of distributed windings – Magnetic fields in rotating machines.

MODULE II DC Generators **13 Periods**

Construction & Principle of Operation of DC Generators – E.M.F Equation- Types of D.C Generators – Armature reaction – Methods of minimizing the effects of armature reaction – Compensating winding – Commutation – Methods of improving commutation. -Voltage build up in generators – OCC-Critical field resistance and critical speed - Causes for failure to self excite and Remedial measures – Load characteristics of shunt, series and compound generators.

MODULE III DC Motors **13 Periods**

A: Principle of operation – Back E.M.F. - Torque equation – Characteristics and application of shunt, series and compound motors and Speed control.

B: Necessity of starter -3- point and 4- point starters – Constant and Variable losses - Calculation of efficiency – Condition for maximum efficiency – Electric Braking – Brake test – Swinburne's test –Hopkinson's test.

MODULE IV Single Phase Transformers **13 Periods**

Types - Constructional details - EMF equation - Operation on no load and load - Phasor diagrams – Equivalent circuit - Losses and efficiency - Regulation. All day efficiency . OC and SC tests - Sumpner's test - Separation of losses test - Parallel operation with equal and unequal voltage ratios.

MODULE V Auto Transformers & Poly-Phase Transformers **13 Periods**

Auto transformers - Comparison with two winding transformers - Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ /Y, Δ / Δ - Open -Scott connection - Three winding transformers – Tertiary windings - Determination of Z_p, Z_s and Z_t. Inrush Current - Off load and on load tap changing.

Text Books

1. J.B.Gupta, **"Theory & Performance of Electrical Machines"**, S.K. Kataria& Sons, 15th Edition, 2015.
2. I.J.Nagrath&D.P.Kothari, **"Electric Machines"** ,Tata Mc Graw Hill, 4th Edition, 2010.

References

1. P.S. Bimbra, **"Electrical Machinery"** , Khanna Publishers, New Delhi, 7th Edition, 2011.
2. A.E.Fitzgerald, C.Kingsley and S. Umans, **"Electric Machinery"**, Tata Mc Graw-Hill Companies, 7th Edition, 2013.
3. Ashfaq Husain, **"Electric Machines"**, Danapati Rai & Co, New Delhi, 2002.
4. S.K.Bhattacharya, **"Electrical Machines"**, Tata McGraw Hill, New Delhi, 4th Edition, 2014.
5. M.V. DESHPANDE, "ELECTRICAL MACHINES", PHI LEARNING PVT. LTD., 2011.

E - Resources

1. https://www.electrical4u.com/electrical-motor-types-classification-and-history-of-motor/
2. https://www.eeweb.com/electromechanical
3. http://nptel.ac.in/courses/108105017

Course Outcomes

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

1. Apply the magnetic induction principles and have the awareness on basic concepts of rotating machines.
2. Analyze the performance of DC generators.
3. Analyze the performance of DC motors and starting methods of DC motor.
4. Evaluate the performance of single phase transformer.
5. Understand the construction and operation of poly phase transformers and auto transformer.

CO-PO Mapping

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: C0208	CONTROL SYSTEMS (Common for EEE & ECE)	L	T	P
Credits: 3		2	1	-

Prerequisites: Laplace Transforms, Differential Equations

Course Objectives: This course introduces different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response. It also emphasis on analysis of system performance in time and frequency domain and techniques for improving the performance.

MODULE I Systems and Representations 10 Periods

Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchro's, AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs

MODULE II Time Response 9 Periods

Time domain specifications – Types of test input (Standard test signals)– I and II order system response – Error coefficients – Generalized error series – Steady state error – Effects of P, PI, PID modes of feedback control.

MODULE III Stability Analysis 9 Periods

A: The concept of stability- Routh's stability criterion – Nyquist stability criterion- Performance criteria

B: Root Locus Technique: The root locus concept - Construction of root loci - Effects of adding poles and zeros to G(s) H(s) on the root loci.

MODULE IV Frequency Response 9 Periods

Introduction, Frequency domain specifications – Bode plot – Polar plot – Gain margin and Phase margin, Nyquist Plot- Determination of closed loop response from open loop response

Effect of Lag, lead and lag-lead compensation on frequency response, Design of Lag, lead and lag-lead compensator using bode plots.

MODULE V State Space Analysis of Continuous Systems 10 Periods

Concepts of state, state variables and state model, State models for linear and time invariant Systems, derivation of state models from block diagrams, diagonalization - Solving the Time invariant state equations - State Transition Matrix and it's Properties – Concepts of Controllability and observability.

Text Books

1. I.J.Nagrath and M.Gopal, "Control Systems Engineering", New Age International Publishers, 5th Edition, 2007.
2. Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition, 1995.

References

1. A.Nagoorkani, "Control Systems", RBA Publications, 2nd Edition, 2006.
2. M.Gopal, "Control System: Principles and Design", Tata McGraw Hill, 2 nd Edition, 2002.
3. Joseph J Distefano, "Schaum's Outline Series of Feedback and Control Systems", Tata McGraw Hill, 2nd Edition, 2014.
4. K. Ogata, "Modern Control Engineering", Pearson Education, New Delhi, 5th Edition, 2010.
5. M. Gopal, "Control Systems, Principles & Design", Tata McGraw Hill, 4th Edition,2012.

E - Resources

1. https://www.electrical4u.com/control-engineering-historical-review-and-types-of-control-engineering/
2. http://ieeecss.org/CSM/library/2011.html
3. http://nptel.ac.in/courses/108101037/

Course Outcomes

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

1. Apply transfer function models to analyze physical systems.
2. Determine the transient and steady state behavior of systems subjected to standard test signals.
3. Analyze the linear systems for absolute and relative stability in time and frequency domain.
4. Analyze the stability of the linear system in frequency domain and design compensators.
5. Familiarize with state space analysis and system properties like Controllability and Observability.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech IV Semester		
Code: C0461	BASIC SIMULATION LAB	L	T	P
Credits: 1.5		-	-	3

Course Objectives:

To get knowledge on how to write programs for various operations on signals and LTI systems.

List of Experiments

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit impulses, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operation of Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal Sequence and Real and Imaginary parts of Signal.
5. Convolution between Signals and Sequences.
6. Auto Correlation and Cross Correlation between signals and Sequences.
7. Verification of linearity and Time Invariance Properties of a given Continuous/ Discrete System.
8. Computation of unit Sample, Unit Step and sinusoidal responses of the given LTI System and Verifying its Physical reliability and stability Properties.
9. Gibbs Phenomenon.
10. Finding the Fourier Transform of a given Signal and Plotting its magnitude and Phase Spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Sampling Theorem Verification.

Course Outcomes:

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

1. Generate Different Signals with different Parameters
2. Perform Different Operation on Matrices
3. Implement Different algorithms for small operations on a signal
4. Apply FT & LT on Signals
5. Verify the Different theorems on Signals

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO2	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO3	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO4	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO5	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: C0209	DC MACHINES AND TRANSFORMERS LAB	L	T	P
Credits: 1.5		-	-	3

Course Objectives:

To provide students with a strong back ground in different types of electrical machines. To train the students with well practical knowledge of different DC machines.

List of Experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator.
5. Hopkinson's test on DC shunts machines.
6. Fields test on DC series machines.
7. Swinburne's test and speed control of DC shunt motor.
8. Brake test on DC compound motor.
9. Brake test on DC shunt motor.
10. Retardation test on DC shunt motor.
11. Separations of losses in DC shunt motor.
12. Brake test on DC series motor.

Course Outcomes

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

1. Assess the performance of DC shunt, series and compound motors.
2. Determine the efficiency of DC shunt, series and compound motors.
3. Perform the speed control methods of DC shunt motor.
4. Predetermine the efficiency of DC shunt motor.
5. Determine the performance characteristics of DC machines.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERINGCOLLEGE	B.Tech. IVSemester		
Code:C0555	Object Oriented Programming Lab (Common for CE, EEE,ME,ECE,MiE)	L	T	P
Credits:1		-	-	2

Prerequisites: NIL

Course Objectives:

This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading.

Software Requirements: JDK

List of Programs:

1. Write a JAVA program to display default value of all primitive data type of JAVA.

2. Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

3. Write a Java Program to implement
   a) Default Constructor
   b) Parameterized constructor

4. Write a Java Program to implement
   a) Method overloading
   b) Method overriding

5. Write a Java program to implement
   a) Single Inheritance
   b) Multilevel Inheritance
   c) Hierarchical Inheritance

6. Write Java programs that uses the following keywords…
   a) this
   b) super

7. Write Java programs that uses the following keywords…
   a) static
   b) final

8. Write a Java program to implement
   a) abstract method
   b) Interfaces

9. Write a Java program to create user defined packages.

10. Write a Java program to implement Exception Handling using
    a) try-catch clause
    b) Multiple Catch clauses

11. Write a Java program that
    a) create user defined Thread by extending Thread class.
    b) create user defined Thread by implementing Runnable Interface

12. Write a Java program
    a) checks whether a given string is a palindrome or not.
    b) for sorting a given list of names in ascending order.

TEXT BOOKS:

1. Herbert Schildt, "**Java The complete reference**", TMH, 8th edition, 2011.
2. T. Budd, "**Understanding OOP with Java**", Pearson Education, updated edition, 1998.

REFERENCES:

1. P.J. Deitel and H.M. Deitel, "**Java for Programmers**", Pearson education.
2. P. Radha Krishna, "**Object Oriented Programming through Java**", Universities Press.
3. Bruce Eckel," **Programming in Java**", Pearson Education.
4. S. Malhotra and S. Choudhary," **Programming in Java**", Oxford Univ. Press.

Course Outcomes:

Course Outcomes:

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

1. Differentiate structured programming and object oriented programming and know the concepts of classes, objects, members of a class.
2. Apply object oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface.
3. Capable of handling run time errors using Exceptional Handling and exploring strings.
4. Develop applications for concurrent processing using Thread Concept.
5. Capable of handling IO operations using Files.

CO-PO MAPPING

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	3	-	-	-	-	-	-	-	-	-	3	2	-
CO2	-	-	3	-	2	-	-	-	-	-	-	-	2	3	-
CO3	-	2	2	-	2	-	-	-	-	-	-	-	-	2	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: C00M1	GENDER SENSITIZATION (An Activity-based Course) (Common for CE, EEE, ME, ECE, MiE, CSE, CSE(DS), CSE(AI and ML), CSE(Cyber Security), CSE(IOT) and IT)	L	T	P
Credits: NIL		-	-	2

Prerequisites: NIL

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.

MODULE I UNDERSTANDING GENDER **6 Periods**

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

MODULE II GENDER ROLES AND RELATIONS 6 Periods

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

MODULE III GENDER AND LABOUR 7 Periods

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Sharethe 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.

MODULE IV GENDER - BASED VIOLENCE 7 Periods

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

MODULE V: GENDER AND CULTURE 7 Periods

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 onGender" 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%

TEXT BOOKS:

1. Towards a World of Equals: A bilingual Textbook on Gender, A Suneetha –etall

REFERENCES:

1. Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We Were Making History...' Life Stories of Women in the ToIrmgana People's Struggle. New Delhi: Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by -the-numbers-where-Indan-womenworkP
3. K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto://harooreollins.co.in/BookDetailasp?FlookCndet,3732
4. Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

E-RESOURCES:

1. http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm (UNDERSTANDING GENDER)
2. https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)
3. http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/ (GENDER AND LABOUR)
4. http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004 (ISSUES OF VIOLENCE)
5. http://www.nordiclabourjournal.org/emner/likestilling (GENDER AND BIOLOGY)

Course Outcomes:

At the end of the course,

- 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 labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	-	3	3	-	2	3	1	-	-
CO2	-	-	-	-	-	3	-	3	3	-	2	3	2	-	-
CO3	-	-	-	-	-	3	-	3	3	-	2	3	1	-	-
CO4	-	-	-	-	-	3	-	3	3	-	2	3	1	-	-
CO5	-	-	-	-	-	3	-	3	3	-	2	3	2	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: C02P1	REAL-TIME RESEARCH PROJECT/ FIELD BASED PROJECT	L	T	P
Credits: 1		-	-	2

COURSE OBJECTIVES:

The primary objective of this course is to provide students with an opportunity to engage in experiential learning by working on real-time research or field-based projects relevant to their discipline. It aims to help students identify and analyze practical problems through field exposure, literature review, or interaction with industry and community stakeholders. The course encourages students to apply engineering knowledge, analytical skills, and appropriate tools or technologies to explore viable solutions. It also focuses on fostering teamwork, critical thinking, and ethical responsibility among students as they collaborate on project tasks. Additionally, the course emphasizes the development of effective communication skills through structured documentation and professional presentation of project outcomes.

COURSE OUTCOMES:

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

COs	BT Level	CO Statement
CO1	Remembering, Understanding	Identify and define real-time problems from field/industry/community relevant to their discipline.
CO2	Applying, Analyzing	Apply suitable engineering concepts and tools to analyze and propose viable solutions for the identified problem.
CO3	Applying, Evaluating	Work collaboratively in teams to design and execute a research or field-based project while adhering to ethical and professional standards.
CO4	Analyzing, Evaluating	Interpret and evaluate field/project data using suitable analytical methods or tools to derive meaningful conclusions.
CO5	Creating, Evaluating	Prepare and present a structured report and deliver an oral presentation effectively, demonstrating project planning and outcomes.

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	2	1	1	1	2	2	2	3	3	3	2
CO2	2	3	3	2	3	1	2	1	2	2	2	3	3	3	2
CO3	2	3	2	3	2	1	1	1	1	2	2	3	3	3	3
CO4	1	2	2	2	2	1	1	1	2	3	2	2	3	3	2
CO5	1	2	2	1	1	2	2	3	3	3	3	2	2	2	2

SEMESTER – V

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0210	POWER TRANSMISSION SYSTEMS	L	T	P
Credits:3		2	1	-

Prerequisites: Electro Magnetic Fields, Electrical Circuit Analysis and Synthesis

Course Objectives:
This course deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

MODULE I TRANSMISSION LINE PARAMETERS 10 Periods

Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects -Typical configurations, conductor types and electrical parameters of EHV lines.

MODULE II PERFORMANCE OF TRANSMISSION LINES 10 Periods

Classification of Transmission Lines - Short, Medium and Long Lines and their Exact Equivalent Circuits - Nominal-T, Nominal-π Methods. Long Transmission Line-Rigorous Solution, Regulation and Efficiency. Evaluation of A,B,C,D Constants– Surge Impedance and Surge Impedance Loading - Ferranti Effect -Numerical Problems.

MODULE III MECHANICAL DESIGN OF TRANSMISSION LINES & OVERHEAD LINE INSULATORS 12 Periods

A: Insulators: Types of Insulators, String Efficiency and Methods for Improvement, Capacitance Grading and Static Shielding. Corona: Corona Phenomenon, Factors Affecting Corona, Critical Voltages and Power Loss, Radio Interference.

B: Sag and Tension Calculations: Sag and Tension Calculations with Equal and Unequal Heights of Towers, Effect of Wind and Ice on Weight of Conductor, Stringing Chart and Sag Template and their Applications, Numerical Problems.

MODULE IV POWER SYSTEM TRANSIENTS & TRAVELLING WAVES 12 Periods

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of Lines with Different Types of Conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

MODULE V UNDERGROUND CABLES 10 Periods

Types of Cables, Construction, Types of Insulating Materials, Calculations of Insulation Resistance and Stress in Insulation, Numerical Problems. Capacitance of Single and 3-Core Belted Cables, Numerical Problems. Grading of Cables - Capacitance Grading, Numerical Problems, Description of Inter-Sheath Grading.

Text Books

1. C.L.Wadhwa, **"Electrical Power Systems"**, New Age International (P) Limited, Publishers,4th Edition, 2005.
2. John J Grainger and William D Stevenson, **"Power System Analysis"**, Tata McGraw Hill Edn., 4th Edition, 1994
3. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Mc Graw-Hill Publishing Company

limited, New Delhi, Second Edition, 2008.

Reference Books

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition, 2008.
2. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.
4. Arun Ingole, "power transmission and distribution" Pearson Education, 2017
5. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2012.

E- Resources

1. https://www.electrical4u.com/types-of-electrical-insulator-overhead-insulator/
2. http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_2
3. http://nptel.ac.in/courses/108102047/

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

1 Evaluate the parameters of transmission line for various configurations.
2 Model the transmission line and analyze their performance
3 Estimate the number of insulators based on string efficiency and analyse the effects of wind and ice loading on transmission conductor
4 Determine reflection and refraction coefficients of the lines with various terminations
5 Illustrate different types of cables and describe grading of cables.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0211	AC MACHINES	L	T	P
Credits:3		2	1	-

Prerequisites: Electromagnetic Fields Electrical Circuit Analysis and Synthesis

Course Objectives:
This course facilitates to study the performance of induction motors which is main drive for industrial applications. It also emphasis about the performance analysis of synchronous machines.

MODULE I Three Phase Induction Motors 13 Periods
Three phase induction motors - Constructional details - Production of rotating magnetic field - Principle of operation - Rotor EMF and rotor frequency - Rotor reactance, rotor current and power factor - Equivalent circuit - Phasor diagram - Crawling and cogging - Power stages

MODULE II Performance of Induction Motors 13 Periods
Rotor power input, Rotor copper loss and mechanical power developed and their inter relation - Torque equation - Expressions for maximum torque and starting torque – Torque- slip characteristics - Condition for maximum torque – Relation between torque and slip – Losses and efficiency – No load and blocked rotor tests – Equivalent circuit – Circle diagram – Induction generator (Elementary treatment only).

MODULE III Single Phase Induction Motors 12 Periods
A: Single phase induction motors – Principle of operation - Double revolving field theory - Split phase induction motor - Capacitor start induction motor - Capacitor start and run induction motor.
B: Equivalent circuit - Shaded pole induction motor.

MODULE IV Synchronous Generators 13 Periods
Synchronous generator – Construction, working principle - EMF equation – Armature reaction – Regulation methods – EMF, MMF,ZPF and ASA methods – Synchronizing to infinite bus bars – Two reaction theory – Parallel operation of synchronous generators.

MODULE V Synchronous Motors 13 Periods
Synchronous motor – Constructional features, principle of operation– Methods of starting – Power developed by a synchronous motor – Synchronous motor with different excitations – Effect of increased load with constant excitation, effect of changing excitation at constant load – Torque equation – V curve and inverted V curves – Hunting.

Text Books
1. P.S. Bimbra, **"Electrical Machinery"**, Khanna Publishers, New Delhi, 7th Edition, 2011.
2. J.B.Gupta, **"Theory & Performance of Electrical Machines"**, S.K. Kataria& Sons, 15th Edition, 2015

References
1. M.G Say, **"Performance and Design of A.C Machines"**, 3rd Edition, BPB Publishers, 2002
2. A.E.Fitzgerald, C.Kingsley and S.Umans, **"Electric Machinery"**, Tata McGraw-Hill Companies, 7th Edition, 2013.
3. I.J.Nagrath&D.P.Kothari, **"Electric Machines"**, Tata McGraw Hill, 4th Edition, 2010.
4. S. Kamakashaiah, **"Electromechanics-II (Transformers and Induction Motors)"**, Hitech Publishers
5. R.K.Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd., New Delhi, 4th Edition,

2006.

E- Resources

1. R.K.Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd., New Delhi, 4th Edition, 2006.
2. https://www.electrical4u.com/synchronous-motor-working-principle/
3. https://www.eeweb.com/electromechanical
4. http://nptel.ac.in/courses/108106072/

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

1 Impart knowledge on Poly Phase Induction Motors.
2 Analyze the performance of Induction Motors.
3 Understand the construction and operation of single phase Induction Motors
4 Analyze the performance of Synchronous Generator.
5 Analyze the performance of Synchronous Motor.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0212	POWER ELECTRONICS	L	T	P
Credits:3		3	-	-

Prerequisites: Electrical Circuit Analysis and Synthesis, Analog Electronics.

Course Objectives:

This course deals about the structure, operation and characteristics of power semiconductor devices. It also emphasis on the operation, characteristics and performance parameters of single phase controlled converters, three phase controlled converters, AC voltage controllers, choppers and Inverters.

MODULE I Power Semiconductor Devices 10 Periods

Thyristors – Silicon Controlled Rectifiers (SCRs) – BJT – Power MOSFET – Power IGBT and their characteristics. Basic theory of operation of SCR – Static and Dynamic characteristics of SCR -Two transistor analogy - UJT firing circuit – Series and Parallel connections of SCRs - Snubber circuit– Specifications and Ratings of SCR, BJT, MOSFET, IGBT - Numerical problems. Natural and forced commutation (Principle only).

MODULE II Single Phase Controlled Converters 9 Periods

Single Phase Half Controlled Converters: Half controlled converters with R, RL and RLE loads without and with freewheeling Diode – Derivation of average load voltage and current -– Numerical problems.

Single Phase Fully Controlled Converters: Midpoint and Bridge configurations with R, RL and RLE loads - Derivation of average load voltage and current - Performance parameters of single-phase full bridge converter, Effect of source inductance – Derivation of load voltage and current - Numerical problems

MODULE III Three Phase Controlled Converters 9 Periods

A: Three phase three pulse converters – Mid Point and Bridge configurations – Average load voltage with R and RL loads – Numerical Problems.

B: Three phase six pulse converters – Mid Point and Bridge configurations – Average load voltage with R and RL loads – Effect of source Inductance – Numerical Problems.

MODULE IV Choppers & AC Voltage Controllers 10 Periods

Choppers: Principle of Step-down and step-up chopper-control strategies–Forced commutated chopper–Voltage commutated, Current commutated, Load commutated choppers. Switched mode regulators- Buck, boost, buck- boost converter.

AC Voltage Controllers : Single phase AC voltage controllers with R and RL loads-wave forms – Modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor – Numerical problems.

MODULE V Inverters &Cyclo-Converters 10 Periods

Inverters: Single phase inverter – Half and full bridge inverter – Wave forms - Performance parameters of inverters – Voltage control techniques for inverters. Pulse width modulation techniques - Single, multiple and sinusoidal PWM - Numerical Problems.

Three Phase Inverters: Analysis of 180 degree and 120 degree modes of operation with R and RL loads - Numerical Problems.

Cyclo Converters: Cyclo-Converters – Single phase Mid-point cyclo-converters with R and RL loads (Principle of operation only) - Bridge configuration of single phase cyclo-converter (Principle of operation) – Wave forms.

Text Books

1. M.H. Rashid, **"Power Electronics: Circuits, Devices and Applications"**, 3rd Edition, Pearson Education, New Delhi, 2014.
2. P.S. Bimbra, **"Power Electronics"**, 5th Edition, Khanna Publishers, New Delhi, 2012.

References

1 A.Chakrabarti, **"Fundamentals of Power Electronics and Drives"**, Dhanpat Rai & Co, 2008.

2 S R Doradla, A Joshi, RMK Sinha and G K Dubey, **"Thyristorised Power Controllers"**, New Age International (P) Ltd., 2012.

3 Ned Mohan, Tore M. Undeland and William P. Robbins, **"Power Electronics: Converters, Applications and Design"**, John Wiley and Sons, 2nd Edition, 2007.

4 M.D. Singh, K.B.Khanchandani, **"Power Electronics"**, 2nd Edition, Tata McGraw Hill, New Delhi, 2008.

5 L. Umanand, **"Power Electronics Essentials and Applications"**, Wiley, 2010

E- Resources

1. http://nptel.ac.in/courses/108105066/
2. https://www.elprocus.com/power-electronics-project-ideas/
3. https://www.eeweb.com/analog-design
4. http://nptel.ac.in/courses/108101038/

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

1 Describe the structure, operation and characteristics of power semi conductor devices.

2 Understand the operation, characteristics and performance parameters of single phase controlled converters.

3 Understand the operation, characteristics and performance parameters of single phase controlled converters.

4 Analyze single phase AC voltage controllers and Cyclo Converters and their applications.

5 Understand the operation, characteristics and performance parameters of choppers and inverters.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0221	HIGH VOLTAGE ENGINEERING (Professional Elective– I)	L	T	P
Credits:3		3	-	-

Prerequisites: Engineering Chemistry, Power Transmission Systems.

Course Objectives:

This course deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. It also emphasis on generation and measurement of high voltage and current, high voltage testing methods.

MODULE I Introduction to High Voltage Technology and Applications 9 Periods

Electric field stresses, gas / vacuum as insulator, liquid dielectrics, solids and composites, estimation and control of electric stress. Numerical methods for electric field computation, surge voltages, their distribution and control. Applications of insulating materials in transformers, rotating machines, circuit breakers, cables, power capacitors and bushings.

MODULE II Break Down in Gaseous, Liquid and Solid Dielectrics 10 Periods

Gases as insulating media, collision process, ionization process, Townsend‘s criteria of breakdown in gases, Paschen‘s law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, breakdown in composite dielectrics, solid dielectrics used in practice

MODULE III Generation and Measurement of High Voltages and Currents 10 Periods

A: Generation of high DC Voltages, generation of high AC Voltages, generation of Impulse Voltages, generation of Impulse Currents, tripping and control of Impulse Generators.

B: Measurement of high DC, AC and Impulse Voltages, measurement of high currents - direct, alternating and impulse, Oscilloscope for impulse voltage and current measurements.

MODULE IV Over Voltage Phenomenon and Insulation Co-Ordination 9 Periods

Natural causes for over voltages – lightning phenomenon, overvoltage due to switching surges, system faults and other abnormal conditions, principles of insulation coordination on high voltage and extra high voltage power systems.

MODULE V Non-Destructive Testing of Material, Electrical Apparatus & High Voltage Testing 10 Periods

Measurement of D.C resistivity, measurement of dielectric constant and loss factor. Partial discharge measurements. Testing of Insulators, Bushings, Isolators, Circuit Breakers, Cables, Transformers and Surge Arresters. Radio Interference Measurements.

Text Books

1. M. S. Naidu and V. Kamaraju, **“High Voltage Engineering”,** TMH Publications, 4th Edition, 2009.
2. E.Kuffel, W.S.Zaengl, J.Kuffel, **“High Voltage Engineering: Fundamentals”**, Cbs Publishers New Delhi, 2nd Edition, 2005.

References

1 C.L. Wadhwa, **“High Voltage Engineering”,** New Age Internationals (P) Limited, 3rd Edition, 2010.

2 Ravindra Arora & Wolfgang Mosch ,**“High Voltage Insulation Engineering”**, New Age International (P) Limited, 1st Edition, 1995.

3 Subir Ray, **“An Introduction to High Voltage Engineering”**, PHI Learning Private

Limited, New Delhi, 2nd Edition, 2013.
4 L.L. Alston, **"High Voltage Technology"**, Oxford University Press, First Indian Edition, 2011.
5 T.J.Gallagher and A.J Pearmain, **"High Voltage Measurement, Testing and Design"**, Wiley, New York, 2nd Edition, 2007.

E- Resources

1. http://www.mv.helsinki.fi/tpaulin/Text/hveng.pdf
2. www.electricity-today.com
3. http://nptel.ac.in/courses/108104048/

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

1 Appraise the applications of solid, liquid and gaseous dielectrics in electrical engineering.
2 Appraise in gaseous insulators media & Breakdown in Composite dielectrics and solid dielectrics.
3 To paraphrase the types of generation of high A.C., D.C. and Impulse voltage existing in research centers all over the world.
4 Appraise the causes for over voltage in EH and principles of insulation co-ordination in HV and EHV in power systems
5 Demonstrate the existing testing techniques to test all the electrical equipments before commissioning into service.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0222	GRAPHICAL PROGRAMME AND APPLICATIONS (Professional Elective– I)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

This course deals with the new concepts in measurement and automation. It also emphasis on controlling of external measuring device by interfacing computer, data acquisition and instrument control

MODULE I Virtual Instrumentation 9 Periods

Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Active X Programming.

MODULE II Structures and Sequence 9 Periods

Controlling program execution with structures: While and For loops, Shift registers, Caseand Sequence structure and Sub VI**.**

MODULE III Composite Data and Displays 10 Periods

Arrays and Structures: Two dimension array, Auto Indexing to set the for loop count,Building arrays with auto indexing, Array Acrobats, Polymorphism, Cluster Order, Cluster topass data, Bundling and unbundling cluster, Interchangeable arrays and cluster , ErrorCluster and Error handling functions.

B: Chart update modes, Single Plot chart, Wiring multiple plot chart, Single Plot verusMultipleplot data types, The X scroll bar, clearing the chart, Stacked and overlaid plots, Multiple Yscales and chart history lengths.: Activity: Temperature monitor, Graphing a sine wave, XYplot to plot a circle, Temperature analysis and 3D graphs

MODULE IV Strings, File output and Signal Measurements and Generation 10 Periods

Single line strings, online string updation, Scroll bar, Writing and reading a measurement file,Writing and reading from a spread sheet,Computer to real world interface using LabVIEW, Creating Ni DAQ Task in Measurement and Automation Explorer (MAX), Generating code from MAX, DAQ timing and trigger, Multichannel and continuous acquisition, Streaming Data file and Counting frequency and events.VI Chassis requirements. Common Instrument Interfaces: Currentloop, RS 232C/ RS485,GPIB.

MODULE V Applications 10 Periods

Networking basics for office & Industrial applications, VISA and IVI, VI toolsets, DistributedI/O modules, Development of Control system, Industrial Communication, Image acquisitionand processing.

Text Books

1. Gary Johnson, **"LabVIEW Graphical Programming"**, 2nd edition, McGraw Hill, Newyork, 1997.
2. Lisa K. wells & Jeffrey Travis, **"LabVIEW for Everyone"**, Prentice Hall, New Jersey, 1997

References

1 Kevin James, **"PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control"**, Newnes, 2000.

E- Resources

1. https://www.ni.com/getting-started/labview-basics/
2. https://www.allaboutcircuits.com/technical-articles/graphical-programming-languages-labview/
3. http://home.hit.no/~hansha/video/labview_basics.php

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

1 Develop a Virtual Instrument using LabVIEW to communicate with real world.
2 Simulate real time systems using arrays and structures in LabVIEW.
3 Identify salient traits of a virtual instrument and incorporate these traits in their projects.
4 Experiment, analyze and document in the laboratory prototype measurement.
5 Develop program for application like networking, Digital image processing ,controlsystem, etc

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0223	ADVANCED CONTROL SYSTEMS (Professional Elective– I)	L	T	P
Credits:3		3	-	-

Prerequisites: Control Systems

Course Objectives:

To cater the knowledge of basic and modern control system for the real time analysis and design of control systems. To expose the students to the concepts of state variables analysis. To provide adequate knowledge of nonlinear systems. To provide comprehensive knowledge of optimal control and model control.

MODULE I State Space Analysis, Controllability and Observability 10 Periods

State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form. Tests for controllability and observability for continuous time systems – Time varying case, time invariant case, Principle of Duality, Controllability and observability form, Jordan canonical form and other canonical

MODULE II Describing Function Analysis & Phase-Plane Analysis 10 Periods

Introduction to nonlinear systems, types of nonlinearities, describing functions, describing function analysis of nonlinear control systems. Introduction to phase-plane analysis, Method of isoclines for constructing trajectories, singular points, phase-plane analysis of nonlinear control systems.

MODULE III Stability Analysis 9 Periods

Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems.

B: Direct method of Lyapunov for the Linear and Nonlinear continuous time autonomous systems.

MODULE IV Modal Control & Calculus of Variations 10 Periods

Effect of state feedback on controllability and observability, Design of state feedback control through pole placement. Full order observer and reduced order observer. Minimization of functionals of single function, constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrange equation.

MODULE V Optimal Control 9 Periods

Fo rmulation of optimal control problem. Minimum time, minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, continuous-time linear regulators.

Text Books

1. M. Gopal, **"Modern Control System Theory"**, New Age International Publishers, 2nd Edition, 1996.
2. I.J.Nagarath and M.Gopal, **"Control Systems Engineering"**, New Age International Publishers, 5th Edition, 2007.

References

1

E- Resources

1. K. Ogata, **"Modern Control Engineering"**, Prentice Hall of India, 3rd Edition, 1998.
2. M.Gopal, **"Digital Control and State Variable Methods"**, Tata McGraw-Hill Companies, 1997.
3. Stainslaw H. Zak, **"Systems and Control"**, Oxford Press, 2003.
4. Stanley M. Shiners, **"Modern Control System Theory and Design"**, John Wiley and Sons

Publications, 2nd Edition, 1998.
5 Khalil H.D., **"Nonlinear Systems"**, Prentice Hall Publications, 3rd Edition, 2003.

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

1 Analyze the system controllability and observability using state space representation.
2 Analyze the non linear systems using describing function method and phase plane analysis.
3 Analyze the concept of stability of nonlinear systems using Lyapunov's theorems.
4 Design pole-assignment controller and the specific design procedures for minimization and Euler Lagrange theorem.
5 Apply the knowledge of basic and modern control system for the real-time analysis and design the solution for optimal control problems.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: C0224	DIGITAL CONTROL SYSTEMS (Professional Elective– I)	L	T	P
Credits:3		3	-	-

Prerequisites: Control Systems

Course Objectives:

This course deals with z-transforms, the estimation of stability in different domains, the design of discrete time control systems, compensators, state feedback Controllers, state observers through various transformations.

MODULE I Discrete Representation of Continuous Systems 9 Periods

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuits. Mathematical Modeling of sample and hold circuits. Effects of Sampling and Quantization. Choice of sampling frequency. ZoH equivalent.

MODULE II Discrete System Analysis 10 Periods

Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time systems.

Stability of Discrete Time System: Stability analysis by Jury's test. Stability analysis using bilinear transformation. Design of digital control systems with dead beat response. Practical issues with dead beat response design.

MODULE III State Space Approach for Discrete Time Systems 10 Periods

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach-ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on controllability & observability

MODULE IV Design of Digital Control System 10 Periods

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

MODULE V Discrete Output Feedback Control 9 Periods

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.

Text Books

1. K. Ogata, "Digital Control Engineering", Prentice Hall, Englewood Cliffs, 1995.
2. M. Gopal, "Digital Control Engineering", Wiley Eastern, 1988.

References

1 G. F. Franklin, J. D. Powell and M. L. Workman, "Digital Control of Dynamic Systems", Addison-Wesley, 1998.

2 B.C. Kuo, "Digital Control System", Holt, Rinehart and Winston, 1980.

E- Resources

1. https://www.coursehero.com/file/13785953/DIGITAL-CONTROL-SYSTEMSpdf/
2. http://nptel.ac.in/courses/108103008/
3. http://www.sciencedirect.com/science/book/9780123943910

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

1 Obtain discrete representation of LTI systems.
2 Analyze stability of open loop and closed loop discrete-time systems.
3 Understand state space representation of the control systems, concepts of controllability andobservability
4 Design and analyze digital controllers.
5 Design state feedback and output feedback controllers

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	-	-	-	-	-	-	3	2	-	3
CO2	3	2	1	2	2	-	-	-	-	-	-	3	2	-	3
CO3	3	2	1	2	2	-	-	-	-	-	-	3	2	-	3
CO4	3	2	2	2	2	-	-	-	-	-	-	3	2	-	3
CO5	3	2	2	2	2	-	-	-	-	-	-	3	2	-	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: C0225	FUNDAMENTALS OF NANOSCIENCE (Professional Elective–I)	L	T	P
Credits:3		3	-	-

Prerequisites: Undergraduate level Physics, Chemistry

Course Objectives:
To learn about basis of nanomaterial science, preparation method, types and application

MODULE I Introduction 8 Periods
Nano scale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering- Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thin films- multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

MODULE II General Methods of Preparation 9 Periods
Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultra sonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE

MODULE III Nanomaterials 12 Periods
Nano forms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications-Nano metal oxides-ZnO, TiO2,MgO, ZrO2, NiO, Nano alumina, CaO, AgTiO2, Ferrites, Nano clays- functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

MODULE IV Characterization Techniques 9 Periods
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nano indentation

MODULE V Applications 7 Periods
Nano InfoTech: Information storage- Nano computer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: Nano probes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bio imaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nano sensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

Text Books

1. A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.
2. N John Dinardo, “Nanoscale Charecterisation of surfaces & Interfaces”, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

References

1 G Timp, “Nanotechnology”, AIP press/Springer, 1999.

2 AkhleshLakhtakia,"The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.

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

1 Understand the implications of Nano-Technology for Physics, Chemistry, Biology and Engineering
2 Understand the general methods of preparation of nanomaterial.
3 Familiarize about the science of nanomaterial
4 Compare the different characterization techniques of nanomaterial
5 Describe the different applications of nanotechnology.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	1	2	-	-
CO2	3	3	3	-	1	1	-	-	-	-	-	1	2	-	-
CO3	2	3	--	-	-	1	-	-	-	-	-	1	2	-	-
CO4	2	2	2	-	2	1	-	-	-	-	-	1	2	-	-
CO5	1	2	3	1	-	1	-	-	-	-	-	1	2	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code	OPEN ELECTIVE – I	L	T	P
Credits:3		3	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0213	AC MACHINES LAB	L	T	P
Credits: 1.5		-	-	3

Prerequisites: DC Machines Lab

Course Objectives:
This course deals with the practical aspects of various ac machines like transformer, induction motor and synchronous machines.

List of Experiments:

1. OC & SC Tests on Single Phase Transformer.
2. Sumpner's test on a pair of Single Phase Transformers.
3. Scott Connection of Transformers.
4. No-load & Blocked rotor tests on Three Phase Induction Motor.
5. Regulation of Three-Phase Alternator by Synchronous Impedance & M.M.F. Methods.
6. V and Inverted V Curves of a Three-Phase Synchronous Motor.
7. Equivalent Circuit of a Single Phase Induction Motor.
8. Determination of X_d and X_q of Salient Pole Synchronous Machine.
9. Parallel operation of Single Phase Transformers.
10. Brake test on Three Phase Induction Motor.
11. Regulation of Three-Phase Alternator by Z.P.F. and A.S.A Methods.
12. Load test on Three-Phase Alternator.

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

1 Assess the performance of single phase transformer using various methods.
2 Assess the performance of single phase induction motor.
3 Determine the regulation of alternator using different methods
4 Determine the performance of 3 phase induction motor by various methods.
5 Assess the performance of synchronous machines.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0214	CONTROL SYSTEMS LAB	L	T	P
Credits: 1.5		-	-	3

Prerequisites: Nil

Course Objectives:

This course will give the basic knowledge on practical control system and PLC applications. It emphasizes the knowledge on applications of machines & electronic devices with control systems

List of Experiments:

1. Time Response of Second Order System.
2. Characteristics of Synchros.
3. Programmable Logic Controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC Servo Motor.
5. Transfer function of DC Motor.
6. Effect of P, PD, PI, PID Controller on a Second Order System.
7. Lag and Lead Compensation – Magnitude and Phase Plots.
8. Temperature Controller using PID (open loop & closed loop).
9. Characteristics of Magnetic Amplifiers (Series, Parallel & Separately-Excited).
10. Characteristics of AC Servo Motor.
11. Stability Analysis (Root Locus, Bode, Nyquist) of Linear Time Invariant system using MATLAB.
12. State Space Model for Classical Transfer Function using MATLAB.

Course Outcomes : At the end of the course, students will be able to	
1	Formulate transfer function for given control system problems.
2	Ability to find time response of given control system model.
3	Plot Root Locus and Bode plots for given control system model by using MATLAB.
4	Ability to design Lead, Lag, Lead-Lag systems in control systems.
5	Ability to design PID controllers for given control system model.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	-	2	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C0563	FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS LAB (Common for CE, EEE, ME, ECE, MiE.)	L	T	P
Credits: 2		-	1	2

Prerequisites: Nil

Course Objectives:

This course enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example project. The student is expected to practice the querying a relational database i.e., "Mysql" with various functionalities of SQL and PL/SQL statements using a sample database.

Sample Database:

Railway Reservation System -(Redesigning IRCTC database)

Train (train Number, name, source, destination, start_time, reach_time, traveltime, distance, class, days, type)

Ticket (PNRNo, Transactionid, from_station, To_station, date_of_journey, class date_of_booking, total_ticket_fare, train number)

Passenger (PNR No, Serial no, Name, Age, Reservation_status)

Train_Route(Train_No, route_no, station_code, name, arrival_time, depart_time, distance, day)

Train_Ticket_fare (Train_No, class, base_fare, reservation_charge, superfast_charge, other_charge, tatkal_charge, service_tax)

List of experiments:

1 SQL Data Definition Language Commands: Create all the tables specified above. Make underlined columns as primary key. (use number, number(m,n), varchar(n), date, time, timestamp data types appropriately)
Insert at least 5 rows to each table. (Check www.irctc.co.in website for actual data)

2 SQL Data Manipulation Language Commands:

1. Change the name of the Passenger table to Passenger_Details.
2. List all train details.
3. List all passenger details.
4. Give a list of trains in ascending order of number.
5. List the senior citizen passengers details.
6. List the station names where code starts with 'M'.
7. List the trains details within a range of numbers.
8. Change the super fast charge value in train fare as zero, if it is null.
9. List the passenger names whose tickets are not confirmed.
10. Remove all the rows from Passenger table permanently.

3 Create (Alter table to add constraint) the necessary foreign keys by identifying the relationships in the table.

1) Add a suitable constraint to train table to always have train no in the range 10001 to 99999.
2) Add a suitable constraint for the column of station name, so that does not take

duplicates.

3) Change the data type of arrival time, depart time (date -> timestamp or timestamp to date), and do the necessary process for updating the table with new values.

4) Add a suitable constraint for the class column that it should take values only as 1A, 2A, 3A, SL, C.

5) Add a not null constraint for the column distance in train_route.

4 Designing Employee Database with MySQL (Create and insert data in EMP table, DEPT table and SALGRADE table)

5 Multi row functions, GROUP By clause, HAVING clause, ORDER BY clause in SQL on sample database.

6 Use Join Query

1. Find the train names that stop in 'Katpadi'.
2. Find the train names that are superfast and the service tax is zero.
3. Find the Passenger name (and train name) who have booked for the train that starts from 'Chennai'.
4. Display the trains names, each type of class and the total fare for each type of class.
5. Display all the train details and the ticket details (if booked any).

7 Use Nested Query(in Operators)

1. Find the train names that stop in 'Warangal'.
2. Find the train names that are superfast and the service tax is zero.
3. Find the Passenger name who have booked for the train that starts from 'Secunderabad'.
4. Find the trains names that have all the AC coaches and the base fare is less than 3000 for each case.

8 Create sample Views and practice basic operation

9 Write a PL/SQL procedures to practice Conditional Statements

10 Write a PL/SQL procedures to practice Iterative Statements

11 Implementing simple trigger

12 Implementing simple cursor

Text Books

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

References

1 Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.

2 SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,

3 Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.

4 Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO3	2	2	2	3	-	-	-	-	-	-	-	-	-	2	2

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. V Semester		
Code: C00M3	QUANTITATIVE APTITUDE AND VERBAL REASONING – I (Common for All Branches)	L	T	P
Credits: Nil		1	1	-

Course objectives:

The Quantitative Aptitude course is designed to equip students with essential mathematical and analytical skills required for various competitive exams, academic pursuits, and real-world problem-solving scenarios. The primary objective of this course is to enhance participants' numerical ability and logical reasoning, enabling them to tackle quantitative questions with confidence and efficiency.

MODULE - I **[8 Periods]**

Quants: Percentages, Profit and Loss.

Percentages- Percentage Increase/Decrease; Results on Population; Results on Depreciation.
Profit & Loss- Cost Price; Selling Price: Profit or Gain; Gain Percentage; Loss Percentage.

Verbal: Sentence Completion

Sentence Completion- Formats of Question; Strategies to solve sentence completion questions- Proactive and reactive solving, Identifying clues- Signposts, Types of signposts, Root words, Sentence structure clues.

Logical: Blood Relation

Blood Relations- Classification of blood relations, Pointing a person, Equation related problems.

MODULE - II **[6 Periods]**

Quants: Interests

Interests- Types of interest; Simple interest; principle; Rate of interest; compound interest; interest is compounded Annually; interest is compounded Half-yearly; interest is compounded Quarterly; Rates are different for different years, say R_1%, R_2%, R_3% for 1st, 2nd and 3rd year respectively; Present worth of Rs. x due n years.

Verbal: Articles, Interrogatives

Articles- Types of articles, Countable nouns, Uncountable nouns, Usage of articles, Omission of articles.

Interrogatives- Definition, Types of Interrogatives, Question Tags.

Logical: Clocks

Clocks: Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.

MODULE - III **[6 Periods]**

Quants: Ratio and Proportion, Averages

Ratios & Proportion- The ratio of two quantities a and b in the same units; Proportion; The equality of two ratios is called proportion; Fourth Proportional; Mean Proportional; Comparison of Ratios; Duplicate Ratios; Variations.
Averages- Average Speed, Weighted average.

Verbal: Idioms and Miscellaneous Vocabulary

Idioms- Idioms and phrasal verbs, Word Analogy, Patterns of questions on Word Analogy; Miscellaneous Vocabulary.

Logical: Coding and Decoding

Coding and Decoding- Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.

MODULE - IV **[6 Periods]**

Quants: Time and Work;

Time & Work- Work from Days: Calculate the one-day work; Days from Work: Shortcut to calculate the work in given time.

Verbal: Voices and Speech

Voices- Introduction- Sentence, Parts of a sentence, Voice of a sentence, Types of voices, Identifying the voice of a sentence, Changing the voice of a sentence.

Speech- Direct & Indirect, Identifying the speech, Change of Speech.

Logical: Directions

- Directions - Introduction, Direction based questions, Shadow based problems.

MODULE - V **[6 Periods]**

Quants: Mixtures and Alligations

- Alligation- Mean Price; Rule of Alligation; a container contains x of liquid from which y units are taken out and replaced by water;

Verbal: Reading Comprehension

- Reading Comprehension- Speed reading strategies; Reading Comprehension - types of questions, tackling strategies.

Logical: Cubes

- Cubes- Cube & cuboid concepts, 3-2-1-0 faced problems.

Text Books:

Reference Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal
2. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
3. "Fast Track Objective Arithmetic" by Rajesh Verma
4. "Magical Book on Quicker Maths" by M. Tyra
5. "Quantitative Aptitude Quantum CAT" by Sarvesh K. Verma

e-Resources:

Concerned Website links:

1. Khan Academy (https://www.khanacademy.org/):
2. MathIsFun (https://www.mathsisfun.com/)
3. GMAT Club (https://gmatclub.com/)
4. IndiaBIX (https://www.indiabix.com/)
5. Studytonight (https://www.studytonight.com/)

Course Outcomes:

After completion of the course students will be able to:

1. Develop Strong Mathematical Foundations: Gain a comprehensive understanding of fundamental mathematical concepts, including arithmetic, algebra, geometry, and data interpretation, providing a solid basis for tackling quantitative problems.
2. Enhance Problem-Solving Skills: Learn diverse problem-solving techniques and

strategies to approach quantitative questions in a systematic manner, enabling efficient and accurate solutions.

3. Improve Speed and Accuracy on Averages: Practice through a variety of exercises and timed quizzes to enhance computational speed and precision, vital for competitive exams and time-sensitive tasks.
4. Master Time and work: Acquire skills in interpreting data from time and work scenarios decisions based on the given information.
5. Build Allegation and mixtures: Strengthen logical reasoning abilities to analyze and deduce patterns, aiding in solving complex quantitative problems.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**1**	**2**	**2**							2					
CO2	**1**	**2**	**2**							2					
CO3	**1**	**2**	**2**							2					
CO4	**1**	**2**	**2**							2					
CO5	**1**	**2**	**2**							2					

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C00M6	INTELLECTUAL PROPERTY RIGHTS	L	T	P
Credits: Nil		3	-	-

Course Objectives:

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

Course Outcomes:

- Distinguish and Explain various forms of IPRs.
- Identify criteria to fit one's own intellectual work in particular form of IPRs.
- Apply statutory provisions to protect particular forms of IPRs.
- Appraise new developments in IPR laws at national and international level

UNIT – I

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trademark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, and trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trademark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international – trademark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOK:

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

SEMESTER – VI

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0215	POWER SYSTEM ANALYSIS	L	T	P
Credits: 3		3	-	-

Prerequisites: DC Machines & Transformers, AC Machines, Power Transmission Systems

Course Objectives:

- To model the power system under steady state operating condition
- To understand and apply iterative techniques for power flow analysis
- To model and carry out short circuit studies on power system
  To model and analyze stability problems in power system

MODULE I POWER SYSTEM 9 Periods

Power system components – Representation - Single line diagram - per unit quantities - p.u. impedance diagram - p.u. reactance diagram - Network graph, Bus incidence matrix, Primitive parameters, Bus admittance matrix from primitive parameters - Representation of off nominal transformer - Formation of bus admittance matrix of large power network

MODULE II POWER FLOW ANALYSIS 9 Periods

Bus classification - Formulation of Power Flow problem in polar coordinates - Power flow solution using Gauss Seidel method - Handling of Voltage controlled buses - Power Flow Solution by Newton Raphson method.

MODULE III SYMMETRICAL FAULT ANALYSIS 9 Periods

Assumptions in short circuit analysis - Symmetrical short circuit analysis - Bus Impedance matrix building algorithm (without mutual coupling) – Symmetrical fault analysis through bus impedance matrix - Post fault bus voltages - Fault level – Current limiting reactors

MODULE IV UNSYMMETRICAL FAULT ANALYSIS 9 Periods

Symmetrical components - Sequence impedances - Sequence networks - Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG - unsymmetrical fault occurring at any point in a power system - computation of post fault currents in symmetrical component and phasor domains.

MODULE V STABILITY ANALYSIS 9 Periods

Classification of power system stability – Rotor angle stability - Swing equation – Swing curve - Power-Angle equation - Equal area criterion - Critical clearing angle and time -Classical step-by-step solution of the swing equation.

Text Books

1. John J. Grainger, William D. Stevenson, Jr, 'Power System Analysis', Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

References

1. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-HillPublishing Company Ltd., New Delhi, Second Edition, 2007.
2. J. Duncan Glover, MulukutlaS.Sarma, Thomas J. Overbye, 'Power System Analysis&Design', Cengage Learning, Fifth Edition, 2012.

3 Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, 2001.

4 Kundur P., 'Power System Stability and Control', Tata McGraw Hill Education Pvt.Ltd., New Delhi, 10th reprint, 2010.

E- Resources

1. https://nptel.ac.in/courses/108/105/108105067/
2. https://nptel.ac.in/content/storage2/courses/108104051/chapter_9/9_1.html

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

1 Formulate the incidence, network matrices and model the power system components
2 Understand and apply iterative techniques for power flow analysis
3 Analyze a power system network under Symmetrical Conditions
4 Understand Positive Sequence, Negative & zero sequence system and fault analysis.
5 Analyze power system operation and stability control

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0216	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	L	T	P
Credits:3		3	-	-

Prerequisites: Applied Physics, Electrical Circuits Analysis and Synthesis

Course Objectives:

This course deals about the different types of instruments to measure electrical quantities, various kinds of bridges for measurement of electrical parameters, measurement of high voltage and current by instrument transformers. It also emphasis on electronic measurements and measurement of physical quantities by transducers.

MODULE I Measuring Instruments 10 Periods

Classification of measuring Instruments -Methods of measurements, Block Diagram - Measurement system, Types of Errors, Deflecting, Control and Damping Torques PMMC, Moving iron type instruments - Expression for the deflecting torque and control torque-Extension of range using shunts and series resistance, dynamometer type instruments, Electrostatic Voltmeters.

Measurement of Power and Energy:

Electro – Dynamic wattmeter, Wattmeter methods, Three ammeter and three voltmeter methods - for low frequency power measurement, Single phase energy meter, Errors and compensation testing by phantom loading using R.S.S. meter - Power factor meters.

MODULE II Measurement of Resistance, Inductance and Capacitance 10 Periods

Measurement of low, medium and high resistances – Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge, insulation resistance measurement, loss of charge method, Megger, Wagner's Earthing device.

AC bridges:

Inductance measurement : Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge Capacitance measurement : De-Sauty's bridge, Schering Bridge (LV & HV bridges), Wein's bridge.

MODULE III Instrument Transformers 10 Periods

Current and Potential transformers, ratio and phase angle errors, testing and measurement of power using instrument transformers.

B:Potentiometers: Applications and DC potentiometers Principle and operation of D.C. Crompton's potentiometer – standardization –AC polar and coordinate types standardization – Measurement of unknown resistance, current, Calibration of Voltmeters and Ammeters using potentiometers.

MODULE IV Electronic Measurements 9 Periods

A: CRO: Block diagram, Sweep generation, vertical amplifiers, Lissajous pattern, measurement of frequency, phase, Amplitude.

B: Digital Multi-meter: Block diagram, principle of operation, Accuracy of measurement, Electronic Voltmeter: principle of operation, various types of electronic voltmeter, Digital Frequency meter.

MODULE V Instrumentation 9 Periods

Transducers, classification & selection of transducers, Calibration, Calibration procedures. Resistance transducer - Strain gauges, inductive transducers - LVDT & Capacitive transducers, piezoelectric and Hall-effect transducers, thermistors, thermocouples, photo-diodes & photo-

transistors, encoder type digital transducers. Signal conditioning and telemetry. Basic concepts of smart sensors and application. Data Acquisition Systems – Introduction and block diagram.

Text Books

1. A.K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Sons Publications, New Delhi, 2012.
2. E. W. Golding & F. C. Widdis, "Electrical Measurement & Measuring Instrument", 5th Edition, A.H.Wheeler & Co., India, 2011.

References

1 Jones, B.E, "Instrumentation Measurement and Feedback", Tata McGraw Hill, 1986.

2 Helfrick Albert D, Cooper William. D, "Modern Electronic Instrumentation and Measurement Techniques", Prentice-Hall of India, Reprint 1992.

3 J. B. Gupta, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, Delhi, 2003.

4 Doebelin E.O. and Manik D.N., "Measurement Systems – Applications and Design", Tata McGraw Hill Education Pvt. Ltd., Special Indian Edition, 2007.

5 D.V.S. Moorthy, "Transducers and Instrumentation", Prentice Hall of India Pvt. Ltd., 2007.

E- Resources

1. https://www.electrical4u.com/electrical-measuring-instruments-types-accuracy-precision-resolution-speed/
2. https://www.eeweb.com/test-and-measure
3. https://www.youtube.com/watch?v=moSUpIRCKMk

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

1 Understand the methods of measurement and its types.

2 Determine the circuit parameters (R, L and C) using bridges.

3 Understand the principle of operation of current and potential transformers

4 Comprehend the construction, operation and application of voltmeter, wattmeter & energy meter and understand the measurement of parameters using CRO.

5 Explain the function and working of various transducers for measuring physical quantities.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0410	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P
Credits:3		3	-	-

Pre-Requisites: Digital Electronics.

CourseObjectives::This course provides the students to understand operation and programming of 8085 Microprocessor, develops real time applications using 8086 processor, understand the basic concepts of 8051 Microcontroller and interfacing with I/O devices.

MODULEI:8085 ARCHITECTURE [10 PERIODS]

Introduction to Microprocessors, Architecture of 8085, registers & flag register, Pin Configuration and Functions, Generation of Control Signals: Bus Timings: De-multiplexing of address/ data bus. Instruction Set and Programming with 8085.

MODULEII:8086 ARCHITECTURE [10PERIODS]

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Physical Memory Organization, Signal descriptions of 8086, interrupts of 8086.

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

MODULEIII: INTRODUCTION TO MICROCONTROLLERS: [10PERIODS]

A:Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

B: 8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

MODULEIV: I/O AND MEMORY INTERFACE [10PERIODS]

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

MODULEV:ARM Architecture [10Periods]

A: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

B: **Advanced ARM Processors:** Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture. Introduction to Intel i3, i5 and i7 Processors.

TEXTBOOKS:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programing and Application with 8085"Penram,5th Edition, 2002.
2. A. K.Ray, "Advanced Micro processors and Peripherals" 3 rdTata McGraw-Hill, Edition.
3. Mazidi, Mazidi&McKinlay, "The 8051 Microcontroller and Embedded Systems using Assembly and C" 2 ndEdition, PHI .
4. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012.

REFERENCE BOOKS:

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, AndhePallavi, Pearson, 2009

E-Resources:

1. https://www.tutorialspoint.com › Microprocessor › Microprocessor - 8085 Architecture
2. http://www.cpu-world.com/CPUs/8086/
3. https://www.journals.elsevier.com/microprocessors-and-microsystems/
4. http://rtcmagazine.com/technologies/view/Microcontrollers
5. http://nptel.ac.in/courses/106108100/
6. http://nptel.ac.in/courses/108107029/
7. nptel.ac.in/courses/106108100/

COURSE OUTCOMES:

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

1. Explain 8085 microprocessor features..
2. Develop programs using 8085 instruction set.
3. Identify peripheral devices to interface with 8086 microprocessor.
4. Get Summarize different 8051 family microcontrollers.
5. Design to interface input and output devices with 8051 microcontroller.

CO-PO,PSO Mapping
(3/2/1indicatesstrengthofcorrelation)3-Strong, 2-Medium,1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	1	-	-	-	-	-	-	-	-	1	3		
CO2	3	2	1	1	2	-	-	-	-	-	-	1	3	2	2
CO3	3	2	2	2	2	-	-	-	-	-	-	2	3	2	2
CO4	3	1	1	-	-	-	-	-	-	-	-		3		
CO5	3	3	3	2	2	-	-	-	-	-	-	2	3	2	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0226	ELECTRICAL DRIVES (Professional Elective - II)	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines & Transformers, AC Machines and Power Electronics

Course Objectives:
To expose the students about the basic idea of electric drives and its characteristics by various power converter topologies. To familiar with the control of DC & AC motors with different techniques.

MODULE I Electric Drives **10 Periods**

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

Control of DC motors by Single phase Converters:

Introduction to thyristor controlled drives, single phase semi and fully controlled converters connected to D.C separately excited and D.C series motors – continuous current operation – output voltage and current waveforms – Speed and torque expressions – Speed–Torque characteristics - Problems on converter fed D.C motors.

MODULE II Control of DC Motors by Three Phase Converters **9 Periods**

Three phase semi and fully controlled converters connected to D.C separately excited and D.C series motors – Output voltage and current wave forms – Speed and Torque expressions – Speed – Torque characteristics – Problems

MODULE III Four Quadrant Operations of DC Drives **10 Periods**

A: Introduction to Four quadrant operation – Motoring operations. Electric Braking – Plugging, dynamic and regenerative braking operations. Four quadrant operation of D.C motors by dual converters.

B: Control of DC motors by Choppers:

Single quadrant, Two quadrant and four quadrant chopper fed D.C separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – Speed torque characteristics – Problems on chopper fed D.C Motors.

MODULE IV Control of Induction Motor through Stator Voltage and Stator Frequency **10 Periods**

Variable voltage characteristics - Control of Induction Motor by AC voltage controllers Waveforms – Speed torque characteristics.Variable frequency characteristics - Control of induction motor by voltage source inverter and current source inverter - Cyclo converters - PWM control – Introduction to CSI and VSI – Comparison of VSI and CSI operations – Speed torque characteristics – Numerical problems on induction motor drives.

MODULE V Control of Induction Motor through Rotor & Synchronous Motors **9 Periods**

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer drive – their performance and speed torque characteristics – advantages - applications – Problems. Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI.

Text Books

1. G.K. Dubey, “Fundamentals of Electric Drives”, Narosa Publications, 5th Edition, reprint, 2005.

2. B.K.Bose, “Modern Power Electronics and AC Drives”, Prentice Hall Inc., 2002.

References

1 MD Singh and K B Khanchandani, “Power Electronics”, Tata McGraw Hill Publishing Company, 1998.

2 Vedam Subramanyam, “Thyristor Control of Electric Drives”, Tata McGraw Hill Publilcations, Reprint 2001.

3 SK Pillai, “A First Course on Electrical Drives”, New Age International (P) Ltd., Reprint 2009.

4 R. Krishnan, “Electric Motor & Drives Modeling, Analysis and Control”, Prentice Hall of India, 1st Edition, 2001.

5 P.C.Sen, “Thyristor DC Drives”, John Wiley & Sons, New York, 2008.

E- Resources

1. https://www.eeweb.com/electromechanical
2. https://www.electrical4u.com/electrical-drives/
3. http://nptel.ac.in/courses/108108077/

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

1 To paraphrase the characteristics of electric drives and control of D.C motors.

2 Analyze the control of D.C motor by three phase converter.

3 Describe the various braking operations of D.C motors by dual converter and choppers.

4 Express the control of induction motor by various converter topologies.

5 Analyze the control of induction motor through rotor side & control of synchronous motors by VSI.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO2	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0227	ELECTRICAL MACHINE DESIGN (Professional Elective - II)	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines and Transformers and AC Machines.

Course Objectives:

To expose the students about the mmf calculations and thermal ratings of various types of electrical machines. To design the main dimension of DC machines, AC machines and transformer based on power ratings and cooling system of electrical machines.

MODULE I INTRODUCTION 10 Periods

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings - Thermal considerations - Heat flow – Temperature rise and Insulating Materials - Rating of machines – Standard specifications.

MODULE II DC MACHINES 9 Periods

Output Equations – Main Dimensions – Choice of Specific Electric and Magnetic Loading – Magnetic Circuits Calculations - Carter's Coefficient - Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature – Design of commutator and brushes – performance prediction using design values.

MODULE III INDUCTION MOTORS 10 Periods

A: Output equation of Induction motor – Main dimensions – Choice of Average flux density – Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings.

B:Design of wound rotor – Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current - Short circuit current – Operating characteristics- Losses and Efficiency.

MODULE IV SYNCHRONOUS MACHINES 10 Periods

Output equations – choice of Electrical and Magnetic Loading – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

MODULE V TRANSFORMERS 9 Periods

Constructional details of core and shell type transformers – output rating of single phase and three phase transformers – optimum design of transformers – design of core, yoke and windings for core and shell type transformers – equivalent circuit parameters from designed data – losses and efficiency calculations.

Text Books

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, 1984.
2. M.V.Deshpande "Design and Testing of Electrical Machine Design" Wheeler Publications, 2010.

References

1 A.Shanmuga Sundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data

2 Book', New Age International Pvt. Ltd., Reprint, 2007.

3 R.K.Agarwal " Principles of Electrical Machine Design" Esskay Publications, Delhi, 2002.

E- Resources

1. http://www.motor-engineer.net/engineering-center/learn/tutorial-electric-machine-design-hendershot/
2. http://nptel.ac.in/courses/108106023/
3. https://www.youtube.com/watch?v=krNH7-wDnZk

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

1 Calculate the magnetic circuit parameters of electrical machines.
2 Design main dimension of DC machines, AC machines and transformer
3 based on power ratings
4 Design the internal dimensions of various electrical machines.
5 Evaluate the thermal ratings of electrical machines

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0228	ELECTRICAL ESTIMATION AND COSTING	L	T	P
Credits:3	(Professional Elective – II)	3	-	-

Prerequisites: Nil

Course Objectives:
To expose the subject highlights on elements of estimation and costing, budgeting of service connections and also about contracting, maintenance.

MODULE I ELEMENTS OF ESTIMATING & COSTING OF DOMESTIC AND INDUSTRIAL WIRING **9 Periods**

Definition of ―Estimation, Types of estimation and estimation tools, Overhead and service charges, Purchase procedure. Layout and wiring diagram for residential building and industrial wiring, Selection of number of circuit for project as per IE rules, Estimation for residential wiring and industrial wiring, I.E. rules observed for above wiring.

MODULE II ESTIMATING & COSTING OF SERVICE CONNECTIONS **9 Periods**

Survey work for domestic and industrial service connection, Lay out/ wiring diagram of service connection (given project work), List of materials and accessories along with specifications required for given project work, Estimation of service connection for domestic and industrial (1phase and 3phase) service connections, I.E. rules pertaining to above wiring.

MODULE III ESTIMATION OF OVER HEAD AND UNDERGROUND DISTRIBUTION LINE **10 Periods**

A: Survey work for estimation of overhead and underground distribution system, Planning and layout of project, List of materials and accessories required for the given project.

B: Procedure for preparing estimate for 440 V, 3 phase, 4 wire or 3 wire overhead and underground distribution system, Necessary drawing/ sketches of overhead and underground service connection, I.E. rules pertaining to above project.

MODULE IV ESTIMATING & COSTING OF ELECTRICAL PRODUCT **10 Periods**

Market survey for cost of given product like D.O.L. starter, small motor, monoblock pump, automatic electric iron, table/ceiling fan, ICDP/ICTP switch etc, Preparation of detailed drawing work of the product, Preparation of material quantity sheet for the product, Market survey for availability of required materials, their cost and other requirements, Preparation of cost schedule of product, Find out cost of product considering material cost, labour cost and overhead charges, Validation of cost schedule, Financial arrangement for the product.

MODULE V ESTIMATING & COSTING OF REPAIR & MAINTENANCE OF ELECTRICAL DEVICES AND EQUIPMENT **10 Periods**

Location of fault, Materials required and their cost for remedial measure of fault, Estimation of repairing cost. Estimation of maintenance, servicing and testing cost including labour cost (service charge), Tools used for repairs & maintenance work, Detailed estimation and preparation of cost schedule for repair and maintenance of electric fan, automatic electric iron, single phase transformer, mixy, D.O.L. starter etc.

Text Books

1. S.L. Uppal, "Electrical Wiring, Estimating and Costing", Khanna Publisher
2. S.K. Bhattacharya ,"TTTI", Chandigarh.

References

1. M.N. Bajpai,“ Electrical estimating and costing” , Saroj publication.
2. S.O.Rs of P.W.D. Govt. departments.
3. I.E. rules gadget.
4. Electrical costing, estimating and contracting.

E- Resources

1. http://www.navodayaengg.in/study-material/eee/semester-viii/estimation-and-costing/
2. http://arieseee.blogspot.in/2013/04/electrical-installation-and-estimation.html
3. http://www.cercind.gov.in/ElectSupplyAct1948.pdf

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

1. Understand elements of estimating & costing of domestic and industrial wiring.
2. Comprehend the estimation of service connection for domestic and industrial service connections.
3. Analyze the estimation of overhead and underground distribution line.
4. Estimate and prepare the cost schedule for a given electrical product.
5. Understand the maintenance of electrical devices and principles of contracting.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0229	SMPS AND UPS (Professional Elective– II)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Electronics

Course Objectives:
This course deals with the Modern power electronic converters and its applications in electric power utility. Resonant converters and UPS

MODULE I BASIC CONVERTER CIRCUITS 9 Periods
Linear regulator Vs. Switching regulator – Topologies of SMPS – isolated and non isolated topologies – Buck – Boost – Buck boost – Cuk – Polarity inverting topologies – Push pull and forward converters half bridge and full bridge – Fly back converters Voltage fed and current fed topologies. EMI issues.

MODULE II SWITCHED MODE POWER CONVERTERS 9 Periods
Analysis and state space modeling of fly back, Forward, Push pull, Luo, Half bridge and fullbridge converters- control circuits and PWM techniques.

MODULE III RESONANT CONVERTERS 10 Periods
Introduction- classification- basic concepts- Resonant switch- Load Resonant converters-ZVS , Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Seriesand parallel Resonant inverters- Voltage control.

MODULE IV DESIGN CONSIDERATIONS 10 Periods
Selection of output filter capacitor, Selection of energy storage inductor, Design of High Frequency Inductor and High frequency Transformer, Selection of switches. Snubber circuit design, Design of driver circuits.

MODULE V POWER CONDITIONERS, UPS & FILTERS 10 Periods
Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

Text Books

1. Simon Ang, Alejandro Oliva," Power-Switching Converters", Third Edition, CRC
2. Press, 2010.
3 KjeldThorborg, "Power Electronics – In theory and Practice", Overseas Press, First

References

1 Philip T Krein, " Elements of Power Electronics", Oxford University Press
2 Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters,Applications and design- Third Edition- John Wiley and Sons- 2006
3 M.H. Rashid – Power Electronics circuits, devices and applications- third edition
4 Prentice Hall of India New Delhi, 2007.

E- Resources
1. https://nptel.ac.in/courses/108/108/108108036/
2. https://www.coursera.org/specializations/power-electronics
3. https://nptel.ac.in/content/storage2/courses/108105066/PDF/L33(DP)(PE)%20((EE)NPTEL).pdf

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

1 Analyze various modes of operation of Dc-Dc converter
2 Acquire knowledge on switched mode power converters.
3 Understand the importance of Resonant Converters.
4 Design various components of dc-dc converter
5 Acquire knowledge on filters and UPS

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	-	-	-	-	-	-	1	1	2	-	3
CO2	2	1	2	2	-	-	-	-	-	-	1	1	2	-	3
CO3	2	2	2	2	-	-	-	-	-	-	1	1	2	-	3
CO4	2	1	1	1	-	-	-	-	-	-	1	1	2	-	3
CO5	2	1	1	1	-	-	-	-	-	-	1	1	2	-	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0230	BIOMEDICAL INSTRUMENTATION (Professional Elective– II)	L	T	P
Credits:3		3	-	-

Prerequisites: Basic Electronics, Instrumentation

Course Objectives:

- To Introduce Fundamentals of Biomedical Engineering
- To study the communication mechanics in a biomedical system with few examples
- To study measurement of certain important electrical and non-electrical parameters
- To understand the basic principles in imaging techniques
  To have a basic knowledge in life assisting and therapeutic devices

MODULE I Fundamentals of Biomedical Engineering 9 Periods

Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals -Basic components of a biomedical system- Cardiovascular systems- Respiratory systems -Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues -Physiological signals and transducers-Transducers– selection criteria– Piezoelectric,ultrasonictransducers-Temperaturemeasurements-Fibreoptictemperaturesensors

MODULE II Non-Electrical Parameters Measurement and Diagnostic Procedures 9 Periods

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers, pH of blood –measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements

MODULE III Electrical Parameters Acquisition and Analysis 9 Periods

Electrodes – Limb electrodes –floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipment.

MODULE IV Imaging Modalities and Analysis 9 Periods

Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography –Different types of biotelemetry systems - Retinal Imaging - Imaging application in Biometric systems

MODULE V Life Assisting, Therapeutic and Robotic Devices 9 Periods

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialysers – Lithotripsy - ICCU patient monitoring system - Nano Robots - Robotic surgery –Orthopedic prostheses fixation

Text Books

1. Leslie Cromwell, “Biomedical Instrumentation and Measurement”, Prentice Hall of India, New Delhi, 2007.
2. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, New Delhi,2nd edition, 2003
3 Joseph J Carr and John M.Brown, Introduction to Biomedical Equipment Technology, John Wiley and sons, New York, 4th edition, 2012

References

1. John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, New York, 1998.
2. Duane Knudson, Fundamentals of Biomechanics, Springer, 2nd Edition, 2007.
3. Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.
4. Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.
5. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.

E- Resources

1. https://www.biomedicalinstrumentationsystems.com/the-introduction-to-biomedical-instrumentation/
2. https://www.medicalnewstoday.com/articles/cardiovascular-system#anatomy
3. https://www.ncbi.nlm.nih.gov/books/NBK279251/
4. http://www.nitjsr.ac.in/course_assignment/Biomedical%20Engineering_1.pdf
5. https://www.youtube.com/watch?v=0d_P5kXkAvE

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

1. Understand the philosophy of the heart, lung, blood circulation and respiration system.
2. Measure and analyze the non electricalbiomedical and physiological information
3. Understand and explain the working and concepts of ECG,EMG,EEG and ERG
4. Explain and analyze the modern methods of imaging techniques.
5. Explain the medical assistance/techniques, robotic and therapeutic equipments.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	1	-	-	-	-	-	1	2	-	2
CO2	3	3	2	2	2	1	-	-	-	-	-	1	2	-	3
CO3	3	2	2	2	2	1	-	-	-	-	-	1	2	-	3
CO4	3	2	1	1	2	1	-	-	-	-	-	1	2	-	3
CO5	3	2	1	1	2	1	-	-	-	-	-	1	2	-	3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:	**OPEN ELECTIVE – II**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0H03	ENGLISH COMMUNICATION AND PRESENTATION SKILLS LAB (Common for EEE, ECE,CSE and IT)	L	T	P
Credits:1		-	-	2

Prerequisites : Nil

Course Objectives:

The learners need to be aware of the characteristics of technical communication in their workplaces; as a result, they are exposed to different channels of technical communication. Hence the acquired skills make the learners effective communicators using persuasive language. Besides the above said, one of the major objectives is to maintain objectivity in writing documents and to produce professional quality documents using different components of the language.

Methodology:

Facilitator's role: Since classroom learning augments thinking process, helping them to develop written, spoken and non verbal communication, the facilitator / Faculty would briefly discuss the topics with the students and later on guide them while the students involved in activities, writing work and while making presentations. The facilitator is required to design a lot of practical/industry oriented project works for the students

*Students are required to participate, perform, write and submit the work in the form of written documents or Power Point Presentations to hone their spoken written and non verbal communication skills. Students are to take up field work and submit the project work.

MODULE I Oral Presentations 9 Periods

Mechanics of Presentations – Methodology of Presentation, Importance of Non-verbal communication during presentations– Nuances of Presentation.

*This particular module is for internal evaluation purpose(s).

MODULE II E - Correspondence and Social Media Etiquette 9 Periods

Common web mail services, yahoo, gmailetc, fields to pay attention- To:, Cc:, Bcc:, Reply All, Subject, Salutation, Body, Signature, Font, Caps Lock , Highlight, The 'KISS' strategy (Keep It Simple and Short,)Points to remember while signing off, Introduction to Technical Vocabulary, Cultural Differences

- This Module is purely for internal assessment/evaluation

MODULE III Group Discussion 9 Periods

.Initiators- Contributor-Informer-Team Leader-Motivator-Creative Contributor , Importance of , Non verbal communication -eye contact, voice characters, posture, gestures, do's and don'ts, Role play and Simulation- Learners assuming the roles of characters and participating in Group discussion, analysis, or prediction with strictly defined goals.

MODULE IV Interview Skills & Office Etiquette 9 Periods

Preparing for the interview, types of interviews, interview session, importance of non verbal communication during the interview, do's and don'ts of interview, follow up and thanking letter. FAQ's. Formal Conversation, office attire- do's and don'ts, greetings and meetings, speaking to seniors and handshakes, offering and taking visiting cards, Asking questions and Seeking Clarifications.

MODULE V Career Progression 9 Periods

Job Hunt Process-SWOT analysis, correspondence and browsing the internet to search for a suitable job(s), job application-cover letter drafting, drafting a winning resume', types of resume's -electronic, video and printed resume's

- Instruction: Students are required to prepare their video resume which will be assessed by the faculty member.

References

1 Chrissie: **Handbook of Practical Communication Skills**: Jaico Publishing house, 1999.

2 Daniels, Aubrey: **Bringing Out the Best in People**: Tata McGraw-Hill: New York, 2003.

3 Wright, Goulstone, Mark: **Just Listen: Discover the Secret to getting through to absolutely anything** : American Management Association, 2010.

4 Leslie. T. Giblin: **Skill with people** Publication details not known

5 Lewis, Norman: **Word Power Made Easy**: Goyal Publications: New Delhi, 2009.

6 Murthy, A.G, Krishna,:**Ten Much** : Tata McGraw-Hill :New Delhi, 2010.

E- Resources

1. http://www.mindtools.com/pages/article/newTMC_05.htm
2. http://www.kent.ac.uk/careers/intervw.htm
3. http://www.wikihow.com/Write-a-Report

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

1 Give Oral Presentations Confidently.

2 Draft appropriate Resume in accordance with the context.

3 Participate and present their view and ideas logically and confidently.

4 Understand the importance of communication in various settings.

5 Utilize the technology for career advancement.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	-	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-
CO4	-	-	-	-	1	1	-	-	1	2	-	2	-	-	-
CO5	-	-	-	1	1	-	-	-	1	2	-	2	-	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0217	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB	L	T	P
Credits: 1		-	-	2

Prerequisites: Nil

To impart the basic knowledge of measuring instruments. To train the students to have the solid foundation in measuring the basic electrical elements like resistance, inductance, capacitance and measurement of power and energy.

Course Objectives:

impart the basic knowledge of measuring instruments. To train the students to have the solid foundation in measuring the basic electrical elements like resistance, inductance, capacitance and measurement of power and energy.

List of Experiments:

1. Calibration and Testing of single phase energy meter.
2. Calibration of dynamometer power factor meter.
3. Calibration of LVDT.
4. Measurement of Resistance using Kelvin's Double Bridge.
5. Measurement of Capacitance using Schering Bridge & De-Sauty Bridge.
6. Measurement of Inductance using Anderson Bridge& Maxwell's Bridge.
7. Measurement of 3 phases reactive power with single wattmeter.
8. Measurement of choke coil parameters using 3 voltmeter and 3 ammeter method.
9. Calibration of LPF wattmeter by Phantom Loading.
10. Measurement of 3 phases power with single wattmeter and Two-Watt Meter method.
11. Calibration of single-phase energy Meter by Phantom Loading.
12. Measurement of Strain by using Resistance strain gauge.

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

1 Calibrate the single-phase energy meter, power factor meter and LVDT.
2 Measure resistance by using various bridges.
3 Determine the inductance, capacitance by using various bridges.
4 Calibrate the energy meters by phantom loading.
5 Measure the three-phase power by different methods.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: C0218	POWER ELECTRONICS LAB	L	T	P
Credits: 1		-	-	2

Prerequisites: Nil

Course Objectives:
Apply the concepts of power electronic converters for efficient conversion/control of power from source to load. Design the power converter with suitable switches meeting a specific load requirement

List of Experiments:

1. Study of Characteristics of SCR, MOSFET & IGBT.
2. Gate firing circuits for SCR.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Single Phase fully controlled bridge converter with R and RL loads.
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E).
6. DC Jones chopper with R and RL Loads.
7. Single Phase Parallel, inverter with R and RL loads.
8. Single Phase Cycloconverter with R and RL loads.
9. Single Phase Half controlled converter with R and RL load.
10. Three Phase half controlled bridge converter with R and RL load.
11. Single Phase dual converter with RL loads.
12. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads and also of resonant pulse commutation circuit and Buck chopper.

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

1 Analyze the AC voltage controller with R and RL Loads.
2 Analyze the different commutation circuits.
3 Understand the operating principles of various power electronic converters.
4 Use power electronic simulation packages& hardware to develop the power converters.
5 Analyze and choose the appropriate converters for various applications.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO2	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO3	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO4	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO5	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. VI Semester		
Code: C00M4	QUANTITATIVE APTITUDE AND VERBAL REASONING – II	L	T	P
Credits: Nil	(Common for All Branches)	1	1	-

Course objectives:
The Quantitative Aptitude course is designed to equip students with essential mathematical and analytical skills required for various competitive exams, academic pursuits, and real-world problem-solving scenarios. The primary objective of this course is to enhance participants' numerical ability and logical reasoning, enabling them to tackle quantitative questions with confidence and efficiency.

MODULE - I **[8 Periods]**

Quants: Number System (NS)
Number Systems- Factors and Multiples: The H.C.F. of two or more than two numbers; Factorization Method Division Method; Finding the H.C.F. of more than two numbers; product of two numbers = Product of their H.C.F. and L.C.M.; Co-primes; H.C.F. and L.C.M. of Fractions: Comparison of Fractions.
Verbal:
Sentence completion: Completing sentences using the most appropriate word or phrase.
Testing vocabulary: Synonyms – Antonyms - Word analogies - Word relationships - Word meanings - Confusing words-context understanding, and sentence structure.
Logical: Calendars
Calendars- Leap year-Non leap year, Odd days, Finding the day from date, Repeated years.

MODULE - II **[6 Periods]**
Quants: Time and Distance, Pipes
Time & Distance- Km/hr to m/sec conversion; m/sec to km/hr conversion; man covers a certain distance at x km/hr and an equal distance at y km/hr.

Verbal: Active and Passive Voice - Reported Speech - Identifying grammatical errors - Recognizing redundancies or in appropriate word choices - Identifying assumptions, conclusions, and reasoning flaws.

Logical: Data Interpretation
Data Interpretation- Tables, Pie charts, Bar Graphs, Line graphs

MODULE - III **[6 Periods]**

Quants: Ages, Progression, Logarithms
Ages, Progression-; Arithmetic progression; Arithmetic mean; Geometric progression and mean Logarithms- Why logarithms: Properties of Logarithms: Laws of logarithm: Characteristic of logarithm.

Verbal:
Analogy- Identifying relationships between words or phrases and applying them to other word pairs - Logical connectors (e.g., however, therefore, thus) - Transition words (e.g., meanwhile, meanwhile, subsequently)

Logical: Data Arrangements
Data Arrangements- Linear Arrangement, Circular Arrangement, Multi-Dimensional Arrangement.

MODULE - IV **[6 Periods]**

Quants: Permutations and Combinations, Probability
Permutations- Factorial Notation: The different arrangements; Number of Permutations: number of all permutations of n things, taken all at a time; n subjects of which p1 are alike of one kind; p2 are alike of another kind; p3 are alike of third kind; Number of Combinations: The number of all combinations of n things, taken r at a time.

Verbal:
Phrasal Verbs **-** Idiomatic Expressions – Job Search - Resume building – Interview skills.

Logical: Data Sufficiency
Data Sufficiency- Strategies to solve.

MODULE - V **[6 Periods]**
Quants: Areas and Volumes (Mensuration)
Areas & Volumes- Pythagoras Theorem Results on Quadrilaterals Perimeter; Area of a circle Circumference Length of an arc Area of a sector; Area of a triangle.
Verbal:
Theme Detection: Understanding the central idea of a passage - Identifying the tone or main purpose of the passage - Analyzing the relationship between different parts of the passage to deduce the theme - Jam Session - Group Discussion.
Logical: Syllogisms
Syllogisms- Statements and Conclusion, Syllogisms using Venn Diagrams.

Text Books:
Reference Books:
1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal
2. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
3. "Fast Track Objective Arithmetic" by Rajesh Verma
4. "Magical Book on Quicker Maths" by M. Tyra
5. "Quantitative Aptitude Quantum CAT" by Sarvesh K. Verma

e-Resources:
Concerned Website links:
1. Khan Academy (https://www.khanacademy.org/):
2. Math Is Fun (https://www.mathsisfun.com/)
3. GMAT Club (https://gmatclub.com/)
4. India BIX (https://www.indiabix.com/)
5. Study tonight (https://www.studytonight.com/)

Course Outcomes:
After completion of the course students will be able to:
1. Apply Mathematics to Numbers in real world Learn to apply quantitative concepts to real-life situations, enhancing practical problem-solving skills and decision-making abilities.
2. Prepare for Competitive Exams: Develop a robust foundation and familiarity with the types of quantitative questions commonly asked in various competitive exams, such as aptitude tests, bank exams, GRE, GMAT, and others.

3. Boost Confidence on Ages and numericals: Gain the confidence to tackle quantitative challenges effectively, overcoming fear or anxiety associated with math-related problem-solving.
4. Foster a Growth in counting : Cultivate a positive attitude towards learning and continuous improvement, motivating students to persistently enhance their quantitative abilities.
5. Facilitate Self-Assessment on Area and volumes: Engage in regular assessments and quizzes to gauge progress, identify areas of improvement, and refine problem-solving techniques accordingly.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**1**	**2**	**2**							2					
CO2	**1**	**2**	**2**							2					
CO3	**1**	**2**	**2**							2					
CO4	**1**	**2**	**2**							2					
CO5	**1**	**2**	**2**							2					

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. VI Semester		
Code: C00M5	CONSTITUTION OF INDIA (Common for All Branches)	L	T	P
Credits: Nil		1	1	-

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- 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.
- 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:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 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
- 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.

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code: C00P1	INDUSTRY ORIENTED MINI PROJECT / INTERNSHIP	L	T	P
Credits:2		-	-	4

A. INDUSTRY ORIENTED MINI PROJECT

COURSE OBJECTIVES:

The objective of the Industry-Oriented Mini Project is to provide students with hands-on experience in solving real-world industry challenges by applying engineering concepts and modern tools.

COURSE OUTCOMES:

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

COs	BT Level	CO Statement
CO1	Remember, Understand, Evaluate	Identify industry-specific problems, analyze requirements, and define clear project objectives.
CO2	Apply, Create	Utilize core engineering concepts, modern tools, and techniques to develop solutions relevant to industry needs.
CO3	Apply, Evaluate	Implement the designed solution and conduct testing to validate functionality and performance.
CO4	Apply, Evaluate	Prepare well-structured reports, document findings, and present technical information effectively.
CO5	Understand, Evaluate	Develop professional ethics, teamwork skills, and industry-specific problem-solving abilities.

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	2	1	1	1	2	2	3	3	3	3	2
CO2	2	3	3	2	3	1	2	1	2	2	3	3	3	3	2
CO3	2	3	2	3	2	1	1	1	1	2	3	3	3	3	3
CO4	1	2	2	2	2	1	1	1	2	3	3	2	3	3	2
CO5	1	2	2	1	1	2	2	3	3	3	3	2	2	2	2

B. INTERNSHIP

COURSE OBJECTIVES:

The objective of the Internship is to provide students with industry exposure, practical knowledge, and professional skills essential for their careers.

COURSE OUTCOMES:

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

COs	BT Levels	CO Statement
CO1	Remember, Understand, Evaluate	Describe and analyze real-time industrial processes, standards, and work environments.
CO2	Apply, Create	Utilize engineering concepts, tools, and techniques to address technical challenges encountered during the internship.
CO3	Understand, Evaluate	Exhibit ethical behavior, time management, and adherence to industry regulations.
CO4	Apply, Evaluate	Collaborate effectively with professionals, document technical work, and present findings clearly.
CO5	Understand, Evaluate, Create	Identify career pathways, demonstrate adaptability, and develop skills for life-long learning.

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	2	2	2	2	2	1	2	3	3	-
CO2	3	3	3	2	3	1	2	1	2	2	1	2	3	3	-
CO3	1	1	2	1	1	3	2	3	3	2	1	2	2	2	3
CO4	1	2	2	1	2	2	1	1	3	3	2	2	1	1	1
CO5	-	-	-	2	2	2	2	2	1	2	-	3	-	-	-

SEMESTER – VII

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code: C0219	SWITCHGEAR AND PROTECTION	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines & Transformers, AC Machines, Power Generation and Distribution.

Course Objectives:
This course deals with different kinds of circuit breakers and relays for protection of generators, transformers and feeder bus bars from over voltages and other hazards. It also emphasis on Neutral grounding for overall protection.

MODULE I Circuit Breakers 13 Periods

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages - Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications-Construction and Operation of Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers-Numerical problems.

MODULE II Relays 13 Periods

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays: Over current/ under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays.

Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison, Numeric Relays

Static Relays: Static Relays versus Electromagnetic Relays.

MODULE III System Protection 13 Periods

A: Protection of Generators: Stator fault protection, Rotor fault protection, Restricted Earth fault and Inter-turn fault Protection, Numerical Problems on % Winding Unprotected.

Protection of Transformers: Percentage Differential Protection, Numerical Problems on Design of CT Ratio, Buchholtz relay Protection.

B: Protection of Feeders: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relay, Translay Relay.

Protection of Bus bars: Differential protection.

MODULE IV Neutral Grounding 12 Periods

Grounded and Ungrounded Neutral Systems- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

MODULE V Protection Against Over Voltages 13 Periods

Generation of Over Voltages in Power Systems.-Lighting Phenomenon-Protection against Lightning Over Voltages

Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

Text Books

1. Sunil S. Rao, "Switchgear and Protection and Power System", 13th Edition, Khanna Publishers, New Delhi, 2008.
2. Soni, M.L., Gupta, P.V., Bhatnagar, U.S. and Chakrabarti, **"A Text Book on Power**

Systems Engineering", Dhanpat Rai & Sons Company Limited, New Delhi, 2nd Edition, 2003.

References

1. Badari Ram, D.N Viswakarma, **"Power System Protection and Switchgear**" Tata McGraw Hill, 2nd Edition, 2010.
2. C.L.Wadhwa, **"Electrical Power Systems"**, New Age international (P) Limited, 4th edition, 2006.
3. Paithankar and S.R.Bhide , **"Fundamentals of Power System Protection"**, Prentice Hall of India, 2nd Edition 2003.
4. B. Ravindranath, and M. Chander, **"Power System Protection & Switchgear"**, 2nd Edition, New Age International, 2005.
5. S. L. Uppal, **"Electrical Power"**, 13thEdition, Khanna Publishers, New Delhi, 2006.

E- Resources

1. https://www.electrical4u.com/electrical-switchgear-protection/
2. http://www.electricity-today.com/
3. http://nptel.ac.in/downloads/108101039/

Course Outcomes

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

1. Analyze the operation of various types of circuit breakers.
2. Identify Characteristics of Relay for specific applications of protection.
3. Design the feasible protection systems for generators, transformers, feeders and bus bars.
4. Emphasis on Grounding practices in real time.
5. Investigate the fundamentals of protection against over voltages.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0220	POWER SYSTEM OPERATION AND CONTROL	L	T	P
Credits:3		3	-	-

Prerequisites: Electrical Power Generation System, Power System Analysis, AC Machines..

Course Objectives:
This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of governors, turbines and generators. It emphasizes on single area and two area load frequency control and reactive power control.

MODULE I PRELIMINARIES ON POWER SYSTEM OPERATION AND CONTROL 10 Periods

Power scenario in Indian grid – National and Regional load dispatching centers – requirements of good power system - necessity of voltage and frequency regulation - real power vs frequency and reactive power vs voltage control loops - system load variation, load curves and basic concepts of load dispatching - load forecasting - Basics of speed governing mechanisms and modeling - speed load characteristics - regulation of two generators in parallel.

MODULE II REAL POWER - FREQUENCY CONTROL 9 Periods

Load Frequency Control (LFC) of single area system-static and dynamic analysis of uncontrolled and controlled cases - LFC of two area system - tie line modeling - block diagram representation of two area system - static and dynamic analysis - tie line with frequency bias control – state variability model.

MODULE III REACTIVE POWER – VOLTAGE CONTROL 10 Periods

Generation and absorption of reactive power - basics of reactive power control – Automatic Voltage Regulator (AVR) – brushless AC excitation system – block diagram representation of AVR loop - static and dynamic analysis – stability compensation – voltage drop in transmission line - methods of reactive power injection - tap changing transformer, SVC (TCR + TSC) and STATCOM for voltage control.

MODULE IV ECONOMIC OPERATION OF POWER SYSTEM 10 Periods

Statement of economic dispatch problem - input and output characteristics of thermal plant - incremental cost curve - optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) - base point and participation factors method - statement of unit commitment (UC) problem - constraints on UC problem – solution of UC problem using priority list.

MODULE V COMPUTER CONTROL OF POWER SYSTEMS 9 Periods

Need of computer control of power systems-concept of energy control centers and functions – PMU - system monitoring, data acquisition and controls - System hardware configurations - SCADA and EMS functions - state estimation problem – various operating states - state transition diagram.

Text Books

1. Olle.I.Elgerd, 'Electric Energy Systems theory - An introduction', McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.
2. Allen. J. Wood and Bruce F. Wollen berg, 'Power Generation, Operation and Control', John

Wiley & Sons, Inc., 2016.
3. Abhijit Chakrabarti and Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.
4. Kundur P., 'Power System Stability and Control, McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

References

1. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
2. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
3. J.Duncan Glover and M.S.Sarma,—Power System Analysis and Design", THOMPSON, 3 rd Edition.

E- Resources

1. https://nptel.ac.in/courses/108/101/108101040/
2. https://www.youtube.com/watch?v=zkN13OmgGOs

Course Outcomes

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

1. Understand the day-to-day operation of electric power system and the significance of power system operation and control.
2. Analyze the control actions to be implemented on the system to meet the minute-to-minute variation of system demand and acquire knowledge on real power-frequency interaction.
3. Describe the reactive power control of a power system and analyze its interaction with voltage.
4. Evaluate the economic operation of thermal units by using economic dispatch and unit commitment methods.
5. **Understand** SCADA and EMS system for power system operation and control

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0231	**Non- Conventional Energy Sources** (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:
The objective of this subject is to provide knowledge about different non-conventional energy sources.

MODULE I PRINCIPLES OF SOLAR RADIATION 10 Periods
Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

MODULE II SOLAR ENERGY COLLECTORS 10 Periods
Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

MODULE III SOLAR ENERGY STORAGE AND APPLICATIONS 9 Periods
Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

MODULE IV WIND ENERGY & BIOMASS 10 Periods
Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.
BIO-MASS : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects

MODULE V GEOTHERMAL ENERGY & OCEAN ENERGY 10 Periods
GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.
OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Text Books

1. Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt.Ltd, New Delhi, 2011.
2. D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.
3. Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning, USA, 2016.

References

1. A.K.Mukerjee and Nivedita Thakur," Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011
2. Richard A. Dunlap," Sustainable Energy" Cengage Learning India Private Limited, Delhi, 2015.
3. Chetan Singh Solanki, " Solar Photovoltaics : Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2011

4. Bradley A. Striebig,Adebayo A.Ogundipe and Maria Papadakis," Engineering Applications in Sustainable Design and Development", Cengage Learning India Private Limited, Delhi, 2016.
5. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
6. Shobh Nath Singh, 'Non-conventional Energy resources' Pearson Education ,2015.

E- Resources

1. **https://nptel.ac.in/courses/121/106/121106014/**
2. **https://nptel.ac.in/courses/103/103/103103206/**

Course Outcomes

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

1. Understand the principles of solar radiation
2. Understand the principles of solar collectors
3. Recognize solar collectors, Solar energy storage and its applications
4. Classify the harvesting of wind energy & bio-mass energy.
5. Understand the harvesting of geothermal energy & ocean energy

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO2	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO3	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO4	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO5	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code: C0232	ELECTRICAL HYBRID VEHICLES (Professional Elective – III)	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines and Transformers and AC Machines.

Course Objectives:
To present a comprehensive overview of Electric and Hybrid Electric Vehicles

MODULE I Introduction to Hybrid Electric Vehicles 10 Periods

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

MODULE II Hybrid Electric Drive-trains 10 Periods

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

MODULE III Electric Propulsion unit &Energy Storage 10 Periods

A:Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives

B:Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices.

MODULE IV Sizing the drive system 9 Periods

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power

MODULE V Communications, supporting subsystems 9 Periods

Communications, supporting subsystems: In vehicle networks- CAN, Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies.

Text Books

1. Iqbal Hussein, **Electric and Hybrid Vehicles: Design Fundamentals**, CRC Press, 2003

References

1. James Larminie, John Lowry, **Electric Vehicle Technology Explained**, Wiley, 2003.
2. 2. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, **Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design,** CRC Press, 2004

E- Resources

1. https://en.wikipedia.org/wiki/Digital_library
2. https://ieeexplore.ieee.org/document/4168013/
3. www.ieahev.org/
4. web.mit.edu/evt/links.html

Course Outcomes

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

1. Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources
2. Design and develop basic schemes of electric vehicles and hybrid electric vehicles.
3. Choose proper energy storage systems for vehicle applications
4. Identify various communication protocols and technologies used in vehicle networks
5. Develop new technologies to generate electrical energy

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0233	ELECTRICAL DISTRIBUTION SYSTEM (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Power System – I, Power System - II

Course Objectives:

To understand design considerations of feeders ,compute voltagedrop and power loss in feeders and understand protection, PF improvement and voltage control

MODULE I GENERAL CONCEPTS **9 Periods**

Introduction to distribution system, Distribution system planning, Factors effecting the Distribution system planning, Load modelling and characteristics. Coincidence factor - contribution factor - Loss factor - Relationship between the load factor and loss factor. Load growth, Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

Design Considerations of Distribution Feeders: Radial, loop and network types of primary feeders, Introduction to low voltage distribution systems (LVDS) and High voltage distribution systems (HVDS), voltage levels, Factors effecting the feeder voltage level, feeder loading, Application of general circuit constants (A, B, C, D) to radial feeders, basic design practice of the secondary distribution system, secondary banking, secondary network types, secondary mains.

MODULE II SUBSTATIONS **9 Periods**

Location of Substations: Rating of distribution substation, service area with 'n' primary feeders. Benefits derived through optimal location of substations. Optimal location of Substations (Perpendicular bisector rule and X, Y co-ordinate method).

System Analysis: Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines, analysis of non-three phase systems, method to analyze the distribution feeder cost.

MODULE III PROTECTION **10 Periods**

Objectives of distribution system protection, types of common faults and procedure for fault calculations, over current Protective Devices: Principle of operation of Fuses, Auto-Circuit Recloser - and Auto-line sectionalizes, and circuit breakers.

Coordination: Coordination of Protective Devices: Objectives of protection co-ordination, general coordination procedure, Types of protection coordination: Fuse to Fuse, Auto-Recloser to Fuse, Circuit breaker to Fuse, Circuit breaker to Auto-Recloser.

MODULE IV COMPENSATION FOR POWER FACTOR IMPROVEMENT **9 Periods**

Capacitive compensation for power-factor control -Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), effect of series capacitors, difference between shunt and series capacitors, Calculation of Power factor correction, capacitor allocation - Economic justification of capacitors - Procedure to determine the best capacitor location.

MODULE V VOLTAGE CONTROL **9 Periods**

Importance of voltage control, methods of voltage control, Equipment for voltage control, effect of shunt capacitors, effect of series capacitors, effect of AVB/AVR on voltage control, line drop compensation, voltage fluctuations.

Text Books

1. Turan Gonen, Electric Power Distribution System Engineering, CRC Press, 3rd Edition 2014.
2. V. Kamaraju, Electrical Power Distribution Systems, Tata Mc Graw Hill Publishing Company, 2nd edition, 2010.

References

1. G. Ram Murthy, Electrical Power Distribution hand book, 2nd edition, University press 2004.
2. A.S. Pabla, Electric Power Distribution, Tata McGraw Hill Publishing company, 6th edition, 2013.

Course Outcomes

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

1. Understand design considerations of feeders.
2. Design the feeders and compute power loss and voltage drop of the feeders.
3. Design protection of distribution systems
4. Understand protection, PF improvement
5. Understand the importance of voltage control

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0234	MODERN POWER CONVERTERS (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Electronics, Electrical Drives

Course Objectives:
This course deals with the Modern power electronic converters and its applications in electric power utility. Resonant converters and UPS

MODULE I SWITCHED MODE POWER SUPPLIES (SMPS) 9 Periods
DC Power supplies and Classification; Switched mode dc power supplies - with and without isolation, single and multiple outputs; Closed loop control and regulation; Design examples on converter and closed loop performance.

MODULE II AC-DC CONVERTERS 10 Periods
Switched mode AC-DC converters. synchronous rectification - single and three phase topologies – switching techniques - high input power factor . reduced input current harmonic distortion. improved efficiency. with and without input-output isolation. performance indices design examples

MODULE III DC-AC CONVERTERS 9 Periods
Multi-level Inversion - concept, classification of multilevel inverters, Principle of operation,main features and analysis of Diode clamped, Flying capacitor and cascaded multilevelinverters; Modulation schemes.

MODULE IV AC-AC CONVERTERS WITH AND WITHOUT DC LINK 10 Periods
Matrix converters. Basic topology of matrix converter; Commutation – current path; Modulation techniques - scalar modulation, indirect modulation; Matrix converter as only AC-DC converter; AC-AC converter with DC link - topologies and operation - with and without resonance link – converter with dc link converter; Performance comparison with matrix converter with DC link converters.

MODULE V SOFT-SWITCHING POWER CONVERTERS 9 Periods
Soft switching techniques. ZVS, ZCS, quasi resonance operation; Performance comparison hard switched and soft switched converters.AC-DC converter, DC-DC converter, DC-AC converter.; Resonant DC power supplies .

Text Books

1. Power Electronics Handbook, M.H.Rashid, Academic press, New york, 2000.
2. Advanced DC/DC Converters, Fang Lin Luo and Fang Lin Luo, CRC Press, NewYork, 2004.
3. Control in Power Electronics- Selected Problem, Marian P.Kazmierkowski,R.Krishnan and FredeBlaabjerg, Academic Press (Elsevier Science), 2002.

References

1. Philip T Krein, " Elements of Power Electronics", Oxford University Press
2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters,Applications and design- Third Edition- John Wiley and Sons- 2006
3. M.H. Rashid – Power Electronics circuits, devices and applications- third edition Prentice Hall of India New Delhi, 2007.
4. Erickson, Robert W, "Fundamentals of Power Electronics", Springer, second edition, 2010.

E- Resources

1. https://nptel.ac.in/courses/108/102/108102157/

2. https://www.coursera.org/specializations/power-electronics
3. https://nptel.ac.in/courses/108/107/108107128/

Course Outcomes

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

1. Analyze the state space model for DC – DC converters
2. Acquire knowledge on switched mode power converters.
3. Understand the importance of Resonant Converters.
4. Analyze the PWM techniques for DC-AC converters
5. Acquire knowledge on filters and UPS

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0235	POWER SYSTEMS TRANSIENTS (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Systems

Course Objectives:

To impart knowledge about the following topics:

- Generation of switching transient sand their control using circuit–theoretical concept.
- Mechanism of lighting stroke sand the production of lighting surges.
- Propagation, reflection and refraction of travelling waves.
  Voltage transients caused by faults, circuit break erection, load rejection on integrated power system.

MODULE I SWITCHING TRANSIENTS 10 Periods

Review and importance of the study of transients-causes for transients. RL circuit transient with sine wave excitation - double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems –role of the study of transients in system planning.

MODULE II AC-DC CONVERTERS 10 Periods

Over voltages due to switching transients - resistance switching and the equivalent circuit for Interrupting the resistor current - load switching and equivalent circuit – waveforms for transient voltage across the load and the switch normal and abnormal switching transients. Current suppression - current chopping effective equivalent circuit. Capacitance switching - effect of source regulation – capacitance switching with a restrike, with multiple restrikes.

MODULE III LIGHTNING TRANSIENTS 10 Periods

A-Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds –mechanism of lightning discharges and characteristics of lightning strokes

B-model for lightning stroke - factors contributing to good line design - protection using ground wires -tower footing resistance

MODULE IV TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS 10 Periods

Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewely's lattice diagram - standing waves and natural frequencies - reflection and refraction of travelling waves.

MODULE V TRANSIENTSININTEGRATEDPOWERSYSTEM 9 Periods

The short line and kilometric fault - distribution of voltages in a power system Line dropping and load rejection-voltage transients on closing and reclosing lines–overvoltage Induced by faults-switching surges on integrated system Qualitative application of EMTP for transient computation

Text Books

1. Allan Greenwood, 'Electrical Transients in Power Systems', Wiley Inter Science, NewYork,2nd Edition,1991.
2. Pritindra Chowdhari, "Electromagnetic transients in Power System" ,John Wiley and Sons Inc., Second Edition,2009.
3. C.S.Indulkar,D.P.Kothari,K.Ramalingam,'PowerSystemTransients–Astatisticalapproach',

PHI Learning Private Limited ,Second Edition,2010.

References

1. M.S.NaiduandV.Kamaraju,'HighVoltageEngineering',McGrawHill,FifthEdition,2013.
2. R.D.Begamudre,'ExtraHighVoltageACTransmissionEngineering',WileyEasternLimited, 1986.
3. J.L.Kirtley,"ElectricPowerPrinciples,Sources,Conversion,Distributionanduse,"Wiley,2012.
4. Akihiroametani,"PowerSystemTransienttheoryandapplications",CRCpress,2013.

E- Resources

1. https://www.dsengg.ac.in/eee/08%20POWER%20SYSTEM%20TRANSIENTS(KP).pdf
2. https://easyengineering.net/ee6002-power-system-transients/
3. https://learnengineering.in/ee8010-power-systems-transients/
4. https://www.notesforgeeks.in/2021/08/ee8010-power-systems-transients-syllabus-2017-regulation.html http://nptel.ac.in/courses/108106072/

Course Outcomes

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

1. Understand and analyze switching and lightning transients.
2. Acquire knowledge on generation of switching transients and their control.
3. Analyze the mechanism of lighting strokes.
4. Understand the importance of propagation, reflection and refraction of travelling waves.
5. Find the voltage transients caused by faults.

CO-PO Mapping

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code: C0236	UTILIZATION OF ELECTRICAL ENERGY (Professional Elective - IV)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Generation and Distribution System, DC Machines and Transformers & AC Machines.

Course Objectives:

This course deals with the fundamentals of illumination, electric heating and welding. It also emphasis on different kinds of electric drives, electric drive vehicles and their application to electrical traction systems.

MODULE I Electric Heating and Welding 10 Periods

Advantages and methods of electric heating, resistance heating, induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

MODULE II Illumination 10 Periods

Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Discharge lamps, MV and SV lamps – Comparison between LED lamps and fluorescent tubes. Basic principles of light control - Types and design of lighting and flood lighting.

MODULE III Electric Traction – I 10 Periods

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor.

Methods of electric braking – Plugging, rheostatic braking and regenerative braking.

MODULE IV Electric Traction-II 9 Periods

Mechanics of train movement. Speed-time curves for different services – Trapezoidal and quadrilateral speed time curves. Calculations of tractive effort, power, specific energy consumption for given run. Effect of varying acceleration and braking retardation, adhesive weight and braking retardation, adhesive weight and coefficient of adhesion.

MODULE V Electric Drive Vehicles 9 Periods

Concept of electric drive vehicles and types – Battery electric vehicles, hybrid vehicles, plug-in hybrid electric vehicles and All-Electric vehicles. Benefits of electric drive vehicles.

Text Books

1. M.L. Soni, P.V. Gupta, V.S. Bhatnagar and A. Chakrabarti, **"A Text Book on PowerSystem Engineering"**, Dhanpat Rai & Co., 2nd Edition, 2014.
2. Partab, **"Art & Science of Utilization of Electrical Energy",**Dhanpat Rai & Sons, 3rd Edition, 2006.

References

1. N.V.Suryanarayana, **"Utilization of Electrical Power Including Electric Drives and Electric Traction"**, New Age International (P) Limited, 1996.
2. C.L.Wadhwa, **"Generation, Distribution and Utilization of Electrical Energy",** New Age International (P) Limited, 1997.
3. J.B.Gupta, **"Utilisation Electric Power and Electric Traction"**, S.K.Kataria and Sons, 2000.
4. R.K.Rajput, **"Utilisation of Electric Power"**, Laxmi Publications Private Limited, 2007.
5. E. Openshaw Taylor, **"Utilisation of Electric Energy",** Orient Longman, 1st Edition,

2006.

E- Resources

1. http://www.intelligent-power-today.com/
2. http://www.electricity-today.com/
3. http://nptel.ac.in/syllabus/108103009/

Course Outcomes

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

CO1	***Illustrate*** different process of utilizing electric energy for heating and welding process in industries for commercial purposes along with few house hold applications	Understand	L2
CO2	***Classify***types of electric light sources based on nature of operation and to ***determine***its MHCP and MSCP.	Evaluate	L5
CO3	***Choose***proper traction systems depending upon application considering economic and technology up-gradation and ***calculate*** tractive effort, power, specific energy consumption for given run	Apply	L3
CO4	***Employ*** appropriate mathematical and graphical analysis considering different practical issues in designing traction system; ***analyze*** the performance parameter of the traction system.	Analyze	L4
CO5	***Explain*** the basics of electric and hybrid electric vehicles, their architecture, technologies, fundamentals and **analyze** various electric drives suitable for electric vehicles.	Understand	L4

CO-PO Mapping

(3/2/1 indicates strength of correlation)
3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (Pos)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1	2	3	2	2	-	-	-	-	1	3	2	-
2	3	2	2	2	3	1	2	-	-	-	-	1	3	2	-
3	3	2	2	2	3	1	2	-	-	-	2	1	3	2	1
4	3	2	2	3	3	-	2	2	-	-	1	-	2	2	-
5	3	2	2	3	3	1	3	2	-	-	1	1	2	1	1

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0237	HVDC AND FACTS (Professional Elective-IV)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Generation & Distribution, Power System Analysis and Control and Power Electronics.

Course Objectives:
This course deals with the basic concepts of HVDC transmission system, its applications and analysis of HVDC converters with their control circuitry. It also emphasizes on reactive power control in HVDC system using FACTS devices.

MODULE I Introduction 10 Periods

Economics & terminal equipment of HVDC transmission systems: Types of HVDC links – Apparatus required for HVDC systems – Comparison of AC & DC transmission, application of DC transmission System – typical layout of a HVDC converter station -Planning & modern trends in D.C. transmission.

MODULE II Analysis of HVDC Converters 10 Periods

Choice of converter configuration – Analysis of Graetz – Characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star-star mode and their performance.

Converter & HVDC System Control:

Principle of DC link control – Converters control characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system. Starting and stopping of DC link - Power Control.

MODULE III Reactive Power Control in HVDC 10 Periods

A: Reactive Power Requirements in steady state - Conventional control strategies – Alternate control strategies - Sources of reactive power - AC Filters – Shunt capacitors – Synchronous Condensers.

B: Power Flow Analysis in AC/DC Systems :

Modeling of DC links - DC network - DC converter - Controller equations - Solution of DC load flow – P.U. system for DC quantities - Solution of AC-DC power flow - Simultaneous method Sequential method.

MODULE IV Power Flow and Dynamic Stability 9 Periods

Transmission interconnections, power flow in an AC System, loading capability limits, power flow and dynamic stability considerations, importance of controllable parameters. Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers. Requirements and characteristics of high power devices – Voltage and current rating, losses and speed of switching, parameter trade - off of devices.

MODULE V STATIC SERIES COMPENSATORS 9 Periods

Concept of series capacitive compensation - Improvement of transient stability - Power oscillation damping. Functional requirements of GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC). Control schemes for GSC, TSSC and TCSC.

Text Books

1. K.R.Padiyar, **"HVDC Power Transmission Systems"**, New Age International Publishers Limited, 3rd Edition, 2015.
2. N.G.Hingorani and L.Guygi, **"Understanding FACTS: Concepts and Technology of**

Flexible AC Transmission Systems", John Wiley & Sons, Inc., Reprint, 2012.

3. HVDC Transmission, S. Kamakshaiah, V. Kamaraju, The Mc — Graw Hill Companies.

References

1. Jos Arrillaga, **"HVDC Transmission"** , The Institution of Electrical Engineers, 2nd Edition, 1998.
2. S.Rao**, "EHVAC and HVDC Transmission Engineering and Practice: Theory, Practice and Solved Problems",** Khanna Publishers, 1990.
3. E.W.Kimbark, **"Direct Current Transmission"**, John Wiley & Sons, Inc., 1971.
4. E.Uhlmann, **"Power Transmission by Direct Current"**, Springer, 1st Edition, 2012.
5. Yong Hua Song and Allan T Johns, **"Flexible AC Transmission Systems (FACTS)",** The Institution of Electrical Engineers, 1999.

E- Resources

1. https://www.electrical4u.com/facts-on-facts-theory-and-applications/
2. https://www.electrical4u.com/high-voltage-direct-current-transmission/
3. http://nptel.ac.in/courses/108104013/

Course Outcomes

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

1. Understand the applications and different types of HVDC links.
2. Analyze the converter configuration & their characteristics.
3. Describe the reactive power requirements in steady state & modeling of DC links.
4. Analyze the power flow in AC system & apply FACTS controllers for dynamic stability.
5. Describe the working principle of static series compensators.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0238	ELECTRICAL ENERGY CONSERVATION AND AUDITING (Professional Elective-IV)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:
This course deals about the concept of energy conservation, energy management and different approaches of energy conservation in industries, economic aspects of energy conservation project and energy audit in commercial and industrial sector.

MODULE I Basic Principles of Energy Audit 9 Periods
Energy audit - definitions, concept , types of audit, energy index, cost index , pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy audit of industries - Energy saving potential, energy audit of process industry, thermal power station, building energy audit.

MODULE II Energy Management 9 Periods
Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

MODULE III Energy Efficient Motors 10 Periods
A: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details.
B: Characteristics - Variable speed, variable duty cycle systems, RMS hp - Voltage variation - Voltage unbalance - Over motoring - Motor energy audit.

MODULE IV Power Factor Improvement, Lighting & Energy Instruments 10 Periods
Power Factor Improvement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non-linear loads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit.
Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers , application of PLC's.

MODULE V Economic Aspects and Analysis 10 Periods
Economics Analysis - Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting – Applications of life cycle costing analysis, return on investment.

Text Books

1. W.R. Murphy and G. Mckay, **"Energy Management",** Butter Worth Publications.
2. John. C. Andreas, **"Energy Efficient Electric Motors",** Marcel Dekker Inc Ltd, 2nd Edition, 1995.

References

1. Paul O' Callaghan, **"Energy Management",** Mc-Graw Hill Book Company, 1st Edition,1998.
2. W.C.Turner, **"Energy Management Hand Book",** A John Wiley and Sons.
3. S. C. Tripathy, **"Utilization of Electrical Energy"**, Tata McGraw Hill, 1993.
4. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online).
5. L.C. Witte, P.S. Schmidt and D.R.Brown, **"Industrial Energy Management and Utilization",** Hemisphere Publication, Washington, 1998.

6. De,B. K., “Energy Management audit & Conservation”, 2nd Edition, Vrinda Publication, 2010.

E- Resources

1. http://industrialelectricalco.com/wp-content/uploads/2014/01/Understanding-Energy Efficient-Motors-EASA.pdf
2. https://beeindia.gov.in/
3. https://beeindia.gov.in/sites/default/files/3Ch10.pdf

Course Outcomes

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

1. Examine the principles of Energy audit and its process in thermal power station, industries.
2. Analyze the different aspects of energy management.
3. Describe the characteristics of energy efficient motors.
4. Illustrate the power factor improvement, good lighting system practice and the types of energy instruments
5. Analyze the economic aspects of Energy Management.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code: C0239	POWER SYSTEM RELIABILITY (Professional Elective– IV)	L	T	P
Credits:3		3	-	-

Prerequisites: Power System-I, Power System-II, Power System Analysis

Course Objectives:

- To describe the generation system model and recursive relation for capacitive model building.
- To explain the equivalent transitional rates, cumulative probability and cumulative frequency.
- To develop the understanding of risk, system and load point reliability indices.
- To explain the basic and performance reliability indices.

MODULE I Definition of Reliability 9 Periods

Definition of terms used in reliability, Component reliability, Hazard rate, derivation of the reliability function in terms of the hazard rate. Hazard models - Bath tub curve, Effect of preventive maintenance. Measures of reliability: Mean Time to Failure and Mean Time between Failures.

MODULE II Generating System Reliability Analysis 9 Periods

Generation system model – capacity outage probability tables – Recursive relation for capacitive model building – sequential addition method – unit removal – Evaluation of loss of load and energy indices**.** Frequency and Duration methods –Evaluation of equivalent transitional rates of identical and non-identical units – Evaluation of cumulative probability and cumulative frequency of non-identical generating units.

MODULE III Composite Data and Displays 10 Periods

A:Operating Reserve Evaluation: Basic concepts - risk indices – PJM methods – security Function approach – rapid start and hot reserve units – Modeling using STPM approach.

B:Bulk Power System Reliability Evaluation: Basic configuration – conditional probability approach –system and load point reliability indices – weather effects on transmission lines – Weighted average rate and Markov model – Common mode failures.

MODULE IV Distribution System Reliability Analysis 10 Periods

Basic Techniques – Radial networks –Evaluation of Basic reliability indices, performance indices – load point and system reliability indices – customer oriented, loss and energy-oriented indices – Basic concepts of parallel distribution system reliability.

MODULE V Substations and Switching Stations 10 Periods

Effects of short-circuits - breaker operation – Open and Short circuit failures – Active and Passive failures – switching after faults – circuit breaker model – preventive maintenance – exponential maintenance times.

Text Books

1. Reliability Evaluation of Power systems by R. Billinton, R.N. Allan, BS Publications, 2007.
2. Reliability Modeling in Electric Power Systems by J. Endrenyi, John Wiley and Sons, 1978.

References

1. Reliability Engineering: Theory and Practice by Alessandro Birolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMH Publications.

E- Resources

1. https://www.youtube.com/watch?v=hoFKwT9nTwE
2. https://www.youtube.com/watch?v=PqhZRRvq0pk
3. https://www.youtube.com/watch?v=W4xlegKqj0g

Course Outcomes

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

1. Analyze the hazard rate and Measures of Reliability.
2. Develop Generating System models and Reliability Analysis.
3. Identify composite data for display and evaluate Power System Reliability for bulk power.
4. Analyze reliability performance indices for Radial and parallel distribution system.
5. Analyze breaker operation failures in Substations and Switching Stations.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code: C0240	PLC AND THEIR APPLICATIONS (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:
To impart knowledge on Mode of operation and programming of a Programmable Logic Controller (PLC), to impart knowledge on Characteristics of a PLC (synchronous, asynchronous), Analysis of the process schematic, analog PLC and PID controllers

MODULE I INTRODUCTION TO PLC 9 Periods
PLC Basics, Block diagram of PLC system, I/O modules, interfacing, PLC-CPU, PLC processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules, Applications of PLCs.

MODULE II PLC PROGRAMMING 10 Periods
PLC programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation. Digital logical gates programming in the Boolean algebra SYSTEM, CONVERSION EXAMPLES-Ladder diagrams for process control – Ladder diagrams for sequence listings – ladder diagram construction and flow chart for spray process system. Programming based on basic instructions, timer, counter, and comparison instructions using ladder program.

MODULE III REGISTERS AND COUNTERS 10 Periods
A: PLC Registers: Characteristics of registers – module addressing – holding registers – output registers – PLC functions – Timer functions and industrial application.
B: counters – counter function industrial application – Arithmetic functions – number function comparison functions.- number conversion functions.

MODULE IV DATA HANDLING FUCNTIONS AND SEQUENCE FUCNTIONS 10 Periods
Data handling functions: SKIP, Master control relay – Jump Move FIFO, FAL, ONS, CLR and sweep functions and their applications.
Bit pattern and changing a bit shift register, sequence functions and applications – controlling of two axes and three axis Robots with PLC, Matrix functions.

MODULE V ANALOG PLC 9 Periods
Analog PLC operation: Analog modules and systems – Analog signal processing, multi-bit data processing, analog output application examples, PID principles, position indicator with PID control, PID modules, PID tuning, PID functions.

Text Books

1. W. Bolton, "Programmable Logic Controllers" , 5th Edition, Elsevier, 2009.
2. J R Hackworth and F D Hackworth Jr, "Programmable Logic Controllers – Programming methods and Applications" 5th Edition,Pearson Publications, 2004.
3. Module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh

References

1. John W Webb and Ronald A Reiss, "Programmable Logic Controllers – Principles and Applications", 5th Edition, Prentice Hall of India, 1998.
2. Rajesh Mehra and Vikrant Vij, "PLCs & SCADA: Theory and Practice", 1st Edition, Laxmi Publications, 2016.

E- Resources

1. https://www.amci.com/industrial-automation-resources/plc-automation-tutorials/what-plc/
2. http://library.automationdirect.com/understanding-ladder-logic/

Course Outcomes

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

1. Understand the basic concepts of PLC and construct the PLC ladder diagrams.
2. Programming the PLC and Analyze the process schematic.
3. Understand the characteristics of PLC registers and Architecture functions.
4. Analyze the data handling functions and sequence functions.
5. Understand the Analog PLC operation & analog signal processing.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code:	OPEN ELECTIVE - III	L	T	P
Credits:3		3	-	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: C0462	MICROPROCESSORS AND MICROCONTROLLERS LAB	L	T	P
Credits:1		-	-	2

Course Objectives:

To introduce programming skills related to microcontrollers.

List of Experiments

1. Arithmetic operations of 8-bit numbers using 8085.
2. Logical operations of 8-bit numbers using 8085.
   a) Binary to BCD code conversions
3. BCD to Binary code conversions using 8085.
4. Arithmetic logical operations of 16 bit numbers using 8086
5. Programming using arithmetic, logical and bit manipulation instructions of 8051.
6. Program to toggle all the bits of Port P1 of 8051 continuously with 250 ms delay.
7. Program to interface seven segment display unit using 8051
8. Program to transmit/receive a message from Microcontroller to PC serially using RS232 using 8051
9. Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions using 8051
10. Program to interface a relay using 8051.
11. Program to interface LCD data pins to port P1 of 8051 and display a message on it.
12. Program for Traffic Light Controller using 8051

Course Outcomes:

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

1. Understand the 8085 processor instructions
2. Develop 8085 programming skills
3. Able to understand 8086 processor instructions
4. Interface different input &output devices to Microcontroller
5. Establish serial communication for interfacing devices

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0241	POWER SYSTEMS LAB	L	T	P
Credits: 1		-	-	2

Course Objectives: To provide better understanding of power system analysis using simulation and to recognize and analyze the operation of power system protection.

List of Experiments:

1. Computation of Parameters and Modeling of Transmission Lines.
2. Formation of Bus Admittance and Impedance Matrices.
3. Load Flow Analysis using Gauss-Seidel Method
4. Short Circuit Analysis for Single Line to Ground fault (L-G).
5. Short Circuit Analysis for Line to Line fault (L-L).
6. Short Circuit Analysis for Double Line to Ground fault (L-L-G).
7. Characteristics of Over Current Relays.
8. Characteristics of Percentage Biased Differential Relay.
9. Performance and Testing of Transformer Protection System.
10. Performance and Testing of Transmission Line Model.
11. Characteristics of Over Voltage Relay.
12. Characteristics of Under Voltage Relay.

Course Outcomes

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

1. Simulate and analyze the load flow of power system network.
2. Simulate and analyze the faults of power system network.
3. Emphasis the performance of transformer.
4. Emphasis the performance of transmission line model.
5. Analyze the performance of power system protection devices

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3					3			2	2		
CO2	3	3	3	3					3			2	2		
CO3	3	3	3	3					3			2	2		
CO4	3	3	3	3					3			2	2		
CO5	3	3	3	3					3			2	2		

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C00P2	PROJECT STAGE -I	L	T	P
Credits: 3		-	-	6

Course Objectives: To utilize science and engineering to make product/process using innovative techniques, predict the results and prepare technical documents.

Course Outcomes:

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

1. Identify project goals, constraints, deliverables, performance criteria, control needs and requirements.
2. Implement concepts, tools and techniques to do quality projects.
3. Adapt projects in response to issues that arise internally and externally.
4. Interact with team and stakeholders in a professional manner, respecting differences, to ensure a collaborative project environment.
5. Utilize technology tools for communication, collaboration, information management, and decision support.

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	2	1	1	1	2	2	3	3	3	3	2
CO2	2	3	3	2	3	1	2	1	2	2	3	3	3	3	2
CO3	2	3	2	3	2	1	1	1	1	2	3	3	3	3	3
CO4	1	2	2	2	2	1	1	1	2	3	3	2	3	3	2
CO5	1	2	2	1	1	2	2	3	3	3	3	2	2	2	2

SEMESTER-VIII

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VIISemester		
Code: C0H09	MANAGEMENT FUNDAMENTALS (Common for EEE, ECE, CSE and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:
Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization

MODULE I Management and Principles of Management 9 Periods

A. **Introduction to Management:** Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.

B. **Management Theories:** Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Corporate Social responsibility.

MODULE II Planning, Organization and types of Structures 10 Periods

A. Planning: Need for planning- -Steps in the process of planning-Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).

B. Organization and types of Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE III Staffing and controlling 10 Periods

A. Staffing: Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.

B. Controlling: process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE IV Operations and Materials Management 9 Periods

A. Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.

B. Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

MODULE V Project Management and Contemporary Practices 10 Periods

A. Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

B. Contemporary Management Practices: Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), six sigma and Capability Maturity Model (CMM) Levels, Bench marking, Balanced Score card.

Text Books

1. Aryasri, **Management Science**, 4th edition TMH, 2004.
2. Stoner, Freeman, Gilbert, **Management,** Pearson Education, New Delhi, 6th Ed, 2004.

References

4. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
5. Koontz &Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
6. Thomas N.Duening& John M. Ivancevich **"Management - Principles and Guidelines"**, Biztantra, 5th edition 2003.
7. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
8. Samuel C. Certo, **"Modern Management"**, PHI, 9th edition, 2005.

E- Resources

1. http://freevideolectures.com/Course/2689/Management-Science
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=human-resource-management
3. http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing-fundamental
4. http://freevideolectures.com/Course/2371/Project-and-Production-Management
5. http://nptel.ac.in/courses/110105034/

Course Outcomes

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

1. Understand the various concepts, principles and theories of management.
2. Understand the basic concepts of planning and various structures of organizations.
3. Understand the process of staffing and controlling
4. Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization.
5. Understand the various contemporary management practices. Also the project management techniques.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2		3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0242	ELECTRICAL POWER QUALITY (Professional Elective- V)	L	T	P
Credits: 3		3	-	-

Prerequisites: Power System Analysis and Control, Power Electronics

Course Objectives: This subject deals with power quality issues and solutions. It also discussed some of the power quality issues like interruptions and voltage sag with their reliability evaluation.

MODULE I Introduction to Power Quality **10 Periods**

Terms and definitions & Sources – Overloading, under voltage, over voltage - Concepts of transients - Short duration variations such as interruption - Long duration variation such as sustained interruption - Sags and swells - Voltage sag - Voltage swell - Voltage imbalance – Voltage fluctuations - Power frequency variations - International standards of power quality – Computer Business Equipment Manufacturers Associations (CBEMA) curve

MODULE II Voltage Sag and Interruptions **10 Periods**

Sources of sags and interruptions -Estimating voltage sag performance - Thevenin′s equivalent source - Analysis andcalculation of various faulted condition - Estimation of the sag severity - Mitigation ofvoltage sag, Static transfer switches and fast transfer switches. Interruptions-definition-difference between failure, outage, interruptions-causes of long interruptions origin of interruptions- costs of interruption

MODULE III Over Voltages **9 Periods**

Sources of over voltages - Capacitor switching – lightning - ferro resonance. Mitigation of voltage swells - surge arresters - low pass filters - power conditioners. Lightning protection – shielding – line arresters - protection of transformers and cables.

MODULE IV Harmonics **10 Periods**

Harmonic sources from commercial and industrial loads - Locating harmonic sources –Power system response characteristics - Harmonics Vs transients. Effect of harmonics –Harmonic distortion - Voltage and current distortions - Harmonic indices - Inter harmonics –devices for controlling harmonic distortion - passive and active filters-Harmonic distortion evaluation, IEEE and IEC standards.

MODULE V Power Quality Monitoring **9 Periods**

Monitoring considerations - Monitoring and diagnostic techniques for various power quality problems - Quality measurement equipment - Harmonic / spectrum analyzer – Flicker meters Disturbance analyzer - Applications of expert systems for power quality monitoring.

Text Books

1. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.Wayne Beaty, **"Electrical Power Systems Quality"**, McGraw Hill, 2003.
2. J. Arrillaga, N.R. Watson, S. Chen, "Power System Quality Assessment", (New York :Wiley),2000.
3. Bhim Singh, Ambrish Chandra, Kamal Al-Haddad," Power Quality Problems & Mitigation Techniques" Wiley, 2015.

References

1. G.T. Heydt, "Electric Power Quality", 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994.
2. M.H.J Bollen, "Understanding Power Quality Problems: Voltage Sags and Interruptions", (New York: IEEE Press), 2000.

3. C. Sankaran, **"Power Quality"**, CRC press, Taylor & Francis group, 2002.
4. Ewald F. Fuchs, Mohammad A. S. Masoum, **"Power Quality in Power Systems and Electrical Machines"**, Academic Press, 2nd Edition, 2011.
5. Angelo Baggiri, **"Handbook of Power Quality"**, John Wiley & Sons, 1st Edition, 2008.
6. Francisco C. De La Rosa, **"Harmonics and Power Systems"**, CRC Press, 1st Edition, 2006.
7. R.S.Vedam, M.S.Sarma, **"Power Quality – VAR Compensation in Power Systems"**, CRC Press, 2013.

E - Resources

1. http://www.elec.uow.edu.au/apqrc/links
2. http://technav.ieee.org/tag/1354/power-quality#concepts
3. http://nptel.ac.in/courses/108106025/

Course Outcomes

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

CO1	***Explain*** the basic terms, definitions, and sources of power quality issues, including overloading, under-voltage, and over-voltage.	Understand	L2
CO2	***Analyze*** the Causes of voltage sag and its characteristics for single phase and three phase system.	Analyze	L4
CO3	***Assess*** the impact of overvoltages on electrical equipment and recommend appropriate mitigation techniques based on system requirements.	Evaluate	L5
CO4	***Describe*** the effects of harmonics on power systems, including voltage and current distortions, and ***Utilize*** passive and active filters to control harmonic distortion in electrical systems.	Apply	L3
CO5	***Explain*** the functionality of quality measurement equipment such as harmonic analyzers, flicker meters, and disturbance analyzers.	Understand	L2

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	3	-	-	-	-	1	3	3	-
CO2	3	3	3	3	3	1	3	-	-	-	-	-	3	2	-
CO3	3	2	1	3	3	-	3	-	-	-	1	-	3	3	-
CO4	3	3	3	3	3	-	3	1	-	-	1	-	3	3	-
CO5	3	3	3	3	3	-	3	1	-	-	1	-	3	3	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0243	SPECIAL MACHINES (Professional Elective – V)	L	T	P
Credits: 3		3	-	-

Prerequisites: DC Machines and Transformers, AC Machines.

Course Objectives: The course deals with the special electrical machines such as induction generator, brushless DC machines, stepper motors which are used in different applications.

MODULE I Induction Generators 10 Periods

Self excitation requirements, steady state analysis, voltage regulation, different methods of voltage control. Doubly fed induction machines: control via static converter, power flow, voltage/frequency control (generation mode), application to grid connected wind and mini/micro hydel systems.

MODULE II Brushless DC Machines 9 Periods

Brushless DC Machines: Construction, operation, performance, control and applications. Micro Machines: Principle of operation of various types. Sensors for control, e.g. Position sensor.

MODULE III Linear Machines 10 Periods

A: Linear Induction Machines and Linear Synchronous Machines. Construction, operation, performance, control and applications.

B: PMDC and PM Synchronous Machine, control and applications. Recent developments in electrical machines.

MODULE IV Stepper Motors 10 Periods

Various types, principle of operation, operating characteristics, applications. Servo Motors, Servo amplifier and control. Special types of permanent magnet motors for servo application. Switched Reluctance Motor: Construction, operation, performance, control and applications.

MODULE V Synchronous and Special Machines 9 Periods

Construction of synchronous machines - Types - Induced emf - Voltage regulation - EMF and MMF methods. Brushless alternators - Reluctance motor - Hysteresis motor – Axial flux machine – Construction and working principle. Flux Reversal Machine – Construction and working principle - Applications.

Text Books

1. P.C. Sen, "**Principles of Electrical Machines and Power Electronics"**, Wisley Edition, 2nd Edition, 1997.
2. Gopal K Dubey, **"Fundamentals of Electrical Drives",**Narosa Publications, 2nd Edition, 2008.

References

1. Bimal K. Bose, **"Modern Power Electronics and AC Drives"**, Low Price Edition, 1st Edition, 2002.
2. R.K. Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd, 5th Edition, 2005.
3. E.G. Janardanan, **"Special Electrical Machines"**, PHI Learning Pvt. Ltd., 2014.
4. K.Venkataratnam, **"Special Electrical Machines",** Universities Press, 1st Edition, 2008.
5. Simmi P. Burman, **"Special Electrical Machines"**, S.K. Kataria& Sons, 2013.

E - Resources

1. http://nptel.ac.in/courses/108105063/pdf/L-32(SS)(IAC)%20((EE)NPTEL).pdf
2. https://www.eeweb.com/electromechanical

3. https://www.youtube.com/watch?v=Qy6mA4TEpyI

Course Outcomes

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

1. Understand the operation of induction generator.
2. Know the Construction and operating principle of Brushless DC motor and sensor used to control the speed of the motors.
3. Understands the Principle of operation of Linear Induction and Synchronous machines.
4. Comprehend the principle of operation of stepper motors, Permanent magnet motors and switched reluctance motors.
5. Understands the construction, operation and application of brushless alternators, reluctance motors, hysteresis motors and axial flux machines.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0244	SUPERVISORY CONTROL AND DATA ACQUISITION (Professional Elective-V)	L	T	P
Credits: 3		3	-	-

Prerequisites: Power Generation and Distribution, Power System Analysis and Control and Digital Electronics.

Course Objectives: To develop architecture of SCADA to explain each unit in detail. To apply knowledge gained about SCADA systems to identify few real-life industrial applications.

MODULE I Introduction to SCADA 10 Periods

Need of SCADA system, Distributed control Systems (DCS), General definition and SCADA components. Hardware architecture, software architecture, protocol detail, discrete control and analog control, application & benefits, PLCs Vs RTUs.

MODULE II Remote Terminal Units (RTU) 10 Periods

General features, Functions and Applications, Benefits, Configurations of SCADA, RTU (Remote Terminal Units) connections. RTU Block diagram, MTU communication interface, Future trends, Internet based SCADA display system, Components of control systems in SCADA.

MODULE III SCADA in Power Systems 9 Periods

A: Main task in power systems- Planning, operation, accounting, tasks of national control centre, regional control centre, Generating station control room, AGC-SCADA,

B:SCADA in generation, SCADA in Power Distribution, SCADA in Power Grid.

MODULE IV Supervisory Power Management 10 Periods

Energy Management System, power system operation states, security analysis, computer programmes-generating planning, transmission planning, system studies, energy audit, state estimation, load forecasting.

Utility distribution system design, regulation, distribution automation, DMS, design, layout and construction and commissioning of substations, Substation Automation and Equipment condition monitoring

MODULE V Automatic mapping and facility management 9 Periods

Introduction to Automatic mapping and facility management, Distribution system design, Facility mapping, tracking, facility inventory, system and equipment maintenance, trouble call management, Customer level intelligent automation system, computer level monitoring and control of distribution transformers, Substation and feeder level automation.

Text Books

1. Stuart A. Boyer ,**"SCADA"** , IAS 1999.
2. J. Parikh, B. Reddy & R. Benerjee**"Planning for demand side management in The electric sector",** TMH**.**
3. Terson ,**"Power system Control Technology"** , Prentice Hall New Delhi

References

1. Elliot L. Gruenberg, **"Hand book of Telemetry of Remote control"** , MGH New Delhi
2. Roddy & Coolen, **"Electronics Communication"**
3. S.S. Rao, **" Switch Gear & Protection"** , Khanna Publication, New Delhi
4. S.L. Uppal, **"Electric Power system"**
5. S K Gupta, **"Power System Engineering"** , Umesh Publication

E - Resources

1. http://nptel.ac.in/courses/108106022/8
2. http://v5.books.elsevier.com/bookscat/samples/9780750669498/9780750669498.DF

Course Outcomes

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

1. Know Need of SCADA, discrete and analog control, basic architecture of SCADA.
2. Understand the Basic concepts of Remote terminal units.
3. Comprehend the application of SCADA in generator control room, in power distribution and in power grid.
4. Estimate the power system operation states, energy audit discussion and substation automation and condition monitoring.
5. Analyze Intelligent automation control, equipment maintenance and feeder level automation for power system applications.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO2	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO3	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO4	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIIISemester		
Code: C0245	INDUSTRIAL ELECTRICAL SYSTEMS (Professional Elective– V)	L	T	P
Credits:3		3	-	-

Prerequisites: Utilization of Electric Energy

Course Objectives: This course deals with the new concepts invarious electrical system components,residential and commercial electrical systems, illumination systems and industrial electrical systems

MODULE I Electrical System Components 9 Periods

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB,inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices

MODULE II Residential and Commercial Electrical Systems 9 Periods

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

MODULE III Illumination Systems 10Periods

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premise, flood lighting.

MODULE IV Industrial Electrical Systems – I 10 Periods

HT connect ion, industrial substation, Transformer select ion, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

MODULE V Industrial Electrical Systems – II 10 Periods

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

Text Books

1. S. L. Uppal and G. C. Garg, “Electrical Wiring, Estimating & costing”, Khanna publishers, 2008.
2. K. B. Raina, “Electrical Design, Estimating & Costing”, New age International, 2007.

References

1. S. Singh and R. D. Singh, “Electrical estimating and costing”, Dhanpat Rai and Co., 1997.
2. H. Joshi, “Residential Commercial and Industrial Systems”, McGraw Hill Education, 2008.

E- Resources

1. safetyrisk.net/15-safety-precautions-when-working-with-electricity/
2. https://www.homequestionsanswered.com/what-is-flood-lighting.htm
3. https://lightning.org/lightning-protection-overview

Course Outcomes

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

1. Understand various components of industrial electrical systems and representing the systems with standard symbols
2. Understand electric shock and electrical safety practices
3. Applying electrical wiring systems for residential, commercial and industrial consumers
4. Analyze various illumination systems
5. Evaluate various electrical industrial systems.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIII Semester		
Code: C0246	**WEARABLE ELECTRONICS** (Professional Elective– V)	L	T	P
Credits:3		3	-	-

Prerequisites: Linear and Digital IC Applications

Course Objectives: This course deals with the various wearable systems, smart sensors and vital parameters, wearable computers, wireless body area networks and electronic textiles

MODULE I INTRODUCTION 9 Periods

Drawbacks of Conventional Systems for Wearable Monitoring, Applications of Wearable Systems, Recent developments – Global and Indian Scenario, Types of Wearable Systems, Components of wearable Systems, Physiological Parameters commonly monitored in wearable applications, Smart textiles, & textiles sensors, Wearable Systems for Disaster management, Home Health care, Astronauts, Soldiers in battle field, athletes, SIDS, Sleep Apnea Monitoring

MODULE II SMART SENSORS AND VITAL PARAMETERS 9 Periods

Vital parameters monitored and their significance, Bio-potential signal recordings (ECG, EEG, EMG), Dry Electrodes design and fabrication methods, Smart Sensors – textile electrodes, polymer electrodes, non-contact electrodes, MEMS and Nano Electrode Arrays, Cuff-less Blood Pressure Measurement, PPG, Galvanic Skin Response (GSR), Body Temperature Measurements, Activity Monitoring for Energy Expenditure, Respiratory parameters.

MODULE III WEARABLE COMPUTERS 10Periods

Flexible Electronics, Signal Processors, Signal Conditioning circuits design, Power Requirements, Wearable Systems Packaging, Batteries and charging, Wireless Communication Technologies and Protocols, Receiver Systems, Mobile Applications based devices. Data processing and validation – Signal Processing Algorithms in wearable Applications

MODULE IV WIRELESS BODY AREA NETWORKS 10 Periods

Wireless Body Area Networks – Introduction, Personal Area Networks (PAN), Application in Vital Physiological Parameter monitoring, Design of Sensor & Sink Nodes, Architecture, Communication &Routing Protocols, Security, Power and Energy Harvesting.

MODULE V ELECTRONIC TEXTILES 10 Periods

Concepts and development of electronic textile. Conductive Polymers and Fibers - Textile Fibres Used for Wearable Electronic Applications. Interfacing Circuits and Garments - Designing of Wearable fabrics integrated with Electronic materials and circuits. Design of Heat-Generating Circuit for Nichrome Fabric, Design of Communication Circuit for Copper Core Conductive Fabric. Design of Signal-Transferring Circuit form Optical Core Conductive Fabric. Design of Bullet Wound Intimation Circuit for Tele-intimation Fabric.

Text Books

1. Micheal R Neuman, Edward Sazonov, "Wearable Sensors: Fundamentals, Implementation and Applications",1st Edition, Elseiver, USA, 2014
2. Xiao ming Tao, "Wearable Electronics and Photonics", 1st Edition, CRC press, Manchester, 2005.

References

1. Kate Hartman, "Wearable Electronics: Design, Prototype and wear your own interactive garments, Maker Media", 1 st Edition, Maker Media, Inc, USA, 2014.
2. Elijah Hunter, "Wearable Technology", 1st Edition, Kindle Edition, USA, 2015.
3. Guang Zhong Yang, "Body Sensor Networks", 1st Edition, Springer, UK, 2014.
4. Xiaoming Tao, "Wearable Electronics and Photonic Wearable Electronics and Photonics, The Textile Institutes",1st Edition, CRC Press, Manchester, 2005.

E- Resources

1. https://www.vtec-ls.nl/solutions/components

2. https://www.energy.gov/sites/prod/files
3. https://www.technicaltextile.net/articles/electrotextiles-concepts

Course Outcomes

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

1. Understandvarious wearable systems
2. Understand smart sensors and bio-potential signal recordings
3. Evaluatewearable computers and signal processing algorithms in wearable applications
4. Apply wireless body area networks and power& energy harvesting.
5. Analyze concepts and development of electronic textile

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0247	WIND AND SOLAR ENERGY SYSTEMS (Professional Elective –VI)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: Renewable energy is clean, affordable, domestic, and effectively infinite. It produces no emissions and results in cleaner air and water for all.This Course discusses prefeasibility analysis, optimum sizing, modeling, control aspects and reliability issues.

MODULE I Constant Speed Wind Power Plants 10 Periods

Type-A WPP(Wind Power Plants): Working Principle , Different topologies, Starting methods and Maintenance procedure.

Type-B WPP: Working Principle, Different Types, Maintenance procedure. Compare the major differences in the maintenance of Type-A and Type-B WPPs.

MODULE II Variable Speed Wind Power Plants 10 Periods

Type-C WPP:Working principle, Working Principle Back- to-Back control and Maintenance procedure of Type-C WPPs.

Type-D Geared WPP:Working principle, Maintenance procedure of Type-D Geared WPPs

Type-D direct-drive WPP:Working principle, Maintenance procedure of Type-D Geared WPPs.Need for direct drive WPPs.

MODULE III Solar Power Plant Performance 10 Periods

A: Solar Thermal Power Plants: Working of a typical Concentrated Solar Power (CSP) plant, Maintenance procedure of CSP systems

B: Solar photovoltaic (PV) Power Plants: Working of a typical Solar PV Power plant. Types of Batteries for solar PV system. Maintenance procedure of typical Solar PV Power plant.

MODULE IV Wind and Solar Power Quality 9 Periods

Local impact of wind power on the grid. System wide impact of wind power on the grid. Power Quality of solar PV systems Power quality of CSP solar plant. Power quality of solar PV power plant .

MODULE V Grid Connection of Wind and Solar Power Plants 9 Periods

Grid interface issues of wind power. Grid operational issues of wind power. Grid connection of CSP plants. Grid connection of solar PV power plants Wind- solar hybrid systems. Maintenance of solar PV and wind solar Hybrid system

Text Books

1. Earnest , Joshua , **"Wind Power Technology"** PHI Learning, New Delhi, 2014
2. Solanki, Chetan Singh, **"Solar Photovoltaic: Fundamentals, Technologies and Application"** PHI Learning, New Delhi, 2009
3. S.P. Sukhatme, J.K.Nayak**"Solar Energy "** Tata McGraw, New Delhi, 2010.

References

1. Solanki, Chetan Singh, Arora, Brij M., VasiJuzer, Patil, Mahesh B. "**Solar Photovoltaic: A Lab TrainingModule "** Cambridge University Press, New Delhi, 2009.

E - Resources

1. http://www.awea.org/Resources/Content.aspx?ItemNumber=900

2. http://www.windpowerwiki.dk/
3. http://www.fao.org/docrep/010/ah810e/AH810E11.htm
4. http://www.renewables-made-in-germany.com/en/renewables-made-in-germany-start/solar-energy/solar-thermal-energy/overview.html
5. http://www.renewables-made-in-germany.com/en/renewables-made-in-germany-start/solar-energy/solar-thermal-power-plants/overview.html
6. 4. http://www.eai.in/ref/ae/sol/technology_options.html

COURSE OUTCOMES:

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

1. Comprehend constant speed wind power plants.
2. Compare the operation of variable speed wind power plants.
3. Analyze the operation of concentrated solar power (CSP) and solar photovoltaic (PV) power plants
4. Analyze the grid compatibility of the power from wind and solar power plants.
5. Resolve the grid integration issues of wind and solar power plants

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. VIIISemester		
Code: C0248	ELECTRIC SMART GRID (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Power System Analysis and Control.

Course Objectives:
This course is introduced to provide an overview of the smart grid and to understand the various aspects of the smart grid, including Technologies, Components, Architectures and Applications.

MODULE I Introduction to Smart Grid 10 Periods
Review Basic Elements of Electrical Power Systems: The Origins of the Power Grid - How the Grid Grew - A Primer on Today's Electrical Utilities - Desirable Traits of a Modern Grid – Principal Characteristics of the Smart Grid - Government and Industry Standardization – Standards and Electricity Markets.

MODULE II Smart Grid Communications 10 Periods
Two - way Digital Communications Paradigm, Network Architectures, IP-based Systems, Power Line Communications, Advanced Metering Infrastructure. **Measurements:** Sensor Networks, Phasor Measurement Units, Communications Infrastructure, Fault Detection and Self-Healing Systems, Applications and Challenges.

MODULE III Distribution System Management 9 Periods
A: Data sources and associated external systems, Modeling and analysis tools, applications.
B: Demand Response: Definition, Applications, and State-of-the Art, Pricing and Energy Consumption, Scheduling, Controllable Load Models, Dynamics, and Challenges, Electric Vehicles and Vehicle-to-Grid Systems, Demand Side Ancillary Services.

MODULE IV Economics and Market Operations 9 Periods
Energy and reserve markets, market power, generation firms, locational marginal prices, financial transmission rights.

MODULE V Security and Privacy 9 Periods
Cyber Security Challenges in Smart Grid, Load Altering Attacks, False Data Injection Attacks, Defense Mechanisms, Privacy Challenges.

Text Books

1. James Momoh, **"Smart Grid Fundamentals of Design and Analysis"**, IEEEPress, 2012.
2. Janaka Ekanayake, Kithsiri Liyanage,Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, **"Smart Grid Technology and Applications"**, IEEE Press, 2012.

References

1. AranyaChakraborthy and Marija D llic, **"Control and Optimization Methods for Electric Smart Grids"**, Editor, Springer Publications.
2. Lars T. Berger, Krzysztof Iniewski, **"Smart Grid applications, Communications and Security"**, John Wiley Publishers Ltd., 2012.
3. Yang Xiao, **"Communication and Networking in Smart Grids"**, CRC Press, Taylor and Francis Group, 2012.
4. Caitlin G. Elsworth, **"The Smart Grid and Electric Power Transmission"**, Nova Science Publishers, 2010.
5. Krzysztof Iniewski **, "Smart Grid Infrastructure & Networking",** McGraw Hill Education, 2012.

E- Resources

1. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_2_Smart_Grid.pdf
2. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_3_Communications.pdf
3. https://www.eeweb.com/power-management

Course Outcomes

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

1. Describe the characteristics of smart grid.
2. Describe the concepts & principles of communications technologies for smart grid.
3. Analyze the demand response and energy consumption.
4. Analyze the market operations & financial transmission rights.
5. Describe the security challenges in smart grid.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIIISemester		
Code: C0249	AI APPLICATIONS IN ELECTRICAL ENGINEERING (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:
To cater the knowledge of soft computing techniques, such as genetic Algorithms, Fuzzy logic and artificial neural networks.

MODULE I Genetic Algorithms **10 Periods**
Introduction – Encoding–Fitness Function – Reproduction operator – Genetic Modeling– Genetic operators – Crossover-Single–site cross over-Two point cross over– Multi point cross over – Uniform cross over–Matrix cross over – Cross over Rate – Inversion & Deletion– Mutation operator – Mutation– Mutation Rate – Bit-wise operators – convergence of Genetic Algorithm.

MODULE II Fuzzy Logic **10 Periods**
Introduction–Fuzzy versus crisp – Fuzzy sets – Membership function – Basic Fuzzy set operations– Properties of Fuzzy sets – Fuzzy Cartesian Product– Operations on Fuzzy relations – Fuzzy Quantifiers –Fuzzy Inference – Fuzzy Rule based system – Defuzzification methods.

MODULE III Artificial Neural Networks **10 Periods**
A: Introduction – Models of Neural Network – Architectures – Knowledge representation – Artificial Intelligence and Neural networks.
B: Learningprocess–Errorcorrectionlearning–Hebbianlearning–Competitivelearning–Supervised learning–Unsupervised learning–Reinforcement learning-learning tasks.

MODULE IV ANN Paradigms **9 Periods**
Multi–layer perceptron using Back propagation Algorithm – Self – organizing Map –Radial Basis Function Network – Functional link, network– Hopfield Network.

MODULE V Applications of AI Techniques **9 Periods**
Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Single area system and two area system –Reactive power control – speed control of DC and AC Motors.

Text Books
1. S.RajasekaranandG.A.V.Pai,**"Neural Networks, Fuzzy Logic & Genetic Algorithms"**, PHI, New Delhi, 2003.

References
1. P.D.Wasserman, Van Nostrand Reinhold, **"Neural Computing Theory & Practice",** New York,1989.
2. BartKosko, **"Neural Network & Fuzzy System",** PrenticeHall,1992.
3. G.J.KlirandT.A.Folger,**" Fuzzy Sets, Uncertainty and Information",** PHI,Pvt.Ltd,1994.
4. D.E.Goldberg,AddisonWesley, **"Genetic Algorithms",** 1999.

E- Resources
1. https://aitopics.org/
2. ieeexplore.ieee.org/document/10029/
3. www.nptelvideos.in/2012/11/artificial-intelligence-prof-p-dasgupta.html

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

1. Apply the genetic modeling, fitness function reproduction operators.
2. Apply the concept of fuzzy based system, analogy between fuzzy and crisp sets, basic fuzzy set operations, rule based systems, Defuzzification methods.
3. Recognize artificial neuron models, architectures, learning process, and learning techniques of artificial neuron models.
4. Apply algorithms like back propagation algorithm, self organizing map, radial networks.
5. Apply the Intelligence techniques to real Power Systems

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1		3	2	1	1	-	-	-	-	-	2	1	1
CO2	3	2	1	2	3	-	-	-	-	-	-	-	1	-	-
CO3	3	2	1	3	2	1	1	-	-	-	-	-	2	1	1
CO4	3	3	2	2	3	-	-	-	-	-	-	-	1	-	-
CO5	3	2	3	3	2	3	1	-	-	-	-	-	3	1	2

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. VIIISemester		
Code: C0250	NEURAL NETWORKS AND FUZZY LOGIC (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associative Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented.

MODULE I Introduction to Neural Networks 10 Periods

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate and Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch- Pitts Model, Historical Developments.

Essentials of Artificial Neural Networks:

Model of an Artificial Neuron, Types of Activation Functions, ANN Architectures, Classification Taxonomy of ANN, Connectivity: Vertices, Edges and Digraph, Learning Methods (Supervised, Unsupervised, Reinforced), Learning Rules, Types of Application

MODULE II Single Layer Feed Forward Neural Networks 10 Periods

Introduction, Perceptron Models: Simple Perceptron Model and Multilayer feed forward perceptron model, Training Algorithms, Limitations of the Perceptron Model, Applications.

Multilayer Feed Forward Neural Networks:

Credit Assignment Problem, Generalized Delta Rule, and Back propagation (BP) Training algorithm.

MODULE III Associative Memories 10 Periods

A: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory(Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory).

B:Bidirectional Associative Memory (BAM):

Architecture, BAM Training Algorithms: Storage and Recall Algorithm. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

MODULE IV Classical& Fuzzy Sets 9 Periods

Introduction to classical set theory - Operations on Crisp sets, Properties of Crisp sets and Crisp Relations. Fuzzy sets, Uncertainty, Membership function, Properties, Fuzzy relations.

MODULE V Fuzzy Logic System Components and Fuzzy Logic Applications 9 Periods

Fuzzy logic, Fuzzy Quantifiers, Fuzzy Inference, Fuzzification, Fuzzy rule based system, Defuzzification, Defuzzification methods, Fuzzy logic applications.

Text Books

1. Bart Kosko, **"Neural Networks and Fuzzy Logic System"**, Prentice Hall of India, 1991.
2. S.Rajasekaran and G.A.V.Pai, **"Neural Networks, Fuzzy Logic & Genetic Algorithms"**, Prentice Hall of India, New Delhi, 2003.

References

1. James A Freeman and Davis Skapura, **"Neural Networks"**, Pearson Education, 2002.
2. Simon Haykin, **"Neural Networks and Learning Machines"**, Pearson Education, 3rd Edition, 2009.
3. C.Eliasmith and CH.Anderson, **"Neural Engineering"** 1st Edition, Prentice Hall of India, 2009.
4. Jacek M. Zurada, **"Introduction to Artificial Neural Systems"**, 1st Edition, Jaico Publishing House, 2006.
5. Rober J. Schalkoff, **"Artificial Neural Networks"**, Tata McGraw Hill Edition, 2011.

E- Resources

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_neural_networks.htm
2. http://uni-obuda.hu/users/fuller.robert/nfs.html
3. http://nptel.ac.in/courses/108104049/

Course Outcomes

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

1. Comprehend the concept of neural networks.
2. Analyze various feed forward networks.
3. Understand the importance of Associative memories.
4. Comprehend classical, fuzzy set theories and the components of fuzzy logic systems.
5. Analyze the application of fuzzy logic control to real time systems.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO2	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO3	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO4	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. VIIISemester		
Code: C0251	AUTOMOTIVE ELECTRICAL AND ELECTRONICS SYSTEMS (Professional Elective– VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Control systems and Instrumentation

Course Objectives:

This course deals with the Current trends in modern automobiles , basic electrical components in an automobile, embedded systems in typical modern automobile, electronics control units and automotive networking protocols.

MODULE I INTRODUCTION **9 Periods**

Current trends in modern automobiles – – Drive by wire Systems -Vehicle functional domains and their requirements - Components of an Automobile Electronic system and their functions: Sensors, Actuators, Control Units and Software structure of Control units.

MODULE II AUTOMOBILE ELECTRICALS AND ELECTRONICS **9 Periods**

Basic Electrical Components in an automobile - Starting system (Battery, Ignition Switch, Solenoid, Starter, Neutral Safety Switch), Charging system (Alternator Drive Belt, Alternator, Voltage Regulator), Fuses. Overview of Vehicle Electronic system - Driver - Vehicle - Environment system (Control and monitoring systems, Electronic systems of the vehicle and the environment) -General instrumentation block diagram - Typical instrumentation cluster lay out.

MODULE III EMBEDDED SYSTEM IN AUTOMOTIVE CONTEXT **10 Periods**

Embedded systems in typical modern automobile - Distributed systems, Embedded components - -Engine Management system - Diesel / Gasoline system, Components, System architecture (H/W, S/W) - Body electronics systems, - Infotainment systems – Navigation, Car radio.

MODULE IV ELECTRONICS CONTROL UNITS (ECUS) **10 Periods**

ECUs and vehicle subsystems - Electronic systems of Power train subsystem, Electronic systems of Chassis subsystem, Electronic systems of Body subsystems (Comfort and Passive safety), Multimedia subsystems. Automobile sensors and actuators, Engine management system, Vehicle safety systems, Environmental legislation (Pollution Norms - Euro / Bharat standards)

MODULE V DIAGNOSTICS AND AUTOMOTIVE NETWORKING PROTOCOLS **10 Periods**

Diagnostics procedure: Introduction – Diagnostics theory – on board and off board diagnostics Diagnostics Link Connector (DLC) - CAN bus topology – Data transmission – CAN protocol – Over view of CAN controller - LIN bus: overview – Data transmission system - LIN protocol.

Text Books

1. Tom Denton, "Automobile Electrical and Electronics systems", Rout ledge Taylor & Francis Group, London & New York, 2002.
2. Nicolas Navet and Francoise Simonot-Lion, "Automotive Embedded Systems Handbook", CRC Press, USA, 2013.

References

1. Michel Parent & FurnioHarshima, Ljubovlacic, "Intelligent Vehicle Technologies: Theory and Applications", 1st Edition, Butterworth-Heinemann publications, New Delhi, 2001.
2. Ronald k.J, "Automotive Electronics Handbook", 2 nd Edition, McGraw Hill Publications, Columbus, 2009.
3. Norman P. Mansour, William Ribbens, "Understanding of Automotive Electronics", 5th Edition, Butterworth- Heinemann, United Kingdom, 2014.

4. Robert Bosch , "Automotive Electrics Automotive Electronics", 5th Edition, Springer, Germany, 2010

E- Resources

1. www.epicflow.com/blog/5-latest-trends-in-the-automotive-industry/
2. https://www.gcoeara.ac.in/learning_material/auto
3. https://copperhilltech.com/blog/controller-area-network-can-bus

Course Outcomes

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

1. Understand current trends in modern automobiles
2. Understand components of an automobile electronic system
3. Applying embedded systems in typical modern automobile
4. Analyze electronics control units in vehicles
5. Evaluate automotive networking protocols

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO2	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO3	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO4	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO5	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C00P3	PROJECT STAGE – II INCLUDING SEMINAR (Major Project)	L	T	P
Credits: 11		-	-	22

Course Objectives:

- To utilize science and engineering to make product/process using innovative techniques, predict the results and prepare technical documents.
- To promote deeper understanding the basic concepts, physical mechanism behind the processes, participate in scientific analysis and comprehensive of scientific writing of verbal presentation. This course is to introduce post graduate student to ideas, methods and techniques that can improve the content and presentation of scientific seminars.

Course Outcomes:

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

1. Identify project goals, constraints, deliverables, performance criteria, control needs and requirements.
2. Adapt projects in response to issues that arise internally and externally.
3. Interact with team and stakeholders in a professional manner, respecting differences, to ensure a collaborative project environment.
4. Utilize technology tools for communication, collaboration, information management, and decision support.
5. Write technical reports and deliver oral presentation with effective communication

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	2	1	1	1	2	2	3	3	3	3	2
CO2	2	3	3	2	3	1	2	1	2	2	3	3	3	3	2
CO3	2	3	2	3	2	1	1	1	1	2	3	3	3	3	3
CO4	1	2	2	2	2	1	1	1	2	3	3	2	3	3	2
CO5	1	2	2	1	1	2	2	3	3	3	3	2	2	2	2

MALLA REDDY ENGINEERING COLLEGE

B.Tech.

ELECTRICAL AND ELECTRONICS ENGINEERING

MR22

OPEN ELECTIVES SYLLABUS

(Students Joined in AY 2022-23)

MALLA REDDY ENGINEERING COLLEGE
B.Tech.
Department of Electrical and Electronics Engineering
(MR22 Regulations)

MR 22 - OPEN ELECTIVES

MR21-LIST OF OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS				
S.NO	**BRANCH**	**COURSE CODE**	**NAME OF THE COURSE**	**No. of credits**
1	**EEE**	C0238	Electrical Energy Conservation and Auditing	3
2		C0253	Electrical Safety and Energy Management	3
3		C0254	Energy Storage Systems	3
4		C0255	Introduction to Electrical Vehicles	3
5		C0256	Smart Grid Technologies	3
6		C0257	Trends in Energy Sources for Sustainable Development	3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0238	ELECTRICAL ENERGY CONSERVATION AND AUDITING (Open Elective) / (Professional Elective-IV)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: This course deals about the concept of energy conservation, energy management and different approaches of energy conservation in industries, economic aspects of energy conservation project and energy audit in commercial and industrial sector.

MODULE I Basic Principles of Energy Audit 9 Periods

Energy audit - definitions, concept , types of audit, energy index, cost index , pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy audit of industries - Energy saving potential, energy audit of process industry, thermal power station, building energy audit.

MODULE II Energy Management 9 Periods

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

MODULE III Energy Efficient Motors 10 Periods

A: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details.

B: Characteristics - Variable speed, variable duty cycle systems, RMS hp - Voltage variation -Voltage unbalance - Over motoring - Motor energy audit.

MODULE IV Power Factor Improvement, Lighting & Energy Instruments 10 Periods

Power Factor Improvement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit.

Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers , application of PLC's.

MODULE V Economic Aspects and Analysis 10 Periods

Economics Analysis - Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

Text Books

1. W.R. Murphy and G. Mckay, **"Energy Management",** Butter Worth Publications.
2. John. C. Andreas, **"Energy Efficient Electric Motors",** Marcel Dekker Inc Ltd, 2nd Edition, 1995.

References

1. Paul O' Callaghan, **"Energy Management",** Mc-Graw Hill Book Company, 1st Edition, 1998.
2. W.C.Turner, **"Energy Management Hand Book",** A John Wiley and Sons.
3. S. C. Tripathy, **"Utilization of Electrical Energy"**, Tata McGraw Hill, 1993.
4. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online).
5. L.C. Witte, P.S. Schmidt and D.R.Brown, **"Industrial Energy Management and**

Utilization", Hemisphere Publication, Washington, 1998.

E - Resources

1. http://industrialelectricalco.com/wp-content/uploads/2014/01/Understanding-Energy-Efficient-Motors-EASA.pdf
2. https://beeindia.gov.in/
3. https://beeindia.gov.in/sites/default/files/3Ch10.pdf

Course Outcomes

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

1. Examine the principles of Energy audit and its process in thermal power station, industries.
2. Analyze the different aspects of energy management.
3. Describe the characteristics of energy efficient motors.
4. Illustrate the power factor improvement, good lighting system practice and the types of energy instruments
5. Analyze the economic aspects of Energy Management.

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0253	ELECTRICAL SAFETY AND ENERGY MANAGEMENT (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

This course deals with the general safety requirements during the electrical installations. The course emphasis on the various objectives of energy management and auditing.

MODULE I: RULES & REGULATIONS 10 Periods

Power sector organization and their roles – significance of IE rules & IE acts – general safety requirements: Span conductor configuration, spacing and clearing, sag, erection, hazards of electricity.

MODULE II:INSTALLATION AND EARTHING OF EQUIPMENTS 10 Periods

Classification of electrical installation - earthing of equipment bodies – electrical layout of switching devices and SC protection – safety in use of domestic appliances – safety documentation and work permit system – flash hazard calculations – tools and test equipments.

MODULE III:SAFETY MANAGEMENT AND FIRST AID 9 Periods

A:Safety aspects during commissioning – safety clearance notice before energizing – safety during maintenance – maintenance schedule – special tools – security grand– check list for plant security – effects of electric and electromagnetic fields in HV lines and substations.

B:Safety policy in management & organizations – economic aspects – safety program structure – elements of good training program – first aid – basic principles – action taken after electrical shock – artificial respiration and methods – chocking – poisoning.

MODULE IV:FIRE EXTINGUISHERS10 Periods

Fundamentals of fire – initiation of fires – types – extinguishing – techniques – prevention of fire – types of fire extinguishers- fire detection and alarm system – CO2 and Halogen gas schemes, foam schemes.

MODULE V:ENERGY MANAGEMENT & ENERGY AUDITING 9 Periods

Objectives of energy management – energy efficient electrical systems – energy conservation and energy policy – renewable source of energy – energy auditing – types and tips for improvement in industry.

Text Books

1.John Codick, **"Electrical safety hand book",** McGraw Hill Inc, New Delhi, 2000.
2.V. Manoilov, **"Fundamentals of electrical safety",** Mir Publishers, MOSCOW, 1975.

References

1.C.S. Raju, **"A Practical Book on domestic safety",** Sri Sai Publisher, Chennai, 2003.
2.**Power Engineering Hand book**, TNEB Engineers officers, Chennai, 2002.
3.S. Rao, R.C. Khanna, **"Electrical safety, Fire safety engineering and safety management"**, Khanna Publisher, Delhi, 1998.
4.The Indian electricity rules, 1956, authority regulations, 1979, Commercial Law Publication, Delhi, 1999.
5.W.F.Cooper, **"Electrical safety Engineering"**,Newnes-Butterworth company, 1978.

E-Resources

1.http://nptel.ac.in/courses/103106071/5
2.https://beeindia.gov.in/
3.https://www.electrical4u.com/equipment-earthing/

4.https://www.electricaltechnology.org/2015/05/earthing-and-electrical-grounding-types-of-earthing.html

Course Outcomes

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

1. Gain basic knowledge on Indian Power sector organization and their roles.

2. Understand the concepts of earthing and its standards.

3. Acquire the basic knowledge on First aid and safety during electrical installation..

4.Distinguish various fire extinguishers and their classification.

5. Understand the basic concepts of energy auditing.

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	**Programme Outcomes(POs)**														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**
CO2	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**
CO3	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**
CO4	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**
CO5	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0254	ENERGY STORAGE SYSTEMS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: This course deals with the need for electrical energy storage, different electrical storage technologies, types and features of energy storage systems and the applications of electrical energy storage.

MODULE I: ELECTRICAL ENERGY STORAGE TECHNOLOGIES10 Periods

Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

MODULE II: NEEDS FOR ELECTRICAL ENERGY STORAGE 10 Periods

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses. The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

MODULE III: FEATURES OF ENERGY STORAGE SYSTEMS 10 Periods

A: Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES).

B: Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

MODULE IV: TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS 9 Periods

Electrical storage systems, Double-layer capacitors (DLC), Superconducting magnetic energy storage (SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

MODULE V: APPLICATIONS 9 Periods

Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

Text Books

1. James M. Eyer, Joseph J. Iannucci and Garth P. Corey, **"Energy Storage Benefits and Market Analysis"**.
2. **"The Electrical Energy Storage"** by IEC Market Strategy Board.

References

1.Jim Eyer, Garth Corey, **"Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report",** Sandia National Laboratories, Feb 2010.

E -Resources

1. http://nptel.ac.in/courses/108105058/
2. http://www.nptel.ac.in/courses/108103009/pdf/lec33.pdf

Course Outcomes

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

1. Understand the different types of electrical energy storage technologies.
2. Learn about the need for electrical energy storage.
3. Comprehend the various features energy storage systems.
4. Understand the various types of electrical energy storage systems.
5. Emphasize the various applications of electrical energy storage.

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0255	INTRODUCTION TO ELECTRIC VEHICLES (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Electrical Machines

Course Objectives: This course is introduced to provide the concepts of automotive electrical systems and electric vehicles

MODULE I: Electric Vehicles **10 Periods**

Layout of an electric vehicle, system components, traction motor characteristics, transmission, electronic control system, advantage and limitations, performance and energy consumption of electric vehicles.

MODULE II: Electric Motors **10 Periods**

Review of technology suited to automotive propulsion, requirements, DC motors, Induction motors, permanent magnet brushless DC motors and switched reluctance motors.

MODULE III: Motor Drives **10 Periods**

Speed and torque control, DC motor - Chopper based four quadrant operations, induction motor, permanent magnet motor and switched reluctance motor.

MODULE IV: **Electrical Systems** **9 Periods**

Simple automotive wiring diagram and components of electrical system, starting system – starter circuit, standard Bendix and over running clutch drive, charging system – alternator, cut-outs and regulators, ignition system - conventional and electronic ignition system.

MODULE V: Sizing of the Drive System **9 Periods**

Matching the electric machine and the internal combustion engine (ICE), Sizing of the propulsion motor, Sizing of engine-generator, Sizing the power electronics based on Switch Technology - Switching Frequency and Ripple capacitor design, selecting the energy storage technology, Supporting subsystems.

TEXT BOOKS

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, CRC Press, 2004
2. Electric Vehicle Technology-Explained, James Larminie and John Loury, John Wiley & Sons Ltd., 2003

REFERENCES:

1. Electric and Hybrid Vehicles – Design Fundamentals, Iqbal Husain, CRC Press, 2010
2. Electric Vehicle Battery Systems, Sandeep Dhameja, Butterworth–Heinemann, 2002
3. Electric and Hybrid – Electric Vehicles, Ronald K. Jurgen, SAE, 2002
4. Light Weight Electric/Hybrid Vehicle Design, Ron Hodkinson and John Fenton, Butterworth–Heinemann

E - RESOURCES

1. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_2_Smart_Grid.pdf
2. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_3_Communications.pdf
3. https://www.eeweb.com/power-management

Course Outcomes

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

1. To study the concepts and drivetrain configurations of electric vehicles
2. To understand about electric propulsion system
3. To provide various energy storage devices
4. Discuss the concepts of automotive electrical systems and electric vehicles.
5. Recommend, Design/Size and Control different electric propulsion units and other components of EVs.

CO- PO Mapping
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs) & Program Specific Outcome (PSO)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0256	SMART GRID TECHNOLOGIES (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: None

Course Objectives: To understand the concept of a smart grid and its advantages over the conventional grid. To know smart metering techniques, to understand the problems associated with the integration of distributed generation & its solution through smart grid.

MODULE I: Introduction to Smart Grid 10 Periods

Introduction: Evolution of Electric Grid, Smart Grid Concept, Need of Smart Grid, Functions of Smart Grid, Opportunities of Smart Grid, Challenges in Implementation of Smart Grid, Difference between Conventional and Smart Grid, Concept of Resilience.

MODULE II: Smart Grid Technologies 10 Periods

Smart Grid Technologies: Introduction, Objectives and functions of Smart Substation,

Sub-Station Automation: Benefits and Functions. Feeder Automation, Energy Management System (EMS), Vehicle (PHEV) to the grid.

MODULE III: Phasor Measurement Unit 10 Periods

Phasor Measurement Unit: Concept of Phasor Measurement, Phasor Measurement Unit (PMU)-Features –Fundamentals, Global Positioning Satellite (GPS) Systems, Synchro phasor –Definition-Measurements, Applications of PMUs in Power Systems. The Comparisons between SCADA system and PMUs System, Intelligent Electronic Devices-Functions-Advantages.

MODULE IV: **Micro-Grid 9 Periods**

Concept of Microgrid, need & applications of Microgrid, Formation of the microgrid, protection and control of the microgrid, Overview of Variable speed Wind generators, microturbines, the basic concept of the fuel cell, Pumped hydro, Compressed air storage, Integration of Renewable Energy Sources.

MODULE V: Power Quality in Smart Grid 9 Periods

Introduction, Power Quality, Electromagnetic Compatibility (EMC), Relation Between Voltage Quality and EMC, Power Quality Issues of Grid Connected Renewable Energy Sources, Causes of Low Power Quality, Issues, Challenges and Solutions of RES-Grid Integration, Power Quality Conditioner (PQC).

TEXT BOOKS

1. Smart Grid Fundamentals of Design and Analysis, James Momoh, 1st Edition

2. Introduction to the Smart Grid Concepts, Technologies and Evolution, S. K. Salman, IET library, 2017

REFERENCES:

1. Smart Grid Technology, Harsh Tanwar, Bhavishya Mittal, Bhawana Chouhan, Genius Publications
2. Smart-Grid-Handbook: For Regulators & Policy Makers, Indian Smart Grid Forum, 2017

E - RESOURCES

1. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_2_Smart_Grid.pdf
2. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_3_Communications.pdf
3. https://www.eeweb.com/power-management

COURSE OUTCOMES

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

1. Appreciate the difference between smart grid & conventional grid
2. Apply smart metering concepts to industrial and commercial installations
3. Formulate solutions in the areas of smart substations.
4. Understand distributed generation and wide Area measurements systems
5. Come up with smart grid solutions using modern communication technologies.

CO- PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs) & Program Specific Outcome (PSO)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0257	TRENDS IN ENERGY SOURCES FOR SUSTAINABLE DEVLOPMENT (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: None

Course Objectives: This course is introduced to understand the principles of Biomass, geo-thermal and wave energy systems

MODULE I: Introduction **10 Periods**

Trends in energy consumption - Conventional and renewable sources, Energy sources and their availability, Energy Conservation status in India -need of new energies for sustainable development.

MODULE II: Fundamentals of Solar Radiation **10 Periods**

Introduction: The Sun as Source of Energy, Extraterrestrial and Terrestrial Radiations, Spectral Power Distribution of Solar Radiation, instruments for measuring solar radiation and sunshine recorder.

Solar PV Conversion: The PV Cell-Crystalline Solar cells -thin film and amorphous solar cells, Module, Array, Equivalent Electrical circuit- Open circuit voltage and short circuit current, I-V, P-V Curves. Developments in efficient non silicon solar cells

MODULE III: Wind Energy **10 Periods**

Origin of winds-Global (or Planetary) Winds- Local Winds-Factors Affecting the Distribution of Wind Energy on the Surface of Earth, Wind Turbine – Types, construction of HAWT, VAWT, performance characteristics, Betz criteria

MODULE IV: **Bio-Mass** **9 Periods**

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Biogas digesters, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

MODULE V: Geothermal Energy **9 Periods**

Resources, types of wells, methods of harnessing the energy Ocean Energy. OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

Tidal and Wave Energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

TEXT BOOKS

1. Non-Conventional Energy Sources, G. D. Rai, 6th Edition, Khanna Publishers, 2004
2. Non-Convention Energy Resources, B. H. Khan, 3rd Edition, McGraw Hill, 2017

REFERENCES:

1. Renewable Energy Sources, Twidell & Weir, 3rd Edition, CRC Press, 2015
2. Solar Energy, Sukhatme, 3rd Edition, McGraw Hill, 2008
3. Non-Conventional Energy, Ashok V. Desai, Wiley Eastern, 1990

Course Outcomes

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

1. Understand various sources for sustainable energy
2. Understand Solar Photo voltaic systems.
3. Understand wind energy systems
4. Explain the harnessing techniques of Biomass.
5. Explain the harnessing techniques of geothermal and Tidal energy

CO- PO Mapping
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-