RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
B.E. (Electrical Engineering)
SCHEME OF EXAMINATION

THIRD SEMESTER

S.N.	Sub Code	Subject	Board	Teaching Scheme				Credits	Examination Scheme			Min. Passing Marks	Paper Duration
				L	T	P	Total		College Assessment	Univ. Assessment	Total Marks		
1	BEELE301T	APPLIED MATHEMATICS-III	ASH	4	1	0	5	5	20	80	100	40	3 Hours
2	BEELE302T	NON CONVENTIONAL ENERGY SOURCES	EE	4	0	0	4	4	20	80	100	40	3 Hours
3	BEELE303T	ELECTRICAL MEASUREMENT AND INSTRUMENTATION	EE	4	1	0	5	5	20	80	100	40	3 Hours
4	BEELE303P	ELECTRICAL MEASUREMENT AND INSTRUMENTATION	EE	0	0	2	2	1	25	25	50	25	
5	BEELE304T	NETWORK ANALYSIS	EE	4	1	0	5	5	20	80	100	40	3 Hours
6	BEELE304P	NETWORK ANALYSIS	EE	0	0	2	2	1	25	25	50	25	
7	BEELE305T	ELECTRONIC DEVICES & CIRCUITS	EN	4	1	0	5	5	20	80	100	40	3 Hours
8	BEELE305P	ELECTRONIC DEVICES & CIRCUITS	EN	0	0	2	2	1	25	25	50	25	
		Total		20	4	6	30	27			650		

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
B.E. (Electrical Engineering)
SCHEME OF EXAMINATION

FOURTH SEMESTER

S.N.	Sub Code	Subject	Board	Teaching Scheme				Credits	Examination Scheme			Min. Passing Marks	Paper Duration
				L	T	P	Total		College Assessment	Univ. Assessment	Total Marks		
1	BEELE401T	APPLIED MATHEMATICS - IV	ASH	4	1	0	5	5	20	80	100	40	3 Hours
2	BEELE402T	ELEMENTS OF ELECTROMAGNETICS	EE	4	1	0	5	5	20	80	100	40	3 Hours
3	BEELE403T	DIGITAL AND LINEAR ELECTRONIC CIRCUITS	EN	3	1	0	4	4	20	80	100	40	3 Hours
4	BEELE403P	DIGITAL AND LINEAR ELECTRONIC CIRCUITS	EN	0	0	2	2	1	25	25	50	25	
5	BEELE404T	ELECTRICAL MACHINES-I	EE	4	1	0	5	5	20	80	100	40	3 Hours
6	BEELE404P	ELECTRICAL MACHINES-I	EE	0	0	2	2	1	25	25	50	25	
7	BEELE405T	COMPUTER PROGRAMMING	EE	4	1	0	5	5	20	80	100	40	3 Hours
8	BEELE405P	COMPUTER PROGRAMMING	EE	0	0	2	2	1	25	25	50	25	
9	BEELE406T	ENVIRONMENTAL STUDIES	ASH	3	0	0	3	0	75 + 25		Grades		
		Total		22	5	6	33	27			650		

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
B.E. (Electrical Engineering)
SCHEME OF EXAMINATION

FIFTH SEMESTER

S.N.	Sub Code	Subject	Board	Teaching Scheme				Credits	Examination Scheme			Min. Passing Marks	Paper Duration
				L	T	P	Total		College Assessment	Univ. Assessment	Total Marks		
1	BEELE501T	ELECTRICAL POWER SYST - I	EE	4	1	0	5	5	20	80	100	40	3 Hours
2	BEELE502T	UTILIZATION OF ELECTRIC ENERGY	EE	3	1	0	4	4	20	80	100	40	3 Hours
3	BEELE503T	ELECTRICAL MACHINE DESIGN	EE	4	1	0	5	5	20	80	100	40	3 Hours
4	BEELE504T	MICROPROCESSOR & INTERFACING	EN	3	1	0	4	4	20	80	100	40	3 Hours
5	BEELE504P	MICROPROCESSOR & INTERFACING	EN	0	0	2	2	1	25	25	50	25	
6	BEELE505T	ELECTRICAL MACHINES-II	EE	4	1	0	5	5	20	80	100	40	3 Hours
7	BEELE505P	ELECTRICAL MACHINES-II	EE	0	0	2	2	1	25	25	50	25	
8	BEELE506P	ELECTRICAL DRAWING & SIMULATION	EE	0	0	2	2	2	25	25	50	25	
9	BEELE507P	ELECTRICAL ENGINEERING WORKSHOP	EE	0	0	2	2	2	25	25	50	25	
		Total		18	5	8	31	29			700		

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
B.E. (Electrical Engineering)
SCHEME OF EXAMINATION

SIXTH SEMESTER

S.N.	Sub Code	Subject	Board	Teaching Scheme				Credits	Examination Scheme			Min. Passing Marks	Paper Duration
				L	T	P	Total		College Assessment	Univ. Assessment	Total Marks		
1	BEELE601T	POWER STATION PRACTICE	EE	3	1	0	4	4	20	80	100	40	3 Hours
2	BEELE602T	ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT	ASH	3	1	0	4	4	20	80	100	40	3 Hours
3	BEELE603T	ELECTRICAL DRIVES & THEIR CONTROL	EE	4	1	0	5	5	20	80	100	40	3 Hours
4	BEELE604T	POWER ELECTRONICS	EE	4	1	0	5	5	20	80	100	40	3 Hours
5	BEELE604P	POWER ELECTRONICS	EE	0	0	2	2	1	25	25	50	25	
6	BEELE605T	CONTROL SYSTEM-I	EE	4	1	0	5	5	20	80	100	40	3 Hours
7	BEELE605P	CONTROL SYSTEM-I	EE	0	0	2	2	1	25	25	50	25	
8	BEELE606P	INDUSTRIAL VISITS & REPORT WRITING	EE	0	0	2	2	2	50	0	50	25	
9	BEELE607T	FUNCTIONAL ENGLISH	ASH	2	0	0	2	2	10	40	50	20	2 Hours
		Total		20	5	6	31	29			700		

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
B.E. (Electrical Engineering)
SCHEME OF EXAMINATION

SEVENTH SEMESTER

S.N.	Sub Code	Subject	Board	Teaching Scheme				Credits	Examination Scheme			Min. Passing Marks	Paper Duration
				L	T	P	Total		College Assessment	Univ. Assessment	Total Marks		
1	BEELE701T	CONTROL SYSTEM-II	EE	4	1	0	5	5	20	80	100	40	3 Hours
2	BEELE702T	**ELECTRICAL POWER SYSTEM –II**	EE	4	1	0	5	5	20	80	100	40	3 Hours
3	BEELE703T	**ELECTIVE –I**	EE	3	1	0	4	4	20	80	100	40	3 Hours
4	BEELE704T	HIGH VOLTAGE ENGINEERING	EE	4	1	0	5	5	20	80	100	40	3 Hours
5	BEELE704P	HIGH VOLTAGE ENGINEERING	EE	0	0	2	2	1	25	25	50	25	
6	BEELE705T	ELECTRICAL INSTALLATION DESIGN	EE	4	1	0	5	5	20	80	100	40	3 Hours
7	BEELE705P	ELECTRICAL INSTALLATION DESIGN	EE	0	0	2	2	2	25	25	50	25	
8	BEELE706P	PROJECT SEMINAR	EE	0	0	3	3	3	50	0	50	25	
		Total		19	5	7	31	30			650		

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
B.E. (Electrical Engineering)
SCHEME OF EXAMINATION

EIGHTH SEMESTER

S.N.	Sub Code	Subject	Board	Teaching Scheme				Credits	Examination Scheme			Min. Passing Marks	Paper Duration
				L	T	P	Total		College	Univ.	Total		
1	BEELE801T	ELECTIVE- II	EE	3	1	0	4	4	20	80	100	40	3 Hours
2	BEELE802T	ELECTIVE- III	EE	3	1	0	4	4	20	80	100	40	3 Hours
3	BEELE803T	SWITCHGEAR & PROTECTION	EE	4	1	0	5	5	20	80	100	40	3 Hours
	BEELE803P	SWITCHGEAR & PROTECTION	EE	0	0	2	2	1	25	25	50	25	
4	BEELE804T	COMPUTER APPLICATIONS IN POWER SYSTEM	EE	4	1	0	5	5	20	80	100	40	3 Hours
	BEELE804P	COMPUTER APPLICATIONS IN POWER SYSTEM	EE	0	0	2	2	1	25	25	50	25	
5	BEELE805P	PROJECT	EE	0	0	6	6	6	75	75	150	75	
		Total		14	4	10	28	26			650		

S. NO.	ELECTIVE-I	ELECTIVE-II	ELECTIVE - III
1	IT and Its Applications in Power System Control	Entrepreneurship Development	Bio-medical Engineering
2	Fuzzy Logic and Neural Networks	Digital Signal Processing	Advanced Microprocessor Peripherals
3	Flexible AC Transmission Systems	Power Quality	Power Semiconductor Based Electric
4	Energy Management and Audit	EHV AC and HVDC Transmission	Electrical Distribution System

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur

Absorption Scheme for the students of B. E. Electrical Engg. (Electronics & Power)

from OLD semester pattern to NEW semester pattern

V Semester B. E. Electrical Engineering

Subject Code	Name of subject in Old semester pattern	Subject Code	Name of subject in New semester pattern
5S-EE-01	ELECTRICAL POWER SYSTEM-I (Th.)	BEELE501T	ELECTRICAL POWER SYSTEM - I
5S-EE-02	INSTRUMENTATION (Th.)		----
5S-EE-03	ELECTRICAL MACHINES DESIGN (Th.)	BEELE503T	ELECTRICAL MACHINE DESIGN
5S-EE-04	MICROPROCESSOR & INTERFACING (Th.)	BEELE504T	MICROPROCESSOR & INTERFACING
	MICROPROCESSOR & INTERFACING (Pract.)	BEELE504P	MICROPROCESSOR & INTERFACING
5S-EE-05	ELECTRICAL MACHINES-II (Th.)	BEELE505T	ELECTRICAL MACHINES-II
5S-EE-05	ELECTRICAL MACHINES-II (Pract.)	BEELE505P	ELECTRICAL MACHINES-II
5S-EE-06	ELECTRICAL ENGG. WORKSHOP	BEELE507P	ELECTRICAL ENGINEERING WORKSHOP
	-------	BEELE506P	ELECTRICAL DRAWING & SIMULATION*
	-------	BEELE502T	UTILIZATION OF ELECTRIC ENERGY *

***** The students who fail to clear any subject(s) of the V semester (old pattern) by the last chance prescribed, shall be required to clear the respective equivalent subject of V semester (new pattern) along with an additional subject marked with (*****).

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur

Absorption Scheme for the students of B. E. Electrical Engg. (Electronics & Power)

from OLD semester pattern to NEW semester pattern

VI Semester B. E. Electrical Engineering

Subject Code	Name of subject in Old semester pattern	Subject Code	Name of subject in New semester pattern
6S-EE-01	POWER STATION PRACTICE (Th.)	BEELE601T	POWER STATION PRACTICE
6S-EE-02	ENGG.ECO. & IND. MGT. (Th.)	BEELE602T	ENGG.ECO. & IND. MGT
6S-EE-03	ELECT. DRIVES & THEIR CONTROL (Th.)	BEELE603T	ELECT. DRIVES & THEIR CONTROL
6S-EE-04	LINEAR ELECTRONIC CIRCUITS (Th.)		----
	LINEAR ELECTRONIC CIRCUITS (Pract.)		----
6S-EE-05	CONTROL SYSTEM-I (Th.)	BEELE605T	CONTROL SYSTEM-I
	CONTROL SYSTEM-I (Pract.)	BEELE605P	CONTROL SYSTEM-I
6S-EE-06	COMP. AIDED ELECT.ENGG. DRAWING (Pract.)	---	------
		BEELE604T	POWER ELECTRONICS*****
		BEELE604P	POWER ELECTRONICS*****
		BEELE606P	INDUSTRIAL VISITS &REPORT WRITING*
		BEELE607T	FUNCTIONAL ENGLISH*

***** The students who fail to clear any subject(s) of the VI semester (old pattern) by the last chance prescribed, shall be required to clear the respective equivalent subject of VI semester (new pattern) along with an additional subject marked with (*****).

V SEM. ELECTRICAL ENGG.

BEELE501T	**ELECTRICAL POWER SYST - I**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
Students will develop the ability ▪ To model and represent the system components used in power system. ▪ To represent and understand the transmission line parameters. • To understand the load flow analysis of power system.	students should be able to ▪ Modeling and representation of the system components used in power system. ▪ Concept of designing transmission line parameters • The basic concept of load flow analysis.

UNIT- 1:

Structure of electrical power system, brief exposure to generation, transmission and distribution aspects, elementary consideration of economic bulk power supply system, use of high voltage general system consideration, idea about substation, concept of real, reactive and complex power. Load and their characteristics, voltage and frequency dependence of loads. (10hrs)

UNIT- 2:

Representation of power system elements, models and parameters of generator, transformer and transmission lines, Transmission line parameters calculation (R,L,C), per unit system representation. 8hrs

UNIT-3:

Elementary distribution scheme: Feeders and distributors. LT and HT cables, Introduction to distribution automation.
Concept of insulator, types of insulator, string efficiency. 10 hrs

UNIT-4:

Voltage regulation and efficiency of power transmission lines using equivalent pi and T representation. Representation using circle diagram with generalized constants. 10 hrs

UNIT-5:

Interconnection of system elements to form two bus systems. Illustration of active and reactive power transmission, types of buses. Introduction to load flow studies in multibus system (Methods of solution not expected). Introduction of frequency and voltage as system state indicators. 10 hrs

UNIT-6:

Elementary concepts of real and reactive power control. Steady state performance of turbine governors, load sharing between generators, preliminary concepts of automatic voltage regulator, 8 hrs

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Elements of power system analysis	W. D. Stevenson	**PHI**
Modern Power system analysis	Nagrath I.J. & Kothari D.P.	Mc-Graw Hill
Power system analysis	Wadhwa C.L.	New-Age international
Power System Analysis	Asfaque Hussain	CBS
Reference Books		
A Text book of Electric Power Distribution Automation	Dr. M. K. Khedkar & Dr. G. M. Dhole	Laxmi Publications
Electric Energy System Theory	O. E. Elgerd	
Westinghouse transmission and distribution handbooks		

BEELE502T	**UTILIZATION OF ELECTRIC ENERGY**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
Students will • understand application of electrical supply for different applications • to calculate electrical equivalent rating for mechanical application	students should be able to • understand applications for heating, welding, illumination using electric power • understand applications for fan, lowers, compressor, pumps and refrigeration using electric power

Unit I: Electric Heating: **(8 Hrs)**

i) Electric Heating : Types and methods of electrical heating, advantages of electrically produced heat, types & application of electric heating equipments, transfer of heat.

ii) Resistance Ovens : General constructions, design of heating elements, efficiency & losses, radiant heating.

iii) Induction heating: Core type & core less induction furnace, indirect induction oven, medium and high frequency eddy - current heating.

iv) Dielectric heating: Principle and application.

v) Arc furnace : Direct & indirect arc furnace, power supply, characteristics & control.

Unit II: Electric Welding: **(8 Hrs)**

i) Importance, Advantages & Disadvantages of welding, classification of welding processes.

ii) Resistance welding, Butt welding, Spot welding, Projection welding, Seam welding.

iii) Electric arc welding: Carbon arc welding, metal arc welding, submerged arc welding, Stainless Steel welding

iv) Ultrasonic welding, electron beam welding, laser beam welding.

Unit III : Illumination : **(8 Hrs)**

Nature of light, terms used in illumination, solid angle, laws of illumination, polar curves, Colour Rendering Index (CRI), Design of illumination systems, indoor lighting systems, factory lighting, outdoor lighting design, flood lighting, street lighting, energy saving in lighting systems.

Unit IV: **Refrigeration & Air conditioning**: **(8 Hrs)**

Terminology, refrigeration cycle, refrigeration systems (Vapor compression, vapor absorption), domestic refrigerator, drinking water cooler, desert air cooler.

Air conditioning: Factors involved in air conditioning, comfort air conditioning, industrial air conditioning, effective temperature, summer / winter air conditioning systems, types of air conditioning systems, room air conditioning, and central air conditioning.

Unit V: Fans & Pumps: **(10 Hrs)**

Fans and Blowers: Fan types, fan performance evaluation & efficient system operation, fan design & selection criteria, flow control strategies, fan performance assessment, energy saving opportunities.

Pumps: Pump types, system characteristics. Pump curves, factors affecting pump performance, efficient pumping system operation, flow control strategies, energy conservation opportunities in pumping system.

Unit VI: Compressors and DG Sets: **(8 Hrs)**

Compressors: Compressor types, Compressor efficiency, Compressed air system components.

Diesel Generating Systems: Introduction, selection and installation factors, operational factors, energy performance assessment in DG sets, energy saving measures for DG sets.

Books :

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Utilization of Electric Power & Electric Traction	J.B. Gupta	Kataria & Sons
Art and Science of Utilization of Electrical Energy	H Partap	Dhanpat Rai & Sons, Delhi
Utilization of Electrical Power	Dr N. V. Suryanarayana	Wiley Eastern Ltd, New Age International
Electronics in Industry	Chute & Chute	McGraw Hill
Utilization of Electric Energy	E. Openshaw Taylor	Orient Longman
Guide book for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency		

BEELE503T	**ELECTRICAL MACHINE DESIGN**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
Students will develop the ability • To analyze different materials and their properties used in design of machine. • To calculate and understand the core design and main dimension of transformer. • To understand the performance characteristics and cooling of transformers.	students should be able to • Select proper material for design of a machine. • Design a overall transformer and estimates its performance characteristics as per requirement and constraints specified. • Design rotor core of Induction motor • Design overall dimensions of synchronous machines

Unit. 1:

REVIEW OF MATERIAL USED IN CONSTRUCTION OF ELECTRICAL MACHINES: - Classification of insulating materials depending upon permissible temperature rise, properties of transformer oil. Standard specification, C.M.R. and short time rating of machines. Heating and cooling characteristics. (10 Hrs)

Unit. 2:

TRANSFORMER DESIGN: - Specific loading, equation for voltage per turn for power and distribution transformer output equation. (10Hrs)

Unit. 3:

Principal of electric and magnetic circuit design, method of cooling and cooling circuit design. Estimation of performance characteristics from the design data. (10 hrs)

Unit. 4:

INDUCTION MOTOR: - Main dimensions, output equation, loading constant estimation of axial lengths, air gap diameter, winding design. (9 hrs)

Unit. 5:

Air gap length, slot combination for stator and rotor of I.M., cage rotor and wound rotor design. Calculation of on load current and other performance on characteristics for design data. (8hrs)

Unit. 6:

SYNCHRONOUS MACHINE: Air gap length, methods of obtaining sinusoidal O/P voltage, field coil design for salient pole machine and for turbo generator rotor, ventilation of synchronous generator, cooling air circuits, closed ventilation / quantity of cooling medium hydrogen and water as cooling media. (8hrs)

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Electrical machine Design	A.K. Sawhney	Dhanpatrai and Sons, Delhi
Electrical Machine Design	Balbir Singh	Brite students Publication, Pune
Electrical Machine Design	M.V. Deshpande	
Reference Books		
Performance and Design of A.C. Machines	M.G. Say	
Power Transformer	S.B. Vasntinsky	P.S.G. College of Technology Coimbtore-4
Principle of Electrical Machine Design	R. K. Agrawal	S. Chand Publication

BEELE504T	**MICROPROCESSOR & INTERFACING**	**L = 3**	**T = 1**	**P = 0**	**Credits = 4**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
This subject helps student to learn the • Microprocessor applications in electrical engineering. • The principle of microprocessor chip working, programming with microprocessor is also explained in this subject.	students should be able touse and apply • VLSI circuit concept • Introduction to Intel 8085A architecture • Programming instructions • Interrupts • Methods of data transfer • Hardware and Interface

UNIT-1:

VLSI circuit concept. Approach to integrated system design using Microprocessors. Bus concepts. Address, Data and control. Organization of computer with MPU, Bits/ Byts / Words/ Long wards - their ranges accuracy and precision. Memory organization. Linear / Absolute decoding.

UNIT-2:

Introduction to Intel's 8085A Architecture description software instructions. Address mode- advantages, Timing diagrams assess, Assemblers and Dissemblers (By Hand Coding).

UNIT-3:

Flag structure, concept of PSW stacks and subroutines simple and Nested. PUSH, POP instructions and CALL/RETURN instruction. Stack manipulations, simple programs.

UNIT-4:

Interrupts - Concept and structure in 8085. Interrupt services routines. Advanced instructions and programming of 8085A.

UNIT-5:

Method of data transfer - serial, parallel, synchronous asynchronous, IN/OUT instructions. Timing diagrams, simple hardware interface to 8085 of standard Latches/Buffers/Keys/display devices as I/O ports. Handshaking concept. Architecture and interface of 8255 and 8253 to 8085.

UNIT-6:

Hardware considerations - bus contention. Slow memory interfacing complete signal description of 8085. Multiplexed Key board/Display interface and assembler directives. General awareness about micro computer system related products.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Programming and interfacing 8085A	Gaonkar	Wiley Eastern
Programming of 8085	D.V. Hall	McGraw Hill
Microprocessor principals and Applications	Pal	Tata Mc Graw Hill
Reference Books		
Intel Microprocessors	Goody	Tata McGraw Hill
Microprocessors principals and Applications	Gomorra	Tata Mc Graw Hill

BEELE504P	**MICROPROCESSOR & INTERFACING**	**L = 0**	**T = 0**	**P = 2**	**Credits = 1**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration

	25	25		50	Practical
BEELE505T	**ELECTRICAL MACHINES-II**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
This subject helps student to learn the • Understand the basic principle, construction, operation, performance characteristics and steady state and transient analysis of synchronous machines. • Understand the principle, construction, operation, control and applications of special electric motors.	• The student has understood principle , construction, laying of armature and field windings, types, generation of emf, steady state and transient behavior, synchronization and parallel operation of synchronous generators • The student has understood principle, construction, methods of starting of synchronous motor, its operation with variable load, operation with variable excitation, performance evaluation. • The student has understood special motors ,like Repulsion, Hysteresis, Reluctance, Universal and Schrage motors.

UNIT-1:THREE PHASE SYNCHRONOUS MACHINES
Introduction, constructional features of cylindrical and salient pole rotor machines, introduction to armature winding and field windings MMF of armature and field windings induced EMF. (9 Hrs)
UNIT-2: STEADY STATE OPERATION OF THREE PHASE SYNCHRONOUS MACHINES:
Phasor diagram, voltage regulation using synchronous impedance and Potier triangle method, steady state performance of three phase synchronous machines, circle diagrams. (9 Hrs)
UNIT-3: SYNCHRONIZATION:
Parallel operation, experimental determination of parameters (positive sequence reactance, negative sequence reactance, Zero sequence reactance, short circuit ratio, losses and efficiency. (9 Hrs)
UNIT-4: SYNCHRONOUS MACHINES ON INFINITE BUS
Phasor diagram, expression for torque, load / torque angle, synchronous machine operation, effects of variable excitation and power input on generator operation and effect of variable excitation and load on motor operation. (10 Hrs)
UNIT-5:TRANSIENT BEHAVIOR
Sudden 3– phase short circuit. Transient and sub- transient reactance's and their measurement. Time constant and equivalent circuit diagram,hunting & damper windings. (10Hrs)
UNIT-6: INTRODUCTION TO SPECIAL MACHINES:
Repulsion motors, AC series motors, universal motors, reluctance motor, hysteresis motor, brushless dc motor, power selsyns, position selsyns (only elementary aspects are expected). (8Hrs)

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Electrical Machine	Dr.P.K.Mukherjeeand S. Chakravarti	Dhanpat Rai
Electrical Machinery	Nagrath and Kothari	3rd , Tata Mcgraw Hill
Generalised Theory of Electrical Machinery	P.S. Bhimbra	Tata Mcgraw Hill
Reference Books		
Electrical Machinery	Fitzgerald and Kingsley and Kusco	McGraw Hill
Electrical Machinary	P. S. Bhimra	

BEELE505P	**ELECTRICAL MACHINES-II**	**L = 0**	**T = 0**	**P = 2**	**Credits = 1**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	25	25		50	Practical

BEELE506P	**ELECTRICAL DRAWING & SIMULATION**	**L = 0**	**T = 0**	**P = 2**	**Credits = 2**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	25	25		50	Practical

Objective: -

Drawings are the powerful tools used by Engineers to represent the concepts on paper Conventional drawing methods are time consuming & difficult to edit. With the availability of powerful package for drawing and analysis of Electrical Systems, need is being felt to introduce this practical to converse the Electrical Engineering students with the latest trends in drawing, designing & analysis*.

Efforts should made to make this as practically oriented as possible so that the students are not only able prepare the drawing, but also have fair insight into the different aspects of the components of the electrical systems.

The packages suggested are only as guidelines. Similar other packages may also be used to achieve **objectives & scope.**

* Detailed analysis is not expected.

SCOPE:

Line diagram single phase, three phases of a factory layout and a substation.

1. Drawing & layouts of DP structures and its components, insulators & bushings, substation assemblies, indoor/outdoor, plinth/pole mounted transformers/switchgears, cable layouts, transmission towers & transmission systems, winding diagrams for motors.
2. General arrangement diagram of power & motor control centers, schematic/single line diagrams of electrical/electronic/illumination layout in industry/office/house, flow charts.
3. Circuit's simulation(Voltage, Current, Power etc.).

Softwares Proposed: - MATLAB, PSCAD, ETAP, PSIM, Power World Simulator, VISIO, AUTOCAD

BEELE507P	**ELECTRICAL ENGINEERING WORKSHOP**	**L = 0**	**T = 0**	**P = 2**	**Credits = 2**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	25	25		50	Practical

VI – SEM. ELECTRICAL ENGG.

BEELE601T	**POWER STATION PRACTICE**	**L = 3**	**T = 1**	**P = 0**	**Credits = 4**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	**Learning Outcomes**
• To understand different sources of energy, methods of energy conversion, economics of generation, load survey, fixation of tariffs for all types of power generating stations and to study voltage control for AC generator.	On completion of this course student will be able to • Work in Power Generation plant. • To calculate the tariff for different customers.

UNIT-1:

SOURCES OF ELECTRICAL ENERGY: - Coal, oil and natural gas water power, nuclear fission and fusion, their scope and potentialities for energy conversion.

Generation: - different factors connected with a generating station, connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity and utilization factor, load curve, load duration curve, load survey, base load and peak load station, advantages of interconnection. 10 Hrs

UNIT-2:

THERMAL STATIONS: - Choice of site, location, size and number of units, general layout, major equipment, essential and non-essential auxiliaries, electric supply to auxiliaries, cost of generation, factors affecting costs of generation. 10 Hrs

UNIT- 3:

HYDRO STATION: - Hydrology, stream flow, flow duration curve, power duration curve, mass curve, reservoir capacity, type of hydro plants and their field of use, pumped storages plants and their utility, surge tanks, governing characteristics of turbine and hydro generators. 10 Hrs

UNIT-4:

NUCLEAR STATION : - Principle of Nuclear energy, materials, types of nuclear reactors, breeder reactors, location, material for moderator and control rods, cost economics. 8 Hrs

UNIT-5:

VOLTAGE CONTROL OF A.C. GENERATOR : - Exciter instability, methods of stabilizing exciter voltage, Automatic voltage regulator action.

Tariff – different consideration of flat rate and two part economical choice. 8 hrs

UNIT-6: COGENERATION, CAPTIVE POWER GENERATION & SUSTAINABLE DEVELOPMENT

Definition and scope, cogeneration technologies, industries suitable for cogeneration, captive generation advantages and constraints, captive generation options, type of captive power plants, financing of captive power plants, Energy problems, prospects of changes in energy supply, agenda for sustainable development. 8Hrs

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Elements of Power Station design	M.V. Deshpande	PHI
Energy Conversion and power generation	L.D. Agrawal and G.K. Mittal	Khanna
Generation of Electrical Energy	B. R. Gupta	S. Chand
Reference Books		
Electric power stations	Car	
Electric power system control	H.P. Young	Chapman and Hall
Generating Stations	Lowels	

BEELE602T	**ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT**	**L = 3**	**T = 1**	**P = 0**	**Credits = 4**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	**Learning Outcomes**
• Every engineer has to manage the things during his working. This subject helps student to understand material, production, personnel, finance and marketing management.	• After the completion of course the students will be able to manage the thing economically.

UNIT-1:

Demand utility and indifference curves, Approaches to analysis of demand, Elasticity of demand, Measures of demand elasticity, factors of production. Advertising elasticity, Marginalism.

UNIT-2:

Laws of returns and costs, Price and output determination under perfect competition, monopoly, Monopolistic competition, oligopoly, Depreciation and methods for its determination.

UNIT-3:

Function of central and commercial banks inflation, deflation, stagflation, Direct and Indirect taxes monetary and cycles, New Economic Policy, Liberalization, Globalization, Privatization, Market friendly state.
Fiscal policy of the government, Meaning and phases of business.

UNIT-4:

Definition, nature and scope of management function of management – planning, organizing, Directing, Controlling, Communicating.

UNIT-5:

Meaning of Marketing managements, concepts of Marketing. Marketing Mix, Administrative and cost plus pricing, Channels of distribution, Advertising and sales promotion.

UNIT-6:

Meaning, nature and scope of financial management, Brief outline of profit and loss account, balance sheet, Budgets and their importance, Ratio analysis, Principles of costing.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Modern Economics	H.L. Ahuja	
Monetary Economics	M.L. Seth	
Industrial Management	I.K. Chopde, A.M. Sheikh	
Business Organization and Management	S.A. Sherlekar	
Reference Books		
Modern Economic Theory	K.K. Dewett	
Managerial Economics	Joel Dean	
Economics	Samuelson	

BEELE603T	**ELECTRICAL DRIVES & THEIR CONTROL**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	**Learning Outcomes**
• To understand the starting, speed control/braking, heating and cooling characteristics of electric motors and to learn the necessity of flywheel. • To learn the basics of Programmable Logic Controllers and become familiar with Ladder Programming. • To Study the motors used in Electric Traction.	The student will develop an ability • To solve numericals on starting, speed control and braking. • To solve numericals on heating and cooling of motors. • It will lay the foundation for studying the advanced subject Power Semiconductor based drives to be studied in 8th semester. • to work on the drives used in the Industry. • to work with PLC's in the Industry • will gain an insight in the working of drives used in traction.

UNIT-1;
Definition classification and speed torque characteristics of common drive motors and their characteristics under starting, running, braking and speed control. 8 Hrs.

UNIT-2:
SELECTION OF MOTOR: Power capacity for continuous and intermittent periodic duties flywheel effect. 10 Hrs

UNIT-3:
PLC, its Programming and its application in electrical drives. 8 Hrs.

UNIT-4:
AC AND DC CONTACTORS AND RELAYS: Lock out contactors, magnetic structure, operation arc interruption contactor rating, H.V. contactors, control circuits for automatic starting and braking of DC motor and three phase induction motor. Control panel design for MCC. 10 Hrs

UNIT-5:
TRACTION MOTORS: Motors used in AC/DC traction, their performance and desirable characteristics, requirements and suitability of motor for traction duty. Traction motor control – control of DC traction motor. Series parallel control with numerical starting and braking of traction motor. 10Hrs

UNIT-6:
Brief idea about drives commonly used in industries. Digital control of electric motor. Block diagram arrangement, comparison with other methods of control. 8 Hrs

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
A course in Electrical Power	Soni, Gupta and Bhatnagar	
Modern Electrical Traction	H. Pratap	
Art and Science of Utilization of Electrical Energy	H. Pratap	
Magnetic Control of Industrial motors	Heumann	
Industrial Electronics	Petru Zula	McGraw Hill
Industrial Electronics	Bhattacharya	
Basic course in Electrical Drives	S. K. Pillai	

BEELE604T	**POWER ELECTRONICS**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objectives	**Learning Outcomes**
To introduce students the basic theory of power semiconductor devices and their practical application in power electronics. To familiarize the operation principle of AC-DC, DC-DC, DC-AC conversion circuits andtheir applications. To provide the basis for further study of power electronics circuits and systems.	A student who successfully fulfills the course requirements will be able to • understand basic operation of various power semiconductor devices. • understand the basic principle of switching circuits. • analyze and design an AC/DC rectifier circuit. • analyze and design DC/DC converter circuits. • analyze DC/AC inverter circuit. • understand the role power electronics play in the improvement of energy usage efficiency and the development of renewable energy technologies.

Unit 1: SCR and Its characteristics: Gate characteristics, SCR turn off, ratings, series and parallel connections of SCRs, Protection of SCR gate circuit protection, over voltage and over current protection, snubber circuit design, commutation methods. 10 Hrs

Unit 2: Static controllable switches: Characteristic and working of MOSFET Gate turn off thyristor and insulated gate bipolar transistor, Triac, AC regulator, Uni-junction transistors, Triggering circuits and optocouplers. 8 Hrs

Unit 3: Line commutated converters: Working of single pulse converter, two pulse midpoint converter, three pulse midpoint converter and' 3 phase six pulse bridge converter, effect of source inductance in converters, effect of freewheeling diode. 8 Hrs

Unit 4: Single phase and three phase half controlled converters: Speed control of d.c. motors using line commutated converters. Power factor improvement methods, Cyclo-converters (single phase), dual converter. 8 Hrs

Unit 5: D.C. Choppers: Principles of step down chopper, step up chopper classification, impulse commutated and resonant pulse choppers. Multi phase choppers. Application of choppers, Inverters: Basic series resonant inverter, half bridge and full bridge series resonant inverters. 10 Hrs

Unit 6: Single phase and three phase bridge inverters, commutation and trigger-circuits for forced commutated thyristor inverters. Output voltage control, Harmonics in output voltage waveform, Harmonic attenuation by filters. Harmonic reduction by pulse width modulation techniques. Analysis for pulse width, modulation. Working of current source inverters few applications of inverters. 10 Hrs

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Power Electronics circuits Devices and Applications	M. H. Rashid	Prentice Hall India
Power Electronics	Ned Mohan, T.M. Undeland and W.P. Robbins	John Wiley and Sons,Inc
Thyristors and their Applications	G.K.Dubey and Doralda, Joshi and Sinha	New Age
Power Electronics	Khanchandani	Tata McGraw Hill
Power Electronics	P. C. Sen	
Reference Books		
Power Electronics	C.W. Lander	

BEELE604P	**POWER ELECTRONICS**	**L = 0**	**T = 0**	**P = 2**	**Credits = 1**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	25	25		50	Practical

EELE605T	**CONTROL SYSTEM - I**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objectives	**Learning Outcome**
• To impart knowledge of modeling and stability analysis of linear time-invariant system. • To understand the stability, time domain specifications and tools • To study frequency domain analysis of linear system An introduction to state space approach.	• Model the linear systems and study the control system components specifications through classical and state variable approach. • Understand the time response and time response specifications. • Analyze the absolute stability • Analyse the relative stability through root locus method • Frequency response tools like bode plot and nyquist plot • Understand the introductory concepts of state variable approach

UNIT-1

Introduction to need for automation and automatic control. Use of feedback, broad spectrum of system application. Mathematical modeling (Electrical & Electromechanical) differential Equation, Transfer functions, block diagram, signal flow graph. 10Hrs

UNIT-2

Effect of feedback on parameter variations, disturbance signal, Control system components electrical, electromechanical, their functional analysis and input output representation. Servomechanism. 8Hrs

UNIT-3:

Time response of system, standard inputs, first order and second order system, concept of gain and time constant. Steady state error, type of control system, approximate methods for higher order system, PD, PI, PID controllers. 8Hrs

UNIT-4:

Stability of control systems, condition of stability, characteristics equation, Routh Hurwitz criterion, special cases for determining relative stability.

Root location and its effect on time response, elementary idea of root locus, effect of addition of pole and zero on proximity of imaginary axis. 10 Hrs

UNIT-5:

Frequency response method of analyzing linear system, Polar, Nyquist and Bode plot, stability and accuracy analysis from frequency response, open loop and close loop frequency response, effect of variation of gain and addition of pole and zero on response plot, stability margin in frequency response. 10 Hrs

UNIT-6:

State variable methods of analysis, characteristics of system state. Choice of state variables, representation of vector matrix differential equation, standard form, relation between transfer function and state variables. 8 Hrs

BOOKS:-

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Modern control system Engineerring	K.Ogatta	Prentice Hall,India
Control System Analysis	Nagrath/Gopal	New age International
Automatic Control Systems	B.C. Kuo	Prentice Hall,India
Control System Engineering	S. K. Bhattacharya	Pearson
Reference Books		
Linear System Design	D' azzo and Houpis	McGraw Hill
Control Systems, Principles & Design	M. Gopal	TMH (Tata McGraw Hill)
Control Systems Engineering	Samarajit Ghosh	Pearson

Practical:

Based on above syllabus. At least two practical should be set using related software.

BEELE606P	**INDUSTRIAL VISITS & REPORT WRITING**	**L = 0**	**T = 0**	**P = 2**	**Credits = 2**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	50	0		50	

Expected work from each student in this practical :-

1) Power point presentation on visited industry

2) Report must contain:-

Single line diagram of the establishment

Electrical Installations available in the establishment

List of Loads available with ratings of equipments

Types of load (continuous, intermittent etc.)

Analysis of Energy Bill

Any problems identified / discussed

BEELE607T **FUNCTIONAL ENGLISH**

BEELE607T	**FUNCTIONAL ENGLISH**	**L = 2**	**T = 0**	**P = 0**	**Credits = 2**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	10	40		50	2 Hrs

Syllabus

Total Credits: 02

Teaching Scheme
Theory: 2 hrs per week
Duration of University Examination :2 hrs

Examination Scheme
T (University): 40 marks
T (Internal): 10 marks

Objective: At the end of the semester, students will have enough confidence to face competitive examinations (IELTES/ TOEFL/CAT/ MAT/ XAT/SNAP/GMAT/GATE etc.)to pursue masters degree. They will also acquire language skills required to write their Reviews/Projects/Reports. They will be able to organize their thoughts in English and hence face job interviews more confidently.

Scope: The Curriculum designed is student –centered and it is guidance for their career

Course Structure

Unit 1. Functional Grammar: (4 hours**)**

Common errors, Transformation of Sentences, Phrases, Idioms & Proverbs.
[50 sentences of common errors, 50 examples of Transformation of Sentences, (5 each type), 50 noun/prepositional phrases, 50 idioms/proverbs]

Unit II. English for Competitive Exams & Interview Techniques: **(** 6 hours)

IPA (vowel & consonant phonemes), Word building (**English** words /phrases derived from other languages), Technical Jargons, Synonyms/Antonyms, Analogies, Give one word for, Types & Techniques of Interview

Assignment : [25 Words for teaching IPA, 25 words/phrases of foreign origin, 25 technical jargons, 25 words for Synonyms/ Antonyms, 25 words for Analogies, 50 examples of give one word for]

Unit III. Formal Correspondence (4 hours)

Business Letters, e-mail etiquettes [Orders, Complaints , Enquiries, Job applications and Resume Writing ,Writing Memorandum, Circulars, notices]

Unit IV. Analytical comprehension: (4 hours)
[Four fictional & four non-fictional unseen texts]

Unit V. Technical & Scientific Writing: (6 hours)
Features of Technical Writing, Writing Scientific Projects, Technical Report writing, Writing Manuals, Writing Project Proposals, Writing Research papers.
Assignment: (Any one project/review as assignment)

RECOMMENDED BOOKS

- **Reference Books:**

1. Effective technical Communication by Barun K. Mitra, Oxford University Press,
2. *Technical Communication-Principles and Practice* by Meenakshi Raman & Sharma, Oxford University Press, 2011, ISBN-13-978-0-19-806529-
3. *The Cambridge Encyclopedia of the English Language* by David Crystal , Cambridge University Press
4. *Contemporary Business Communication* by Scot Ober , Published by Biztantra,
5. *BCOM- A South-Asian Perspective* by C.Lehman, D. DuFrene & M. Sinha, Cenage Learning Pvt. Ltd.2012
6. *Business English*, by Dept of English, University of Delhi, Published by Dorling Kindersley (India), Pvt .Ltd.,2009, ISBN 978 81 317 2077 6
7. *How to Prepare a Research Proposal*: Guidelines for Funding and Dissertations in the Social and Behavioral Sciences by Krathwohl & R David
8. *Technical Writing- Process and Product* by Sharon J. Gerson & Steven M. Gerson, 3rd edition, Pearson Education Asia, 2000
9. *Developing Communication* skills by Krishna Mohan & Meera Banerjee

EVALUATION PATTERN:
Internal Examination: Weightage = 10 marks
Written Examination: 05 marks
Project Seminar : 05 marks

External Examination: Weightage = 40 marks

Question pattern for end semester examination

Unit No	Q. No	Question type	No. of Questions	Weightage
Unit 1	1(A) 1(B) 1(C)	objective objective objective	3 out of 5 3 out of 5 4 out of 6	3+3+4=10
Unit 2	2 (A) 2(B) 2(C)	objective objective subjective	3 out of 5 3 out of 5 1 (no choice)	3+3+4=10
Unit 3 & Unit4	3 (A) 3(B)	Subjective subjective	1 set (out of 2 sets) 1(no choice)	5 5
Unit 5	4(A) 4(B)	subjective subjective	1 out of 2 1 out of 2	5 5