B. Tech. (Electrical & Computer): Semester – III (2023 COURSE), Program Code: 2311207

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	MJ	MJ1107301	Power System Engineering	3	-	-	60	40	-	-	-	100	3	-	-	3
2.	MJ	MJ1107302	Electrical Machines-I	2	2	1	60	40	25	25	-	150	2	1	1	4
3.	MJ	MJ1107303	Computer Network Communication	3	2	-	60	40	25	-	-	125	3	1	-	4
4.	MJ	MJ1107304	Operating Systems	3	2	-	60	40	25	-	25	150	3	1	-	4
5.	MJ	MJ1107305	Network Analysis	3	2	-	60	40	25	-	-	125	3	1	-	4
6.	SE	SE1107306	Skill base Course –III- Computer Aided Design	-	2	-			25	-	25	50	-	1	-	1
			Total	**14**	**10**	**01**	**300**	**200**	**125**	**25**	**50**	**700**	**14**	**5**	**1**	**20**
7.	AC	AC1113307	Indian Knowledge System	2	-	-	-	100	-	-	-	100	2	-	-	2
8.	VA	VA1107308	Value Added Course-I	2	-	-	-	100	-	-	-	100	2	-	-	2

B. Tech. (Electrical & Computer): Semester – IV (2023 COURSE), Program Code: 2311207

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	MJ	MJ1107401	Machine Learning	3	2	-	60	40	25	-	25	150	3	1	-	4
2.	MJ	MJ1107402	Electrical Machines-II	2	2	1	60	40	25	-	25	150	2	1	1	4
3.	MJ	MJ1107403	Web Designing	3	-	-	60	40	-	-	-	100	3	-	-	3
4.	MJ	MJ1107404	Power Electronics	3	2	-	60	40	25	-	25	150	3	1	-	4
5.	MJ	MJ1107405	Database Management Systems	3	2	-	60	40	25	-	-	125	3	1	-	4
6.	SE	SE1107406	Skill base Course -IV Mobile Application Development	-	2	-	-	-	25	-	-	25	-	1	-	1
			Total	**14**	**10**	**1**	**300**	**200**	**125**	**-**	**75**	**700**	**14**	**5**	**1**	**20**
7.	AE	AE1107407	MOOC-I	-	-	-	-	-	-	-	-	-	-	-	-	2
8.	EC	EC1107408	Social Activity	-	-	-	-	-	-	-	-	-	-	-	-	2

Annexure II

Power System Engineering		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours/Week	End Semester Examination: 60 Marks	Theory : 03
	Continuous Assessment: 40 Marks	Total : 03

Course Pre-requisites:	
The students should have knowledge of	
1.	Electromagnetic energy conversion system
2.	Electromagnetics and its applications

Course Objectives:	
	This course introduces knowledge about electrical power generation, its transmission and distribution. The course is designed to identify different methods of power generation. Also, it focuses on performance of transmission line and distribution system along with its design consideration.

Course Outcomes: Students will be able to	
1.	Understand the functioning of various components of Power Generation techniques by Conventional energy Sources.
2.	Understand the functioning of various components of Power Generation techniques by nonconventional energy Sources.
3.	Define and apply the significance of terms on economics of power generation.
4	Understand the mechanical components of transmission line and apply the knowledge of calculation of string efficiency, sag and R, L, C parameters of different types of transmission line.
5	Understand the representation of various models of transmission line and analyze the performance of it.
6	Understand the different type of cables & apply the knowledge to calculate performance of AC distribution lines.

UNIT - I	**Power Generation techniques by Conventional energy Sources**	**(06 Hours)**
	Introduction to energy sources, selection of site – classification – general arrangements and operations – functions of each component – types of turbines – electric generators – advantages and disadvantages - list of major power stations : of Hydroelectric , Thermal and Nuclear power plants in India with capacity. Basic layout and working of diesel and gas power plant. Concept and types of grid/s.	
UNIT - II	**Power Generation techniques by Non - Conventional energy Sources**	**(06 Hours)**
	Different types of Nonconventional Energy Sources, Comparative benefits over conventional type, contribution of conventional & nonconventional energy sources, Solar energy – Its characteristics, basic concept of solar power plant, major solar power plants in India/world, Wind power plant– schematic arrangement – concept of vertical axis, horizontal axis WTG, major wind farms in India / world, Power generation by bio gas, biomass, geothermal energy and tidal energy– its types, Concept of carbon credit.	
UNIT - III	**Load Curves and Economic Aspects**	**(06 Hours)**
	Load Curves: load curve – base load station and peak load station - demand factor – maximum demand – average demand – diversity of load – load factor – diversity factor – significance of high load factor & diversity factor – plant factor – capacity factor – connected load – load duration curve – integrated load duration curve – selection of units. (Simple numerical on various factors) Concept of Per capita energy consumption, Concept of cogeneration and captive generation.	
UNIT - IV	**Design of Transmission Line**	**(06 Hours)**
	Transmission Line Components and its types - Line Supports, Conductors, Insulators, Potential distribution over a string of insulators, methods of equalizing the potential, string efficiency. (Simple numerical), methods of improving string efficiency. Sag: Catenary curve – calculation of sag and tension – (Simple numerical), Corona effect, Skin effect, Proximity effect, Ferranti effect etc.	

UNIT - V	**Transmission Line Performance analysis :**	**(06 Hours)**
	Various Parameters of Transmission Line – Resistance, Inductance and capacitance and its calculation (Simple numerical). Circuit Representation and performance of short, medium and long transmission Line– Representation of tee and pi models of lines as two port networks – evaluation and estimation of ABCD constants (Simple numerical). Concept of Surge Impedance Loading (SIL), Characteristic Impedance.	
UNIT - VI	**Underground Cables and Distribution System**	**(06 Hours)**
	Underground Cables - Classification – construction - insulation resistance – capacitance – dielectric stress in single core cable (No derivation but simple numerical). Grading of cables. Laying of cables – CableTerminations, cable jointing – causes of failure – cable faults and location of faults. Distribution System – Classification – A.C. distribution connection schemes - design consideration – Calculation of potential drop of radial and ring system.	

Project based learnings:

1. Measurement of A, B, C, D constants of short/ medium / long transmission line.
2. Experimentation / simulation on testing of cables
3. Industrial visit report on cable manufacturing company.
4. Industrial Visit report on of HPS / TPS / GAS Power plant
5. Industrial Visit report of WPS / Solar PP
6. Design analysis of transmission line model using any simulating software.
7. Calculations of transmission line parameters using MATLAB
8. Sag / String efficiency calculations using MATLAB.
9. Load curve calculations using MATLAB

Text Books:

1. A Course in Power System - J. B. Gupta - S. K. Kataria & Son's
2. V. K. Mehta, "Electrical Power System", S. Chand Publications
3. R. K. Rajput, "A text book on Power System Engineering", Laxmi Publications (P) Ltd

Reference Books:

1. Electrical Power - S. L. Uppal - Khanna Publication
2. Energy Technology - S. Rao, Dr. B B Panelkar - Khanna Publication
3. A Course in Power Plant Engineering - Arrora, Domkundwar - Dhanpatrai & Co. Publications
4. A Course in Electrical Power - Soni, Gupta, Bhatanagar - Dhanpatrai & Co. Publications

Syllabus for Unit Test:

Unit Test -1	UNIT – I, UNIT – II, UNIT - III
Unit Test -2	UNIT – IV, UNIT – V, UNIT - VI

Electrical Machines-I		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 02 Hours/ Week	End Semester Examination: 60 Marks	Theory: 02 Tutorial: 01
Practical: 02 Hours/ Week	Continuous Assessment: 40 Marks	Practical: 01
Tutorial: 01 Hour/ Week	Term Work: 25 Marks Practical: 25 Marks	Total: 04

Course Pre-requisites:

The Students should have knowledge of

1. Magnetic Physics, AC & DC Fundamentals
2. Basic laws of rotating machines like Faraday's Law, Lenz's Law, etc
3. Basics of Electrostatics and electromagnetic

Course objectives:

To develop the students to identify, Design & analyze & to understand the fundamentals, classification, application and selection of DC machine, Transformer & Special Purpose Machines for a particular application as per the operational characteristics.

Course Outcomes:

The students will be able to

1.	Apply the concepts and identify the applications of single phase transformer
2.	Identify the difference between the single phase and three transformers and also will Apply the concepts for various connections of the three phase transformer.
3.	Determine the main dimensions and performance parameters of 1-phase and 3-phase transformer.
4.	Describe the basics of dc machine, armature reaction, commutation, characteristics & applications of dc generators, dc motors & identify the different parts.
5.	Describe construction, principal of operation and applications of Servo Motor, BLDC & PMSM.
6.	Describe construction, principal of operation and applications of Stepper Motor, Synchronous & Switched Reluctance Motor.

Topics covered

UNIT – I	**Single Phase Transformers**	**(06 Hrs)**
	Construction, working principle, EMF equation, voltage and current ratio, Ideal and practical transformer, equivalent circuit & phasor diagram, losses in transformer, determination of regulation & efficiency of a Transformer, Parallel operation of single phase Transformer.	
UNIT - II	**Polyphase Transformers**	**(06 Hrs)**
	Comparison between single three phase unit and three single phase units, standard connections & phasor groups, Concept of polarity & Polarity Test, open circuit and short circuit tests, Direct Load Test, Sumpner's test (Back to back), I.S. Specifications of transformers. Concept of routine and type tests. Parallel operation of three phase transformers, Three winding transformers.	
UNIT - III	**Design of Transformer**	**(06 Hrs)**
	Output equation with usual notations, design of core, yoke and windings of transformer. Design of small single phase transformers. Estimation of resistance and leakage reactance of transformer, regulation of transformers. Calculation of mechanical forces.	
UNIT -IV	**DC Machines**	**(06 Hrs)**
	Construction of DC machines, E.M.F. equation of D.C. generator. Process of commutation & types, causes of bad commutation and remedies, Basic principle of working of DC motor, Significance of Back e.m.f., Torque equation, Types, characteristics and applications of d. c. motors, Armature reaction, Losses,	

	efficiency.	
UNIT-V	**Special Purpose Machines Part I**	**(06 Hrs)**
	Construction & working, types, applications, analysis of servo motors, Construction, Principal of operation, Commutation - Power Converter Circuits and their controllers. Types, torque speed characteristics & applications of BLDC motor. Construction, Principal of operation, emf equation, torque speed characteristics & applications of PMSM.	
UNIT-VI	**Special Purpose Machines Part II**	**(06 Hrs)**
	Constructional features – Principle of operation. Types, Modes of excitation, Torque equations, Characteristics, Applications and selection of stepper motor. Construction, Operating principle, Torque Equation, Phasor diagram, performance characteristics and Applications of synchronous reluctance and switched reluctance motor.	

List of Practical's to be performed in the laboratory:	
1.	Open circuit and short circuit tests on a single phase transformer
2.	Sumpner's test on two identical single phase transformers
3.	Parallel operation of two single phase transformers
4.	Determination of efficiency and regulation by direct load test on single phase transformer.
5.	Identification of DC machine windings and resistances.
6.	Speed control of D. C. Shunt motor by Armature and Field control.
7.	Brake test on DC shunt motor
8.	Study of DC Machines Starters
9.	Load test in order to determine the performance characteristics of the Reluctance Motor.
10.	To determine the d-axis and q-axis synchronous reactance of the Reluctance Motor.
11.	Experimental analysis/simulation of SRM/BLDC/PMSM/Stepper motor.
Note: The term work shall be the record of minimum eight experiments performed from the above list.	
Project based learning: Student shall demonstrate minimum one concept based on syllabus topic.	
1.	Demonstration and operation of three and four point starter
2.	Demonstration of reversing the direction of rotation of dc motor
3.	Demonstration of verification of Electromagnetic laws
4.	Demonstration of operation of Induction Motor as induction generator
5.	Application based MATLAB Project
6.	List the commonly used instruments for maintenance and find out the voltage between phases and between phase and neutral, test the continuity and insulation, measure earth resistance.
Reference Books:	
1.	Nagrath Kothari, "Electrical Machines", Tata McGraw Hill
2.	A. E. Fitzgerald, Charles Kingsley, Jr. Stephen D. Umans, "Electric Machinery", Tata McGraw Hill
3.	M.G. Say, " Alternating Current Machines", Pitman Publishing Ltd.
4.	Ashfaq Husain, "Electric Machines", Dhanat Rai & Co.
5.	Dr. S. K. Sen, "Electric Machinery", Wiley Eastern
6.	B. H. Deshmukh, "Electrical Technology", Nirali Prakashan
7.	Sawhney A. K., Electrical Machine Design, Dhanpath Rai & Co. (P) Ltd Sixth Edition: 2006

Syllabus for Unit Test:	
UnitTest-1	UNIT–I,UNIT–II, UNIT-III
UnitTest-2	UNIT–IV,UNIT–V,UNIT-VI

Computer Network & Communication		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours/ Week	End Semester Examination: 60 Marks	Theory : 03
Practical: 02 Hours/ Week	Internal Assessment: 40 Marks	
	Term Work: 25 Marks	Term Work: 01
		Total: 04

Course Pre-requisites:	
The Student should have prior knowledge of	
	Computer systems, its applications and Operating systems
Course Objectives:	
	The Course emphasis on theoretical concepts and practical aspects of networking. The course enables the students to understand the networking hardware & concepts through using network simulators.
Course Outcomes:	**After learning this course students will be able to**
1	Describe the knowledge of computer networking and physical layer
2	Describe the structure of data link layers and media access
3	Explain the knowledge of about Network and Transport Layers
4	Describe the Session and Presentation Layers
5	Illustrate the functionality of Application layer
6	Explain the fundamentals of network security.

UNIT – I	**INTRODUCTION TO NETWORKING AND PHYSICAL LAYER**	**(06 Hours)**
	History of network and internet, need of network, Types of networks, Networking hardware, Information transmission, Transmitter, Receiver, Introduction to networking applications and simulators, Protocol Layering — TCP/IP Protocol suite — OSI Model — Physical Layer: Performance — Transmission media — Switching — Circuit-switched Networks — Packet Switching.	
UNIT - II	**DATA-LINK LAYER & MEDIA ACCESS**	**(06 Hours)**
	Introduction — Link-Layer Addressing — DLC Services — Data-Link Layer Protocols — HDLC — PPP — Media Access Control — Wired LANs: Ethernet — Wireless LANs — Introduction — IEEE 802.11, Bluetooth — Connecting Devices, Error Detection & Correction Techniques, Sliding window, protocols to understand concept of flow control	
UNIT -III	**NETWORK LAYER & TRANSPORT LAYER**	**(06 Hours)**
	Network Layer: Network Packet structure and formation, routing algorithms, congestion control algorithms, quality of service, IP Addressing, Subnets, configuring network settings, Network problem solving. Transport Layers: Segmentation, Congestion control, Connection oriented and connection less services, Network and Transport Layer Protocols	
UNIT -IV	**SESSION AND PRESENTATION LAYERS**	**(06 Hours)**
	Session Layer: Session management, synchronization, Dialog control, Presentation Layer: Encryption-decryption, Compression, File formats, Translation, Session and Presentation Layer protocols, Session and Presentation Layer protocols.	
UNIT - V	**APPLICATION LAYER**	**(06 Hours)**
	DNS, URL, Data Cache and streaming, Web Applications, Web browser working, Cloud	

	services, User interface and User interaction, Mail systems, Support of file formats, Application Layer protocols	
UNIT -VI	**NETWORK SECURITY**	**(06 Hours)**
	Firewall, Types of Firewalls, Cryptography, Symmetric Key Algorithm, Public Key Algorithm, Digital Signatures, Public Key Management, Communication Security, Authentication protocols.	

Term Work:

1. Introduction to Computer Network and Network Simulators. Networking devices, Addresses, Network Security, Internet working, Network Simulators: Cisco Packet Tracer, Netemul, NetSim.
2. Network configuration of PCs and other networking devices using network simulators. Observing and configuring PCs, Routers, Switch, Hub, and other networking devices using network simulators
3. Establishment of simple LAN network using real time devices and network simulators.
4. Establishment of simple LAN network using actual devices like PCs, Switch, Router and through network simulators
5. Establishing network to broadcast the information using network simulator. Use of PCs, Switch and Hub in the network simulator.
6. Establishment of different networks and communication between using actual devices like PCs, Switch, Router and through network simulators
7. Understanding Transport Layer protocols TCP, UDP using networking simulators
8. Study of Network Devices in Detail
9. Connect the computers in Local Area Network.
10. Establishment of wireless networking using actual devices and via network simulator. Use of Laptops and Wifi Router.

Project Based Learning

1. IP based patient monitoring system
2. Configuring Internet Router
3. Configuring Network Switch
4. Home Automation system using Wi-Fi
5. Wireless Weather monitoring system using Raspberry pi.
6. Smart Traffic control system
7. Smart energy meter for homes
8. Analysis of IPv4/IPv6 protocols
9. Web System Security.
10. . Personalized Web Search with Location Preferences

Text Books:

1. Data and computer communications, William Stallings, 10th edition, Pearson
2. Computer networking: a top-down approach, James f. Kurose, Keith w. Ross, 6th edition, Pearson.
3. Computer Networks, Tanenbaum, 5th Edition, Pearson

Reference Books:

1. Data communication & networking, Forouzan, 5th edition, McGraw-Hill
2. Computer Networking Beginners Guide, Russell Scott, 1st edition, Stefano Cardinale

Syllabus for Unit Test:

UnitTest-1	UNIT–I,UNIT–II, UNIT-III
UnitTest-2	UNIT–IV,UNIT–V,UNIT-VI

Operating Systems		
TEACHING SCHEME:	**EXAMINATIONSCHEME:**	**CREDITSALLOTTED:**
Theory: 03 Hours/Week	End Semester Examination: 60 Marks	Theory : 03
Practical: 02 Hours/Week	Continuous Assessment: 40 Marks	Practical: 01
	Term Work: 25 Marks, Oral: 25 Marks	Total: 04

Course Pre-requisites:	
The Students should have knowledge of	
	Computer System, Applications of Computers and Computer operation's.
Course Objectives:	
	To learn the basic structure and operations of a computer. Understand the memory and I/O organization and recent trends
Course Outcomes:	**After learning this course students will be able to**
1	Discuss the operating system and their principles
2	Analyze the process management system
3	Elaborate the memory management system
4	Analyze the I/O and file management system
5	Analyze the recent trends and compare the future technologies
6	Examine the various applications of computer systems.

UNIT – I	**OPERATING SYSTEMS OVERVIEW**	**(06 Hours)**
	Operating system operations, process management, memory management, storage management, protection and security, distributed systems.	
UNIT - II	**PROCESS AND THREAD MANAGEMENT**	**(06 Hours)**
	Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming, threads in UNIX, comparison of UNIX and windows.	
UNIT -III	**MEMORYMANAGEMENT**	**(06 Hours)**
	Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing Memory Management Requirements, Swapping, continuous memory allocation Partitioning:	
UNIT -IV	**INPUT/OUTPUT AND FILE MANAGEMENT**	**(06 Hours)**
	I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling, Disk Cache, Linux I/O. File Management: Overview, File Organization and Access, File Directories, File Sharing, Record	
UNIT - V	**TRENDS IN OPERATING SYSTEMS**	**(06 Hours)**
	Linux Kernel Module Programming, Embedded Operating Systems: Characteristics of Embedded Systems, Embedded Linux, and Application specific OS. Basic services of NACH Operating System. Introduction to Service Oriented Operating System (SOOS), EDGE	
UNIT -VI	**LINUX SYSTEM AND CASE STUDY**	**(06 Hours)**

	Basic Concepts of LINUX, Multifunction Server, Virtualization- Xen, VMware with Linux Host, Android operating system –Features, characteristics, Basic building blocks, Architecture, System services. Case Study: DOS and Windows Operating System	

Term Work:

The term work shall consist of record of minimum eight experiments and not limited to

1. Process control system calls
2. Apply Banker's algorithm
3. Inter process communication in Linux
4. Linux Kernel configuration, compilation and rebooting from the newly compiled kernel. Requirements
5. Kernel space programming
6. Implementing a CPU scheduling policy in a Linux OS.
7. Implementing a memory management policy in a Linux OS.
8. Implementing a file system in a Linux OS.
9. Apply disk Scheduling algorithms

Project Based Learning

1. To develop several system calls to enable user programs to interface with the file system.
2. Functioning threading system- scheduling algorithm, interrupt handling.
3. To enable the memory system by enabling virtual memory, including adding paging support, stack growth, memory mapped file support, and protects user level pages while in use by the kernel.
4. Memory Management Game
5. Process Scheduling Simulator
6. File System Explorer
7. Device Driver Development
8. Shell Scripting Language
9. Network Protocol Analyzer
10. Virtual Memory Management
11. Multi-User Chat System:

Text Books:

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014.
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons ,Inc., 9th Edition,2012.
3. Maurice J. Bach, "Design of UNIX Operating System", PHI

Reference Books:

1. Dhananjay M Dhamdhere, 'Operating Systems - A Concept Based approach ', Tata McGraw, Hill
2. Abraham Silberschatz, Peter B. Galvin &Grege Gagne (Wiley))'. Operating System Concepts '
3. Sumitabha Das, 'Unix Concepts and Applications, Tata McGraw Hill
4. Achyut S. Godbole, 'Operating System with case studies in Unix, Netware and Windows NT' Tata
5. Karim Yoghmour 'Embedded Android', O'Reilly Publication

Syllabus for Unit Test:

UnitTest-1	UNIT–I,UNIT–II, UNIT-III
UnitTest-2	UNIT–IV,UNIT–V,UNIT-VI

Network Analysis		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours/Week	End Semester Examination: 60 Marks	Theory : 03
Practical: 02 Hours/Week	Continuous Assessment: 40 Marks	
	TW : 25 Marks	Term Work : 01
		Total: 04

Course Pre-requisites:

The Students should have knowledge of

Terminology of electrical networks, series and parallel combinations of resistance, Laplace transforms , linear differential equations.

Course Objectives:

- To develop the strong foundation for Electrical Networks.
- To develop analytical qualities in Electrical circuits by application of various theorems.
- To understand the behavior of circuits by analyzing the transient response using classical methods and Laplace Transform approach.
- To apply knowledge of laws and Network theory for analysis of 2-port networks and design of other circuits like filters.

Course Outcomes: Students will be able to

1.	Apply the knowledge of different type of electrical networks and analyze accordingly.
2.	Apply the knowledge of various theorems to identify the value of current/voltage in electrical networks.
3.	Analyze the response of RLC circuit with different conditions.
4	Apply the knowledge of Laplace transform to analyze behavior of an electrical circuit.
5	Apply the knowledge of two port network to solve the complex networks and understand the different types of filters.
6	Apply the knowledge of network theory to find transfer function, poles and zeroes location to perform stability analysis and parallel resonance.

UNIT - I	**Basics of Network with types, Mesh & Nodal Analysis**	**(06 Hours)**
	Lumped and Distributed, Linear and Nonlinear, Bilateral and Unilateral, Time-variant and Time invariant. Independent and Dependent (controlled) voltage and current sources. Concept of voltage and current divider, Source transformation and shifting. Network Equations: Network equations on Loop basis and Node basis, choice between Loop analysis and Nodal analysis. Concept of super node and super mesh, mutual inductance, Dot convention for coupled circuits, Concept of duality and dual networks.	
UNIT - II	**Network Theorems and Graph Theory:**	**(06 Hours)**
	Network Theorems: Superposition, Thevenin's, Norton, Maximum Power Transfer Theorem, Reciprocity, Millman's theorems applied to electrical networks with all types of sources. **Graph Theory:** Tree ,Co-tree, Incidence matrix ,F-cutest Matrix, Tie set B Matrix	
UNIT - III	**Transients in RLC circuit:**	**(06 Hours)**
	Solutions of differential equations and network equations using classical method for R-L, R-C and R-L-C circuits with DC and sinusoidal excitation (under-damped, over-damped and critically damped conditions with derivation), Initial and Final Condition (series and parallel).	
UNIT - IV	**Laplace Transform and its Applications:**	**(06 Hours)**
	Basic Properties of Laplace Transform, Laplace Transform of Basic R, L and C components, Solutions of differential equations and network equations using Laplace transform method for RL, R-C and R-L-C circuits (series and parallel), Inverse Laplace transforms, transformed networks with initial conditions. Analysis of electrical circuits with applications of step, pulse, impulse & ramp functions, shifted & singular functions the convolution integral, application of initial and final value theorem.	
UNIT - V	**Two port network and Filters:**	**(06 Hours)**
	Two Port Network: Short circuit admittance, open circuit impedance, Hybrid parameters and transmission parameters, Interrelations between parameters. **Filters:** Introduction to active & passive filters, low pass filters, high pass filters and m-	

	derived LPF and HPF filters and design.	
UNIT - VI	**Network Functions:**	**(06 Hours)**
	Poles and Zeros: Terminal pairs or ports, network functions for the one port and two ports, the calculation of network functions, general networks. Restrictions on poles and zeros locations for transfer functions and driving point function, Time –domain behavior from the pole and zero plot. Stability of active networks.	

Term Work:

The term work shall consist of record of minimum eight experiments:

1. Verification of Superposition theorem in A.C. circuits.
2. Verification of Thevenin's theorem in A.C. circuits.
3. Verification of Reciprocity theorem in A.C. circuits.
4. Verification of Millman's theorem.
5. Verification of Maximum Power Transfer theorem in A.C. circuits.
6. Determination of time response of R-C circuit to a step D.C. voltage input. (Charging and discharging of a capacitor through a resistor).
7. Determination of time response of R-L circuit to a step D.C. voltage input. (Rise and decay of current in an inductive circuit).
8. Determination of time response of R-L-C series circuit to a step D.C. voltage input.
9. Determination of parameter of Two Port Network.
10. Determination of current under parallel Resonance condition.
11. Determination of Resonance, Bandwidth and Q factor of R-L-C series circuit.

Project based learning:

- Prepare a hardware model based on any of the network theorem and calculate current flowing through the load.
- Prepare a simulation model for the above hardware model in any software and compare the results with hardware model.
- Develop an article based on hardware and software model and get it published in conference/technical journal, etc.
- With the help of CRO perform transient analysis of voltage and current for any of the circuit.

Text Books:

1. Network Analysis Third Edition by M. E. Van Valkenburg, Prentice Hall of India Private Limited.
2. Network Analysis & Synthesis by G. K. Mittal, Khanna Publication.
3. Network Analysis and Synthesis by Ravish R Singh, McGraw Hill.
4. Introduction to Electric Circuits by Alexander & Sadiku, McGraw Hill.
5. Introduction to Electric Circuits by S. Charkarboorty, Dhanpat Rai & Co.
6. Fundamentals of Electrical Networks by B.R.Gupta & Vandana Singhal- S.Chand Publications
7. Electrical Circuit Analysis 2nd Edition by P. Ramesh Babu, Scitech Publication India Pvt. Ltd.

Reference Books:

1. Network Analysis by Cramer , McGraw Hill Publication.
2. Engineering Circuit Analysis by William H. Hayt, Jr. Jack E. Kemmerly, McGraw Hill Publication.
3. Schaum's Outline of Electric Circuits, McGraw-Hill Education; 7 edition

Syllabus for Unit Test:

Unit Test -1	UNIT – I, UNIT – II, UNIT - III
Unit Test -2	UNIT – IV, UNIT – V, UNIT - VI

Skill Base Course-III – Computer Aided Design		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Practical: 02 Hours/Week	TW: 25 Marks, OR: 25 Marks	Practical: 01
Total Hours: 40		Total: 01

Course Pre-requisites:

The Students should have basic knowledge of

- A working knowledge of the CAD software and electrical terminology

Course Objectives:

- Navigate the CAD Electrical user interface.
- Use the fundamental features of CAD Electrical. Build intelligent ladder diagrams and panel layouts.
- Create, view, and edit the project settings and properties.
- Extract data from drawings into reports formatted to match users' standards.
- Insert and edit parametric PLC modules, nonparametric PLC modules, and stand- alone PLC I/O points.

Course Outcomes: After learning this course students will be able to

1.	Illustrate the basics of electrical drawings and list the common symbols in electrical drawings.
2.	Explain the basics of schematics.
3.	Sketch the circuit and mark the cables.
4.	Explain the panel layout and identify the components.
5.	Explain the PLC, its layout, PLC parameter selection and connection of wires from source to equipment.
6.	Compare and examine the generated report.

UNIT – I	**Basics of electrical drawings**	**(06 Hours)**
	Need of Drawings, Electrical Drawings, Common Symbols in Electrical Drawings, Wire and its Types, Labelling. Design Environment, Basic Workflow, Project Manager, Project Drawing List, Moving Through a Project, Copy Projects, **GUI.**	
UNIT - II	**Schematics**	**(06 Hours)**
	Single wires/components, referencing, Ladders, Wire Type, Wire Numbers, PLC I/O wire numbers, 3-Phase Circuits, Source and Destination Signal Arrows, Multi Wire 3-Phase Circuits, Point-2- Point Connectors.	
UNIT - III	**Circuit and Cables**	**(06 Hours)**
	Cable markers, Fan In/Out, insert saved circuits, save circuits to ICON menu, circuit clipboard, circuit builder, copy component, align, delete component and attribute editing commands.3 D model of electrical assembly. Drawings of electrical machines half sectional end and half sectional elevation.	
UNIT - IV	**Panels**	**(08 Hours)**
	Panel Layout, Foot Prints, Footprints from Schematic list, Footprints	

	from icon menu, Din rails, Balloons, Wire Annotations, Create Assembly, Editing & Modifying Footprints. Creating Own Footprint, Placing a Terminal. Terminal Editor	
UNIT - V	**PLC**	**(06 Hours)**
	Generate PLC Layout Modules, PLC parametric selection, Module layout, Insert PLC modules, Edit PLC module, PLC Database File. Point to Point Wiring Tools, Introduction to Connector Diagrams, Inserting Connectors, Editing & Modifying Connectors, Link components by dashed lines, Grouping Wires	
UNIT - VI	**Reports**	**(06 Hours)**
	Generate Reports, Types of schematic reports, Generate a schematic report, Types of panel reports, Generate a panel report, Run automatic reports, Automatic report generation, Audit: Missing Catalog, Electrical Audit, Signal Error/ List, Drawing Audit Import/Export: To Spreadsheet. From Spreadsheet	

Term Work:

The term work shall consist of record of minimum eight (2 based on schematics, 2 based on 3D model of electrical assembly, 2 based on panel layout and 2 based on PLC Circuit)sheets.

1. To create a schematic for 3 phase motor starters
2. To create a schematic drawing of any circuit of dc machines experiment
3. To create a schematic drawing of Load test on a Linear Induction Motor
4. To create a schematic drawing of Load test on a AC Series motor.
5. To Create schematic of the given circuit. Design the panel for the user and then generate the report for the components.
6. To draw the half sectional end and half sectional elevation of Squirrel cage motor
7. To draw the half sectional end and half sectional elevation of DC generator
8. To draw the detailed drawing of each part of single phase transformer
9. To draw the 3-phase, double layer lap winding with full pitch and chorded coils
10. To create a panel layout of3 phase motor starters
11. To create a panel layout ofLoad test on a Linear Induction Motor
12. To create a panel layout ofLoad test on a AC Series motor.
13. Create the PLC circuit of the given figure

Text Book:

1. AUTOCAD ELECTRICAL 2016 BLACK BOOK By *Gaurav Verma CAD/CAM/CAE Expert Matt Weber CAD/CAE Expert (CADCAMCAE Works, Georgia)*
2. AutoCAD Electrical 2019: Fundamentals with NFPA Standards: Autodesk Authorized Publisher
3. AutoCAD Electrical 2016 for Electrical Control Designers, Prof. Sham TickooPurdue University
4. Getting Started AutoCAD® Electrical 2005
5. AutoCAD Electrical 2012 User's Guide

Value added Course I : -Industrial Safety Practices

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 02 Hours / Week	Continuous Assessment: 100 Marks	Theory:02

Course Pre-requisites:

Students should have basic knowledge of safety practices

Course Objectives:

1. To make students aware about the hazards while working in industry and respond appropriately in an emergency.
2. To help prevent workplace injuries, illnesses and fatalities.
3. To reduce and remove existing dangers to improve working conditions.

Course Outcomes:

Students are expected to:

1	To understand importance of safety
2	To understand process safety management
3	To evaluate safety in hazardous area
4	To apply the knowledge of Industrial safety engineering
5	To review of IE rules and acts and their significance
6	To analyse case studies on Industrial Safety Practices

Topics covered

UNIT - I	**Importance of Safety:** Health and environment. Health safety and environmental policy, fundamentals of safety, classification of accidents, Managements responsibility, objectives of safety management, National safety council, Employees state insurance act 1948, approaches to prevent accidents, principles of safety management, safety organization, safety auditing, maintenance of safety, measurements of safety performance, industrial noise and noise control, Industrial Psychology, Industrial accidents and prevention.	**(04 Hours)**
UNIT - II	**Process safety management:** Process safety management, legal aspects of safety, safety with respect to plant and machinery, the explosive act 1884, Petroleum act 1934, personal protective equipment, classification of hazards, protection of respiratory system, work permit system, hazards in refineries and process plants, safety in process plants, pollution in some typical process industry. Safe working practices, housekeeping, safe working environment, safety device and tools, precaution in use of ladders, safety instruction during crane operation electrical safety, case studies, safety in use of electricity, electric shock, phenomena, occurrence of electric shock, medical analysis of electric shock and its effect, safety procedures in electric plants, installation of Earthing system.	**(04 Hours)**
UNIT - III	**Safety in hazardous area:** Hazard in industrial zones, classification of industrial Enclosures for gases and vapors. Mechanical, Chemical, Environmental and Radiation hazards, Machine guards and safety devices, slings, load limits, lifting tackles and lifting equipment, hydrostatic test, Chemical hazards, industrial toxicology, toxic chemicals and its harmful effects on humans, factors influencing the effect of toxic materials, Units of concentration, control measure, environmental hazards, devices for measuring radiation, safety analysis and risk analysis, risk management, First aid, Safety measures to avoid occupational diseases.	**(04 Hours)**
UNIT -IV	**Industrial Safety Engineering:** Industrial Lighting : Purpose of lighting, Uses of good illumination, recommended optimum standards of illumination, Design of lighting installation, Standards for lighting and colour. Vibration and Noise : Activities related to vibrations, its impact on human health, abatement Sources, effects of noise on man, Measurement and evaluation of noise, Silencers, Practical aspects of control of noise. Safety at various Industries: Agro-Industry, Sugar Industry, Textile Industry etc.	**(04 Hours)**
UNIT-V	**Review of IE rules and acts and their significance**:	**(04 Hours)**

	Objective and scope –ground clearances and section clearances – standards on electrical safety - safe limits of current, voltage –Rules regarding first aid and fire fighting facility. The Electricity Act, 2003.	
UNIT-VI	**Case studies on Industrial Safety Practices:** Case studies in various industries like: Processing industry, Hazardeous material industry, Engineering applications industry etc	**(04 Hours)**
Reference Books:		
1. Industrial safety management By: L.M. Deshmukh Publishers: Tata McGraw Hill ,New Delhi Year: 2006 Edition: First 2. Industrial safety health and environment Management system By: R.K. Jain & Sunil S. Rao Publishers: Khanna Publishers Year: 2008 Edition: Second		

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. III / IV: **SUBJECT: - Indian Knowledge System**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 02	End Semester Examination: --	Credits: 02
Practical: 00	Internal Assessment: 50 Marks	
Tutorial: 00		
		Total Credit: 02

Course Objectives:	
1.	To sensitize the students about Indian culture and civilization including its Knowledge System and Tradition.
2.	To help student to understand the knowledge, art and creative practices, skills, and values in ancient Indian system
3.	To help to study the enriched scientific Indian heritage.
4.	To introduce the contribution from Ancient Indian system & tradition to modern science & Technology

Course Outcomes:	**After learning this course students will be able to understand**
1	Concepts of Indian Knowledge System
2	India's contribution in Philosophy and Literature
3	India's involvement in Mathematics and Astronomy
4	India's role in Medicine and Yoga
5	India's influence in Sahitya
6	Concepts of Indian Shastra

UNIT – I	**Introduction to Indian Knowledge System**	**(04 Hours)**
	Definition, Concept and Scope of IKS, IKS based approaches on Knowledge Paradigm, IKS in ancient India and in modern India	
UNIT – II	**Philosophy and Literature**	**(04 Hours)**
	Contributions by Maharishi Vyas, Manu, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini in Philosophy and Literature	

UNIT - III	**Mathematics and Astronomy**	**(04 Hours)**
	Contribution of Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta in Mathematics and Astrononmy	
UNIT - IV	**Medicine and Yoga**	**(04 Hours)**
	Major contributions of Charak, Susruta, Maharishi Patanjali and Dhanwantri in Medicine and Yoga	
UNIT -V	**Sahitya**	**(04 Hours)**
	Introduction to Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda) Puran and Upnishad) and shad darshan (Vedanta, Nyaya.Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation)	
UNIT - VI	**Shastra**	**(04 Hours)**
	Introduction to Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet	

Reference Books

1. Textbook on IKS by Prof. B Mahadevan, IIM Bengaluru
2. Kapur K and Singh A.K (Eds) 2005). Indian Knowledge Systems, Vol. 1. Indian Institute of Advanced Study, Shimla. Tatvabodh of sankaracharya, Central chinmay mission trust, Bombay, 1995.
3. The Cultural Heritage of India. Vol.I. Kolkata:Ramakrishna Mission Publication, 1972.
4. Nair, Shantha N. Echoes of Ancient Indian Wisdom. New Delhi: Hindology Books, 2008.
5. Dr. R. C. Majumdar, H. C. Raychaudhuri and Kalikinkar Datta: An Advanced History of India (Second Edition) published by Macmillan & Co., Limited, London, 1953.
6. Rao, N. 1970. The Four Values in Indian Philosophy and Culture. Mysore: University of Mysore.
7. Avari, B. 2016. India: The Ancient Past: A History of the Indian Subcontinent from c. *7000* BCE to CE 1200. London: Routledge.

8. Textbook on The Knowledge System of Bhārata by Bhag Chand Chauhan,
9. Histrory of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramkrishan Mission Institute of Culture, Kolkata (2014).
10. Pride of India- A Glimpse of India's Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati (2006).
12. Vedic Physics by Keshav Dev Verma, Motilal Banarsidass Publishers (2012).
13. India's Glorious Scientific Tradition by Suresh Soni, Ocean Books Pvt. Ltd. (2010).
14. Kapoor, Kapil, Avadesh Kr. Singh (eds.) *Indian Knowledge Systems* (Two Vols), IIAS, Shimla, 2005

Machine Learning		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours/Week	End Semester Examination: 60 Marks	Theory : 03
Practical : 02 Hours/ Week	Continuous Assessment: 40 Marks	Practical: 01
	TW: 25 Marks, OR: 25 Marks	Total: 04

Course Pre-requisites:

The Students should have knowledge of

Fundamentals of computer programming, Python, understanding of linear algebra and calculus, familiarity with probability and statistics.

Course Objectives:

- Acquire theoretical Knowledge on setting hypothesis for pattern recognition.
- Apply suitable machine learning techniques for data handling and to gain knowledge from it.
- Evaluate the performance of algorithms and to provide solution for various real world applications.

Course Outcomes: Students will be able to

1.	Understand the fundamental concepts of machine learning in details.
2.	Apply the principles of machine learning for various techniques and applications.
3.	Evaluate and assess the performance of classification and regression models.
4.	Understand the clustering techniques effectively.
5.	Create and design decision trees for various problem domains.
6.	Understand the core concepts in reinforcement learning.

UNIT - I	**Introduction:**	**(06 Hours)**
	What Is Machine Learning?, Definitions and Real life applications. Define Learning, What are datasets and how to handle them?, Feature sets, Dataset division: test, train and validation sets, cross validation, Dimensionality reduction techniques- PCA	
UNIT - II	**Basics of Machine Learning:**	**(06 Hours)**
	Applications of Machine Learning, processes involved in Machine Learning, Introduction to Machine Learning Techniques: Supervised Learning, Unsupervised Learning and Reinforcement Learning, Real life examples of Machine Learning.	
UNIT - III	**Supervised Learning:**	**(06 Hours)**
	Classification and Regression: K-Nearest Neighbor, Linear Regression, Logistic Regression, Support Vector Machine (SVM), Evaluation Measures: SSE, MME, R2, confusion matrix, precision, recall, F-Score, ROC-Curve.	
UNIT - IV	**Unsupervised Learning:**	**(06 Hours)**
	Introduction to clustering, Types of Clustering: Hierarchical, Agglomerative Clustering and Divisive clustering; Partitional Clustering - K-means clustering, K-Mode Clustering, Support Vector Machines: Linear and Non-Linear, Kernel Functions.	
UNIT - V	**Decision Tree Learning:**	**(06 Hours)**
	Decision tree representation, appropriate problems for decision tree learning, hypothesis space search in decision tree learning, inductive bias in tree learning, avoiding over-fitting the data, alternative measures for selecting attribute values, ensemble methods, bagging, boosting, random forest	
UNIT - VI	**Reinforcement Learning:**	**(06 Hours)**
	Introduction, Learning Task, Q Learning, Non deterministic Rewards and actions, temporal-difference learning, Relationship to Dynamic Programming, Active reinforcement learning, Generalization in reinforcement learning.	

Term Work:

The term work shall consist of minimum eight experiments from the list given below:

1. Perform basic data manipulation and visualization tasks on a simple dataset
2. Use pandas to load a dataset, explore its statistics, and apply strategies to handle missing values
3. Implement train-test split and k-fold cross-validation on a dataset using scikit-learn
4. Use scikit-learn to perform PCA and visualize the reduced dimensionality data

5. Apply KNN using scikit-learn on a dataset and evaluate its performance
6. Perform linear regression on a dataset and evaluate the model using R^2
7. Use scikit-learn to apply logistic regression on a dataset and interpret the model coefficients
8. Use scikit-learn to implement SVM with different kernels and evaluate their performance
9. Implement decision trees and random forests using scikit-learn and compare their accuracy
10. Cluster a dataset using K-means and evaluate the clustering performance
11. Perform hierarchical clustering on a dataset and visualize the dendrogram
12. Implement a simple Q-learning algorithm to solve a basic reinforcement learning problem
13. Implement bagging, boosting, and stacking strategies on a dataset and compare their performance
Note: The experiments can be conducted beyond the list by the subject chairman as per the requirement.
Project based learning:
• Apply linear regression to predict a continuous target variable.
• Implement image classification using the K-Nearest Neighbors algorithm.
• Apply K-Means clustering to segment customers based on their behavior.
• Use a decision tree to classify iris flowers based on their features.
• Implement Q Learning for a simple game or environment.
• Predict equipment failures using a Random Forest model.
Text Books:
1. Introduction to Machine Learning, By Jeeva Jose, Khanna Book Publishing Co., 2020.
2. Machine Learning for Dummies, By John Paul Mueller and Luca Massaron, For Dummies, 2016.
3. Machine Learning, By Rajeev Chopra, Khanna Book Publishing Co., 2021.
4. Machine Learning: The New AI, By Ethem Alpaydin, The MIT Press, 2016.
5. Machine Learning, Tom M. Mitchell, McGraw Hill Education, 2017.
6. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Prentice Hall of India, 3rd Edition2014.
7. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar " Foundations of Machine Learning", MIT Press,2012.
Reference Books:
1. MACHINE LEARNING - An Algorithmic Perspective, Second Edition, Stephen Marsland, 2015.
2. CharuC.Aggarwal,"DataClassificationAlgorithmsandApplications",CRCPress,2014.
3. Kevin P. Murphy "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012
Syllabus for Unit Test:

Unit Test -1	UNIT – I, UNIT – II, UNIT - III
Unit Test -2	UNIT – IV, UNIT – V, UNIT - VI

Electrical Machine-II		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 02 Hours/ Week	End Semester Examination: 60 Marks	Theory: 02 Tutorial: 01
Practical: 02 Hours/ Week	Continuous Assessment: 40 Marks	Practical: 01
Tutorial: 01 Hour/ Week	TW: 25 Marks Oral: 25 Marks	Total: 04

Course Pre-requisites:

The Students should have basic knowledge of

1.	Magnetic Physics, AC & DC Fundamentals, Basic laws of rotating machines like Faraday's Law, Lenz's Law, etc.

Course Objectives:

	To develop the students to identify, Design & analyze & to understand the fundamentals, classification, application and selection of Synchronous machine & Induction Machines for a particular application as per the operational characteristics.

Course Outcomes: After learning this course students will be able to

1.	Apply the concepts of three phase induction motor and estimate the losses, different motor parameters.
2.	Apply the concepts of induction machine and explain the single phase induction motor, state specifications & applications.
3.	Estimate the main dimensions and performance parameters of 3-Φ Induction Motor by understanding the general concepts and constraints in design.
4.	Analyze, estimate the performance parameters of Squirrel Cage & Wound Rotor of 3-Φ Induction Motor and optimize the design using FEA.
5.	Describe the basics of synchronous generators & identify the different parts.
6.	Describe construction, principal of operation and applications of Synchronous Motor.

UNIT – I	**Induction Machines Part I**	**(06 Hours)**
	Construction, Concept of rotating magnetic field, Principle of Operation, Concepts of Speed & Slip, Frequency of rotor voltage & current, Power Flow Diagram & development of Equivalent Circuits, Losses, Efficiency, Torque–Slip/Speed characteristics, Applications. Speed control mechanisms. Cogging & Crawling of induction motor.	
UNIT - II	**Induction Machines Part II**	**(06 Hours)**
	High Torque Cage Motors - Deep bar & Double cage rotor, Applications. Construction of single-phase induction motor, double revolving field theory, methods of self-starting and types: Resistance start, Capacitor start, Capacitor start-Capacitor run, Shaded Pole motor, equivalent circuit, torque-speed/slip characteristics and applications.	
UNIT - III	**Design of 3-Φ Induction Motor: Stator Design**	**(06 Hours)**
	General Specifications of 3-Φ Induction Motor. Output equation, Choice of average flux density in air gap, choice of ampere conductors per meter. Efficiency and Power factor, Main Dimensions. Stator winding design: turns per phase, stator conductors. Stator slot design: Shape of slots, number of slots and area of slots. Length of mean turn. Stator teeth design, Design of stator core. .	
UNIT - IV	**Design of 3-Φ Induction Motors: Rotor Design**	**(06 Hours)**
	Air gap length: factors affecting the length of air gap, relations for calculating the length of air gap. Squirrel Cage Rotor Design: Number of rotor slots: the effect of harmonics, rules for selecting rotor slots, reduction of harmonic torques. Design of rotor slots and bars, design of end rings. Wound Rotor	

	Design: Number of rotor slots, number of rotor turns, area of rotor conductors, Design of winding, Design of rotor teeth & rotor core	
UNIT - V	**Synchronous Generator**	**(06 Hours)**
	Types of synchronous machines & their constructional features, Excitation Systems. Principle of working, Estimation of winding factor, EMF Equation, Rating, Generator on no load & balanced load, Armature reaction & its effect under load power factors, Synchronous Impedance, Equivalent Circuit & Phasor Diagram, Two Reaction Theory model. Parallel Operation of alternators - Necessity, Conditions, Methods of synchronizing alternators.	
UNIT - VI	**Synchronous Motor**	**(06 Hours)**
	Principle of operation, Methods of starting, Equivalent Circuit & Phasor Diagrams, Pull-in & Pull-Out Torque, Power Flow Equations, Operation with constant excitation & variable load and with Constant load & variable excitation (V Curves & Inverted V Curves), Phenomenon of Hunting & its remedies, Applications.	

Term Work:

The term work shall consist of record of minimum eight experiments.

1. No load & Blocked Rotor Test on three phase induction motor: Determination of Equivalent Circuit Parameters/Plotting Circle diagram
2. Study of Induction Machines Starters
3. Determination of efficiency by performing load test on three phase induction motor.
4. Speed Control of Wound Rotor Induction Motor
5. Laboratory demonstration of Induction Generator.
6. Design of three phase induction motor using RMxprt & Ansys Maxwell.
7. Direct loading test on alternator
8. Open circuit and short circuit test on alternator – regulation by emf and mmf method
9. Slip test on salient pole alternator – regulation by two reaction theory
10. Synchronization of alternator with bus bar
11. V-Curves of synchronous motor
12. Load test on synchronous motor

Project based learning: Student shall demonstrate minimum one concept based on syllabus topic.

1. Development of prototype of any one type of machine.
2. Practical study of any one type of machine
3. Theoretical design/software simulation of three phase induction motor.

Reference Books:

1. S. K. Sen, "Principle of Electrical Machine Design with Computer Programs", Oxford & IBH
2. A. E. Fitzgerald, Charles Kingsley, Jr. Stephen D. Umans, "Electric Machinery", Tata McGraw Hill - 7th Edition 2013.
3. M.G. Say, "Alternating Current Machines", Pitman Publishing Ltd – 4th Edition 1976.
4. Nagrath Kothari, "Electrical Machines", Tata McGraw Hill – 5th Edition 2017.
5. Sawhney A. K., *Electrical Machine Design*, Dhanpath Rai & Co. (P) Ltd Sixth Edition: 2006
6. M.G. Say – Theory and Performance and Design of A.C. Machines, 3rd Edition, ELBS London.
7. P. P. Silvester and Ferraris's book on Electrical Machine Design using FEA

Syllabus for Unit Test:	
Unit Test -1	UNIT – I, UNIT – II, UNIT - III
Unit Test -2	UNIT – IV, UNIT – V, UNIT - VI

Web Designing		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	Theory: 03
	Continuous Assessment: 40 Marks	Total: 03

Course Prerequisites:	
The students should have knowledge of	
	Basic knowledge in HTML tags & skill of creating web pages, basic Computer hardware & software.
Course Objectives:	
	Students will understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and Web site development studio and other information technology sectors.
Course Outcomes: After learning this course the students will be able to	
1.	Define the principle of Web page design
2.	Define the basics in web design
3.	Understanding the basic concept of HTML.
4.	Recognize the elements of HTML.
5.	Understanding basics concept of CSS.
6.	Creating the ideas for web publishing

UNIT I	**Web Design Principles**	**(06 Hours)**
	What is website, Website purpose, Basic principles involved in developing a web site, How to design a good website, Planning process, Five Golden rules of web designing, Designing navigation bar, Different Home Page Layouts, Concept of basic web design..	
UNIT II	**Basics in Web Design**	**(06 Hours)**
	Brief History of Internet, Origin of the internet, Packet switching, TCP/IP, DNS, E-mail, Difference between WWW and the internet ,What is World Wide Web-in-depth explanation, Web browsers, HTTP, Different reasons to create a web site, Different Web Standards, Advantages of Web standards, Audience requirement for web page.	
UNIT III	**Introduction to HTML**	**(06 Hours)**
	What is HTML, What are HTML Documents, Basic structure of an HTML document, Creating an HTML document, Simple HTML document, HTML elements, HTML horizontal rules, Different Mark-up Tags, HTML Heading, HTML Paragraphs, HTML Line Breaks.	
UNIT IV	**Elements of HTML**	**(06 hours)**
	Introduction to elements of HTML, Nested HTML elements, HTML tag reference, Working with HTML Text, HTML formatting elements, Working with HTML Lists, HTML Tables, HTML Frames, Working with Hyperlinks, Images and Multimedia, Working with HTMLForms and controls.	
UNIT V	**Introduction to Cascading Style Sheets (CSS)**	**(06 Hours)**
	Concept of CSS, types of CSS, CSS Properties, CSS styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties) CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs	

UNIT VI	Introduction to Web Publishing or Hosting	(06 Hours)
	Creating the Web Site-creating page contents-basic HTML page, Creating page contents, Header, Navigation bar, Contents, Footer, Hosting the web site, Saving the web site, Working on the web site, Creating web site structure, Creating Titles for web pages Themes-Publishing a web sites. . Installing and configuring a web server. Publishing websites on intranet and internet.	

Project Based Learning :

1. Design a Tribute page
2. Design a website for bookshops, grocery stores & others.
3. Design a website for any vehicle showroom.
4. Design a website for any kind of sports.
5. Design a website for food delivery.
6. Design a address book.
7. Design a word counter

This list is for reference purpose, student can implement their own idea for designing a website.

Text Books:

1. Kogent Learning Solutions Inc, HTML 5 in simple steps, Dreamtech Press publisher
2. A beginner's guide to HTML, NCSA,14th May,2003

Reference Books:

1. Web Designing & Architecture-Educational Technology Centre, University of Buffalo
2. Steven M. Schafer, HTML, XHTML, and CSS Bible, 5ed, Wiley India
3. Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design, Wiley India

Reference Websites:

1. http://www.w3schools.com/html
2. http://www.html.net/
3. http://www.2createwebsite.com
4. http://www.webdesign.about.com

Syllabus for Unit Test:	
Unit Test -1	UNIT – I, UNIT – II, UNIT - III
Unit Test -2	UNIT – IV, UNIT – V, UNIT - VI

Power Electronics		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	Theory: 03
Practical: 02 Hours / Week	Continuous Assessment: 40 Marks	Practical: 01
	Term Work: 25 Marks & Oral : 25 marks	Total: 04

Course Pre-requisites:	
The Students should have knowledge of	
1.	Fundamentals of Electronics Engineering and Fundamentals of Electrical Engineering
Course Objectives:	
To introduce basic knowledge of electronics devices used for control of power.	
To describe characteristics and application circuits of SCR and other power devices.	
Course Outcomes: After learning this course the students will be able to	
1.	Classify power semiconductor devices and describe the working and application of power semiconductor devices.
2.	Illustrate the working and application of AC to DC converters (1 phase and 3 phase) for various loads and understand overlap angle with voltage drop calculations.
3.	Describe the working and application of AC voltage controllers, especially DIAC and TRIAC for various loads.
4	Explain the working and application of DC to DC converters especially Choppers for various loads and understand derivation of average and RMS output voltage and current.
5.	Memorize the working and application of DC to AC inverters especially PWM Inverters. Understand comparison of CSI and VSI and its applications.
6.	Identify various applications of power electronics in various sectors including FACTS, HVDC, Transport, Healthcare, Power system, Telecommunication etc.

UNIT - I	**Power semiconductor devices**	**(06 Hours)**
	Classification of power semiconductor devices Controlled turn-on and uncontrolled turn-off (SCR, TRIAC), Insulated-gate bipolar transistor IGBT, static induction transistor SIT, GTO, Integrated gate-commutated thyristor IGCT, MOS- controlled thyristor MCT, static induction thyristor SITH), Continuous gate signal requirement (IGBT, SIT), Diamond wafer technologies for semiconductor device applications, synthetic diamond semiconductor technology. Synthetic chemical-vapor- deposition (CVD) diamond semiconductor technology, Single crystal diamond wafers for high power electronics	
UNIT - II	**AC to DC Convertors (Single phase and three phase)**	**(06 Hours)**
	Single phase convertor, three phase semi controlled and fully controlled bridges with R, RL and RLE loads, derivation of average and RMS output voltage and current, rectification and inversion mode of operation, concept of overlap angle and associated voltage drop calculation, dual convertor and selection of transformer and semiconductor devices for convertors. Total Harmonic Distortion (THD).	
UNIT - III	**AC Voltage Controllers**	**(06 Hours)**
	DIAC, TRIAC - construction, characteristics, four mode operation, specifications, triggering of TRIAC using DIAC, AC voltage regulator principle, single phase and three phase analysis with R and RL Load, Harmonics and ripple factor, Applications of two stage, three stage and multistage voltage controllers, derivation of average and RMS output voltage and current	
UNIT - IV	**DC to DC Convertors**	**(06 Hours)**
	Principle of operation of chopper, classification on the basis of operating quadrants control techniques, CLC, TRC, PWM and FM techniques, analysis of step up	

	choppers and numerical with RLE load, area of application, necessity of input filter, derivation of average and RMS output voltage and current	
UNIT - V	**DC to AC Inverters**	**(06 Hours)**
	Single phase and three phase inverters principle of operation, VSI and CSI inverters, applications, operating frequency range. PWM inverters: single pulse, multi-pulse and sinusoidal pulse modulation, PWM techniques for voltage control and harmonic elimination.	
UNIT - VI	**Applications of Power Electronics**	**(06 Hours)**
	Power electronics for renewable energy systems., energy storage systems, smart cities, smart grids, power systems: FACTS, HVDC systems, etc., transport applications (electric vehicles, trains, aircrafts, ships, etc.)., industrial applications., medical applications., in military applications. telecommunication applications., energy harvesting systems., consumable applications. home appliances. Wearable devices	

Term Work:
The term work shall consist of minimum eight experiments.
1. To study software based design of converter circuits
2. V-I Characteristic of SCR, DIAC & TRIAC
3. V-I characteristic of power semiconductor devices GTO, IGBT
4. 1 Phase half Controlled & Full controlled converter (R & RL Load)
5. 3 phase converter (R, RL, RLE Load)
6. Step down Chopper circuit (RC technique)
7. 3 phase Voltage Source transistorized inverter
8. Firing circuit for 3 phase converter
9. 1 phase or 3 phase AC voltage regulator
10. 3 phase AC – DC converter with RLE Load
11. 1 phase PWM bridge inverter
Project based learning:
1. Commutation circuit of SCR
2. Design of Snubber Circuit
3. Collection of data sheets of Power Devices
4. Matlab based experiments on power electronics
5. case study of a industry manufacturing covertors
6. To design and build a rectifier circuit in the laboratory
7. To design and build a ac to DC converter circuit in the laboratory
8. To design and build a DC to DC converter circuit in the laboratory
9. To design and build a Dc to AC inverter circuit in the laboratory
10. To design and build a circuit for application in solar energy in the laboratory
11. To design and build a circuit for application in wind energy in the laboratory
12. To design and build a circuit for application in energy storage system in the laboratory
Reference Books:
1. Vedam SubraManyam - “Power Electronics” - New Age international, New Delhi
2. Dubey, Donald, Joshi, Sinha - “Thyristerised Power Controller”- Wiley Eastern New Delhi
3. M. D Singh & K B Khandchandani, “Power Electronics” - Tata McGraw hill
4. Jai P Agarwal - “Power Electronics, Systems theory & design” LPE Pearson Education

5.	L Umanand - “Power Electronic, Essentials & Applications” - Wiley publication
6.	Randall , Shaffer - “Fundamental of Power Electronics with Matlab”
7.	J. Michale, Jacob - “Power Electronics Principles & Applications”
8.	V K Mehta – “Principles of Electronics” – S. Chand Publications

Syllabus for Unit Test:	
Unit Test -1	UNIT – I, UNIT – II, UNIT - III
Unit Test -2	UNIT – IV, UNIT – V, UNIT - VI

Database Management System		
TEACHING SCHEME:	**EXAMINATIONSCHEME:**	**CREDITS ALLOTTED:**
Theory: 03Hours/Week	End Semester Examination: 60 Marks	Theory : 03
Practical: 02 Hours/Week	Continuous Assessment: 40 Marks	Practical: 01
	Term Work: 25 Marks	Total: 04

Course Pre-requisites:	
The Students should have knowledge of	
	1) Basic understanding of data and data structure 2) Basic understanding of programming language
Course Objectives:	
	Identify various techniques to communicate with database. Relate relevant data for effective processing of data. Construct a database to maintain data adroitly. Study various
Course Outcomes:	**After learning this course student will be able to**
1	Study database architecture.
2	Identify various constraints
3	Discuss relational database model
4	Extend power of SQL by adding programming paradigm
5	Apply knowledge of DBMS to process the software efficiently
6	Discuss advances in database

UNIT – I	**Introduction to DBMS**	**(06 Hours)**
	Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	
UNIT - II	**Relational database model**	**(06 Hours)**
	Relational query languages: Relational algebra, Tuple and domain, relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency	
UNIT -III	**Integrity Constraints**	**(06 Hours)**
	What are constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views.	
UNIT -IV	**SQL**	**(06 Hours)**

	SQL: Characteristics and Advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators. Tables: Creating, Modifying, Deleting, Updating. SQL DML Queries: SELECT Query and clauses, Index and Sequence in SQL. Views: Creating, Dropping, Updating using Indexes,	
UNIT - V	**Transaction management**	**(06 Hours)**
	Introduction to Database Transaction, Transaction states, ACID, properties, Concept of Schedule, Serial Schedule. Serializability:, Conflict and View, Cascaded Aborts, Recoverable and Nonrecoverable Schedules. Concurrency Control: Lock-based, Timestamp based Deadlock handling.	
UNIT -VI	**Advances in Databases**	**(06 Hours)**
	Emerging Databases: Active and Deductive Databases, Main Memory Databases, Semantic Databases. Complex Data Types: Semi-Structured Data, Features of Semi Structured Data Models. Nested Data Types:	

Term Work:
The term work shall consist of record of minimum eight experiments and not limited to
List of experiments:
1) Draw an ER Diagram to maintain database of Bank
2) Normalize the database of Library, upto BCNF
3) Perform the following operation for demonstrating the insertion, updation and deletion using the referential integrity constraints
4) Calculate turnover of a banks in Pune using group by query
5) WAP to implement auto rollback option on deletion using trigger.
6) WAP to implement Procedure to calculate square of a number.
7) Implement implicit cursor using PL/SQL.
8) Simulate two phase locking protocol on the database of Movie.
9) Perform document processing using Mango DB,.
10) Solve word count problem using Hadoop.
Project Based Learning:
1. Make a project to maintain employee data using files and dynamic object/structure. The project should be able to read, write, modify, add and search records. Also demonstrate the effect of performing change in employer data definition after few records have been added.
2. Make an extended ER diagram for insurance management system. Transform this into relation
3. Employ various data control restrictions on databases, relations and attributes of relations.
4. Create a phonebook which enables user to save contacts with additional information and
5. Design and develop a library management system.
6. Design and develop a inventory management system and create multiple views on the relations so that users not authorized to edit the relations should be able to views the data.
7. Implement of audit trails and backup on relations.
8. Create a student result calculation system. However when updating final results after calculation should be only of students who paid complete fees, such that transaction of each row is executed separately. Hint- use explicit cursor
9. Develop a student data management system using hash files.
10. Installation of a NoSQL database and implementing a simple student database to compare with

Text book:
1. A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts”, Sixth Edition McGraw-Hill
2. Oracle SQL and PL/SQL Guide Till 10gR2
3. Ramkrishna R., Gehrke J., Database Management Systems, 3rd Edition, McGrawHill
Reference Books:
1. Rob, Coronel, “Database Systems”, Seventh Edition, Cengage Learning.
2. Bipin Desai, Introduction to Database Management Systems.
3. Groff James R., Paul Weinberg, LAN times guide to SQL.
Syllabus for Unit Test:

UnitTest-1	UNIT–I,UNIT–II, UNIT-III
UnitTest-2	UNIT–IV,UNIT–V,UNIT-VI

SBC IV: Mobile Application Development

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Practical : 02 Hours/ Week	TW: 25 Marks	Practical: 01
		Total: 01

Course Prerequisites:

The students should have knowledge of, basic programming language.

Course Objectives:

1.	To facilitate students to understand android SDK
2.	To help students to gain a basic understanding of Android application development
3.	To inculcate working knowledge of Android Studio development tool

Course Outcomes: After learning this course the students will be able to

1.	Identify various concepts of mobile programming that make it unique from programming for other platforms.
2.	Critique mobile applications on their design pros and cons.
3.	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
4.	Program mobile applications for the Android operating system that use basic and advanced phone features.
5.	Deploy applications to the Android marketplace for distribution.

UNIT I	**INTRODUCTION TO ANDROID DEVELOPMENT**	**(06 Hours)**
	Overview of mobile application development, Introduction to Android: The Android Platform, Android SDK, Setting up Android development environment: Eclipse Installation, Android Installation. building you First Android application, Understanding Anatomy of Android Application, Android Manifest file	
UNIT II	**ANDROID APPLICATION DESIGN**	**(06 Hours)**
	Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.	
UNIT III	**USER INTERFACE DESIGN**	**(06 Hours)**
	Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.	
UNIT IV	**NAVIGATING THE ANDROID DEVELOPMENT LANDSCAPE**	**(06 hours)**
	Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.	
UNIT V	**ANDROID API**	**(06 Hours)**
	Using Common Android APIs: Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.	

Termwork: The term work shall consist of record of minimum eight experiments.

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Write an application that draws basic graphical primitives on the screen.
4. Develop an application that makes use of databases.
5. Develop an application that makes use of Notification Manager
6. Implement an application that uses Multi-threading.
7. Develop a native application that uses GPS location information
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message
10. Write a mobile application that makes use of RSS feed
11. Develop a mobile application to send an email.
12. Develop a Mobile application for simple needs (Mini Project)

Text Books:

1. T1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

Reference Books:

1. R1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. R2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. R3. Android Application Development All in one for Dummies by Barry Burd, Edition: