ELECTRICAL & ELECTRONICS ENGINEERING
COURSE STRUCTURE
B. TECH I SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EE1T01	HSMC	English - I	2	-	-	2	2
2	18EE1T02	BSC	Linear algebra and differential equations	3	1	-	4	4
3	18EE1T03	BSC	Applied Chemistry	3	-	-	3	3
4	18EE1T04	ESC	Problem Solving Approaches through C	3	-	-	3	3
5	18EE1T05	ESC	Engineering Graphics	3	-	-	3	3
6	18EE1L06	HSMC	English Communication Skills Lab-I	-	-	2	2	1
7	18EE1L07	BSC	Applied chemistry Lab	-	-	3	3	1.5
8	18EE1L08	ESC	Problem Solving Approaches through C Lab	-	-	3	3	1.5
9	18EE1L09	ESC	Field Practice Lab	-	-	2	2	1
						Total number of credits		**20**

B. TECH II SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EE2T01	HSMC	English – II	2	-	-	2	2
2	18EE2T02	BSC	Vector Calculus and Fourier Transforms	**3**	-	-	3	3
3	18EE2T03	BSC	Applied Physics	3	-	-	3	3
4	18EE2T04	BSC	Biology For Engineers	2	-	-	2	2
5	18EE2T05	PCC	Power Systems –I	3	-	-	3	3
6	18EE2T06	ESC	Electrical Circuit Analysis – I	4	-	-	4	4
7	18EE2L07	BSC	Applied Physics Lab	-	-	3	3	1.5
8	18EE2L08	ESC	Basic Engineering & IT Workshop	-	-	3	3	1.5
9	18EE2T09	MC	Environmental Science	2	-	-	2	-
						Total number of credits		**20**

B. TECH III SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EE3T01	BSC	Complex Variables and Numerical Methods	3	-	-	3	3
2	18EE3T02	PCC	Electrical Circuit Analysis – II	3	1	-	4	4
3	18EE3T03	PCC	Analog Electronics-I	3	-	-	3	3
4	18EE3T04	PCC	Electrical Machines – I	3	-	-	3	3
5	18EE3T05	PCC	Electromagnetic Fields	3	-	-	3	3
6	18EE3T06	ESC	Basics of Mechanical Engineering	3	-	-	3	3
7	18EE3L07	PCC	Electrical Circuits Lab	-	-	3	3	1.5
8	18EE3L08	PCC	Analog Electronics Lab	-	-	3	3	1.5
9	18EE3T09	MC	Education Technology and Society	2	-	-	2	-
							Total number of credits	**22**

B. Tech IV Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EE4T01	PCC	Analog Electronics-II	3	-	-	3	3
2	18EE4T02	PCC	Electrical Machines – II	3	-	-	3	3
3	18EE4T03	PCC	Control Systems	3		-	3	3
4	18EE4T04	PCC	Power Systems –II	3	-	-	3	3
5	18EE4T05	PCC	Digital Electronics	3	-	-	3	3
6	18EE4T06	ESC	Data Structures Through C	3	-	-	3	3
7	18EE4L07	PCC	Control Systems & Simulation Lab	-	-	3	3	1.5
8	18EE4L08	PCC	Electrical Machines – I Lab	-	-	3	3	1.5
9	18EE4L09	ESC	Data Structures Through C Lab	-	-	2	2	1
							Total number of credits	**22**

B. Tech V SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EE5T01	PCC	Power Electronics	3	-	-	3	3
2	18EE5T02	PCC	Electrical Measurements	3	-	-	3	3
3	18EE5T03	ESC	Python Programing	3	-	-	3	3
4	18EE5T04	HSMC	Effective Technical Communication	3	-	-	3	3
5	**Open Elective – I**			3	-	-	3	3
6	18EE5L08	PCC	Electrical Machines – II Lab	-	-	3	3	1.5
7	18EE5L09	PCC	Electrical Measurements Lab	-	-	3	3	1.5
8	18EE5L10	ESC	Python Programing Lab	2	-	-	2	1
9	18EE5T11	MC	Constitution of India	2	-	-	2	-
							Total number of credits	**19**

B. Tech VI SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EE6T01	PCC	Microprocessors and Micro controllers	3	-	-	3	3
2	18EE6T02	PCC	Switchgear and Protection	3	-	-	3	3
3	18EE6T03	ESC	OOPS through JAVA	3	-	-	3	3
4	18EE6T04	HSMC	Management Science	3	-	-	3	3
5	**Open Elective – II**			3	-	-	3	3
6	18EE6L07	PCC	Microprocessors and Micro Controllers Lab	-	-	3	3	1.5
7	18EE6L08	PCC	Power Electronics & Simulation Lab	-	-	3	3	1.5
8	18EE6L09	ESC	OOPS through JAVA Lab	2	-	-	2	1
							Total number of credits	**19**

B. Tech VII SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
	18EE7T01	PCC	Digital Signal Processing	3	-	-	3	3
	18EE7T02	PCC	Power System Operation & Control	3	-	-	3	3
1	**Professional Elective-I**			3	-	-	3	3
	18EE7T03	PEC-I	Electric Vehicles					
	18EE7T04		Renewable Energy Sources					
	18EE7T05		Smart Grid Technologies					
4	**Professional Elective-II**			3	-	-	3	3
	18EE7T06	PEC-II	Programmable Logic Controllers					
	18EE7T07		AI Techniques					
	18EE7T08		Special Electrical Machines					
5		OEC-III	**Open Elective-III**	3	-	-	3	3
6	18EE7L09	PCC	Digital Signal Processing Lab	-	-	3	3	1.5
7	18EE7L10	PCC	Power Systems & Simulation Lab	-	-	3	3	1.5
8	18EE7P11	PROJ	Summer Internship / Mini Project	-	-	-	-	1
							Total number of credits	**19**

B. Tech VIII SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EE8T01	PCC	Utilization of Electrical Energy	3	-	-	3	3
2	**Professional Elective-III**			3	-	-	3	3
	18EE8T02	PEC-III	Digital Control Systems					
	18EE8T03		Electrical Distribution Systems					
	18EE8T04		Power Electronic Control of Electric Drives					
3	**Professional Elective-IV**			3	-	-	3	3
	18EE8T05	PEC-IV	HVDC & FACTS					
	18EE8T06		Instrumentation					
	18EE8T07		Advanced Control Systems					
4		OEC-IV	MOOC/Open Elective IV	-	-	-	-	2
5	18EE8P09	PROJ	Project	-	-	-	-	8
							Total number of credits	**19**

Open Elective-I (V Semester)

S.No	Course Code	Course Category	Course Title	Offering Dept
1	18EE5T05	OEC	Quantitative Aptitude and Reasoning	BED
2	18EE5T06	OEC	Basics of Control Systems	EEE
3	18EE5T07	OEC	Electrical Engineering Materials	EEE

Open Elective–II (VI Semester)

S.No	Course Code	Course Category	Course Title	Offering Dept
1	18EE6T05	OEC	Basic Civil Engineering	CE
2	18EE6T06	OEC	Sustainable Engineering Practices	CE
3	18EE6T07	OEC	Design and Estimation of Electrical Systems	EEE
4	18EE6T08	OEC	Energy Audit, Conservation and Management	EEE
5	18EE6T09	OEC	Embedded Systems	ECE
6	18EE6T10	OEC	Computer Networks	CSE/IT

Open Elective–III (VII Semester)

S.No	Course Code	Course Category	Course Title	Offering Dept
1	18EE7T09	OEC	Fuzzy Sets and Fuzzy Logic	BED
2	18EE7T10	OEC	Remote sensing and GIS	CE
3	18EE7T11	OEC	Green Buildings	CE
4	18EE7T03	OEC	Electric Vehicles	EEE
5	18EE7T08	OEC	Special Electrical Machines	EEE
6	18EE7T12	OEC	Bio Medical Instrumentation	ECE
7	18EE7T13	OEC	Nano Electronics	ECE
8	18EE7T14	OEC	Software Project Management.	CSE/IT
9	18EE7T15	OEC	Computer Architecture & Organization	CSE/IT
10	18EE7T16	OEC	Technology Innovation Management	DMS
11	18EE7T17	OEC	Global Environment Trends	DMS

Open Elective-IV (VIII Semester)

S.No	Course Code	Course Category	Course Title	Offered by Dept
1	18EE8T08	OEC	Polymer Chemistry	BED
2	18EE8T09	OEC	Advanced Drawing for Civil Engineers	CE
3	18EE8T10	OEC	Power Quality	EEE
4	18EE8T11	OEC	Soft Computing Techniques	ECE
5	18EE8T12	OEC	Satellite communication	ECE
6	18EE8T13	OEC	Internet of Things	CSE
7	18EE8T14	OEC	Mechatronics	ME
8	18EE8T15	OEC	Green Engineering Systems	ME
9	18EE8T16	OEC	Micro - Electro - Mechanical Systems	ME

Note: Prior approval from the department is required for the selection of open electives

SEMESTER-I

SYLLABUS

ENGLISH-1

B.Tech I SEMESTER

L	T	P	C
2	0	0	2

Prerequisites: -

Course Outcomes

1. CO 1: Use English language, both written and spoken, competently and correctly.
2. CO 2: Improve comprehension and fluency of speech.
3. CO 3: Gain confidence in using English in verbal situations.
4. CO 4: Hone the communication skills to meet the challenges of their careers very successfully.
5. CO 5: Strengthen communication skills in different contexts like formal and informal.
6. CO 6: Develop knowledge of different fields and serve the society accordingly

Syllabus:

Unit 1	Human Resources
	Ideal Family
Unit 2	In London
	Verger
Unit 3	Our Living Environment
	Three Days to See
Unit 4	Part A: Energy: Alternative Sources
	War
Unit 5	Principles of Good Writing
	Letter Writing

References:

1. English for Engineers and Technologists, Orient Blackswan
2. Prose for Communication, Ravindra Publishing House
3. Panorama, Oxford University Press

LINEAR ALGEBRA & DIFFERENTIAL CALCULUS

B.Tech I SEMESTER

L	T	P	C
3	1	0	4

Prerequisites: -

Course Outcomes:

- Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
- Illustrate the methods of computing eigen values and eigen vectors
- Able to analyze the real life situations, formulate the differential equations then apply the solving methods
- Explain the techniques of solving the linear differential equations
- Optimize functions of several variables and able to find extreme values of constrained functions

Syllabus:

UNIT I: Linear systems of equations, Eigen values & Eigen vectors

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence, Consistency of linear system of equations, System of linear homogeneous equations.

Gauss -Jordan method, LU decomposition method, **Application:** Finding the current in electrical circuits, Eigen values, Eigen vectors, Properties of Eigen values(without proofs).

UNIT II: Quadratic forms & Differential calculus:

Cayley-Hamilton theorem(without proof), Reduction to diagonal form, Reduction of quadratic form to canonical form, Nature of quadratic form. Limits and continuity and differentiability, Mean value theorems, Taylor's and Maclaurin's series.

Functions of two variables, Partial derivatives, Homogeneous functions, Total derivative, Jacobian, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT III: Differential equations of first order:

Formation of a differential equation, Solution of a differential equation, Variables separable method, Linear equations, Bernoulli's equation, Exact differential equations.

Equations reducible to exact equations, **Applications:** Orthogonal Trajectories, Newton's Law of cooling, Rate of decay & growth.

UNIT IV: Differential equations higher order:

Part –A: Definitions, Complete solution, Operator D, Rules to find Complementary function, Inverse operator, Rules to find the particular integral(RHS term of the type e^{ax} , Sin(ax+b), cos(ax+b), polynomials in x).

Rules to find the particular integral(RHS term of the type e^{ax} V(x), any other function), Method of variation of parameters. **Application:** L-C-R circuits.

UNIT V: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t.

Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application**: Application to differential equations.

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rdEdition, 2014.
2. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.

APPLIED CHEMISTRY

B.Tech I SEMESTER

L	T	P	C
3	0	0	3

Prerequisites: -

Course Outcomes

CO1: Study of polymers and composite materials enable us to use them in a good number of engineering fields

CO2: Industries are run by the quality of fuels and energy crisis can be met by broad understanding of different fuels

CO3: Electrochemical principles form the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by understanding the science of corrosion.

CO4: Study of the existing developed materials forms a basis for developing more number of advanced materials

CO5: Methods of purification of water can be known so that more of them can be developed

CO6: The importance of engineering materials in the domestic and engineering fields can be understood.

Syllabus:

UNIT I: POLYMERS AND PLASTICS

Introduction- Degree of polymerization-functionality-tacticity-

Types- Addition polymerization-Definition-PVC-Properties-applications

condensation polymerization-Bakelite-Properties-applications

Physical and mechanical properties – Conducting polymers– Biodegradable polymers-applications– Natural rubber- Disadvantages - Compounding of rubber - vulcanization – Synthetic rubber: Thiokol -Thermoplastics and Thermosetting plastics –- Composite materials & Fiber reinforced plastics

UNIT II: BASICS OF ELECTRO CHEMISTRY AND CORROSION

:Galvanic cell - Electro chemical series - Standard electrodes (Hydrogen and Calomel electrodes)

Primary cells: Zinc – air cell

Secondary cells:- Lithium ion batteries, Pb-acid cell,

Fuel cells:- H_2-O_2 fuel cell and molten carbonate fuel cells

Corrosion: Dry Corrosion– Wet (Electrochemical) Corrosion –Factors influencing the rate of corrosion – Protection from corrosion – Cathodic protection – Electro plating -Electroless plating

UNIT III: NON CONVENTIONAL ENERGY SOURCES

Solar Energy: - Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance

Non-conventional energy sources:

(i) Hydropower include setup a hydropower plant (schematic diagram)

(ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant

(iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.

(iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.

(v) Biomass and biofuels

UNIT IV: SEMICONDUCTORS AND SUPER CONDUCTORS

Non –Elemental Semi conductors: Stoichiometric, Non- Stoichiometric ,Controlled valency & Chalcogen photo/semiconductors- Preparation of Semiconductors Ge & Si by crystal pulling technique – purification by Zone refining.

Semiconductor Devices:- Diode –Transistor.

Super conductors*:*-Definition-Types- Characteristics –applications

UNIT V: ADVANCED MATERIALS AND GREEN CHEMISTRY

Nano materials*:*-Introduction –General methods of preparation (top down and bottom up).**Liquid Crystals-**Definition, classification,applications

Green synthesis:- Introduction- Principles - methods of synthesis– alternative reactive media (aqueous phase method) and alternative energy sources(microwave method) -R4M4 principles-Econoburette.

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

UV Spectroscopy- Basic principle-Instrumentation- Applications

IR Spectroscopy- Basic principle-Instrumentation- Applications

NMR Spectroscopy- Basic principle-Instrumentation- Applications

Analytical techniques: FE-SEM,TEM,BET

Chromatography techniques: Paper chromatography, Thin layer chromatography-applications

Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

Reference Books:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

PROBLEM SOLVING APPROACHES THROUGH C

B.Tech I SEMESTER

L	T	P	C
3	0	0	3

Prerequisites: -

Course Outcomes

The student will learn

- To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To use structures and files

Syllabus:

UNIT I

INTRODUCTION TO COMPUTERS

Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process.

BASICS OF C PROGRAMMING:

Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

UNIT II

Decision making statements: if, if else, nester if. Muti way decision making statements: else if, Switch statement

Looping statements: while, do while, for, Compilation process

UNIT III

Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, Two dimensional arrays, Matrix Operations, Multi dimensional Arrays

Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

UNIT IV

FUNCTIONS Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion , Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

POINTERS

Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation.

UNIT V

STRUCTURES AND UNIONS

Structure , Nested structures , Pointer and Structures , Array of structures , Example Program using structures and pointers , Self referential structures, Unions.

FILE PROCESSING

Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command line arguments

Text Books:

1. Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2016.
2. Krnighan. B.W and Ritche, D.M, “The C Programming Language”, Second Edition, Pearson Education, 2006
3. Pradep dey, Manas Ghosh, “Fundamentals of Computing and programming in C”, First Edition, Oxford University Press, 2009.

References:

1. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh Edition, Pearson Publication.
2. E Balagursamy, “Programming in C, Sixth Edition, Tata McGraw Hill.
3. Ajay Mittal, “Programming in C A practical Approach”, Pearson education

ENGINEERING GRAPHICS

B.Tech I SEMESTER

L	T	P	C
3	0	0	3

Prerequisites: -

Course Outcomes:

CO1: Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles.

CO2: Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.

CO3: Draw the projections of planes.

CO4: Draw the projections of solids

CO5: Convert Orthographic projections to isometric projection and vice versa.

Syllabus:

UNIT I:

Lettering, Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods.

Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes- Tangent and Normals to the above curves.

UNIT II :

Orthographic projections: Introduction, Projections of points.

Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT III

Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane;

Projections of planes inclined to both the reference planes.

UNIT IV:

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

UNIT V:

Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views.

Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications
2. Engineering Drawing +Auto CAD, K Venugopal &V Prabhuraja, Newage Publishers.

Reference Books:

1. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree, K. C. John, PHI Publishers
3. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
4. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

ENGLISH COMMUNICATION SKILLS LAB-1

B.Tech I SEMESTER

L	T	P	C
0	0	2	1

Prerequisites: -

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

List of Experiments:

1 **Greetings and Introduction**

2 **Request Permission & Giving Directions**

3 **Inviting/Complaining/Congratulating**

4 **Root Words**

5 **Phonetics-Sounds and Symbols**

6 **Pronunciation Rules**

References:

1. ***Strengthen Your Steps,*** Maruti Publications

2. ***Interact,*** Orient Blackswan

3. Word Power Made Easy, Pocket Books

APPLIED CHEMISTRY LAB

L	T	P	C
0	0	3	1.5

B.Tech I SEMESTER

Prerequisites: -

Syllabus:

1. Introduction to chemistry laboratory
2. Determination of HCl using standard Na_2CO_3 solutions
3. Determination of alkalinity of a sample containing Na2CO3 and NaOH.
4. Determination of temporary and permanent hardness of water using standard EDTA solution.
5. Determination of Copper using standard EDTA solution
6. Determination of ferrous iron using standard $K_2Cr_2O_7$ solution
7. Determination of $KMnO_4$ using standard Oxalic acid solution
8. Determination of pH of the given sample solution using pH meter
9. Conductometric Titrations between strong acid and strong base
10. Potentiometric Titrations between strong acid and strong base
11. Synthesis of Phenol-Formaldehyde resin
12. Synthesis of Urea-Formaldehyde resin
13. Determination of Surface tension of a liquid
14. Determination of Viscosity of a liquid
15. Determination of Flash and Fire point of a lubricant
16. Determination of Cloud and Pour point of a lubricant
17. Determination of Aniline point of a lubricant

PROBLEM SOLVING APPROACHES THROUGH 'C' LAB

B.Tech I SEMESTER

L	T	P	C
0	0	3	1.5

Prerequisites: -

Syllabus:

1. Write a C program to convert temperature from Fahrenheit to Celsius.
   Write a C program to find the roots of a quadratic equation.
   Write a program to implement simple calculator using switch case
2. Write a C program to determine if the given number is a prime number or not.
   Write a program to display the factorial of a given number
3. Write a program to display whether a given is Armstrong or not
   Write a C program to generate the first n terms of the Fibonacci sequence.
4. Write a C program to display the reverse of a given number.
   Write a C program to calculate the following sin and cos value
5. Write a program for sorting numbers in a list.
6. Write programs for searching a number in the list using
   a. Linear search
   b. Binary search
7. Write programs that reads two matrices to perform the following:
   a. Addition of two matrices
   b. Multiplication of two matrices
8. Write a program to perform the following operations without using build in string operations:
   a. To display the length of the string.
   b. To check whether the string is palindrome or not
   c. To delete n characters from a given position in a given string.
9. Write a program to generate GCD of two numbers using functions
10. Write a C program that reads two integers n and r to compute the ncr value using the following relation: ncr(n, r) = n! / r! (n,r)! . Use a function for computing the factorial value of an integer.
11. Write programs for the following using recursive functions
    a. Factorial of a given number
    b. GCD of two numbers
    c. Fibonacci series

12. Write a program to demonstrate call by value and call by reference.
13. Write a program to perform following operating using pointers
    a. Reverse of a string
    b. Comparison of two strings
14. Write a program for displaying the details of the student by sorting them according to the marks using structure containing roll no, name and marks.
15. Write a program for merging two files
16. Write a program to count no of lines, words, characters in a file
17. C Program to Create Employee File Name Record that is taken from the Command Line Argument

FIELD PRACTICE LAB

B.Tech I SEMESTER

L	T	P	C
0	0	2	1

Prerequisites: -

1. Study of various supply systems
2. Study of different switches, MCBs, measuring instruments, wires and cables.
3. Identification and measurement of resistance, inductance & capacitance.
4. Practice house wiring with MCB, 3 pin socket, 2 way control of lamp.
5. Practice soldering with simple electronic components on PCB.
6. Estimation of Power loads
7. Maintenance /Charging of the Batteries.
8. Testing and repair of Iron box, kettle
9. Testing of Refrigerator
10. Testing of Geyser

SEMESTER-II

SYLLABUS

ENGLISH II

B.Tech II SEMESTER

L	T	P	C
2	0	0	2

Prerequisites: -

Syllabus:

Unit 1 **a) Transport: Problems and Solutions**

b) The Scarecrow

Unit 2 **a) The Drunkard**

b) A Village Lost to the Nation

Unit 3 **a) Evaluating Technology**

b) The Knowledge Society

Unit 4 **a) Industry: Safety and Training**

b) Martin Luther King and Africa

Unit 5 **a) Man's Peril (Detailed)**

b) Report Writing

References:

1. **English for Engineers and Technologists,** Orient Blackswan
2. **Prose for Communication,** Ravindra Publishing House
3. **Panorama,** Oxford University Press

VECTOR CALCULUS AND FOURIER TRANSFORMS

B.Tech II SEMESTER

L	T	P	C
3	0	0	3

Syllabus:

UNIT I: Special functions & Multiple integrals:

Special functions: Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

Multiple Integrals: Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Cartesian to Cylindrical & Cartesian to Spherical polar coordinate systems). **Applications:** Area enclosed by plane curves, Volume of solids.

UNIT II: Vector Calculus:

Vector Differentiation: Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, Del applied to vector point functions-Div& Curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

Vector Integration: Line integral, Green's theorem in the plane (without proof), Surface integrals, Stokes theorem (without proof), Volume integral, Gauss Divergence theorem (without proof).

UNIT III: Fourier Series:

Euler's formulae(without proof), Conditions of a Fourier expansion, Functions having points of discontinuity.

Change of interval, Even and odd functions, Half-range series.

UNIT IV: Fourier Transforms:

Fourier Integral, Fourier cosine & sine integral, complex forms of Fourier integral.

Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms(without proof), Convolution theorem(without proof), finite Fourier sine & cosine transforms.

UNIT V: Applications of Partial Differential Equations:

Definition of PDE, Classification of 2^{nd} order PDE, Variable separable method, Vibrations of a stretched string – Wave equation.

One-dimensional heat flow, Two-dimensional heat flow, Solution of Laplace's equation.

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rdEdition, 2014.
2. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi
   Publications, 9th Edition, 2014.
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.

APPLIED PHYSICS

B.Tech II SEMESTER **L T P C**
3 0 0 3

Prerequisites: -

Course Outcomes

CO1: Study of lasers and optical fibers with an emphasis of their application in communication in particular.

CO2: Outline the principles of Quantum mechanics to understand the principles of solid state materials for use in engineering applications.

CO3: The Analytical study of response of materials to Electromagnetic fields.

CO4: To study various magnetic and dielectric materials and their Engineering applications.

CO5: To Gain knowledge on the physics of semiconductors for their engineering applications.

Syllabus:

UNIT –I

LASERS

Characteristics of Lasers – Spontaneous and Stimulated Emission – Population Inversion - Einstein Coefficients – Ruby Laser – He-Ne Laser – Recording and Reconstruction of Holography-Applications.

OPTICAL FIBERS

Principle of Optical fiber – construction – Acceptance angle – Numerical Aperture – Types of Optical fibers – Single and Multi mode, Step Index and Graded Index fibers — Advantages of Optical Fibers in Communication – Applications in Communication.

UNIT – II

QUANTUM THEORY OF SOLIDS

Matter waves – Physical significance of wave function – Schrodinger's Time independent wave equation.

Schrodinger's Time dependent wave equation - Particle in a 1 Dimensional Potential well.

UNIT-III ELECTROMAGNETIC FIELDS

Grad – Div – Curl – Gauss and Stoke's theorems – Fundamental Laws of Electromagnetism.

Maxwell's Equations – Poynting vector – Propagation of Electromagnetic waves in a dielectric medium.

UNIT-IV

MAGNETIC MATERIALS

Origin of magnetic moment – Classification of magnetic materials (Dia, Para, Ferro) - Weiss theory of Ferromagnetic domains – Hysteresis – Soft and Hard magnetic materials - Applications.

DIELECTRIC MATERIALS

Types of Polarization – Dielectrics in DC and AC fields – Internal field – Clausius Mossoti Equation – Dielectric Loss and Dielectric Breakdown – Ferroelectric Hysteresis and applications.

UNIT-V

PHYSICS OF SEMICONDUCTORS

Carrier Concentration in Intrinsic semiconductor – Fermi level and electrical conductivity in intrinsic semiconductors - Carrier Concentration in Extrinsic semiconductors – Variation of Fermi level with temperature and impurity concentration.

Drift and Diffusion currents – Einstein's relation – Hall Effect & its applications.

Text Books:

1. Engineering Physics by R.K.Gaur and S.L.Gupta – Dhanpatrai Publications
2. Engineering Physics by M.Avadhanulu and P.G. Kshirasagar – S Chand Publications (10^{th} Edition)
3. Applied Physics by S.O.Pillai – New Age Publications – (3^{rd} Edition)

Reference Books:

1. Engineering Physics by P.K.Palanisamy – Scitech Publications (2014 Edition)
2. Engineering Physics by M.Armugam – Anuradha Publications
3. Engineering Physics by M.R.Srinivasan (2014 Edition) New Age International Publications

BIOLOGY FOR ENGINEERS

B.Tech II SEMESTER

L	T	P	C
2	0	0	2

Course Outcomes

After studying the course, the student will be able to:

CO1: Understand how biological observations lead to major discoveries and the morphological,
Biochemical and ecological classification of organisms.

CO2: Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms.

CO3: Classify enzymes and distinguish between different mechanisms of enzyme action and Study the chemical reactions that are catalyzed by enzymes. Apply thermodynamic Principles to biological systems and able to understand major chemical processes that occur
Within a living organism in order to maintain life.

CO4: Identify DNA as a genetic material in the molecular basis of information transfer.

CO5: Identify and classify microorganisms, understand media compositions and growth of Microorganisms

Unit-1: Introduction

Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry.

Classification of organisms based on (a) Cellularity- Unicellular or Multicellular , (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life.

Unit-2: Biomolecules

Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function.

Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit-3: Enzymes & Metabolism

Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters.

Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an

energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

Unit-4: Information Transfer

Concept of genetic code.

Molecular basis of information transfer; Transcription and translation.

Unit-5: Microbiology

Concept of species and strains, Identification of Micro organisms.

Sterilization and media compositions, Growth kinetics.

Text/Reference Books:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

POWER SYSTEMS-I

B.Tech II SEMESTER

L	T	P	C
3	0	0	3

Prerequisites: -

UNIT-I Thermal Power Stations

Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super, heaters, Economizers, electrostatic precipitators

Steam Turbines: Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers and Chimney.

UNIT-II Hydel & Nuclear Power Stations

Hydro Power Stations: Choice of site, arrangement of hydroelectric installations, Hydrology. Mass curve, flow duration curve, classification of Hydro Power Plants, pumped storage plants.

Nuclear Power Stations: Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR.Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT-III Solar power generation

Solar radiation spectrum. Radiation measurement. Applications of solar thermal systems Solar Photovoltaic(SPV) systems,

Applications of Solar Photovoltaic systems, Green Building, Solar – thermal, Solar – PV), Present Status of PV in India, Numerical problems

UNIT- IV Wind Power Generation

Introduction to wind energy, basic principles of wind energy conversion, forces on the blade power in the wind – maximum power, wind energy conversion – wind data and (qualitative treatment only) energy estimation, Basic components of wind energy conversion systems.

Classification of WECS-HAWT, VAWT, Geared wind power plants (WPPs), direct-drive WPPs and Hybrid (semi-geared) WPPs, Schemes of electric generation, Site selection considerations. Numerical problems

UNIT-V Economic Aspects of Power Generation & Tariff

Economic Aspects - Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants.

Tariff Methods- Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods.

Text Books:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, S.Bhatnagarand, A Chakrabarti, DhanpatRai& Co. Pvt. Ltd.
2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers
3. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006

ELECTRICAL CIRCUIT ANALYSIS – I

B.Tech II SEMESTER

L	T	P	C
4	0	0	4

Syllabus:

Unit I: DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Network reduction techniques (series, parallel, series – parallel)

Star-to-delta and delta to- star transformation, Source transformation technique, nodal analysis and mesh analysis.

Unit II: AC Circuits

Periodic waveforms (determination of rms, average value and form factor), Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks, 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), Series and Parallel Resonance.

Unit III: Network topology

Definitions of Graph and Tree, Basic cutset and tieset matrices for planar networks. Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources, Duality

Unit IV: Magnetic Circuits

Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits. Faraday's laws of electromagnetic induction,Concept of self and mutual inductance.

Dot convention-coefficient of coupling and composite magnetic circuit, Analysis of series and parallel magnetic circuits

Unit V: Network Theorems

Analysis of Superposition theorem, Thevenin theorem, Norton theorem for independent and dependent current and voltage sources.

Maximum power transfer theorem. Reciprocity theorem, Compensation theorem.

Text Books:

1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.
3. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
4. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi,DhanpatRai&Co.

APPLIED PHYSICS LAB

B.Tech II SEMESTER

L	T	P	C
0	0	3	1.5

Prerequisites: -

(Any 10 of the following listed experiments)

LIST OF EXPERIMENTS:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating.
5. Determination of Numerical Aperture and bending loss of a given optical fiber.
6. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
8. Verification of laws of vibrations in stretched strings - Sonometer
9. Determination of Young's modulus by method of single cantilever oscillations.
10. Melde's experiment – Transverse and Longitudinal modes.
11. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
12. L- C- R Series Resonance Circuit.
13. Study of I/V Characteristics of Semiconductor diode.
14. I/V characteristics of Zener diode.
15. Energy Band gap of a Semiconductor p - n junction.

BASIC ENGINEERING AND IT WORKSHOP

B.Tech II SEMESTER

L	T	P	C
0	0	3	1.5

Prerequisites: -

Engineering Workshop

1. Carpentry

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

2. Fitting

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

3. Black Smithy

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

4. Tin Smithy

1. Taper Tray
2. Square Box without lid
3. Open Scoop 4. Funnel

IT Workshop

1. Identification of computer peripherals, installation of OS and troubleshooting.
2. Orientation and practice on MS Word.
3. Orientation and practice on MS Excel.
4. Orientation and practice on MS Power Point.
5. LAN & Wi-Fi Network connectivity using TCP/IP settings and customization of web browsers.
6. Introduction to HTML and design of basic web page.

ENVIRONMENTAL SCIENCE

B.Tech II SEMESTER

L	T	P	C
2	0	0	0

Prerequisites: -

Course Outcomes

- **CO1** The importance of environment, Natural resources and current global environmental Challenges for the sustenance of the life on planet earth.
- **CO2** The concepts of the ecosystem and its function in the environment
- **CO3** The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- **CO4** The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- **CO5** The environmental legislations of India and Social issues and the possible means to
- **CO6** Environmental assessment and the stages involved in EIA.

UNIT-I MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

UNIT-II: ECOSYSTEM

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^{o}production& 2^{o}production- Major ecosystems: Forest ecosystem- Grassland ecosystem ,Desert ecosystem- Aquatic ecosystem: pond ,lake ecosystem- Streams ,river ecosystem, Oceans

UNIT-III : NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources- Forest resources**:** Use and over-exploitation

- Deforestation-Timber extraction-Mining- Conservation- Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management- Energy resources**:** renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas- Nuclear energy

UNIT-IV: **BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity- Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India- Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

UNIT-V: ENVIRONMENTAL PROBLEMS

Global warming,Climate change- Acid rain , Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects,control measures- Pollution case studies- Role of an individual in prevention of pollution

UNIT-VI: ENVIRONMENTAL LEGISLATION &MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act- Drawbacks-

Environmental Impact Assessment and its significance- Preparation of Envirronmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
4.Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi

SEMESTER-III

SYLLABUS

COMPLEX VARIABLES AND NUMERICAL METHODS (CVNM)

B.Tech III Semester

L	T	P	C
3	0	0	3

UNIT-I: Analytic Functions
Introduction, Complex function, Limit and continuity of a complex function, Derivative of f(z), Analytic functions, Harmonic functions & orthogonal system, Milne-Thomson method.
Applications: Applications to flow problems.

UNIT-II: Integration and Series Expansions
Complex integration, Cauchy's theorem and Cauchy's integral formula (without proofs), Series of complex terms, Taylor's series and Laurent's series (without proofs).

UNIT-III: Integration using Residues
Zeros & singularities of an analytic function, Residues, Residue theorem (without proof), Calculation of residues. Evaluation of integrals of the type (a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ (d) Integrals by indentation.

UNIT IV: Numerical Solution of Equations:
Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method (one variable and non-linear simultaneous equations). Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT V: Numerical Integration & Numerical Solution of ODE:
Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules.
Numerical Solution of ODE: Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta method of 4th order.

Text Books:
3. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rdEdition, 2014.
4. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:
3. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.
4. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.

ELECTRICAL CIRCUIT ANALYSIS-II

B.Tech III Semester

L	T	P	C
3	1	0	4

UNIT-I

Balanced Three phase circuits: Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power.

UNIT-II

Unbalanced Three phase circuits: Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.

UNIT-III

Transient Analysis in DC and AC circuits: Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

UNIT-IV

Two Port Networks: Two port network parameters – Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks - Poles and zeros of network functions.

UNIT-V

Network synthesis: Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6 th edition
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd

Reference Books:

1. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
2. Introduction to circuit analysis and design by TildonGlisson. Jr, Springer Publications.
3. Circuits by A.Bruce Carlson , Cengage Learning Publications
4. Network Theory Analysis and Synthesis by SmarajitGhosh, PHI publications
5. Networks and Systems by D. Roy Choudhury, New Age International publishers
6. Electric Circuits by David A. Bell, Oxford publications
7. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi,DhanpatRai&Co.

ANALOG ELECTRONICS-I

B.Tech III Semester

L	T	P	C
3	0	0	3

UNIT – I Semiconductor diodes: Review of Semi Conductor Materials, p-n Junction Diode, V-I Characteristics and its temperature dependence, Ideal and Practical Diode Equivalent Circuits, concept of Diode Resistance & Capacitances,

Zener and Avalanche breakdown, zener diode characterstics, zener diode as a voltage regulator.

UNIT-II Diode Circuits:Rectifiers: Half wave, full wave (Centre tapped, bridge) rectifiers, filters, Regulation and Ripple calculations.

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

UNIT – III Bipolar Junction Transistors:

Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes

UNIT-IVField Effect Transistors: JFET, pinch-off voltage, Volt-ampere characteristics, MOSFET-Enhancement & Depletion mode, Volt-ampere characteristics, small signal model of FET, Biasing of FET,

UNIT -V Feedback amplifiers: Concept of Feedback, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, voltage and current, series and shunt feedbacks. Introduction to power amplifier.

Oscillators: Barkhausen criterion, RC oscillators, Wien bridge, phase shift, LC Hartley and Colpitts oscillator, Crystal oscillators (BJT only), frequency stability of oscillator.

TEXT BOOKS:

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, Tata Mc-Graw Hill

REFERENCE BOOKS:

1. Electronic Devices and Circuits by David A. Bell, Oxford University Press
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGraw Hill, Second Edition
3. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9thEdition, 2006

ELECTRICAL MACHINES-I

B.Tech III Semester

L	T	P	C
3	0	0	3

Unit – I: Electromechanical energy conversion principles

Basic Laws, electromechanical energy conversion principles – singly excited magnetic system, doubly excited magnetic system. Physical concept of torque production – electromagnetic torque & reluctance torque. Static and dynamic induced voltage, Lap and wave windings, AC windings and winding factors.

Unit – II: DC Generators

Construction details and operating principle, EMF equation, types of DC generators – separately excited, shunt, series and compound generators. Characteristics of DC generators, voltage build up in shunt generator, armature reaction & methods of reducing effect of armature reaction, commutation, losses and efficiency-applications.

Unit – III: DC Motors

Torque production, back EMF, types of DC motors – DC shunt, series and compound motor, characteristics of DC motors. Starters – need for starter, shunt, compound and series motor starters. Speed control methods armature and field control methods, brake test, swinburne's test, Hopkinson's test, losses and efficiency- applications.

Unit – IV: Single phase transformers

Construction details, types and operating principle of a transformer, ideal transformer, transformer on no load and with load, phasor diagrams, equivalent circuit, regulation, losses and efficiency, OC and SC test, Sumpner's test, all day efficiency, auto transformer, parallel operation of transformers.

Unit – V: Three phase transformers

Types of three phase transformers Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Tertiary winding, Scott connection, transients in switching – off load and on load tap changers.

Text Books:

1. Electrical Machines – P.S. Bhimbra, Khanna Publishers
2. Electric Machinery by A.E.Fitzgerald,Charleskingsley,StephenD.Umans, TMH

Reference Books:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth,McGrawHill Publications, 4th edition
2. Electrical Machines by R.K.Rajput, Lakshmi publications,5th edition.
3. Electrical Machinery by AbijithChakrabarthi and SudhiptaDebnath,McGraw Hill education 2015
4. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2010
5. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria& Sons

ELECTROMAGNETIC FIELDS

B.Tech III Semester

L	T	P	C
3	0	0	3

UNIT-I

ELECTROSTATICS: Coulomb's law and field intensity, Electric fields due to continuous charge distributions, Electric flux density. Gauss's law – Maxwell's Equation, applications of Gauss's law, Electric potential, relationship between E and V – Maxwell's Equation, an electric dipole and flux lines, energy density in electrostatic fields.

UNIT- II

CONDUCTORS AND DIELECTRICS: Behavior of Conductors in an Electric Field-Conductors and Insulators – Electric Field Inside a Dielectric Material – Polarization – Dielectric Conductors and Dielectric Boundary Conditions – Capacitance-Capacitance of Parallel Plate, Spherical & Co-axial capacitors – 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

UNIT-III

MAGNETO STATICS AND AMPERE'S LAW: Static Magnetic Fields – Biot-Savart Law – Oerstead's experiment – Magnetic Field Intensity(MFI) due to a Straight, Circular &Solenoid Current Carrying Wire – 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 – Point Form of Ampere's Circuital Law – Maxwell's Third Equation

UNIT – IV

MAGNETIC FORCE AND ENERGY IN MAGNETIC FIELDS: Magnetic Force – – Lorentz Force Equation – Force on Current Element in a Magnetic Field - Force on a Straight and Long Current Carrying Conductor in a Magnetic Field - Force Between two Straight and Parallel Current Carrying Conductors. Self and Mutual Inductances – Neumann's Formulae – Determination of Self Inductance of a Solenoid and Toroid and Mutual Inductance Between a Straight, Long Wire and a Square Loop Wire in the Same Plane – Energy Stored and Intensity in a Magnetic Field

UNIT-V

TIME VARYING FIELDS: Faraday's Law of Electromagnetic Induction – It's Integral and Point Forms – Maxwell's Fourth Equation. Statically and Dynamically Induced E.M.F's -Modified Maxwell's Equations for Time Varying Fields – Displacement Current. Uniform Plane Wave equation Poynting Theorem, Poynting Vector and its Significance**.**

TEXT BOOKS:

1. Principles of Electromagnetics, 6th Edition, Sadiku, Kulkarni, OXFORD University Press, 2015
2. Engineering Electromagnetics, William.H.Hayt, Mc.Graw Hill, 2010.

REFERENCE BOOKS:

1. Electromagnetics 5th edition, J.D.Kraus,Mc.Graw – Hill Inc, 1999.
2. Field & Electromagnetic waves – 2nd edition, David K. Cheng
3. Electromagnetics, Joseph Edminister, Tata Mc Graw Hill, 2006.

BASICS OF MECHANICAL ENGINEERING

B.Tech III Semester

L	T	P	C
3	0	0	3

Unit-I

Heat and Work: Heat and Work, Point and Path function. Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry –Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale – PMM I, Problems on heat and work for various processes.

First law of thermodynamics, application of steady flow energy equation to various components of a power plant (boiler, turbine, condenser and pump), Carnot engine.

UNIT-II

Introduction to cycles: Power cycle: Introduction to 2 stroke and 4 stroke engine, Otto cycle, Diesel cycle, problems on Otto and Diesel cycle

Refrigeration cycle: Refrigerant, Vapour compression refrigeration (VCR) cycle, Problems on VCR cycle, vapour absorption refrigeration cycle, domestic refrigerator, window and split AC.

Unit-III

Hydro Prime Movers: Hydraulic Turbines: Classification, Principles and operations of Pelton wheel, Francis turbine and Kaplan turbine, Performance and characteristic curves.

Hydro Power: Components of hydro-electric power plant, Estimation of water power potential, Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor, load-duration curve, firm power, secondary power, prediction of load.

Unit-IV

Introduction to Engg. Mechanics – Basic Concepts. Systems of Forces: Coplanar Concurrent Forces– Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, analysis of plane trusses.

Unit-V

Stresses and strains: kinds of – stress-strains, elasticity and plasticity, Hooks law, stress –strain diagrams, modules of elasticity, Poisson's ratio, linear and volumetric strain, relation between E, N, and K, bars of uniform strength, compound bars and temperature stresses.

Types of supports– loads – Shear force and bending moment for cantilever and simply supported beams without overhanging for all types of loads.

Text books:

1. Engineering Thermodynamics , PK Nag 4th Edn , TMH.
2. Hydraulics & Fluid Mechanics Including Hydraulics Machines, Dr. P.N. Modi & Dr. S.M. Seth, Rajsons Publ, 21st Ed., 2017.
3. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications
4. Strength of materials by Bhavikatti, Lakshmi publications.

References:

1. A Textbook of Elements of Mechanical Engineering", S Trymbaka Murthy, University Press(India) Pvt Ltd, 4th Edition, 2006.6

ELECTRICAL CIRCUITS LAB

B.Tech III Semester

L	T	P	C
0	0	3	1.5

List of Experiments

Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin's and Norton's Theorems
2) Verification of Superposition theorem and Maximum Power Transfer Theorem
3) Verification of Compensation Theorem
4) Verification of Reciprocity , Millmann's Theorems
5) Locus Diagrams of RL and RC Series Circuits
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of coupling
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Parameters of a choke coil.
11) Determination of cold and hot resistance of an electric lamp.
12) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

ANALOG ELECTRONICS LAB

B.Tech III SEMESTER

L	T	P	C
0	0	3	1.5

List of Experiments

Electronic Workshop Practice:

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias& Reverse bias)
   Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
6. Transistor Biasing
7. CRO Operation and its Measurements
8. BJT-CE Amplifier
9. Emitter Follower-CC Amplifier
10. FET-CS Amplifier
11. Clippers with different reference voltages
12. Clampers with different reference voltages
13. RC phase shift oscillator

EDUCATION, TECHNOLOGY AND SOCIETY

B.Tech III Semester

L	T	P	C
2	0	0	0

UNIT 1: Necessity of education for human life, Impact of education on society

UNIT 2: Nature and scope of education (Gurukul to ICT driven), Emotional intelligence Domains of learning, Approaches to learning, Learning outcomes

UNIT 3: Role of education in technology advancement.

UNIT 4: Technology and society; management of technology; technology transfer

UNIT 5: Ethical and value implications of education and technology on individual and society

.

REFERENCE BOOKS:

1. Education and Social order by Bertrand Russel
2. Theories of learning by Bower and Hilgard
3. Technology and Society by Jan L Harrington

SEMESTER-IV

SYLLABUS

ANALOG ELECTRONICS-II

B.Tech IV Semester

L	T	P	C
3	0	0	3

UNIT –I Multivibrators : Analysis and Design of Bistable, Monostable, Astable Multivibrators using transistors

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

UNIT - II: Operational Amplifier: Basic information of op-amp, block diagram of op-amp, Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, buffer,

UNIT-III Applications of Op-Amp: Instrumentation amplifier, ac amplifier, V to I and I to V converters, Sample & hold circuits, logarithm & antilogarithm amplifier, multiplier and divider, differentiator and integrator, comparator, Schmitt trigger, Multivibrators, waveform Generators - Triangular, Sawtooth, Square wave

UNIT - IV: Active filters &IC 555 Timer: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters,

IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, Introduction to PLL.

UNIT - V: Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approxiamtion ADC and Dual Slope ADC, DAC and ADC Specifications.

TEXT BOOKS:

1. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition,2003.

2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI,1987.

3.Operational Amplifiers–C.G. Clayton, Butterworth & Company Publ. Ltd./Elsevier, 1971

4. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill

5. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005

REFERENCES :

1. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma ;SK Kataria &Sons;2nd Edition,2010

2. Design with Operational Amplifiers & Analog Integrated Circuits – Sergio Franco, McGraw Hill, 1988.

3. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.

4. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.

5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition

ELECTRICAL MACHINES-II

B.Tech IV Semester

L	T	P	C
3	0	0	3

Unit – I: Three phase induction motors

Construction, types, concept of rotating magnetic field, principle of operation, slip, torque, characteristics, equivalent circuit, phasor diagram, power, losses and efficiency, circle diagram of induction motor, starting methods - squirrel cage and slip ring induction motor. Double squirrel cage induction motor, speed control, concept of induction generator (self-excited)-applications.

Unit – II: Single phase induction motors

Double field revolving theory, starting methods of single phase motors, constructional features, principle of operation and equivalent circuits of single phase induction motors – capacitor start & run induction motor, shaded pole motors, AC series motor-applications.

Unit – III: Synchronous generators

Constructional features, types, EMF equation, winding factors, armature reaction, synchronous reactance, Alternator on load with vector diagrams, voltage regulation methods- EMF, MMF, ZPF. two reaction theory of salient pole synchronous machine, phasor diagram,.

Unit – IV: Parallel operation of Synchronous generators

synchronization methods, alternator connected to infinite bus bar , parallel operation of two alternators, effect of change in excitation and mechanical input-Applications.

Unit V: Synchronous motors

Principle of operation, starting torque, starting methods, effect of increased load with constant excitation, effect of changing excitation with constant load, v and inverted v curves, power developed, hunting and damper windings, synchronous condenser, applications.

Text Books:

1. Electrical Machines – P.S. Bhimbra, Khanna Publishers
2. Electric Machinery by A.E.Fitzgerald,Charleskingsley,StephenD.Umans, TMH

Reference Books:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth,McGrawHill Publications, 4th edition
2. Electrical Machines by R.K.Rajput, Lakshmi publications,5th edition
3. Electrical Machinery by AbijithChakrabarthi and SudhiptaDebnath,McGraw Hill education 2015
4. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2010
5. Electric Machines by MulukutlaS.Sarma&Mukeshk.Pathak, CENGAGE Learning.
6. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria& Sons

CONTROL SYSTEMS

B.Tech IV Semester

L	T	P	C
3	0	0	3

UNIT – I

Mathematical Modeling of Control Systems: Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver – Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-II

Time Response Analysis : Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT – III

Stability and Root locus Technique: The concept of stability – Routh's stability criterion – limitations of Routh's stability –Root locus concept - construction of root loci

UNIT–IV

Frequency Response Analysis:

Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion. Basic concepts of compensators.

UNIT–V

State Space Analysis of LTI Systems: Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India,2ndEdition.

Reference Books:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Control Systems, ManikDhanesh N, Cengage publications.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition.
4. Control Systems Engineering, S.Palani,TataMcGraw Hill Publications.

POWER SYSTEMS - II

B.Tech IV Semester

L	T	P	C
3	0	0	3

UNIT I

TRANSMISSION LINE PARAMETERS: Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines.

UNIT II

MODELING OF TRANSMISSION LINES: Classification of Transmission Lines - Short, medium and long line and their model - representations - Nominal-T, Nominal-Pie and A, B, C, D Constants. Mathematical Solutions to estimate regulation and efficiency of all types of lines- Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations – Representation of Long lines – Equivalent T and Equivalent – π. Surge Impedance and surge Impedance loading - wavelengths and Velocity of propagation – Ferranti effect, Charging current.

UNIT III

INSULATORS, CORONA AND MECHANICAL DESIGN OF LINES:

Insulators: Types of Insulators- String efficiency and Methods for improvement– Voltage Distribution, Calculation of string efficiency- Capacitance grading and Static shielding.

Corona: Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

Mechanical design of lines: 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 its applications.

UNIT IV

TRAVELLING WAVES ON POWER SYSTEMS: 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 -Bewley's Lattice Diagrams.

UNIT V

POWER CABLES: Types of Cables, Types of Insulating materials, Calculations of Insulation resistance and stress- Capacitance of Single and 3-Core belted cables, Grading of Cables - Capacitance grading, Description of Inter-sheath grading.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.
3. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND&COMPANY LTD., New Delhi 2004.

REFERENCE BOOKS:

1. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003
2. Power System Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill Education (India) Pvt. Ltd., 2nd Edition, 2008, 23rd Reprint 2015.
3. Electric Power Transmission System Engineering: Analysis and Design, TuranGonen, 2nd Edition, CRC Press, Taylor & Francis group, 2009, 1st Indian Reprint 2010.

DIGITAL ELECTRONICS

B.Tech IV Semester

L	T	P	C
3	0	0	3

UNIT- I

Introduction, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes, Error detection and correction codes.

Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, logic operations & Logic gates.

UNIT-II

Introduction, the map method, four variable, Five variable Kmap, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Quine-McCluskey Technique-simplification of Boolean function using tabulation Method..

UNIT-III

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT- IV

Sequential Logic: Basic latch circuit - Flip-flops: SR, JK, D and T, Truth table and excitation tables and conversion.

Registers & Counters: Registers, Shift registers, Applications of registers, Ripple & Synchronous counters- up/down counter, Ring counters, Twisted Ring counter.

UNIT-V

Design of Digital Systems: Programmable Logic devices: Introduction, PROM, PLA, PAL. Concept of state, State diagram and state reduction techniques

Introduction to digital logic families : Diode logic , RTL, DTL,TTL, ECL,CMOS

Text Books:

1. Morris Mano M., Digital Design, Prentice Hall of India, 3rd Edition, 2002.
2. Donald Pleach, Albert Paul Malvino, Goutamsaba Digital Principles and Applications, McGraw- Hill, 6th Edition, 2006.

Suggested Reading:

1. Tocci, Widmer, Moss, Digital Systems, Principles and Applications, Pearson Education, 10th Edition, 2016.
2. B. Somnath Nair, Digital Electronics and Logic Design, Prentice Hall of India, Eastern Economy, Edition, 2006.

DATA STRUCTURES THROUGH 'C'

B.Tech IV Semester

L	T	P	C
3	0	0	3

SYLLABUS:

UNIT - I:

Sortings: Bubble sort, Section sort ,Quick sort, Merge sort, Radix sort.
Searching: linear search, binary search

UNIT II:

Data structures: Definition, Recursion: Definition, recursive algorithms for factorial function, GCD, Towers of Hanoi problem, Fibonacci series.

UNIT III:

Stacks: Definition, Representing stacks, ADT Stack and its operations: Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms.

UNIT IV:

Queues: Queue and its Sequential Representation, Queue as an abstract data type, Types of Queue: Simple Queue, Circular Queue, Operations on each types of Queues: Algorithms.

UNIT V:

Linked lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; **Doubly linked list:** operations and algorithms.
Circular Linked Lists: All operations their algorithms.

Text Books:

1) Data Structures using C, Reema Thareja, Oxford.
2) Data Structures, 2/e,Richard F,Gilberg, Forouzan, Cengage.
3) Data Structures and Algorithm Analysis in C, 2nd ed, Mark Allen Weiss.

Reference Books:

1. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH.
2. Classic Data Structures,2/e,Debasis,Samanta, PHI,2009.
3. Fundamentals of Data Structure in C,2/e, Horowitz, Sahni,Anderson Freed,UniversityPress

CONTROL SYSTEMS AND SIMULATION LAB

B.Tech IV Semester

L	T	P	C
0	0	3	1.5

LIST OF EXPERIMENTS

PART-A

Any 8 of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – characteristics of stepper motor
4. Effect of feedback on DC servo motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. DC position control system
8. Transfer function of separately excited DC motor
9. Temperature controller using PID controller
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor
12. Characteristics of DC servo motor
13. Potentiometer as an error detector

PART-B

Any 2 of the following experiments are to be conducted:

1. Simulation of transient response of RLC circuits
   a. Response to pulse input
   b. Response to step input
   c. Response to sinusoidal input
2. Plotting of Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5th order
3. Simulation of D.C separately excited motor using transfer function approach.

B.Tech IV Semester

L	T	P	C
0	0	3	1.5

ELECTRICAL MACHINES – I LAB

LIST OF EXPERIMENTS

Any 10 of the following experiments are to be conducted

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Brake test on DC shunt motor. Determination of performance curves.
3. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
4. Swinburne's test and Predetermination of efficiencies as Generator and Motor.
5. Speed control of DC shunt motor by Field and armature Control.
6. Retardation test on DC shunt motor. Determination of losses at rated speed.
7. Separation of losses in DC shunts motor.
8. OC& SC test on single phase transformer.
9. Sumpner's test on single phase transformer.
10. Scott connection of transformers
11. Parallel operation of Single phase Transformers
12. Separation of core losses of a single phase transformer

DATA STRUCTURES THROUGH 'C' LAB

B.Tech IV Semester

L	T	P	C
0	0	2	1

COURSE OUTCOMES:

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

1. Implement search and sorting techniques
2. Develop recursive solutions to a given problem
3. Implement data structures like stacks, queues, lists and compare their Performance.

LIST OF EXPERIMENTS

1. Write C programs to sort the list of elements using following techniques
   a. Bubble Sort b. Selection Sort
2. Write C programs to sort the list of elements using following techniques
   a. Quick Sort b. Merge Sort
3. Write C programs to search for an element in an array using following techniques
   a. Linear Search b. Binary Search
4. Write recursive C programs for the following
   a. Factorial of a number b. Fibonacci series c. GCD d. Towers of Hanoi
5. Write a C program to perform stack operations using arrays
6. Write a C program to perform queue operations using arrays
7. Write C program to implement stack applications.
   a. Conversion of Infix expression to postfix expression
   b. Evaluation of postfix expression

8. Write a C program to implement following operations on Single Linked List

a. Insertion b. Deletion c. Search

9. Write a C program to implement stack operations using linked list

10. Write a C program to implement queue operations using linked list

SEMESTER-V

SYLLABUS

POWER ELECTRONICS

B.Tech V Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study the characteristics of various power semiconductor devices and their switching operation.
- To understand the operation of $1-\emptyset$ & $3-\emptyset$ full–wave converters and their harmonic analysis.
- To understand the operation of different types of DC-DC converters.
- To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- To analyze the operation of AC-AC controllers.

Course Outcomes:

Student should able to

- Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's.
- Explain the operation of single phase & three Phase full–wave converters and analyze harmonics in the input current.
- Analyze the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyze the operation of AC-AC regulators.

SYLLABUS

UNIT-I

Power Semiconductor Devices: 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 – Triggering and commutation methods – Turn on and turn off methods. Gate driver circuits for SCR & IGBT - Snubber circuit details

UNIT-II

AC to DC converters: Principles of phase controlled rectification -Study of Single phase and three-phase half controlled and full controlled bridge rectifiers with R and RL loads. Effect of source inductance. Dual converters- circulating current mode and circulating current free mode control strategies.

UNIT-III

DC to DC converters: Analysis of Buck, boost, buck-boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) – Output voltage equations. Principle operation of forward and fly back converters in CCM.

UNIT-IV

DC to AC converters: Principle of operation of Single phase Inverters -Three phase bridge Inverters (180^0 and 120^0 modes)-voltage control of inverters-Single pulse width modulation-

multiple pulse width modulation, sinusoidal pulse width modulation. Harmonic reduction techniques- basics of Voltage Source Inverters and Current source Inverters - Comparison of VSI and CSI

UNIT-V

AC to AC Converters: Static V-I characteristics of TRIAC and modes of operation – 1-phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction- 3-Phase AC-AC regulators with R load.

Text Books:

1. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
2. Power Electronics by M. D. Singh and K. B. Khanchandani
3. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India

Reference Books:

1. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India
2. Power Electronics by VedamSubramanyam, New Age International (p) Limited, Publishers.
3. Power Electronics by P.C. Sen, Tata Mc Graw-Hill Publishing.

ELECTRICAL MEASUREMENTS

B.Tech V Semester

L	T	P	C
3	0	0	3

Course Objective:

- To study the principle of operation and working of different types of instruments
- To study the working principle of operation instruments for measurement of power & energy
- To understand the principle of operation and working of potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns

Course Outcomes:

- Able to choose right type of instrument for measurement of voltage and current for AC and DC.
- able to choose right type of instrument for measurement of power and energy and able to calibrate energy meter by suitable method
- Able to calibrate ammeter and potentiometer.
- Able to select suitable bridge for measurement of electrical parameters
- Able to use digital instruments in electrical measurements.

SYLLABUS

UNIT-I

Measuring Instruments: Classification of measuring instruments. Requirements of measuring instruments. Deflecting, control and damping torques.PMMC instrument, moving iron attraction and repulsion type instruments. Errors and compensations– Extension of range using shunts and series.

UNIT-II

Measurement of Power and Energy: Construction ,working and torque equation of single and three phase Dynamometer wattmeters. Errors and their compensation. LPF wattmeter. Two wattmeter method, measurement of reactive power. Construction ,working and torque equation of Single phase induction type Energy meter. Errors and their compensation. Testing by phantom loading using R.S.S. meter. Single phase Power factor meter-electro dynamometer type and moving iron type.

UNIT-III

Instrumentation transformers and Potentiometers: Construction of CT and PT, Ratio and phase angle errors. Potentiometers: Standardization. Principle and working of potentiometers. Standardization of potentiometer, Crompton's DC potentiometer

UNIT-IV

Measurement of parameters: Measurement of Resistance: Voltmeter-ammeter method. Kelvin's Double Bridge, Megger. A.C. Bridges: Balance equation for an AC bridge.

Measurement of Inductance: Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance: Schering Bridge, Wien's Bridge.

UNIT-V

Digital meters

Digital Voltmeter: Successive approximation type, Ramp type and integrating type. Digital frequency meter–Digital multimeter–Digital Tachometer.

Text Books:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C.Widdis, fifth Edition, Wheeler Publishing.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

Reference Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney DhanpatRai & Co.Publications.
2. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand.
3. Electrical Measurements – by Buckingham and Price, Prentice – Hall
4. Electrical Measurements by Forest K. Harris. John Wiley and Sons

PYTHON PROGRAMMING

B.Tech V Semester

L	T	P	C
3	0	0	3

Course Objectives:

Making Software easily right out of the box. Experience with an interpreted Language. To build software for real needs.

Course Outcomes:

Upon successfully completing this course, students will be able to

- Identify/characterize/define a problem
- Design a program to solve the problem
- Create executable code
- Read most Python code

SYLLABUS

UNIT – I:

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT – II:

Types, Operators, and Expressions: Types – Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while break, continue, pass

UNIT – III:

Data Structures Lists – Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – IV:

Functions – Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables. Modules: Creating modules, import statements, from. The import statement, namespacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – V:

Object-Oriented Programming OOP in Python: Classes, ‘self-variable’, Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Error, and Exceptions: Difference between an error and Exception, Handling Exception, try except for block, Raising Exceptions, User Defined Exceptions

TEXT BOOKS

1. Learning Python, Mark Lutz, Orielly
2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, ―Introduction to Computation and Programming Using Python‘‘, Revised and expanded Edition, MIT Press , 2013.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. “Python in easy steps In Easy Steps”, Mike MC Grath, illustrated edition, In easy steps 2013 publishers.
5. Professional Python Frameworks: Web 2.0 Programming, Dana Moore, Raymond Budd, William Wright, Wrox Publication, ISBN: 978-0-470-13809-0, October 2007.
6. “Introduction to Programming Concepts with Case Studies in Python”, Gokturk Ucoluk Sinan Kalkan, Springer.

EFFECTIVE TECHNICAL COMMUNICATION

B.Tech V Semester

L	T	P	C
3	0	0	3

Course Objective:

- To practice vocabulary building.
- To study the writing skills.
- To identify common errors in writing.
- To improve oral communication.
- To study different life skills.

Course Outcomes:

- Able to speak with fluent vocabulary.
- Able to write with proper sentence formation.
- Able to identify errors in writing.
- Able to communicate orally.
- Able to analyze different life skills.

SYLLABUS

Unit I Vocabulary Building
The concept of word formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives
Synonyms, antonyms, and standard abbreviations

Unit II Writing Skills
Sentence structures
Use of phrases and clauses in sentences
Importance of proper punctuation
Creating coherence
Organizing principles of paragraphs in documents
Comprehension
Essay writing

Unit III Identifying Common Errors in Writing
Subject-verb agreement
Noun-pronoun agreement
Misplaced modifiers
Articles
Prepositions
Redundancies
Clichés

Unit IV Oral Communication
Common everyday situations: Conversations and Dialogues
Communication at workplace

Interviews
Formal presentations

Unit V Life Skills
Self-assessment and self-esteem
Attitudes, values and beliefs
Personal goal setting
Career planning
Managing time
Complex problem-solving
Creativity

Suggested Readings:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007.
3. On Writing Well. William Zinsser. Harper Resource Book. 2001.
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
7. You Can Win. Shiv Khera. Macmillan Books, New York, 2003.

ELECTRICAL ENGINEERING MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

B.Tech V Semester

Course Objectives:

- To study about different conducting materials
- To study about different semiconducting materials.
- To understand the properties of insulating materials.
- To understand the properties of dielectric and magnetic materials.
- To study about different special purpose materials.

Course Outcomes:

- Able to analyze different conducting materials
- Able to differentiate different semiconducting materials.
- Able to explain different properties of insulating materials.
- Able to explain the properties of dielectric and magnetic materials.
- Able to analyze different special purpose materials.

SYLLABUS

Unit I

Conducting Materials: Conducting Materials – Properties -Hardening, Annealing – Its effects- Low Resistive Materials – Requirements – Properties and applications of Copper and Aluminum - Comparison between Copper and Aluminum - ACSR Conductors, AAAC, - High Resistive Materials – Requirements- Properties and applications of Manganin, Eureka, Constantan, Nichrome, Tungsten, Platinum, Mercury and Carbon- Color coding of Resistors.

Unit II

Semiconducting Materials: Types of semiconductors, Intrinsic semiconductors, impurity type semiconductor, diffusion, the Einstein relation, hall effect, Properties of semiconductors, thermal conductivity of semiconductors, electrical conductivity of doped materials. Different semi-conducting materials (silicon and germanium) used in manufacture of various semiconductor devices (i.e p-type and n-type semiconductors) Materials used for electronic components like resistors, capacitors, diodes, transistors and inductors etc.

Unit III

Insulating Materials: Properties -Insulation resistance - Factors effecting Insulation resistance - Classification of Insulating materials - Properties & Applications of Impregnated Paper, Wood, Card Board, Asbestos, Mica, Ceramic, Glass- Thermo Plastics, Thermo Setting resins – PVC- Effects on PVC

Unit IV

Di- electric materials: Permittivity of different Di - electric materials- Polarization - Dielectric Loss – Applications of Dielectrics – Color codes of Capacitors.

Magnetic Materials: Classification of magnetic materials - Soft & Hard magnetic materials- B-H Curves - Hysteresis loop - Hysteresis loss - Steinmetz constant - Eddy Current Loss -- Curie Point – Magnetostriction.

Unit V

Special Purpose Materials: Need of Protective materials – List of Special Purpose Materials (Lead, Paints, Steel Tapes) - Thermocouple - Bi-metals- Soldering- Fuses -Galvanizing and Impregnating - Use Enameled Coated Copper Wires- Nano Materials.

Text Books:

1. Electrical Engineering MaterialsAdrianus J Dekker,Phi Learning Publishers.
2. Introduction to Engineering materials – B.K.Agarwal

References:

1. ElectricalPropertiesof Materials, 8th Edition by Solymar, L, Oxford University Press-New Delhi.
2. Introductionto ElectricalEngineeringMaterials4th Edn. 2004 Edition by Indulkar C, S. Chand & Company Ltd-New Delhi.
3. Electronic Components -Dr.K.Padmanabham
4. Electronic Components -D.V.Prasad.
5. Material science for Electrical and Electronic Engineers – Ian P.Jones (Oxford Publications)

BASICS OF CONTROL SYSTEMS

(Open Elective-I)

B.Tech V Semester

L	T	P	C
3	0	0	3

Course Objective:

- To study merits and demerits of open loop and closed loop systems; the effects of feedback, the use of block diagram algebra and Mason's gain formula.
- To study Transient and steady state responses , time domain specifications
- To study the concept of Root loci
- To study frequency domain specifications, Bode diagrams and Nyquist plots
- To study the fundamental aspects of modern control

Course Outcomes:

Upon successful completion, the student can able to

Evaluate the effective transfer function of a system from input to output using (i) block diagram reduction techniques (ii) Mason's gain formula
Compute the steady state errors and transient response characteristics for a given system and excitation
Determine the absolute stability and relative stability of a system
Draw root loci &Design a compensator to accomplish desired performance
Derive state space model of a given physical system and solve the state equation

SYLLABUS

UNIT-I
SYSTEMS AND REPRESENTATION: Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function of DC servo motor – Block diagram reduction techniques – Signal flow graphs.

UNIT-II
TIME RESPONSE:– Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error. Effects of P, PI, PID Controllers.

UNIT-III
STABILITY AND ROOTLOCUS TECHNIQUE: Characteristic equation – Routh Hurwitz criterion, Root locus construction.

Unit IV
FREQUENCY RESPONSE: Correlation between frequency domain and time domain specifications, concept of gain and phase margin. Bode plot, Polar plot, Nyquist stability criterion – Determination of closed loop response from open loop response.

UNIT-V

STATE VARIABLE ANALYSIS: Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability

Text Books:

1. Modern Control Engineering, Katsuhiko Ogata, PEARSON, 1st Impression 2015.
2. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International Publishers, 5th edition, 2007, Reprint 2012.

Reference Books:

1. Control Systems Engineering by A Nagoor Kani, CBS Publishers.
2. Automatic Control Systems, Farid Golnaraghi and Benjamin. C. Kuo, WILEY, 9th Edition, 2010.
3. Control Systems, Dhanesh N. Manik, CENGAGE Learning, 2012.
4. John J D'Azzo and C. H. Houpis , "Linear Control System Analysis and Design: Conventional and Modern", McGraw - Hill Book Company, 1988.

QUANTITATIVE APTITUDE AND REASONING
(Open Elective-I)

B.Tech V Semester

L	T	P	C
3	0	0	3

Course Objective:

- 1 .To study various concepts of athematic reasoning.
- To understand various concepts of Quantitative aptitude.

Course outcomes:

- Able to solve problems on number series, profit and loss ,ratio and proportion etc.
- Able to solve problems on time and work, pipes and cisterns, boats and streams etc.

Syllabus:

Unit-I

Divisibility and remainder rules of numbers: Unit digit , square root, cube root and simplification of numbers, HCF and LCM of numbers, Averages and Percentages. Alphabetical and miscellaneous series, Coding and decoding and Blood Relations.

Unit-II

Profit & loss, Simple interest and Compound interest: Direction, Order and Ranking, Sitting arrangement and Puzzle

Unit-III

Ratio & proportions, Partnership, Alligation and mixtures and Ages: Data sufficiency, Inequalities and Decision making.

Unit-IV

Time and work, Pipes & cisterns and Time and distance. Syllogism, Statement and course of action and Statement and Assumption.

Unit-V

Boats and streams, Areas, Volume and surface areas. Statement and argument, Cause and effect and Drawing inference.

Text Books:

1. “Objective Arithmetic” by R.S. Agarwal, S. Chand Publications.
2. Verbal and non-verbal Reasoning, R.S. Agarwal, S. Chand Publications

Reference Books:

1. Quantitative Aptitude by Dinesh Khattar, Pearson Education.
2. Quantitative Aptitude by Abhjit Guha.
3. Fast Track objective Arithmetic, Rajesh Verma, Arihant publications.

ELECTRICAL MACHINES-II LAB

B.Tech V Semester

L	T	P	C
0	0	3	1.5

Course Objectives:

- To control the speed of three phase induction motors.
- To determine /predetermine the performance three phase and single phase induction motors.
- To improve the power factor of single phase induction motor .
- To predetermine the regulation of three–phase alternator by various methods, find Xd/ Xqratio of alternator and asses the performance of three–phase synchronous motor.

Course Outcomes:

- Able to assess the performance ofsingle phase and three phase induction motors.
- Able to control the speed of three phase induction motor.
- Able to predetermine the regulation of three–phase alternator by various methods.
- Able to find the Xd/ Xqratio of alternator and asses the performance of three–phase synchronous motor.

Lists of Experiments

Any 10 of the Following experiments are to be conducted:

1. Brake test on three phase Induction Motor
2. No–load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three –phase alternator by synchronous impedance &m.m.f. Methods
4. Regulation of three–phase alternator by Portier triangle method
5. V and Inverted V curves of a three—phase synchronous motor.
6. Determination of X_d and X_q of a salient pole synchronous machine
7. Equivalent circuit of single phase induction motor
8. Speed control of induction motor by V/f method.
9. Efficiency of three phase alternator by loading with three phase induction motor.
10. Power factor improvement of single phase induction motor by using capacitors
11. Load test on single phase induction motor.
12. Measurement of sequence impedance of a three–phase alternator

ELECTRICAL MEASUREMENTS LAB

B.Tech V Semester

L	T	P	C
0	0	3	1.5

Course Objective:

- To understand the electrical parameters and calibration of voltmeter and Ammeter
- Calibration of wattmeter and energy meter
- Measurement of electrical characteristics of resistance, inductance and capacitance of circuits through appropriate methods.
- To understand testing of transformer oil.

Course Outcomes:

- Able to measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
- Able to calibrate different measuring instruments
- Able to test transformer oil for its effectiveness.

Lists of Experiments

Any 10 of the Following experiments are to be conducted

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer wattmeter using phantom loading
3. Measurement of 3 phase reactive power with single phase wattmeter for balanced loading.
4. Calibration of LPF wattmeter by direct loading.
5. Calibration of Power factor meter
6. Measurement of Power by 3 Voltmeter and 3 Ammeter method.
7. Measurement of parameters of a Choke Coil using 3 Voltmeter and 3 Ammeter method.
8. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
9. Measurement of resistance and Determination of Tolerance using Kelvin's double Bridge.
10. Capacitance Measurement using Schering bridge.
11. Inductance Measurement using Anderson bridge.
12. Dielectric oil testing using H.T test Kit.

PYTHON PROGRAMMING LAB

B.Tech V Semester

L	T	P	C
0	0	2	1

Lists of Experiments

Any 10 of the Following experiments are to be conducted

1. Write a program to perform various list of operations (eg: Arithmetic, logical, bitwise etc) in
   python.
2. Write a program to implement control flow statements.
3. Write a program implementing various predefined function of Lists, Sets, Tuples and Dictionaries.
4. Write a program covering various arguments for a function.
5. Write a program to implement various types of functions.
6. Write a program to implement recursion.
7. Write a program to implement command line arguments.
8. Write a program to create a class and its constructors.
9. Write a program to implement inheritance.
10. Write a program for exception handling.
11. Write a program to perform various linear algebra operations like finding eigen vales and
    vectors, determinant for a matrix.
12. Write a program to use System, math etc packages.

CONSTITUTION OF INDIA

B.Tech V Semester

L	T	P	C
2	0	0	0

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative.

Course outcomes:-

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

SYLLABUS

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT-IV

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

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi

2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

SEMESTER-VI

SYLLABUS

MICROPROCESSORS AND MICROCONTROLLERS

B.Tech VI Semester

L	T	P	C
3	0	0	3

Course objectives:

- To understand the organization and architecture of 8086 Micro Processor
- To understand 8051 micro controller architecture
- To understand the programming principles for 8086 and 8051
- To understand the interfacing of MP with I/O as well as other devices
- To understand the applications of 8051 microcontroller

Course Outcomes:

- To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
- To be able to understand the addressing modes of microprocessors
- To be able to understand the micro controller capability
- To be able to program microprocessor and microcontroller
- To be able to interface microprocessor and microcontroller with other electronic devices

UNIT–I

Microprocessor Architecture: Introduction and evolution of Microprocessors– Architecture of 8086–Register Organization of 8086–Memory organization of 8086–pin diagram of 8086-General bus operation of 8086.

UNIT–II

Minimum and Maximum Mode Operations: Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III

I/O Interface: 8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing – DMA controller (8257) – architecture– Interfacing 8257 DMA controller–Programmable Interrupt Controller (8259)–Command words and operating modes of 8259–Interfacing of 8259–Keyboard/display controller (8279)–Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

UNIT–IV

Introduction to 8051 Micro Controller: Overview of 8051 Micro Controller– Architecture–Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

UNIT– V:

Applications of Micro Controllers: Interfacing 8051 to LED's–Push button– Relay's and Latch Connections– Keyboard Interfacing– Interfacing Seven Segment Display–ADC and DAC Interfacing.

Text Books:

1. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2nd Edition.
2. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw Hill.
3. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.

Reference Books:

1. R.S. Kaler, " A Text book of Microprocessors and Micro Controllers", I.K. International Publishing
House Pvt. Ltd.
2. Ajay V. Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw–Hill Companies –2005.
3. Ajit Pal, "Microcontrollers – Principles and Applications", PHI Learning Pvt Ltd, 2011.

SWITCH GEAR AND PROTECTION

B.Tech VI Semester

L	T	P	C
3	0	0	3

Course Objective:

- To provide the basic principles and operation of various types of circuit breakers.
- To study the classification, operation and application of different types of electromagnetic protective relays.
- To explain protective schemes, for generator and transformers, various protective schemes used for feeders and bus bars.
- To explain the principle and operation of different types of static relays.
- To study different types of over voltages in a power system and principles of different protective schemes for insulation co–ordination.

Course Outcome:

- Able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF6 gas type.
- Ability to understand the working principle and operation of different types of electromagnetic protective relays.
- Students acquire knowledge of faults and protective schemes for high power generator and transformers and understand various types of protective schemes used for feeders and bus bar protection.
- Able to understand different types of static relays and their applications.
- Able to understand different types of over voltages and protective schemes required for insulation co–ordination.

SYLLABUS

UNIT-I

Circuit Breakers: Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max.RRRV– Current chopping and Resistance switching– Introduction to oil circuit breakers–Description and operation of Air Blast– Vacuum and SF6 circuit breakers– CB ratings and specifications.

UNIT-II

Electromagnetic Protection: Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types– Applications of relays**:** Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation–Distance relays**:** Impedance– Reactance– Mho and offset mho relays– Characteristics of Distance relays and comparison

UNIT-III

Static relays: Introduction to static relays and Static relay components

Generator Protection: Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection

UNIT IV

Transformer Protection: Protection of transformers**:** Percentage differential protection– Design of CT's ratio– Buchholz relay protection

Feeder and Bus bar Protection: Protection of lines**:** Over current Protection schemes – PSM,TMS - Numerical examples - Carrier current and three zone distance relay using impedance relays–Protection of bus bars by using Differential protection

UNIT-V

Protection against over voltage and grounding: Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc oxide lighting arresters– Insulation coordination– BIL– impulse ratio–Standard impulse test wave– volt-time characteristics– Grounded and ungrounded neutral systems–Effects of ungrounded neutral on system performance– Methods of neutral grounding**:** Solid– resistance–Reactance–Arcing grounds and grounding Practices.

Text Books:

1. Power System Protection and Switchgear by Badari Ram and D.N Viswakarma, TMH Publications
2. M.L.Soni, P.V.Gupta, U. S. Bhatnagar and A. Chakraborti,‖Power System Engineering‖, Dhanpat Rai& co. Pvt. Ltd., 2016.

Reference Books:

1. Sunil S Rao, ―Switchgear and Protection‖, Khanna Publishers, Latest Edition
2. C.L.Wadhwa, ―Electrical Power Systems‖, New Age international (P) Ltd, 2012.

OOPS THROUGH JAVA

B.Tech VI Semester

L	T	P	C
3	0	0	3

Course Objectives:

- Focus on object oriented concepts and java program structure and its installation.
- Comprehension of java programming constructs, control structures in Java.
- Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
- Understanding of Thread concepts and I/O in Java.
- Being able to build dynamic user interfaces using applets and Event handling in java.
- Understanding of various components of Java AWT and Swing and writing code snippets using them.

Course Outcomes:

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

- Understand the principles of object oriented concepts. Define classes and objects by identifying real world entities, their properties and functionalities.
- Reuse the existing classes by using inheritance and understand the concepts of packages and exception handling.
- Make use of built-in classes in Java and understand the concept of thread.
- Develop user interfaces using applets, AWT and Event handling in java.
- Create portable GUI applictions using Swing components.

SYLLABUS:

UNIT-I: Introduction to OOP, procedural programming language vs object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector.

UNIT-II:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions.

UNIT-III:

Multithreading: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-IV:

Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

UNIT-V:

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List, Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

TEXT BOOKS:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. JAVA for Beginners,4e,Joyce Farrell,Ankit R. Bhavsar,Cengage Learning.
4. Object oriented programming with JAVA,Essentials and Applications, Raj Kumar Bhuyya,Selvi,Chu,TMH.
5. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

1. Java Programming,K.Rajkumar.Pearson
2. Core Java,Black Book,R Nageswara rao,Wiley,Dream Tech
3. Core Java for Beginners,Rashmi Kanta Das,vikas.
   Object Oriented Programming Through java, P.Radha Krishna, Universities Press

MANAGEMENT SCIENCE

B.Tech VI Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To familiarize with the process of management and to provide basic insight into select contemporary management practices
- To provide conceptual knowledge on functional management and strategic management.

Course Outcome:

- After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
- The student will acquire insight on the concepts of Project management , strategic management and Contemporary management practices.

Unit I

Introduction to Management: Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

Unit II

Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

Unit III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager-Wage payment plans (Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

Unit IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).
Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis.

Unit V

Contemporary Management Practice: Basic concepts of MIS, MRP, Just in Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management ,Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

Text Books

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, Management Science' TMH 2011.

References

1. Koontz & Weihrich: 'Essentials of management' TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson Publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.)
Delhi 2015.
9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

DESIGN AND ESTIMATION OF ELECTRICAL SYSTEMS

(Open Elective-II)

B.Tech VI Semester **L T P C**
Course Objective: **3 0 0 3**

- Domestic and Industrial wiring estimation
- Coasting and Contracting types
- Estimate the Transmission line based on IE Rules.
- Estimate the Overhead distribution and underground distribution systems materials and accessories based on IE Rules.

Course Outcomes:

- Prepare an estimate of quantity and cost of the material for a electrical project
- Prepare an estimating, costing and contracting electrical project
- Prepare detail estimate and costing of Residential and commercial Electrical Installations.
- Test Residential, commercial and Industrial Electrical Installation Prepare detail estimate and costing of a transmission line/Overhead and underground distribution project.
- Prepare estimates for repairs and maintenance of electrical devices and equipment.

SYLLABUS

UNIT-I

Electrical Wiring: Types of wires Different types of wiring system and wiring procedure Merits, demerits and comparison of different types of wiring, Different types and specifications of wiring materials, Accessories and wiring tools Domestic and industrial panel wiring I.E. rules for wiring, including Electricity supply act-1948 Different types of wiring circuits. Types of service connections.

Unit– II

Estimation and Costing of Domestic wiring: Layout for domestic Wiring, Load calculation, Cable selection Earthing Selection of switchgear. Overall Estimating and costing.

Unit– III

Estimation of Industrial wiring: Layout for industrial Wiring, Load calculation, Cable selection, Earthing, Selection of switchgear. Overall Estimating and costing.

Unit-IV

Estimation of Overhead Transmission lines: Transmission lines, Line supports, Factors governing height of pole, Conductor materials, size of conductor for overhead, Transmission line: cross arms, pole brackets and clamps, guys and stays, conductors configuration spacing and clearances, span lengths, overhead line insulators, insulator materials lightning arrestors, erection of supports, setting of stays, Earthling of lines, Guarding of overhead lines, Clearances of conductor from ground, Spacing between supports conductors, I.E. rules pertaining to LV transmission line. Estimate for 440 V, 3-phase, 4 wires or 3 wires overhead distribution system.

Unit- V

Estimation, Costing and Contracting: Estimation and estimation tools. Electrical Schedule of rates, catalogues, Survey and source selection, Recording estimates, Quantity and cost of material required. Purchase system, Purchase enquiry and selection of appropriate purchase mode, Comparative statement, Purchase orders, Payment of bills, Types of contract system. Tendering procedure and preparation of simple tender, Earnest Money Deposit, Security Deposit Schedule of rates (S.O.R.)

Text Books:

1. Electrical Design, estimating & Costing aina, K. B. and Bhattacharya,S.K
2. Electrical Estimating & costing Uppal, S L New Age International (p) New Delhi

Reference Books:

1. Electrical Installation Estimating & Costing Gupta, J.B. S. K. Kataria & Sons, New Delhi
2. Relevant IS Code for-service line connection, laying of cable, wiring installation NBC National Building Code-Vol-IV
3. IE. rules for wiring, Electricity supply act-1948. Bureau of Indian Standards Electricity supply act-1948

ENERGY AUDIT, CONSERVATION AND MANAGEMENT
(Open Elective-II)

B.Tech VI Semester

L	T	P	C
3	0	0	3

Course Objective:

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Course Outcomes:

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

SYLLABUS

UNIT-I

Basic Principles of Energy Audit and management: Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Piecharts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions –Language – Questionnaire – Check list for top management.

UNIT-II

Lighting: Modification of existing systems – Replacement of existing systems – Priorities**:** Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level –Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

UNIT-III

Power Factor and energy instruments: Power factor – Methods of improvement – Location of capacitors – Power factor with nonlinear loads – Effect of harmonics on Power factor – Numerical problems. Energy

Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters– Tong testers – Power analyzer.

UNIT-IV

Space Heating and Ventilation: Ventilation – Air–Conditioning (HVAC) and Water Heating**:** Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning –Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

UNIT-V

Economic Aspects and Financial Analysis: Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

Computation of Economic Aspects

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment – Numerical examples.

Text Books:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995

Reference Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevierpublications. 2012
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons.
5. Energy management and conservation –k v

MICROPROCESSORS AND MICROCONTROLLERS LAB

B.Tech VI Semester

L	T	P	C
0	0	3	1.5

Course Objectives:

- To study programming based on 8086 microprocessor and 8051 microcontroller.
- To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
- To study modular programming using 8086 microprocessor.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051 microcontroller.

Course Outcomes:

- Will be able to write assembly language program using 8086 microprocessor based on arithmetic, logical, and shift operations.
- Will be able to do modular programming using 8086 micro processor.
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do serial communication using 8051 micro controllers.

Lists of Experiments

Any 10 of the Following experiments are to be conducted

I. Microprocessor 8086 :

Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix**:** Move block, Reverse string Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Modular Program: Procedure, Near and Far implementation, Recursion.
5. Interfacing 8255–PPI
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Interfacing 8259 – Interrupt Controller.
8. Interfacing 8279 – Keyboard Display.
9. Stepper motor control using 8253/8255
10. Arithmetic operations using 8051..
11. Reading and Writing on a parallel port.
12. Timer in different modes.
13. Serial communication implementation.
14. Understanding three memory areas of 00 – FF (Programs using above areas). Using external interrupts.

POWER ELECTRONICS AND SIMULATION LAB

B.Tech VI Semester

L	T	P	C
0	0	3	1.5

Course Objectives:

- To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
- To understand the operation of PWM inverter and AC voltage regulator with resistive and inductive loads.
- To understand the working of Buck converter, Boost converter and inverters.
- To understand the working of Integrator, Differentiator circuits using op–amp and AC voltage controller

Course Outcomes: After completion, the student will be able to

- Study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.
- Analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
- Understand the operation of single phase AC voltage regulator with resistive and inductive loads.
- Simulate and understand the working of Buck converter, Boost converter, single–phase square wave inverter and PWM inverter
- Simulate and understand the working of Integrator, Differentiator circuits using op–amp and AC voltage controller

LIST OF EXPERIMENTS

PART A (hardware):

Any 5 out of 6 experiments are to be conducted

1. Study of Characteristics of Thyristor, MOSFET & IGBT
2. Design and development of a firing circuit for Thyristor.
3. Single -Phase Half controlled converter with R and RL load
4. Single -Phase fully controlled bridge converter with R and RL loads
5. Single -Phase AC Voltage Regulator with R and RL Loads
6. Single -phase PWM inverter with sine triangle PWM technique

PART B (simulation):

Any 5 out of 6 experiments are to be conducted

7. Simulation of single phase full converter using RL and RLE loads
8. Simulation of three phase full converter using RL Load
9. Simulation of Boost and Buck converters
10. Simulation of single phase inverter with PWM control
11. Simulation of Integrator & Differentiator circuits using op–amp
12. Simulation of AC voltage controller using RL load

OOPS THROUGH JAVA LAB

B.Tech VI Semester

L	T	P	C
0	0	2	1

Course Objective:

- To understand the behaviour of primitive data types, object references, and arrays.
- To implement interfaces, inheritance and polymorphism as programming techniques
- To implement exceptions handling

Course Outcomes:

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

- Understand the behavior of primitive data types, object references, and arrays.
- Implement Java classes from specifications
- Implement interfaces, inheritance, and polymorphism as programming techniques
- Apply exceptions handling.

Lists of Experiments

Any 10 of the Following experiments (Exercise) are to be conducted

Exercise - 1 (Basics)
a). Write a JAVA program to display default value of all primitive data type of JAVA
b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)
a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
b). Write a JAVA program to sort for an element in a given list of elements using bubble sort
(c). Write a JAVA program to sort for an element in a given list of elements using merge sort.
(d) Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3 (Class, Objects)
a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
b). Write a JAVA program to implement constructor.
Exercise - 4 (Methods)
a). Write a JAVA program to implement constructor overloading.
b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)
a). Write a JAVA program to implement Single Inheritance.
b). Write a JAVA program to implement multi level Inheritance.

c). Write a java program showing the usage of abstract class.

Exercise - 6 (Inheritance - Continued)
a). Write a JAVA program give example for "super" keyword.
b). Write a JAVA program to implement Interface.

Exercise - 7 (Exception)
a).Write a JAVA program that describes exception handling mechanism
b).Write a JAVA program Illustrating Multiple catch clauses.

Exercise – 8 (Runtime Polymorphism)
a). Write a JAVA program that implements Runtime polymorphism

Exercise – 9 (Exception)
a). Write a JAVA program Illustrating exception handling keywords.
b). Write a JAVA program for creation of Java Built-in Exceptions
c).Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)
a). Write a JAVA program that creates threads by extending Thread class.
b). Write a program illustrating **isAlive** and **join ()**
c). Write a Program illustrating Daemon Threads.
Exercise - 11 (Threads continuity)
a).Write a JAVA program Producer Consumer Problem
b).Write a case study on thread Synchronization after solving the above producer consumer problem.

Exercise – 12 (Packages)
a). Write a JAVA program illustrate class path
b). Write a case study on including in class path in your os environment of your package.
c). Write a JAVA program that import and use your package in the previous Problem.

Exercise - 13 (Applet)
a).Write a JAVA program to paint like paint brush in applet.
b). Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)
a).Write a JAVA program that display the x and y position of the cursor movement using Mouse.
b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

SEMESTER-VII

SYLLABUS

DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

B.Tech VII Semester

Course Objectives: This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous-time and discrete time signals and systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.

Course Outcomes: On completion of this subject, the student should be able to:

- Perform time, frequency, and Z -transform analysis on signals and systems.
- Understand the inter-relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of round off errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and appreciate the FFT processing.

SYLLABUS

UNIT - I

Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems

UNIT - II

Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

UNIT - III

Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform. Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.

UNIT - IV

IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT - V

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley, 2009

REFERENCES:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

POWER SYSTEM OPERATION AND CONTROL

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objective:

- Calculation of power flow in a power system network using various techniques.
- Able to deal with short circuit analysis and analysis of power system for steady state and transient stability.
- To learn about load characteristics and economic operations of Power Systems.
- To know about single area and two area load frequency control.

Course Outcomes:

- Develop Power flow solutions using iterative techniques.
- Compute symmetrical and unsymmetrical fault analysis of given power system.
- Perform stability analysis of a power system.
- Analyse the performance of generators in thermal power station for economical operation.
- Analyse Load frequency control of power system.

SYLLABUS

UNIT-I

Power Flow Studies: Per unit representation, Y bus formation by Direct inspection method, Power flow solution using Gauss Seidel Method, Newton Raphson Method in Polar Co-ordinates form, Decoupled and Fast Decoupled Methods, Algorithms. (problems upto 3 bus system only).

UNIT-II

Short Circuit Analysis:

Symmetrical fault analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Symmetrical Component Theory, Positive, Negative and Zero sequence components: Positive, Negative and Zero sequence Networks.

Unsymmetrical fault analysis: LG, LL, LLG faults with and without fault impedance.

UNIT-III

Power System Stability Analysis: Classification of power system stability, Power system stability problem-Power angle curve-stability limits, Derivation of Swing Equation, Analysis of steady state stability, Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Methods to improve Stability, Introduction to Voltage stability.

UNIT-IV

Economic operation of Power Systems: Optimal operation of Generators in Thermal power stations, Heat rate curve, Cost Curve, Incremental fuel and Production costs, Input–output characteristics. Optimum generation allocation with & without transmission losses, Loss Coefficients.

UNIT-V

Load Frequency control: Definitions of Control area, **Single area control:** Block diagram representation of an isolated power system, Steady state analysis, Dynamic response, uncontrolled case. Proportional plus Integral control of single area and its block diagram representation,

Two area control: uncontrolled case and controlled case, tie-line bias control.

Text Books:

1. Modern Power system Analysis–by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.
2. C.L. Wadhwa, "Electrical Power Systems", New Age International Publishers, 7th Edition, 2017.
3. Power System Analysis by Hadi Saadat –TMH Edition.
4. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill
5. Power Generation Operation and Control -Wood and Wollenberg, Wiley Publishers.
6. Power Systems Operation and Control –Chakravarthi, Halder.

Reference Books:

1. Computer Methods in Power Systems, Stagg El –Abiad & Stags.
2. Power System Analysis–by A.R.Bergen, Prentice Hall, Inc.
3. Computer Analysis of Power Systems –J Arrillaga.
4. Power System Stability –Vol-1, Kimbark, IEEE Press.
5. Analysis of Faulted Power Systems –P M Anderson, IEEE Press.
6. Power System Stability and Control –Prabha Kundur, McGraw Hill Publishers.

ELECTRIC VEHICLES
(Professional Elective-I)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study the different drive train configurations of electric vehicles
- To propose the various propulsion and energy storage systems for EHVs
- To know the sizing of propulsion motors and other systems involved in EH vehicles
- To carry out different design case studies of EHv and BEVs

Course Outcomes:

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

- Assess the performance, societal and environmental impact of EHVs having known their past history
- Implement various drive train topologies and control strategies in Electric and Hybrid vehicles
- Recommend, Design/Size and Control different electric propulsion units and other components of EHVs and BEVs
- Appropriately select the energy storage system and strategize its management in EHVs

SYLLABUS

UNIT I:

Introduction to Electric Vehicles: History of electric vehicles (EV) and hybrid electric vehicle (EHV), need and importance of EV and HEV, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies, Power/energy supplies requirements for EV/HEV applications, vehicle power source characterization, and transmission characteristics.

UNIT-II:

Hybrid Electric Drive-trains: Basic architecture and 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.

UNIT-III:

Electric Propulsion Unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, and Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV:

Battery Energy Storage Systems: Battery Basics - Lead-Acid Battery -Cell Discharge Operation - Cell Charge Operation-Construction-Battery Parameters - Battery Capacity-Discharge Rate - State of Charge- State of Discharge- Depth of Discharge-Technical Characteristics - Practical Capacity -Battery Energy -Constant Current Discharge -Specific Energy - Battery Power -Specific Power -Batteries for EV applications.

UNIT-V:

Modelling of EV/HEV: Modelling and analysis of EV/HEV drive train sizing of motor, and design of traction power electronics, various vehicle subsystems.

TEXT BOOKS:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2010.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2009.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

REFERENCES:

1. Jefferson, C.M., Barnard and R.H., Hybrid Vehicle Propulsion, WIT Press, Boston, 2002
2. Jack Erjavec and Jeff Arias, “Hybrid, Electric and Fuel Cell Vehicles”, Cengage Learning, 2012
3. SerefSoylu “Electric Vehicles - The Benefits and Barriers”, InTech Publishers, Croatia, 2011
4. Jack Erjavec and Jeff Arias, “Alternative Fuel Technology – Electric, Hybrid and Fuel Cell Vehicles”, Cengage Learning Pvt. Ltd., New Delhi, 2007
5. Seth Leitman, “Build Your Own Electric Vehicle” McGraw hill, New York, USA, 2013

RENEWABLE ENERGY SOURCES
(Professional Elective-I)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objective:

- To give sufficient knowledge about the promising new and renewable sources of energy
- Explain the concept of various forms of renewable energy
- Learn the present energy scenario
- Analyse the environmental aspects of renewable energy resources.

Course Outcomes:

- Know the need of various renewable energy systems
- understand the concepts of bio-energy,
- Acquire the knowledge of OTEC, tidal,
- Acquire the knowledge of geothermal and **Alternative energy sources**

SYLLABUS

UNIT-I

Introduction: Introduction to energy sources, reserves and estimates, global energy scenario, renewable energy -environment implications, global warming and climate change, limitations of conventional energy sources, classification of non-conventional energy sources - solar energy, wind energy, bio-energy, Ocean Thermal Energy Conversion (OTEC), tidal, geothermal and hydro.

UNIT-II

Bio-energy: Biomass and its sources, energy plantation, production of fuel wood, bio-conversion processes, bio-gas, bio-diesel and ethanol production and utilization, thermo-chemical processes, biomass gasification, process, types of reactors, utilization of producer gas for thermal and electricity generation.

UNIT-III

Ocean thermal energy conversion, tidal, geothermal: Tidal energy, wave energy, data, technology options; open and closed *Ocean thermal energy conversion* cycles, geothermal energy sources, power plant and environmental issues.

UNIT-IV

Fuel Cells: Hydrogen generation-storage, transport and utilization, applications, power generation. Fuel cells-Technologies, types, economics and power generation.

UNIT-V

Solar Energy Storage and Applications:

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications-solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Text Books:

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2006
2. Renewable Energy Resources – Twidell&Wier, CRC Press(Taylor & Francis), 2012
3. *Y. W. B. Charles, B.H. Essel, ―Biomass Conversion and Technology‖*, John Wiley, Latest Edition

Reference Books:

1. Renewable energy resources by G. N. Tiwari, M. K. Ghosal, Alpha Science International, 2005.
2. Renewable Energy Technologies by R. Ramesh, K. Uday Kumar, M. Anandakrishnan, Narosa Publishing House, 1997
3. Non-Conventional Energy Systems by K Mittal, A. H. Wheeler Publishing Company Limited, 01-Jan-1999.
4. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, P.H.I.
5. Godfrey Boyle, ―Renewable Energy- Power for a Sustainable Future‖, Oxford University Press, U.K.,
6. Twidell, J.W. & Weir, A., ―Renewable Energy Sources‖, E.F.N Spon Ltd., UK.

SMART GRID TECHNOLOGIES
(Professional Elective-I)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objective:

- To understand various aspects of smart grid
- To study various smart transmission and distribution technologies
- To appreciate distribution generation and micro grids
- To know the Elements of communication and networking for smart grid

Course Outcomes:

- Understand technologies for smart grid
- Appreciate the smart transmission as well distribution systems
- Realize the distribution generation and
- Know the Elements of communication and networking for smart grid

SYLLABUS

UNIT – I
Introduction to Smart Grids: Definition need for smart grids, smart grid conceptual model, Difference between conventional & smart grid, Role of Smart grids. Smart grid economic and environmental benefits

UNIT – II:
Monitoring and control for transmission system: Smart Substations and their automation, Supervisory control and data acquisition (SCADA), energy management system (EMS), phasor measurement units (PMU), Wide area measurement systems (WAMS)

UNIT – III
Smart Distribution Technologies: Distribution automation, automated meter reading (AMR), fault location isolation and service restoration (FLISR), Outage Management Systems (OMS), Energy Storage, Renewable Integration

UNIT – IV
Micro grids and Distributed energy resources: Concept of micro grid, need & applications of micro grid, formation of micro grid, issues of interconnection, protection & control of micro grid.
Distributed energy resources (DERs): Small scale distributed generation, Distributed Generation Technology, Micro turbines, Fuel Cells, Solar Photovoltaic, Solar thermal, Wind power, Advantages and disadvantages of DG.

UNIT – V
Elements of communication and networking:

Local Area Network (LAN) - House Area Network (HAN) - Wide Area Network (WAN) - Broadband over Power line (BPL) - IP based Protocols - Basics of web service and CLOUD Computing, Cyber Security for Smart Grid.

Text Books:

1. Clark W Gellings, "The Smart Grid, Enabling Energy Efficiency and Demand Side Response"- CRC Press, 2009.
2. Jean Claude Sabonnadière, Nouredine Hadjsaïd, "Smart Grids", Wiley-ISTE, IEEE Press, May 2012
3. Tony Flick and Justin Morehouse, "Securing the Smart Grid", Elsevier Inc.

Reference Books:

1. James Momoh, "Smart Grid: Fundamentals of Design and Analysis" – Wiley, IEEE Press, 2012.
2. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong. Wu, Akihiko Yokoyama, Nick Jenkins, "Smart Grid: Technology and Applications"- Wiley, 2012.
3. Stuart Borlase , Smart Grid: Infrastructure, Technology and Solutions, CRC Press 2012.
4. Mini S. Thomas, John D McDonald, Power System SCADA and Smart Grids, CRC Press, 2015
5. Kenneth C.Budka, Jayant G. Deshpande, Marina Thottan, Communication Networks for Smart Grids, Springer, 2014.
6. Ali K., M.N. Marwali, Min Dai, "Integration of Green and Renewable Energy in Electric Power Systems", Wiley.

PROGRAMMABLE LOGIC CONTROLLERS
(Professional Elective-II)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the basic concepts of programmable logic controllers and its applications.
- To familiarize the students in programming formats and construction of PLC ladder diagrams.
- To Study PLC functions, Data handling functions and controlling of two axes and three axes Robots with PLC.
- To Study Analog PLC operation and different examples.

Course Outcomes:

After completion of this course, Students will be able to

- Describe the Characteristics of Registers, module addressing, holding registers, input registers, output registers and determine its importance in Ladder diagram.
- Apply the knowledge of programming formats for construction of PLC ladder diagrams in Boolean algebra systems.
- Develop ladder diagrams for process control.
- Describe the Analog modules and systems, Analog signal processing, multi bit data processing.
- Understand various Industrial applications of PLC.

SYLLABUS

UNIT-I

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT-II

PLC Programming & Registers : Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system. Characteristics of Registers, module addressing, holding registers, input registers, output registers.

UNIT-III

PLC Functions: PLC Functions: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.

UNIT-IV

Data Handling Functions: 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.

UNIT-V

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. Programmable Logic Controllers – Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI.
2. Programmable Logic Controllers – Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. – Pearson, 2004.

Reference Books:

1. Programmable Logic Controllers Hardware and Programming by Max Rabiee Goodheart-Wilcox.
2. Programmable Logic Controllers by Frank D. Petuzeela McGraw-Hill.
3. Industrial Automation and Process control by Jon Stenerson Prentice-Hall.

AI TECHNIQUES
(Professional Elective-II)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study various methods of AI
- To study the models and architecture of artificial neural networks.
- To study the ANN paradigms**.**
- To study the fuzzy sets and operations and fuzzy logic systems.
- To study the applications of AI.

Course Outcomes

- Compare human brain and computer and learn different AI Techniques
- Understand the basic concepts, models training algorithms and applications of artificial neural networks CO 3
- Explain the basic concepts of fuzzy and classical sets and fuzzy logic system components
- Model an intelligent system from the concepts of NN & Fuzzy logic and understand their applications

SYLLABUS

UNIT–I

Fundamentals of Neural Networks: Introduction to artificial intelligence systems, Humans and Computers. Organization of the Brain – Biological Neuron – Biological and Artificial neuron Models, MC Culloch-pitts neuron model, Activation functions, Learning process, Learning rules, neural network architectures- Single-layer feed-forward networks: – Perceptron, Learning algorithm for perceptron- limitations of Perceptron model

Unit–II

Multilayer feed forward Neural Networks: Derivation of Back propagation (BP) Training, Radial Basis Function (RBF) Neural Network – Kohonen Self Organising feature Map (KSOM). Architecture of Hopfield Network

UNIT – III

Classical and Fuzzy Sets: Introduction to classical sets – properties – Operations and relations – Fuzzy sets – Membership – Uncertainty – Operations – Properties – Fuzzy relations – Cardinalities – Membership functions.

Fuzzy Logic System Components: Fuzzification – Membership value assignmen – Development of rule base and decision making system – Defuzzification to crisp sets – Defuzzification methods – Basic hybrid system.

UNIT IV

Genetic Algorithms and Genetic modeling: Introduction-Encoding – fitness function-Reproduction operators – Genetic Modeling – genetic operators – crossover – single site

crossover – two point crossover – multipoint crossover – uniform crossover – matrix crossover – crossover rate – inversion & deletion – mutation operator – mutation – mutation rate – Bit wise operator – Generational Cycle – Convergence of Genetic Algorithm

UNIT–V:

Application of AI techniques: Load forecasting – Economic load dispatch – Reactive power control – Speed control of dc and ac motors.

Text Books:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S.Rajasekaran and G.A. Vijayalakshmi Pai – PHI Publication.
2. Fuzzy logic with fuzzy applications- by T.J. Ross, TMH.

Reference Books:

1. Introduction to Artificial Neural Systems – Jacek M. Zurada, Jaico Publishing House, 1997.
2. Fundamentals of Neural Networks Architectures, Algorithms and Applications - by laurene Fausett, Pearson.
3. Neural Networks, Algorithms, Applications and programming Techniques by James A. Freeman, David M. Skapura.
4. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa TMGH

SPECIAL ELECTRICAL MACHINES
(Professional Elective-II)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objective:

- To explain theory of operation and control of switched reluctance motor.
- To explain the performance and control of stepper motors, and their applications.
- To describe the operation and characteristics of permanent magnet dc motor.
- To distinguish between brush dc motor and brush less dc motor**.**
- To explain the theory of travelling magnetic field and applications of linear motors.

Course Outcomes:

The student should be able to

- Distinguish between brush dc motor and brush less dc motor**.**
- Explain the performance and control of stepper motors, and their applications.
- Explain theory of operation and control of switched reluctance motor.
- Explain the theory of travelling magnetic field and applications of linear motors.
- Understand the significance of electrical motors for traction drives.

SYLLABUS

Unit I

Stepper Motors: Classification and construction details of stepper motors – Hybrid and Variable Reluctance Motor (VRM) - Construction and principle of hybrid type synchronous stepper motor – Different configuration for switching the phase windings control circuits for stepper motors – Open loop and closed loop control of stepper motors – Applications of stepping motors.

Unit II

Switched Reluctance Motors: Construction – Comparison of conventional and switched reluctance motors –Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

Unit III

Brushless DC Motor: Construction – Principle of operation of BLDM – sensing and logic scheme, basic drive circuit, power converter circuit, transient analysis Theory of brushless DC motor as variable speed synchronous motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency.

UNIT-IV

Linear motors: Linear induction motor: Construction– principle of operation– applications. Linear synchronous motor: Construction – principle of operation– applications.

Unit V

Electric Motors for traction drives: AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

Text Books:

1. Special electrical Machines, K.VenkataRatnam, University press, 2009, New
2. "Linear Electric Motors: Theory, Design and Practical application" , Naser A and Boldea I, Prentice Hall Inc, New Jersey, 1987.

Reference Books:

1. Generalized Theory of Electrical Machines – PS Bhimbra, Khanna Publishers.
2. "Brushless Permanent Magnet and Reluctance Motor Drives" , Miller T.J.E. Clarendon Press, Oxford, 1989.
3. Electric Machines – Theory, operation, Applications and Control - Charles I. Hubert – Pearson Publications.

DIGITAL SIGNAL PROCESSING LAB

B.Tech VII Semester

L	T	P	C
0	0	3	1.5

Course Objectives: Students undergoing this course, are expected to

- Analyze the Discrete Time Signals and Systems
- Know the importance of FFT algorithm for computation of Discrete Fourier Transform
- Understand the various implementations of digital filter structures
- Learn the FIR and IIR Filter design procedures

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

- Apply the difference equations concept in the analyzation of Discrete time systems
- Use the FFT algorithm for solving the DFT of a given signal
- Design a Digital filter (FIR&IIR) from the given specifications
- Realize the FIR and IIR structures from the designed digital filter.

Lists of Experiments

Any 10 of the Following experiments are to be conducted

1. Generation of basic sequences like impulse, unit step, ramp. Sinusoidal, co-sinusoidal, exponentially growing and decaying sequences.
2. Finding Power and Energy of a given signal
3. Verification of linear convolution.
4. Verification of circular convolution.
5. DFT of an N-point sequence
6. IDFT of an N-point sequence
7. N-point FFT algorithm
8. Frequency response of IIR low pass and high pass Butterworth filters
9. Frequency response of IIR low pass and high pass Chebyshev filters
10. Frequency response of FIR low pass filter using Rectangular and Hamming Windows
11. MATLAB program to generate sum of sinusoidal signals.
12. MATLAB program to find frequency response of analog filter.

POWER SYSTEMS AND SIMULATION LAB

B.Tech VII Semester

L	T	P	C
0	0	3	1.5

Course Objective:

To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

Course Outcomes:

- Students are able to determine parameters of transmission line.
- Students are able to understand the concept of fault analysis of alternator.
- Students are able to check the dielectric strength of transformer oil.
- Students are able to write the program for analysing energy management systems functions at load dispatch centre.

Lists of Experiments

Any 10 of the Following experiments are to be conducted

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of the single phase Transmission line.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.
8 Load flow studies using Gauss-seidel method
9. Load flow studies using N-R method.
10. Transient Stability Analysis using Swing curve.
11. Load frequency control without control.
12. Load frequency control with PI control.
13. Economic load dispatch without losses.
14. Economic load dispatch with losses.

SUMMER INTERNSHIP/ MINI PROJECT

B.Tech VII Semester

L	T	P	C
0	0	0	1

SEMESTER- VIII

SYLLABUS

UTILIZATION OF ELECTRICAL ENERGY

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design
- To understand the basic principle of electric traction including speed–time curves of different traction services and calculation of different parameters.

Course Outcomes:

- Able to identify a suitable motor for electric drives and industrial applications
- Able to identify most appropriate heating or welding techniques for suitable applications.
- Able to understand various level of illuminosity produced by different illuminating sources.
- Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
- Able to determine the speed/time characteristics of different types of traction motors and estimate energy consumption levels

SYLLABUS

UNIT-I

Electric Drives: Selection of motor, steady state and transient characteristics, Applications of electric drives, Types of industrial loads- continuous–Intermittent and variable loads.

UNIT-II:

Electric Heating and Welding: Advantages and methods of electric heating–Resistance heating, induction heating and dielectric heating. Resistance welding and arc welding, Electric welding equipment.

UNIT-III

Illumination : Introduction, terms used in illumination, Laws of illumination, Sources of light, Mercury Vapor lamps and Sodium Vapor lamps, Discharge lamps, LED lamps, Types of lighting, flood lighting, LED lighting, street lighting.

UNIT- IV

Electric Traction - I: Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed– time curves for different services – Trapezoidal and quadrilateral speed time curves-High speed transportation trains.

UNIT-V

Electric Traction – II: 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–Principles of energy efficient motors-Modern traction motors.

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai&Sons.

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

DIGITAL CONTROL SYSTEMS
(Professional Elective-III)

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objective:

- To understand the concepts of digital control systems and assemble various components associated with it.
- To represent the discrete–time systems in state–space model and evaluation of state transition matrix
- To examine the stability of the system using different tests.
- To study the conventional method of analyzing digital control systems in the w–plane.
- To study the design of state feedback control by "the pole placement method."

Course Outcomes:

- Learn the advantages of discrete time control systems and the "know how" of various associated accessories
- Understand z–transformations and their role in the mathematical analysis of different systems(like Laplace transforms in analog systems)
- The stability criterion for digital systems and methods adopted for testing the same are explained
- Finally, the conventional and state space methods of design are also introduced

SYLLABUS

UNIT-I

SIGNAL PROCESSING: Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Frequency domain characteristics of zero order hold – z–Transforms – Solving of difference equations.

UNIT-II

STATE SPACE ANAYSIS: State space representation of discrete time systems – State transition matrix and methods of evaluation – Discretization of continuous Time state equations – Concepts of controllability and observability – Tests(without proof)

UNIT-III

STABILITY ANALYSIS: Mapping between the s–Plane and the z–Plane – Primary strips and Complementary strips – Stability criterion – Modified Routh's stability criterion and Jury's stability test.

UNIT-IV

DESIGN OF DISCRETE TIME CONTOL SYSTEMS: Transient and steady state specifications – Design using frequency response in the w–plane for lag and lead compensators – Root locus technique in the z–plane.

UNIT-V

STATE FEEDBACK CONTROLLERS: Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman's formula.

Text Books:

a. Discrete–Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition.
b. Digital Control and State Variable Methods by M.Gopal, TMH, 4th Edition.

Reference Books:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.

ELECTRICAL DISTRIBUTION SYSTEMS
(Professional Elective-III)

L	T	P	C
3	0	0	3

B.Tech VIII Semester

Course Objective:

- To study the Load characteristics and corresponding factors.
- To understand about substations and design the distribution systems.
- To study about distribution feeders and determination of voltage drop and power loss calculations.
- To study the distribution system protection and its coordination.
- To model the capacitor bank for power factor improvement and study about voltage control equipment.

Course Outcomes:

- Able to understand the daily load curve and finding different factors for economical operation.
- Able to understand the different substation equipment and design of distribution systems.
- Able to understand the distribution feeders, voltage drop and power loss calculations.
- Able to understand the different protective devices and how to coordinate them for complete protection.
- Able to modelling the capacitor banks for improving power factor and understanding about voltage control.

SYLLABUS

UNIT-1

General Concepts: Introduction to distribution systems - Distribution system losses – Coincidence factor – Contribution factor loss factor – Numerical Problems – Load Modelling and Characteristics – Relationship between the load factor and loss factor – Classification and characteristics of loads (Residential, commercial, Agricultural and Industrial).

UNIT – II

Substations : Location of substations: Rating of distribution substation – Service area with'n'primary feeders –Benefits and methods of optimal location of substations. Distribution Feeders Design Considerations of distribution feeders: Radial and loop types of primary feeders –Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

UNIT – III

System Analysis : Voltage drop and power loss calculations: Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Numerical problems – Three phase balanced primary lines. Load flow analysis: forward/backward – direct approach.

UNIT – IV

Protective devices and Coordination: Objectives of distribution system protection –Time current characteristics – Protective devices**:** Principle of operation of fuses – Circuit reclosures

– Line sectionalizes and circuit breakers, Modulated case circuit breakers, Earth leakage circuit breakers – Protection schemes of parallel & Ring main feeders.

UNIT – V

Power Factor and Voltage control: Capacitive compensation for power factor control – Different types of power capacitors –Application and modelling of capacitor banks– Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location. Voltage Control: Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR –Line drop compensation.

Text books:

1. Electric Power Distribution System Engineering, Turan Gonen, CRC press, Taylor & Fracis Group, 2nd edition.
2. J. J. Burke "Power Distribution Engineering: Fundamentals and Applications", CRC Press, 1994.

Reference books:

1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing Company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V. Kamaraju, Right Publishers.

POWER ELECTRONIC CONTROL OF ELECTRIC DRIVES
(Professional Elective-III)

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the concept of drive and multi-quadrant operation of drive.
- It covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry.
- To understand the operation of Rectifier and Chopper fed DC drives.
- Describes the slip power recovery schemes in induction motors and operation of AC drives.

Course Outcomes:

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

- Identify different electric drive system.
- Understand the operation of rectifier fed DC drives, chopper fed DC drives and closed loop control of DC motor.
- Analyse the slip power recovery schemes of Induction motor and speed control of converter fed induction motor & synchronous motor.
- Evalute the performance of speed control of synchronuous motor by CSI and VSI.

SYLLABUS

Unit I

Basics of Electric Dives: Definition, Advantages and applications of drives, Components of electric drive system, Difference between DC and AC drives, Multi quadrant operation of drive, fundamental torque equation and components of torque, load equalization, Speed control methods of DC motors and Induction motor, Electric Braking.

Unit II

Rectifier Control of DC Motor Drives: Single Phase Fully controlled converters connected to DC separately excited motor and DC series motor – Continuous & Discontinuous current operation – voltage and current waveforms – Speed Torque expressions – Speed Torque Characteristics.

Unit III

Chopper Control of DC Motor Drives: Chopper controlled DC separately excited motor and DC series motor – Continuous current operation – voltage and current waveforms – Speed Torque expressions – Speed Torque characteristics, Closed loop control of DC drive (Only Block Diagram).

Unit IV

Control of Induction Motors: Variable voltage control of Induction motor by AC voltage controller, Variable frequency control of Induction motor – waveforms – Speed Torque characteristics, Slip power recovery schemes – Static Kramer Drive – Static Scherbius Drive.

Unit V

Control of Synchronous Motors: Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI and Load commutated CSI fed Synchronous Motor – Operation – Waveforms – Speed Torque characteristics.

Text Books:

1. Fundamentals of Electrical Drives by G.K.Dubey, Second Edition, 2002.
2. Power Electronics: Circuits, Devices and Applications by M.H.Rashid, Third Edition, 2009.
3. P.S. Bimbhra, ― Power Electronics‖, 4th Edition, Khanna publishers. 2010

Reference Books:

1. Power Electronics by M.D.Singh and K.B.Khanchandani, Second Edition, 2017.
2. Modern Power Electronics and AC Drives by Bimal K Bose, 2005.
3. Thyristor Control of Electric Drives by Vedam Subramanyam, Tata McGraw-Hill Publications,
2008.

HVDC & FACTS
(Professional Elective-IV)

L	T	P	C
3	0	0	3

B.Tech VIII Semester

Course Objective:

- To Understand basic concepts of HVDC Transmission
- To analyze the converter configuration.
- To Know the control of converter and HVDC Transmission.
- To Understand the basic concepts of FACTS.
- To Know the operation of different FACTS devices

Course Outcomes:

- Learn different types of HVDC levels and basic concepts.
- Know the operation of converters.
- Learn the control of converter and HVDC Transmission.
- Analyze the basic concepts of FACTS.
- To learn the operation of different FACTS devices

UNIT – I

Basic Concepts and Analysis of HVDC Converters: Basic Concepts: Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links –Apparatus required for HVDC Systems – Comparison of AC &DC Transmission,

Analysis of HVDC Converters: Choice of converter configuration, and analysis of Graetz – characteristics of 6 pulse & 12 pulse converters.

UNIT – II

Reactive Power Control in HVDC and System Control: Principal of DC Link Control – Converters Control Characteristics – Firing angle control Current and extinction angle control, sources of reactive power AC Filters – shunt capacitors-synchronous condensers.

UNIT – III

Converter Faults and Harmonics & Introduction to FACTS:

Converter Faults and Harmonics: Converter faults, DC breakers, Characteristics harmonics, Non- Characteristics harmonics, Effect of Pulse number on harmonics.

Introduction to FACTS:

Power flow in an AC System, Dynamic stability considerations, Importance of controllable parameters, Basic types of FACTS controllers, Benefits from FACTS controllers.

UNIT – IV

Voltage source and Current source converters and Shunt Compensators:

VSC AND CSC: Concept of voltage source converter (VSC) – Single phase bridge converter – Three–phase full wave bridge converter, Concept of current source converter (CSC), Comparison of current source converter with voltage source converter.
Shunt Compensators: Objectives of shunt compensation, Mid–point voltage regulation for line segmentation, Thyristor Switched Capacitor (TSC), Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR).

UNIT – V
Series Compensators and Combined Controllers
Series Compensators: Objectives of series compensation, Concept of series capacitive compensation, GTO thyristors controlled Series Capacitor (GCSC), Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC), Basic concept of Unified Power Flow Controller (UPFC).

Text Books:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. HVDC Transmission by S.Kamakshaiah andV.Kamaraju-Tata McGraw–Hill
3. "Understanding FACTS" N.G.Hingorani and L.Guygi, IEEE Press.Indian Edition is Available:—Standard Publications, 2001.

Reference Books:

1. HVDC Transmission – J.Arrillaga.
2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.
3. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications
4. "Flexible ac transmission system (FACTS)" Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.
5. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R.MohanMathur and Rajiv k.Varma, Wiley

INSTRUMENTATION
(Professional Elective IV)

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study the basics of measuring system.
- To study various Electrical transducers and to measure the various types of Non–electrical quantities
- To study various types of digital voltmeters
- To study the working principles of various types of oscilloscopes and their applications.
- To study various types of signal analyzers

Course Outcomes:

- Able to study the basics of measuring system.
- Acquire proper knowledge to use various types of Transducers and able to monitor and measure various parameters such as strain, Fow, temperature and pressure
- Acquire proper knowledge and working principle of various types of digital voltmeters.
- Able to measure various parameters like phase and frequency of a signal with the help of CRO.
- Acquire proper knowledge and able to handle various types of signal analyzers.

SYLLABUS

UNIT-I

Basics of Measuring System: Measuring Systems, Performance Characteristics – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors and Random Errors, Statistical analysis of random errors.

UNIT-II

Transducer Basics and Applications: Definition of transducers – Classification of transducers – Advantages of Electrical transducers –Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers. Measurement of Temperature, Pressure, Strain and Flow.

UNIT-III

Digital Voltmeters: Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Microprocessor based ramp type DVM, digital frequency meter – Digital phase angle meter.

UNIT-IV

Oscilloscope: Cathode ray oscilloscope – Time base generator – Horizontal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope, data logger, Transient recorder.

UNIT-V

Signal Analyzers: Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters

Text Books:

1. Electronic Instrumentation–by H.S.Kalsi Tata MCGraw–Hill Edition, 1995.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai & Co

Reference Books:

1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
2. Measurements Systems, Applications and Design – by D O Doeblin
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson/Prentice Hall ofIndia
4. Modern Electronic Instrumentation and Measurement techniques – by A.D HelfrickandW.D.Cooper, Pearson/Prentice Hall of India.
5. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

ADVANCED CONTROL SYSTEMS
(Professional Elective-IV)

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objective:

- Review of the state space representation of a control system: Formulation of different models from the signal flow graph, diagonalization.
- To introduce the concept of controllability and observability. Design by pole placement technique.
- Analysis of a nonlinear system using Describing function approach and Phase plane analysis.
- The Lypanov's method of stability analysis of a system &Formulation of Euler Laugrange equation
- Formulation of linear quadratic optimal regulator (LQR) problem by parameter adjustment and solving riccatti equation.

Course Outcomes:

- State space representation of control system and formulation of different state models are reviewed.
- Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
- Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
- Able to analyse the stability analysis using lypnov method& Minimization of functionals using calculus of variation studied.
- Able to formulate and solve the LQR problem and riccatti equation.

SYLLABUS

UNIT-I

State space analysis: State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form

UNIT-II

Controllability, observability and design of pole placement: Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

UNIT-IIIDescribing function analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase–plane analysis.

Stability analysis: Stability in the sense of Lyapunov – Lyapunov's stability and Lypanov's instability theorems – Direct method of Lypanov for the linear and nonlinear continuous time autonomous systems.

UNIT-IV

Calculus of variations: Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangine equation.

UNIT-V

Optimal control: Linear quadratic optimal regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by continuous time algebraic riccatti equation (CARE) – Optimal controller design using LQG framework.

Text Books:

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
2. Automatic Control Systems by B.C. Kuo, Prentice Hall Publication

Reference Books:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw– Hill Companies, 1997.
4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.

POWER QUALITY
(Open Elective IV)

B.Tech VIII Semester

L	T	P	C
2	0	0	2

Course Objective:

- To introduce the power quality problem
- To educate on production of voltages sags, over voltages and harmonics and methods of control.
- To study overvoltage problems
- To study the sources and effect of harmonics in power system
- To impart knowledge on various methods of power quality monitoring.

Course Outcome:

At the end of this course the student should be able to

- Differentiate between different types of power quality problems.
- Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- Analyze power quality terms and power quality standards.
- Explain the principle of voltage regulation and power factor improvement methods.
- Explain the power quality monitoring concepts and the usage of measuring instruments.

SYLLABUS

Unit-I

Introduction to Power Quality: Terms and definitions of transients, Long Duration Voltage Variations: under Voltage, Under Voltage and Sustained Interruptions; Short Duration Voltage Variations: interruption, Sag, Swell; Voltage Imbalance; Notching D C offset; waveform distortion; voltage fluctuation; power frequency variations.

Unit-II

Voltage Sag: Sources of voltage sag: motor starting, arc furnace, fault clearing etc; estimating voltage sag performance and principle of its protection; solutions at end user level- Isolation Transformer, Voltage Regulator, Static UPS, Rotary UPS, and Active Series Compensator.

Unit-III

Electrical Transients: Sources of Transient Over voltages- Atmospheric and switching transients motor starting transients, pf correction capacitor switching transients, ups switching transients, neutral voltage swing etc; devices for over voltage protection.

Unit-IV

Harmonics: Causes of harmonics; current and voltage harmonics, measurement of harmonics, THD; effects of harmonics on – Transformers, AC Motors, Capacitor Banks, Cables, and

Protection Devices, Energy Metering, Communication Lines etc. harmonic mitigation techniques.

Unit-V

Monitoring and Instrumentation: Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application
of intelligent systems – PQ monitoring standards.

Text Books:

1. Roger C Dugan, McGrahan, Santoso & Beaty, "Electrical Power System Quality" McGraw Hill
2. Arinthom Ghosh & Gerard Ledwich, "Power Quality Enhancement Using Custom Power Devices" Kluwer Academic Publishers
3. Sankaran, " Power Quality" CRC Press.

Reference Books:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.
2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
4. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
5. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis)

Power Quality in Power systems and Electrical Machines–EwaldF.fuchs, Mohammad A.S. Masoum–Elsevier.