Shri Rawatpura Sarkar University, Raipur

Schemeof Teaching,Examination&

Syllabus for

B.Tech.(Electrical Engineering)

Semester-(VIII)

(Effective from the session: 2022-23)

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Four Years B.Tech. Programme
Scheme of Teaching and Examination of B.Tech. Eighth Semester

(Electrical Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S.No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	BENEE801T	High Voltage Engineering	3	1	-	4	30	70	100	3
2	BENEE801P	High Voltage Engineering	-	-	2	1	15	35	50	-
3	BENEE802T	Elective VI	3	1	-	4	30	70	100	3
4	BENEE803T	Installation Maintenance & Testing of Electrical Equipment's	2	1	-	3	30	70	100	3
5	BENEE803P	Installation Maintenance & Testing of Electrical Equipment's	-	-	2	1	15	35	50	-
6	BENEE804T	Flexible A C transmission System	2	1	-	3	30	70	100	3
7	BENEE805T	Elective VII	3	1	-	4	30	70	100	3
8	BENEE806P	Computer Simulation	-	-	2	1	15	35	50	-
9	BENEE807P	Project Phase-II	-	-	2	1	50	100	150	-
						22			800	

Elective VI

A. EHV AC & DC Transmission
B. Radar & Television
C. Bio Medical Instrumentation
D. VLSI Design

Elective VII

A. Management Concepts & Techniques
B. Industrial Drives
C. Artificial Neural Network & Fuzzy Logic
D.PLC and SCADA

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

<table>
<tr><td>Course Title</td><td colspan="5">HIGH VOLTAGE ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="5">BENEE801T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Power system</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• The course is an advanced course in high voltage technology and electrical insulatingmaterials.
• It deals with basic gaseous, liquid and solid dielectric breakdowntheories.
• It also contains important experimental methods of high voltage generation and measurement.
• The course makes the students familiar with various applications where high voltage field is used.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT- I
Breakdown in Gases
Levels of high voltages, necessity of EHV and its limitations, Electrical insulation and dielectrics, Electrical fields – Uniform and non-uniform fields (weekly and extremely), Electric field, intensity/stress, degree of non-uniformity, Types of insulation – gas, liquid, and solids, Types of ionizations – impact, thermal and photo-ionization, Electron avalanche in uniform field, Townsend’s first and second Criterion for breakdown, Streamer theory of breakdown, Paschen’s law, Discharge in Weakly non-uniform field, Law of similarity of discharge, Discharge in extremely non-uniform field, Partial breakdown corona, Star, streamer and leader types, Corona loss in transmission lines, Methods of reducing coronaloss.
UNIT-II
Breakdown in dielectrics:
Breakdown in Liquid Dielectrics: Types of liquid dielectrics, pure and commercial liquids, Conduction & breakdown in commercial liquids-suspended particle theory, Cavitation and the bubble theory, determination of breakdown strength of transformer oil, Factors affecting dielectric strength of liquids.
Breakdown in Solid Dielectrics:
Breakdown mechanism, Intrinsic breakdown, Electromechanical breakdown, thermal breakdown, breakdown of solid dielectric in practice, Breakdown due to treeing & tracking, breakdown due to the internaldischarges.
UNIT- III
Generation of high voltages
Generation of high D.C. voltages, half wave & full wave rectifier circuits, Van De</td></tr>
</table>

	Graff generators, Electro static Generators, Generation of high alternating voltages, cascade transformers, Generation of impulse voltages, Multistage Impulse generator, Marx circuit, Tripping & control of Impulse generators **UNIT-IV** **Measurement of high Voltages** Measurement of high D.C.voltage, Measurement of high A.C.& impulse voltages, series Impedance voltmeter, series capacitance voltmeter capacitance potential dividers & capacitance voltage transformers, Resistance potential dividers, Electrostatic voltmeter, Spark gap for measurement of high D.C., A.C. & impulse voltages, Potential divider for impulse voltage measurements, CRO for impulse voltage measurements. **UNIT-V** **High Voltage Testing of Electrical Apparatus:** Test on insulators, Dry & wet flash Over tests & withstand tests, Impulse flash over & withstand voltage test, High voltage tests on cables Impulse testing of transformers. **Non-Destructive Testing:** Measurement of dielectric constant & loss factor, High voltage Schering Bridge, Partial Discharge Measurements.
Course Outcomes	**After studying the contents of the syllabus in detail the students will be able to:** • Describe the various breakdown theories for gaseous, liquid and soliddielectric. • Describe the generating methods for high DC, AC, andimpulse. • Describe the measuring methods for high DC, AC andimpulse. • Understand the fundamentals of High VoltageTest
Text Books	1. High Voltage Engg , C.L. Wadhwa, New Age International Ltd. , 2ndEd 2. High Voltage Engg., M.S. Naidu & V. Kamraju, Tata McGraw Hill, 3rdEd 3. An Introduction to High Voltage Engineering, Subir Ray,PHI.
Reference Books	1. High voltage Insulation Engineering, Ravindra Arora, New AgeInternational. 2. High voltage Engineering, D. V. Razevig and Chaurasia, KhannaPublication..

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

<table>
<tr><td>Course Title</td><td colspan="5">INSTALLATION MAINTENANCE & TESTING OF ELECTRICAL EQUIPMENT'S</td></tr>
<tr><td>Course Code</td><td colspan="5">BENEE803T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>3</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Electrical machines and electrical power system</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• This subject aims to give various types of real time and practical problems in electricalsystems.
• It introduces the site activities before erection of electrical subsystem, its installation procedure, testing and various precautions in eachstage.
• It also gives knowledge of identifying the healthy and faulty condition, maintenance procedure for various electricalinstallations.
• Italsogivesanideaaboutdomesticinstallationatlowvoltageaswellashot line maintenance at high voltage and safety against Electric Fire.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT- I
Overview of Site Management, Electrical Safety
Introduction to Site activities; Civil works, Erection, Testing & Commissioning, Operation and Maintenance, Type and Scope of Maintenance, Advantages of programmed preventive maintenance, Safety management, Electrical shocks, Recommended safety precautions against electrical shocks in LV and HV installations, Safety procedure during commissioning phase and Operation & maintenance phase

UNIT-II
Transformer
Important steps in maintenance of power transformer, maintenance schedule for attended and unattended transformer, causes of troubles and failure of power transformer, Dispatch and shipping, inspection, storage, procedure of filling oil in transformer tank, drying out, various commissioning tests on a power transformer, typical maintenance schedule for transformer up to 1000 KVA and above 1000KVA, transformer oilfiltration.

UNIT- III
Switchgear, Circuit Breaker
Introduction to switchgears and equipments in substation and their functions, Type tests, routine test and commissioning tests, high/low voltage ac circuit breakers (Air, Oil, Vacuum, SF6) possible troubles, causes and remedial actions for outdoor circuit breakers, maintenance of CB (Air, Oil, Vacuum, SF6), Trouble shooting of substation equipment.</td></tr>
</table>

	UNIT-IV **Rotating Machines** Standard designation for cooling and degree of protection, Installation and commissioning of introduction motor and rotating machines, drying out of electrical rotating machines, installation resistance measurements, Mechanical maintenance of rotating machines, Care, servicing and maintenance of motor, Troubles, causes, remedies and protective devices during respective abnormal condition in low voltage induction motor, Testing of inductionmotors. **UNIT-V** **Hotline Maintenance and Safety against Electric Fire** Leaning and advantages of hot-line maintenance. Special type non conducting materials used for preparing tools for Hot line maintenance, Tools, Various types of Hot- line operations, safety during Hot line maintenance; Introduction to Electrical Fire Safety, Fire Fighting to extinguish Electrical Fire using Dry Powder type Fire extinguisher.
Course Outcomes	**At the end of this course student will be able to:** • Install an electricalsystem. • Maintain procedure of various static and rotating equipments andmachines. • Test Electrical Equipments. • Work when the line islive.
Text Books	1. Testing, commissioning, operation and maintenance of Electrical equipments, S. Rao, 6th Edn. Khanna Publishers .
Reference Books	1. Installation maintenance and testing of Electrical Equipments, S. Tarlok, S. K. Kataria & Sons

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	**FLEXIBLE A C TRANSMISSION SYSTEM**				
Course Code	**BENEE804T**				
Course Credits	**L**	**T**	**P**	**TC**	
	2	**1**	**0**	**3**	
Prerequisites	Electrical power system				
Course Objectives	• To study different types of FACTscontrollers. • To study concepts and operation of voltage source converter and currentsource converter and current sourceconverter. • To study the different methods of seriescompensation.				
Course Contents	**UNIT- I** **Introduction** Flow of power in AC system, loading capability, controllable parameters, basic types of FACTS controllers, review of semi-conductor devices (diodes, SCR's, MOSFET's, IGBT'setc.) **UNIT-II** **Voltage Source Converters (VSCs)** Basic concepts of VSC, single-phase full wave bridge converter operation, single phase-leg operation, three-phase full wave bridge converter and its operation, transformer connections for 12-pulse, 24-pulse and 48-pulse operation. **UNIT- III** **Current source converters (CSCs)** Basic concepts, three-phase CSCs, three-phase full wave rectifier, comparison of VSC and CSC. Static shunt compensators: basic concepts, method of controllable VAR generation, Static VAR compensator (SVC), application of SVC in power systems. **UNIT-IV** **Static Synchronous Series Compensator (STATCOM)** Introduction, mathematical model, working of STATCOM, V-I and V-Q characteristics, transient stability enhancement and exchange of real power using STATCOM, comparison of SVC and STATCOM, Merits of hybrid compensators. **UNIT-V** **Static Series Compensators** Objectives of series compensation, variable impedance type series compensation, GTO thyristor controlled series capacitors (GCSC), thyristor controlled series capacitor (TCSC), basic concepts of GCSC and TCSC. Introduction to Unified Power Flow Controller (UPFC)				

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Outcomes	**At the end of this course student will be able to:** • Make transformer connections for 12 pulse, 24 pulse and 48 pulse operation of voltage sourceconverter. • Apply static var compensators in power systems for performanceimprovement. • Apply different methods of series compensation in power systems for performanceimprovement
Text Books	1. Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems, Narain G. Hingorani, Laszlo Gyugyi, Wiley-IEEEPress. 2. Thyristor-Based FACTS Controllers for Electrical Transmission Systems, R. Mohan Mathur, Rajiv K. Varma, John Wiley &Sons
Reference Books	1. Flexible a c transmission system (FACTS), Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers,London.

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	**EHV AC & DC TRANSMISSION**				
Course Code	**BENEE802TA**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**0**	**4**	
Prerequisites	Power system				
Course Objectives	• To study basic concepts of EHV AC and DC Transmissionsystem. • To study concepts and operation of FACTS devices and gain knowledge about Series/ Shunt compensation of Lines. • To understand various components of EHV dc system, convertercircuits, rectifier and inverter valves, their operation and control.				
Course Contents	**UNIT- I** **Fundamentals of EHV AC & DC transmission and Converter** Constitution of EHV AC and DC Links, Kind of DC Links, Limitations and advantages of AC and DC Transmission, Principal application of AC and DC Transmission, trends EHV AC and DC Transmission, Power-handling capacity, Converter analysis Graetz circuit, Firing control, overlapping. **UNIT-II** **Line Compensation and FACTS Devices** Extra long distance lines, Voltage profile of loaded and unloaded line along the line, Compensation of lines, series and shunt compensation, Shunt reactors, Tuned power lines, Problems of extra long compensated lines, FACTS concept and application. **UNIT- III** **Traveling waves and Over voltages in transmission system** Traveling waves on transmission systems, Their shape, attenuation and distortion, effect of junction and termination on propagation of traveling waves, Over voltages in transmission system, Lightning, switching and temporary over voltage: Control of lighting and switching over voltages. **UNIT-IV** **Components and working of EHV dc system** Components of EHV dc system, converter circuits, rectifier and inverter valves, Reactive power requirements, harmonics generation, adverse effects, Classification, Remedial measures to suppress, filters, Ground return, Converter faults & protection harmonics mis-operation, Commutation failure, Multi-terminal D.C. lines. **UNIT-V** **Control of EHV DC system** Control of EHV dc system desired features of control, control characteristics, constants current control, Constant extinction angle control, Ignition angle control,				

	parallel operation of HVAC & DC system, Problems and advantages.
Course Outcomes	**At the end of this course student will be able to:** • Describe fundamentals of EHV AC and DC Transmissionsystem. • Describe the series / shunt Compensation of line by applying FACTSdevices • Explain the components of EHV dc system, converter circuits, rectifier and inverter valves, their operation andcontrol.
Text Books	1.EHV AC Transmission, Begamudre, New AgeInternational. 2. EHV AC & DC Transmission, Manoj Nair, Balajipublication 3. HVDC Transmission, Padiyar, New Age Pbs.
Reference Books	1. EHV-AC and HVDC Transmission Engineering and Practice: Theory, Practice and Solved Problems, Sunil S. Rao, KhannaPublisher. 2. Direct current transmission, Edward Wilson Kimbark,Wiley-Interscience

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	**RADAR & TELEVISION**				
Course Code	**BENEE802TB**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**0**	**4**	
Prerequisites	Communication theory				
Course Objectives	1. Understanding the basic concepts ofradar 2. Understanding of the components of a radar system and their relationship to overall system performance, the radar operating environment andtechniques 3. Analyzing different antennasystem 4. Understanding the basic concepts of Television engineering, Transmitter and Receiversystem				
Course Contents	**UNIT- I** **Principal & Application:** Basic Radar, radar block diagram, radar frequencies, application of radar, radar range equation, probabilities of false alarm, integration of radar pulses, radar cross-section oftargets **UNIT-II** **Types of radar system operation with Application:** Pulse, CW, MTI radar stacking radars, basics of radar Navigational aids **UNIT- III** **Types of Antennas Display:** Parabolic, cosecant square antenna, Radomes, A scope display, B scope, E&F scope displays, Plain position indicator **UNIT-IV** **Fundamental of TV & TV standard:** Sound and picture transmission, the scanning process, camera pick-up device, video signal, principle and working of colour television, colour fundamental mixing of colors and colours and colour perception, colour TV Camera. Horizontal and vertical sync and Blanking standards,standard channels characteristics, consolidated CCIR system –B standard, various television broadcast systems. **UNIT-V** **TV Transmission and receiver:** Requirements of TV broad –cast transmission, design principle of transmission, design principle of TV transmitters, Visual and aurual exciter, transmitting antennas. Receivers: - Block schematic and functional for mono chromatics and colour TV receiver in India				

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Outcomes	**At the end of this course student will be able to:** • Know the concepts ofradar • Analyze different antennasystem • Understand the concepts of Television engineering. • Design TVTransmitter.
Text Books	1. Radar system & Radio aids to Navigations. A K Sen Khannapub 2. Television and video Engg . by A.M Dhake, TMHpublication 3. Microwave & Radar Engineering, Kulkarni, Umeshpub
Reference Books	1. Introduction to Radars, Skolnik,TMH 2. Radar Principles, Peebles, WileyPbs.

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

<table>
<tr><td>Course Title</td><td colspan="5">BIO MEDICAL INSTRUMENTATION</td></tr>
<tr><td>Course Code</td><td colspan="5">BENEE802TC</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Electrical measurement and measuring instrument</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• The course is designed to make the student acquire an adequate knowledge ofthe physiological systems of the human body and relate them to the parameters that have clinicalimportance.
• The fundamental principles of equipment that are actually in use at thepresent day areintroduced.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT- I
Human Physiology And Basics:
Brief introduction to human physiology, Basic components of bio-medical instruments, bioelectric signals, action potentials, Bio-electrodes.

UNIT-II
Transducers
Biomedical Transducers: displacement, velocity, force, acceleration, flow, temperature, potential, dissolved ions andgases

UNIT- III
Electro-Physiological Measurements
Analysis of EEG, ECG, EMG, EOG, & Bio-Potential Amplifiers for ECG, EMG, EEG,etc.

UNIT-IV
Electrical Parameter Measurements
Cardiovascular measurement-blood pressure, blood flow, stroke volume, Impedance Plethysmography, Cardiac output, heart sound etc. Instrumentation for respiratory & nervous systems.

UNIT-V
Monitoring, Assisting, Therapeutic Equipments And Safety
Patient care & monitoring system, Remote monitoring through telephone, Internet, Satellite link, Safety aspects associated with Biomedical Instrumentation. Recent advances in Bio-Medical Instrumentation, Microprocessor based systems, Laser & optical Fiber systems.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">At the end of this course student will be able to:
• Provide an acquaintance of the physiology of the heart, lung, blood circulation and circulationrespiration.
• Understand the various sensing and measurement devices of electricalorigin.</td></tr>
</table>

	• Provide the latest ideas on devices of non-electricaldevices. • Bring out the important and modern methods of imagingtechniques. • Provide latest knowledge of medical assistance / techniques and therapeutic equipments.
Text Books	1. Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer,Prentice-Hall, 2. Handbook Of Biomedical Instrumentation, R. S. Khandpur, McGrawHill
Reference Books	1. Biomedical Instrumentation, M. Arumugam, AnuradhaAgencies. 2. Introduction to Biomedical Engineering, Domach, PearsonEducation.

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	**VLSI DESIGN**				
Course Code	**BENEE802TD**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**0**	**4**	
Prerequisites	Basic electronics				
Course Objectives	1. To make student familiar with basic design techniques for ICfabrication. 2. Students will understand the significance of various design rule and its implementation for IC design.				
Course Contents	**UNIT- I** **Overview of VLSI Design Methodology** VLSI design process-Architectural design-Logical design-Physical design-Layout styles-Full customsemi custom approaches. Basic Electrical properties of MOS & CMOS circuits: NMOS enhancement transistor-PMOS enhancement transistor-threshold voltage-threshold voltage equations-MOS devices equations-Basic DC equations-Second order effects-MOS modules-small signal AC characteristics – NMOS inverter-Steered input to an NMOS modules-Depletion mode & enhancement mode pull ups-CMOS inverter-DC characteristics-Inverter delay-pass transistor- transmissiongate **UNIT-II** **VLSI Fabrication Techniques** An overview of wafer fabrication –wafer Processing-Oxidation-Patterning-Diffusion –Ion implantation-Deposition-Silicon gate NMOS process-CMOS processes-Nwell-Pwell-Wintub-Silicon on insulator- CMOS process enhancement-Interconnect-Circuitelements. **UNIT- III** **Layout Design Rules** Need for design rules-Mead Conway design rule for the silicon gate NMOS process-CMOS Nwell/Pwell design rules-Simple layout examples-sheet resistance-area Capacitance-Wiring Capacitance-drive large capacitive loads **UNIT-IV** **Logic Design** Switch logic-pass transistor & transmission gate-Gate logic-Inverter-two point, NAND gate-NOR gate-other forms of CMOS logic-Dynamic CMOS logic-clocked CMOS logic-Precharged domino CMOS logic-structured design-simple combinational logic design examples-Parity generator- Multiplexes-clocked sequential circuits-two phase clocking-charge storage-dynamic register element-NMOS &CMOS- dynamic shift register-semi static register-JK flip flop circuit.					

	UNIT-V **Subsystem Design Process** Design of a 4 bit shifter-General arrangement of a 4 bit arithmetic processor-Design of a ALU subsystem-Implementing ALU functions with an adder-Carry look ahead adders-Multipliers-serial parallel multipliers-Pipelined multiplier array-Modified Booth's Algorithm
Course Outcomes	**At the end of this course student will be able to:** • Apply his/ her knowledge in basic design techniques for ICfabrication • Understand layout design rules and logic design. • Help in VLSI Fabrication Industries
Text Books	1. Basic VLSI Design, Douglas A.Pucknell & Kamran Eshranghian, Prentice Hall of India, New Delhi, 3rd edition 1994. 2. CMOS VLSI Design : A Circuits and Systems Perspective, Neil H. E. Weste, David Harris and Ayan Banerjee, Pearson, 3rd Edition 3. Introduction to NMOS & CMOS VLSI system design, AmarMukherjee, Prentice Hall, USA, 1986
Reference Books	1. Introduction to VLSI system, Caver Mead & Lynn Conway, AddisonWesley. 2. Introduction to VLSI design, Eugene D.Fabricus, McGraw Hill International edition, 1990.

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

<table>
<tr><td>Course Title</td><td colspan="5">MANAGEMENT CONCEPTS & TECHNIQUES</td></tr>
<tr><td>Course Code</td><td colspan="5">BENEE805TA</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Communication skill</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• To develop skill of project planning and management amongststudent.
• To understand the significance of human recourse and its proper utilization for the organizationalgrowth.
• Students will learn to minimize the project cost by using effective management technique.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT- I
Basic Management techniques:
Planning, nature purpose and objectives of planning, organizing, nature and purpose of organizing, authority and responsibility, performance appraisal, controlling, process of controlling, control techniques.
Human resource management:
nature and scope of human resource planning, training and development, recruitment and selection, career growth, absenteeism, grievances, motivation and its types, need of motivation, reward and punishment, leaders, types of leaders, leadership styles, roles and functions of leaders, group and teamworking

UNIT-II
Marketing Management:
marketing environment, customer markets and buyer behavior, marketing mix, advertising and sales promotion, channels of distribution.
Financial management and accounting concepts:
book keeping, financial statements analysis, financial ratios, capital budgeting, and breakeven analysis.

UNIT- III
Production/operations Management:
planning and design of production and operations systems, facilities planning, location, layout and movement of materials, materials management and inventory control, maintenance management, conflict management, types and causes of conflict.
Project Management:
Introduction, cost analysis of resource allocations, project risk analysis, measure of risk, sensitive analysis, decision tree analysis, PERT & CPM analysis</td></tr>
</table>

	UNIT-IV **Management Information Systems:** role of information in decision making, information system planning, design and implementation, evaluation and effectiveness of the information system, statistical quality control, total quality management and ISO certificate. **UNIT-V** **Social and ethical issues in management:** Ethics in management, social factors, unfair and restrictive trade practices.Strategic and technology management: need, nature, scope and strategy SWOT analysis, value chainconcept.
Course Outcomes	**After studying the contents of the syllabus in detail the students will be able to:** • successfully design and executeproject. • understanding the correlation between physical ,market and humanresources
Text Books	1. Industrial management and engineering economics, K. C. Arora, KhannaPbs. 2. Industrial engineering and production management, Martand Telsang, S.Chand 3. Industrial management and organization, Ahuja, Khanna Pbs. 4. Industrial engineering and management, O. P. Khanna,DRD
Reference Books	1 . Industrial organization and management, Ramchandran, Ramana Mutrhy, TMH. 2. Management science, Ramchandra,TMH. 3. Industrial engineering and production management, Mahajan,DRP. 4. Management theory and practice, Chandan, VikasPbs

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	**Industrial Drives**				
Course Code	**BENEE805TB**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**0**	**4**	
Prerequisites	Communication theory				
Course Objectives	1. To make the students significance of electrical drives in industry. 2. To acquaint the students with the speed and torque control techniques.				
Course Contents	**UNIT- I** **Industrial Drives Fundamentals:** Introduction, Classification of Industrial Drives, Requirements of Industrial Drives, Dynamics of Electrical Drives; Review of Torque-Speed Characteristics of DC and AC Motors including Motoring and Braking, Basics of Industrial Motor Control . **UNIT-II** **DC Drives:** Phase-Controlled DC Drives and control: Converter fed DC Drives; Control of DC Motor Drives; Torque Speed Characteristics of Converter-fed DC Drives, Chopper Controlled DC Drives (Single and Multi-quadrant Operation), Motoring and Braking operations, Ward Leonard Drive, Brushless DC motor Drives. **UNIT- III** **AC Drives:** Phase-Controlled AC Drives and control: Stator Voltage Control, Voltage Source Inverter (VSI) fed induction motor drive, Current Source Inverter (CSI) fed induction motor drive, Variable voltage variable frequency control of induction motor, Slip speed control of induction motor, Constant Volt/Hz control with slip speed regulation, Slip Power Recovery Scheme, Closed-loop control. **UNIT-IV** **Industrial Application of Electrical Drives:** Electric Traction Drives: Requirement of Traction motors, Drives used Steel Mill, Cement Mill, Rolling Mill Drive, Kiln Drive, Textile Industry, Paper Industry, Crane Drives, Sugar Mill, Petrochemical Industry Losses in Electrical Drives. **UNIT V** Energy efficient Operation of Drives, Improvement of power factor, Energy Savings with Variable Speed Drives Solar and Battery Powered Drives.				

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Outcomes	**At the end of this course student will be able to:** 1. Appraise the concept and different components of industrial drives and their role in our society. 2. Interpret the operating concept, control and analyze the performance of DC Drive systems. 3. Interpret the operating concept, control and analyze the performance of AC Drive systems. 4. To acquire the knowledge of different methods of speed control and braking of AC and DC drives and its influence on the operation of drives. 5. Infer the practical application, structure, different features, and advantages of drives used indifferent industry.
Text Books	1.Gopal K. Dubey, Narosa ,"Fundamentals of Electrical Drives", Second Edition ,2010. 2. R. Krishnan, "Electric Motor Drives: Modeling, Analysis, and Control", Pearson Education India, 1st edition, 2015. 3. Vedam Subrahmanyam, "Electric Drives: Concepts and Applications", McGraw Hill Education, 2nd edition 2017. 4. Theodore Wildi , "Electric Machines Drives and Power Systems", Pearson Education, 6th edition,2013.
Reference Books	1.Ned Mohan,"Electric Machines and Drives: A First Course", Wiley, 2013. 2. Austin Hughes, "Electric Motors and Drives: Fundamentals, Types and Applications", Newnes (an imprint of Butterworth-Heinemann Ltd), 5th edition, 2019. 3. Juha Pyrhonen, Valeria Hrabovcova, R. Scott Semken, "Electrical Machine Drives Control: An Introduction", Wiley, 1st edition, 2016.

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

<table>
<tr><td>Course Title</td><td colspan="5">ARTIFICIAL NEURAL NETWORK & FUZZY LOGIC</td></tr>
<tr><td>Course Code</td><td colspan="5">BENEE805TC</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">C+, c ++</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• This subject aims to give an idea of evolution of artificial neural network as well as fuzzylogic.
• It introduces the architecture of a neuralnetwork.
• It gives the knowledge of network formation and various trainingalgorithms.
• It also gives an introduction to fuzzy set theory its concepts andapplications.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT- I
Basics of Artificial Neural Networks
Histroical development of Neural Network Principles, Biological Neural Network (BNN), Basic building blocks of ANN, ANN: Terminologies (Weights, Activation function, Sigmoidal functions, Bias, Threshold), Topologies.

UNIT-II
Models and Learning laws of ANN
Models: McCulloch-Pitts Model, Perceptron model, Adaline model, Learning laws : Hebb's law, Perceptron law, Delta learning law, Competitive law, Boltzmann learning, Memory based learning.

UNIT- III
Perceptron Networks
Single layer perceptron: Architecture, Algorithm, Application procedure, Perceptron Algorithm for several Output Classes, Brief introduction to Multi Layer Perceptron Networks.

UNIT-IV
Back Propagation Network (BPN)
Generalized BPN rule, Architecture, Training Algorithm, Selection of parameters, Learning in Back Propagation, Local minima and Global Minima, Merits and Demerits of BPN, Applications.

UNIT-V
Fuzzy Sytems
History of Development, Operation of Fuzzy logic, Fuzzy sets and Traditional sets, Membership Functions, Fuzzy techniques, Applications.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">At the end of this course student will be able to:
• Explain basic artificial neural network architecture andfunctioning.
• Describe the training schemes of variousmodels.</td></tr>
</table>

	• Differentiate Fuzzy and Crisp systems with theirapplications. • Design ANN model for elementary engineeringapplications.
Text Books	1. Introduction to Neural Networks using Matlab , S.N. Sivanandam, S. Sumathi, S.N.Deepa, Tata Mc Graw Hill Education Private limited, New Delhi,2006. 2. Introduction to Artificial Neural Systems , Jacek M. Zurada, JAICO Publishing House,2006. 3. Fuzzy Set Theory & its Applications, Zimmerman, H.J, AlliedPublishers, New Delhi, 1996.
Reference Books	1. Artificial Neural Network-Theory & Application Dan W Patterson, Prentice Hall of India, 1996 2. Fuzzy Logic with Engineering Applications, Timothy J Ross, McGraw Hill International Edition, USA,1997 3. Artificial Intelligence: A Modern Approach Paperback, Stuart Russell, Peter Norvig,Pearson 4. Neural Networks in Computer Intelligence, Li Min Fu, McGraw Hill, USA,1994. 5. Neural Networks, A Comprehensive foundation, 2nd Edition, Simon Haykin, PearsonEducation.

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	**PLC and SCADA**				
Course Code	**BENEE805TD**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**0**	**4**	
Prerequisites	Electrical measurement and measuring instrument				
Course Objectives	1.Identify different components ofPLC. 2.Select appropriate PLC modules for givenapplication. 3.Develop PLC ladder program for a givenapplication. 4.Test a simple SCADAapplication 5. Test a simple PLC-SCADAapplication..				
Course Contents	**UNIT- I** **Introduction to PLC:** Introduction about Programmable Logic Controller, History of PLC, Architecture ofPLC,CPU, IO Modules, Power Supply and Communications, Need of PLC forIndustrial Automation. .Identify the specified parts of the given PLC along with its function, Identify different Programming devices types. **UNIT-II** **PLC Hardware** module of PLC, addressing of PLC, Use instruction set to perform the given operation. Develop ladder logic programs for the given application, sketches the steps to interface appropriate Input module with the given input device, AC & DC input and output modules –block diagram, description, wiring details, and specifications **UNIT- III** PLC **programmi**ng and **applications** Specify the proper I/O addressing format for PLC, format of different relay type instructions, Describe the format of different Timer and counter Instructions, Describe the format ofdifferentLogical and Comparison type instruction, handling instructions, different, programming languages used to program PLC. **UNIT-IV** **Introduction to SCADA:** Applications of SCADA , the function of the given element of SCADA, SCADA configuration, Differentiate SCADA and PLC, SCADA architecture/block diagram, SCADA System Hardware, RTUs, MTUs. **UNIT-V** **SCADA interfacing** and **Applicatio**ns : Interface the given PLC with the SCADA system using OPC, steps to develop SCADA system for given industrial application, the steps to develop a simple SCADA screen for a given application, object linking and embedding for Process Control(OPC)architecture, Steps in CreatingSCADA				

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Outcomes	**At the end of this course student will be able to:** • Provide an acquaintance Maintain PLCs and SCADA systems used in differentapplications • Understand the various sensing, programming, interfacing PLC and SCADA.origin.
	• Provide the latest ideas on devices of non-electricaldevices. • Bring out the important and modern methods of imagingtechniques. • Provide latest knowledge of medical assistance / techniques and therapeutic equipments.
Text Books	**1.** Introductionto Programmable logic controller Dunning,G. Thomson /Delmarlearning, 2005,ISBN 13 : 9781401884260 2. Industrial Automation with SCADA: Concepts, Communications and Security Paperback – Newnes (an imprint of Elsevier), 2003, ISBN:0750658053April 2019, by K S Manoj (Author)
Reference Books	1.Programmable logic controllers and Industrial automationAn introduction. Domach, PearsonEducation, Mitra, Madhuchandra; Sengupta, Samarjit, Penram International Publication, 2015, Fifth reprint, ISBN: 9788187972174 2. Supervisory control and Dataacquisition, Boyar,S.A., ISAPublication(4"edition) ISBN:978-1936007097

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	**HIGH VOLTAGE ENGINEERING LAB**				
Course Code	**BENEE801P**				
Course Credits	**L**	**T**	**P**	**TC**	
	0	**0**	**2**	**1**	
Prerequisites	High voltage engineering				
Course Objectives	• It deals with basic gaseous, liquid and solid dielectric breakdowntheories. • It also contains important experimental methods of high voltage generation and measurement. • The course makes the students familiar with various applications where high voltage field is used.				
Course Contents	**List of Experiments:** (At least Ten experiments are to be performed by each student) 1. Study of 100 kV (or higher) high voltage testing transformer and its controlpanel. 2. To plot breakdown voltage versus distance curve for sphere- spheregap. 3. Determine the break down voltage of transformeroil. 4. Measurement of unknown high voltage using Sphere-Spheregap. 5. ComparisonofbreakdownvoltageforPlane-Plane,Needle-Plane,andNeedle-Needle gaps. 6. To observe the effect of polarity in Sharply Non UniformField. 7. To determine the break down voltage for two parallel conductors for various spacing 8. Determination of string efficiency with guardring. 9. Determination of string efficiency without guardrings 10. To determine dry and wet flash over voltage of Pin / Suspension typeinsulator. 11. To determine flash point and Fire Point of oil using Pensky Marten'sapparatus. 12. Measurement of high voltage using ScheringBridge. 13. Measurement of relative permittivity of the givenmaterial. 14. Measurement of RMS voltage by transformer ratiotest. 15. High Voltage DC testing ofcables.				
Course Outcomes	**At the end of this course student will be able to:** • Describe the generating methods for high DC, AC, andimpulse. • Describe the measuring methods for high DC, AC andimpulse. • Understand the fundamentals of High VoltageTest				
Text Books	1. HV Engg. By, Naidu &kamaraju. 2. Electrical instrument & MeasurementA.K.Sawhney				

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

<table>
<tr><td>Course Title</td><td colspan="5">INSTALLATION MAINTENANCE & TESTING OF ELECTRICAL EQUIPMENT'S, LAB</td></tr>
<tr><td>Course Code</td><td colspan="5">BENEE803P</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Installation maintenance & testing of electrical equipment's</td></tr>
<tr><td>Course Objectives</td><td colspan="5">It introduces the site activities before erection of electrical subsystem, its installation procedure, testing and various precautions in eachstage.
• It also gives knowledge of identifying the healthy and faulty condition, maintenance procedure for various electricalinstallations.
• It also gives an idea about domestic installation at low voltage as well as hot line maintenance at high voltage and safety against ElectricFire</td></tr>
<tr><td>Course Contents</td><td colspan="5">LIST OF EXPERIMENTS

(At least Ten experiments are to be performed by each student)
1. Calibration of Ammeter andvoltmeter
2. Calibration ofWattmeter
3. Calibration of Energymeter.
4. Testing of wiring installation usingMegger.
5. Current TransformerTesting.
6. Potential TransformerTesting
7. To study the Installation of Plate and PipeEarthing
8. Measurement of Earth Resistance using EarthTester.
9. To study the installation and routine test required for commissioning of 3phase Inductionmotor
10. Study of Installation of Pole Mount Substation and preparation of it'sestimate.
11. Installation, Maintenance and Testing of HPMV/ Sodium Vapour/ Metal Halide Lampfitting.
12. Live Demonstration of Fire Fighting to extinguish Electrical Fire using Dry Powder type Fire extinguisher. (Mock Demo to entire group/class at a time; No batch sizelimitation)
13. Live Demonstration of Artificial Respiration Techniques, Preferably by a Doctor with the help of Dummy Model. (Mock Demo to entire group/class at a time; No batch sizelimitation)
14. To study and prepare the standard operating procedure required while taking electricalshutdown.
15. To carry out general preventive maintenance of electrical machines, panels, experimental kits of different Electrical labs of your Institute and prepare its maintenance report.</td></tr>
</table>

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Outcomes	**At the end of this course student will be able to:** • Install an electricalsystem. • Maintain procedure of various static and rotating equipments andmachines. • Test Electrical Equipments. • Work when the line islive.
Text Books	1. A course in electrical and electronic measurement and instrumentation, A. K. Sawhney.

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

<table>
<tr><td>Course Title</td><td colspan="5">COMPUTER SIMULATION LAB</td></tr>
<tr><td>Course Code</td><td colspan="5">BENEE806P</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Power system, matlab</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• To familiarize the student in introducing and exploringMATLAB
• To enable the student on how to approach for solving Engineering problems using simulationtools.
• To provide a foundation in use of this softwares for real timeapplications.</td></tr>
<tr><td>Course Contents</td><td colspan="5">LIST OF EXPERIMENTS
(At least Ten experiments are to be performed by each student)

1. Simulation of different types of controllers (PID, PLL, PI)
2. Simulation for the addition of poles and zeros in a given transferfunction.
3. Simulation of different types offilters.
4. Simulation of the performance of a full wave bridge rectifier for RL load and RLEload.
5. Simulation of step up and step downchoppers.
6. Simulation of Chopper controlled DCmotor.
7. Simulation and modeling of synchronous machine. (Xd, Xd’ etccalculation)
8. Write a MATLAB program for Computation of Real, Reactive power and line loss.
9. Write a MATLAB program to Plot V and inverted Vcurve.
10. Write a MATLAB program for Transformer parametercalculation.
11. Write a MATLAB program for Transmission line parameter calculation (Z, Y, A, B, C,D).
12. Write a MATLAB program for Load flow solution by Gauss Seidalmethod.
13. Write a MATLAB program for Load flow solution Load flow solution by Newton Raphson Method.
14. Write a MATLAB program for Economic load dispatchcalculation.
15. Write a MATLAB program for load frequencycontrol.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">At the end of this course student will be able to:
• Articulate importance of software’s in research by simulationwork.
• Write basic mathematical, electrical, electronic problems inMatlab.
• Simulate basic electrical circuit inSimulink.</td></tr>
<tr><td>Text Books</td><td colspan="5">1. Power system analysis, HaddiSaddat.
2. Introduction to MATLAB,Palm.</td></tr>
</table>

B.TECH ELECTRICAL
Semester-(VIII)
2022-23

Course Title	Project Phase-II				
Course Code	BENEE807P				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**2**	**1**	
Prerequisites	-				
Course Objectives	• To provide knowledge of Basic Electric Circuit Concepts. • Specific: Project should target a specific goal • Measurable: It should be quantifiable • Realistic: It should be realistic in nature				
Course Contents	**List of experiments:** **(At least Ten experiments are to be performed by each student)** 1. The basic objective of the Mini Project is to inculcate the habit of enquiry, Team work, Confidence to tackle newproblems and to develop their skill so that they can successfully make their minor / major project in higher semesters. 2. The Mini Project model must be prepared INHOUSE (in college) on their own. For this, components must be brought bythe students and Tools/ Accessories will be provided by the institute. It is again highlighted that the mini project MUST beprepared in the Project Lab / Workshop in the presence of supervisor. 3. The Mini Project must be submitted along with typed report, in the same format as the report for Major project issubmitted. The report will be Soft wound with transparent sheet stapled at the top and bottom , Stapled side must becovered with Tape. 4. Projects may be selected from Electrical / Electronic Magazines, books, journals. Highly advance circuit usingMicrocontroller etc are not expected at this stage. Common Mini Projects may also be prepared. 5. Mini project must be Hardware based working model.Software based projects are not permitted as mini project.				
Course Outcomes	**At the end of this course student will be able to:** • Handle all major tools • Install ceiling fan and regulator • Check fluorescent lamp with industrial project				
Text Books	1. Experiments in basic electrical engineering, S.K.Bhattacharya. 1. Basic shop practical, Mehta & Gupta 2. Practical in electrical engineering, Dr. N.K.Jain				