JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)
Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)
Scheme of Study and Examination (w.e.f. July 2010)

BE (PTDC) Sem : FIFTH Branch : ELECTRICAL ENGINEERING

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
EE-25	Electrical Power Generation	3	1	-	10	20	30	70	100	4
EE-28	Utilization of Electrical Energy	3	1	-	10	20	30	70	100	4
EE-30	Power Electronics : Devices & Circuits	3	1	-	10	20	30	70	100	4
EE-34	Electrical Machine Design	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
EE-29L	Utilization of Electrical Energy Lab	-	-	2	20	-	20	30	50	2
EE-31L	Power Electronics Devices & Circuits Lab	-	-	2	20	-	20	30	50	2
CS-05L	Computer Programming .Lab- II	-	-	2	20	-	20	30	50	2
EE-62L	Professional Activity	-	-	2	50	-	50	-	50	2
	Total	**12**	**4**	**8**	**150**	**80**	**230**	**370**	**600**	**24**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 600 Total Periods : 24, Total Credits : 24

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	ELECTRICAL POWER GENERATION	EE-25	Min "D"	Min "D"	5.0

ELECTRICAL POWER GENERATION

UNIT-1

General consideration on various sources of energy, energy conversion employing steam, energy conversion using water gas turbine

a) MHD generation

b) Solar generation

c) Wind power station

d) Geothermal power generation.

UNIT-II

Thermal, nuclear and gas power station:

Block diagram of thermal power station, selection of site .Different types of auxiliaries used in thermal power station .Nuclear Power Station: Different types of reactors and fuels, safety methods, waste disposal.

Gas Power Station:

Block diagram, gas cycles, combined cycle power plants. Comparison between these power stations

UNIT-III

Hydro Power Station:

Choice of site, block diagram including surge tank and penstock, Hydrographs, flow duration curve .Types of turbines, base load and peak load power station.

UNIT-IV

Economic aspects of power plant operations:

Definitions, load factor, demand factor and Diversity factor. Calculation of cost of generation, fixed charges, interest and depreciations. Methods of Depreciation. Tariffs: different types of tariffs, power factor improvement**.**

UNIT-V

Economic Scheduling of Power Stations:

Economic operation of power system, criteria of loading of power plants with and without transmission loss, load dispatching in power system, co-generation and coordination of power plants.

References:

1 Nagpal," Power Plant Engineering", Khanna publisher

2 Deshpandey," Modern Design of Power Station".

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
PTDC	**UTILIZATION OF ELECTRICAL ENERGY**	**EE-28**	Min "D"	Min "D"	5.0

UTILIZATION OF ELECTRICAL ENERGY

UNIT I

ILLUMINATION ENGINEERING : Nature of lights, units, sensitivity of the eye, luminous efficiency, glares. Production of light; Incandescent lamps, arc lamps gas discharge lamps- fluorescent lamps-polar curves, effect of voltage variation on efficiency and life of lamps, Distribution and control of light, calculations, solid angle, inverse square and cosine laws, methods of calculations, factory lighting and street lighting, Direct diffused and mixed reflection & transmission factor, refractors, light fittings.

UNIT II : HEATING, WELDING AND ELECTROLYSIS

Electrical heating –advantage, methods and applications, resistance heating, design of heating elements, efficiency and losses, control . Induction heating: core type furnaces, core less furnaces and high frequency eddy current heating, die electrical heating: principle and special applications, arc furnace: direct arc furnace, indirect arc furnaces, electrodes, design of heating elements, power supply and control. Different methods of electrical welding, resistance welding, arc welding, energy storage welding, laser welding, electric beam wielding and electrical equipment for them.Arc furnaces and welding transformers. Review of electrolytic principles, laws of electrolysis, electroplating, anodizing electro-cleaning, extraction of refinery metals, power supply of electrolytic process, current and energy efficiency.

UNIT III : TRACTION

Special feature of traction motors, Different system of electric- traction and their advanrages and disadvantages, diesel electric locomotives. Mechanics of train movement: simplified speed time curves for different services, average and schedule speed, specific energy consumption, factors effecting specific energy consumption, acceleration and braking retardation, adhesive weight and coefficient of adhesion.

UNIT IV : TRACTION MOTORS

DC motors, single phase and three phases motors, starting and control of traction motors, braking of traction motors: plugging, rheostatic braking, Modern 25KV ac single phase traction systems: advantages, equipment and layout of 250KV line, single phase power frequency AC traction.

UNIT V : ELECTRICAL DRIVES

Individual and collective drives- electrical braking, plugging, rheostatic and regenerative braking, load equalization use of fly wheel criteria for selection of motors for various industrial drives, calculation of electrical loads for refrigeration and air –conditioning, intermittent loading and temperature rise curve.

References:

- Tailor, E.O., "Utilization of Elect. Energy".
- H. Pratap, "Art and Science of Utilization of Electrical Energy".
- Gupta , J.B.," Utilization of Electrical Energy".
- N V Suryanarayan," Utilization of Elect. Power including Electric Drives and Elect. Traction", New Age International.
- Hancok N N," Electric Power Utilization", WheelerPu.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**POWER ELECTRONICS DEVICES & CIRCUITS**	**EE-30**	Min "D"	Min "D"	5.0

POWER ELECTRONICS DEVICES & CIRCUITS

UNIT I

POWER SEMICONDUCTOR DEVICES

Power Diodes, transistors, power mosfet, IGBT, thyristors, characteristics, two- transistor equivalent model, turn on & off, techniques thyristor performance parameters, protection circuits & thermal design of thyristors, commutation techniques-forced and natural.

UNIT II

CONTROLLED RECTIFIERS

Principle of phase controlled converter operation, single-phase half wave, Full wave and semi converters. Three phase half wave, Full wave and semi converters Dual converters, power factor improvement, Symmetrical angle control, pulse width modulation control, effects of load and source inductance, Design of converter circuits, regulated DC power supplies.

Cyclo converter:

Principles of operation of single and three phase cyclo converters.

UNIT III

AC VOLATGE CONTROLLERS

Principle of phase control, single phase AC Voltage controllers with resistive and inductive loads. Three phase AC voltage controllers with resistive & inductive loads, Industrial applications of AC controllers. Unity power factor controller, design of AC controller.

UNIT IV

DC CHOPPER

Principles of step down & step up choppers, operation with R-L load, four quadrants choppers, thyristor chopper circuit, impulse commutation, effects of source inductance, chopper circuit design, switched mode power suppliers, and regulators.

UNIT V

INVERTER CIRCUITS

Principle of operation of inverter, single phase & three phase voltage source, inverter magnitude of voltage & harmonics control. forced commutation techniques, , current source inverters, inverter circuit design.

References:

1. M.H.Rashid," Power Electronics Circuit, Devices & Applications", Person publication,1993.
2. M.Ramsmoorthy, "An Introduction to transistor their Applications", affiliated East-West Press.
3. P.C.Sen "Power Electronics", TMH publication.
4. M.D.Singh, K.B.Khanchandani," Power Electronics", TMH, Delhi 2001.
5. Chakravarti A.," Fundamental of Power Electronics and Drives", Dhanpat Rai & Co.
6. Dr P.S. Bhimra," Power Electronics", Khanna Publication.
7. Vedam Subramanyam," Power Electronics" New Age International Revised II ed.2006.
8. Randal Shaffer, "Fundamental of Power Electronics with MATLAB learning" 2008.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
PTDC	ELECTRICAL MECHINE DESIGN	EE-34	Min "D"	Min "D"	5.0

ELECTRICAL MECHINE DESIGN

Unit I : GENERAL CONCEPT AND CONSTRAINTS ON DESIGN OF ROTATING MACHINES

Relation between rating and dimensions of rotating machines, symbols, Main dimensions, Total loading, Specific loadings ,Output coefficient ,Factors affecting size of Rotating machines, Choice of specific magnetic loading, choice of specific electric loading , Variation of output and losses with linear dimensions ,Separation of D and L ,Separation of D and L for d. c. machine , Separation of D and L for induction machine, Separation of D and L for Synchronous machines , Standard Frames.

Unit II : TRANSFORMERS

Introduction, Core and shell type transformers, single and three phase transformers, three phase transformers connections, Core cross-section ,construction with hot rolled laminations ,Yoke cross sections, Clamping of core , Core construction of Modern Core type power Transformer ,Cooling of cores, Core earthing , transformer windings , Continuously transposed conductor windings, , Methods of cooling of transformers ,Transformer tank , Cooling ducts ,Transformer oil, Terminals and leads, Bushings ,Tapping and Tap changing, Conservator and Breather, Temperature indicator, Buchholz Relay, Transformer assembly.

Unit III : **THREE PHASE INDUCTION MOTORS**

Introduction ,Stator ,stator frames, Rotor, Rotor windings, Comparison of squirrel cage and wound rotors, slip rings, Shaft and bearings, Design- Output equations, Choice of average flux density in air gap, , Main Dimensions, Stator winding Turns per phase, Stator conductors, shapes of stator slots, ,Area of stator slots, length of mean turns, Stator teeth, stator core,Design of single phase induction motors

Unit IV : **SYNCHRONOUS MACHINES**

Types of construction, Types of synchronous machines, Prime movers for generators ,run-away speed, Construction of hydro generators, stator core, stator winding, Bracing of stator overhang, Rotor body, Poles, Field winding, Damper winding, Bearing , Brakes and Jacks, slip ring, construction of turbo-alternators, stator core, stator winding, rotor, Output equation, choice of specific magnetic loading, choice of specific electric loading.

Unit V : COMPUTER AIDED DESIGN

Introduction, advantage of digital computer, computer aided design- different approaches, analysis method, synthesis method, hybrid method, optimization, general procedure for optimization, variable and constraints, computer aided design of three phase induction motors, list of symbols used, general design procedure.

References:

A.K.Sahney," Electrical Machine Design", Dhanpat Rai & sons
V.N.Mittle," Electrical Machine Design"

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
PTDC	**UTILIZATION OF ELECTRICAL ENERGY LAB**	EE - 29L	Min "D"	Min "D"	5.0

UTILIZATION OF ELECTRICAL ENERGY LAB

List of Experiments

1. Study of polar curves .
2. Determine MSCP of lamp using integrated sphere method.
3. Determine MHCP of lamp using flicker photometer.
4. Study of different types of lamps.
5. Study of different types of heating and welding & electroplating.
6. Study of different system of track electrification .
7. Study of speed torque characteristics of traction motors.
8. Study of different characteristics of dc series ,shunt ac series and induction motor.
9. Study of speed control of DC series motor & its operation
10. Study of different methods of breaking of DC series motor .

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**POWER ELECTRONICS DEVICES & CIRCUITS LAB**	EE - 31L	Min "D"	Min "D"	5.0

POWER ELECTRONICS DEVICES & CIRCUITS LAB

(Suggested Exercise)

List of Experiments :

1. SCR characteristics
2. TRIAC characteristics.
3. MOSFET characteristics
4. IGBT characteristics

5. To study the different triggering circuits for thyristor.
   i. Resistor triggering circuit.
   ii. R-C triggering circuit
   iii. UJT triggering circuit.
6. AC voltage control by using TRIAC & DIAC

7. Study of 1-pulse & 2-pulse converter with R and L load.
8. Study of three phase semi converter & full converter with R and R-L load.
9. Study of single phase dual converter.
10. Study of single phase cycloconverter.
11. Study of Impulse commutated chopper.
12. Series & parallel inverter
13. Speed control of single phase induction motor.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**COMPUTER PROGRAMMING LAB - II**	CS - 05L	Min "D"	Min "D"	5.0

COMPUTER PROGRAMMING LAB - II

List of Experiments : Introduction

- Creation of Java, importance of Java to internet, Java buzzwords
- JVM –The heart of Java
- Java's Magic Bytecode

Language Fundamentals

- The Java Environment:
- Installing Java.
- Java Program Development
- Java Source File Structure
- Compilation
- Executions.
- Basic Language Elements:
- Lexical Tokens,Identifiers
- Keywords,Literals, Comments
- Primitive Datatypes,Operators
- Assignments.
- Console Input and output in java
- Branch control and loop control statements

Object Oriented Programming

- Class Fundamentals.
- Object & Object reference.
- Creating and Operating Objects.
- Constructor & initialization code block.
- Use of Modifiers with Classes & Methods.

Extending Classes and Inheritance

- Use and Benefits of Inheritance in OOP
- Types of Inheritance in Java
- Inheriting Data Members and Methods
- Interfaces.

Exception Handling:

- The Idea behind Exception
- Exceptions & Errors
- Types of Exception
- Use of try, catch, finally, throw, throws in Exception Handling.

Thread :

- Understanding Threads
- Needs of Multi-Threaded Programming.
- Thread Life-Cycle

Applet

- Applet & Application
- Applet Architecture.
- Embedding Applets in Web page.

GUI Programming

- Components and Containers
- Basics of Components
- Using Containers
- Layout Managers
- AWT Components

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
PTDC	**PROFESSIONAL ACTIVITY- I**	EE-62L	Min "D"	Min "D"	5.0

PROFESSIONAL ACTIVITY- I
(Suggested Exercise)

- Student shall visit a nearby Industry and shall prepare a technical report suggesting some improvement in operation.
- Student shall Design and fabricate a new laboratory equipment. He shall prepare a design report.
- Student shall improve an existing lab equipment and prepare chart or lab manual .
- Student shall publish a review paper in some Indian Journal.
- Student shall make a report on an Industry employing latest technology/ Innovation.
- Student shall prepare a working model of a machine part.
- Student shall make a software/ comp. program for the Institute to enhance efficiency in its working.
- Student shall prepare a detailed project report to start a small-medium enterprise.
- A group of student shall register with the Industry cell and submit a report on work done there about Institute-Industry linkage.
- Experimental work on a new set of equipments.
- Seminar Presentation with a report submitted to the supervisor.

Note : The list of activities can be modified as per requirements of the department.

A hand written report of about 30 pages duly signed by the student and the concerned teacher should be submitted.