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 : Fourth Branch : Electrical Engineering

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
EE-20	Electrical Machines - II	3	1	-	10	20	30	70	100	4
EE-22	Electromagnetic Theory	3	1	-	10	20	30	70	100	4
EE-18	Electrical & Electronics Instrumentation	3	1	-	10	20	30	70	100	4
EE-23	Microprocessor & Micro Controller	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
EE-21L	Electrical Machines Lab - II	-	-	2	20	-	20	30	50	2
EE-19L	Electrical & Electronics Instrumentation Lab	-	-	2	20	-	20	30	50	2
EE-24L	Microprocessor Lab	-	-	2	20	-	20	30	50	2
EE-55L	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)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**ELECTRICAL MACHINE - II**	**EE-20**	Min "D"	Min "D"	5.0

ELECTRICAL MACHINE – II

Unit – I : Basic Principles of Three Phase Induction Motor :

Constructional details, types – squirrel cage, slip ring, principle of operation, production of rotating magnetic field, speed / slip, rotor current and voltage, torque developed, condition for max. torque, torque/slip and torque/speed characteristics, induced emf in stator and rotor winding.

Unit – II : Performance Analysis of Three Phase Induction Motor :

Rotor circuit model, stator circuit motor, complete equivalent circuit, referred to stator, approximate equivalent circuit, power flow diagram, circle diagram, no load & block rotor test, starters used with three phase induction motor- DOL, auto-transformer , star delta starter, effect of space harmonics on performance of three phase induction motor, cogging and crawling, different methods of speed control, pole changing, stator voltage control, variable frequency control.

Unit – III : Polyphase Synchronous Machine (Alternator)

Constructional details, advantages of rotating field, excitation system, EMF equation, armature winding coil span/pitch factor, distribution or breadth factor, armature leakage reactance, armature reaction in synchronous machine.

Synchronous impedance, equivalent circuit and phasor & equivalent Ckt. diagram of synchronous generator, voltage regulation, emf method, mmf method, ZPFC/potier delta method, two reaction theory, torque angle characteristic of salient pole synchronous machine determination of Xd & Xq, parallel operations of alternator, process of synchronization, significance of synchronizing power coefficient, transient condition of alternator, SCR cooling of synchronous machine.

Unit – IV : Polyphase Synchronous Machine (Motor)

Construction, principle of operation, main features of synchronous motor, torque developed, power flow equation for synchronous motor, phasor diagram, effect of varying field current, V & inverted V curves, starting of Synchronous motor, Hunting or phase swinging, application of synchronous motor.

Unit – V : Special Electric Motors :

Switch reluctance motor, linear induction motor, stepper motor, PMBLDC motor, AC series motor hysteresis motor their industrial application.

Books Recommended :

1. Electrical Machines by Nagrath & Kothari, TMH Publication
2. Electrical Machinery by P.S. Bhimbra, Khanna Pub.
3. AC Machine by Langsdorf, TMH Pub.
4. Electrical Technology by H.Cotton, CBS Pub.
5. Electrical Machines by Ashfaq Hussain, Dhanpat Rai Pub.

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**ELECTROMAGNETIC THEORY**	**EE-22**	Min "D"	Min "D"	5.0

ELECTROMAGNETIC THEORY

Unit – I

Cartesian, cylindrical & spherical co-ordinate systems, scalar & vector fields, gradient, divergence & curl of a vector field, Divergence theorem & Stokes's theorem, concept of vectors.

Electrostatic Fields – Coulomb's law, electric field intensity due to different charge distribution viz. line charge, sheet charge, field due to continuous volume – electric potential, properties of potential function, potential gradient equipotential surfaces, line of force, Gauss law, applications of Gauss law, Gauss law in point form, method of images.

Unit – II

Laplace's poisson's equations, solution of Laplace's equation. Electric dipole, dipole moment, potential, electric field intensity due to dipole. Behavior of conductors in an electric field. Conductor & insulator, electric field inside a dielectric, polarization. Boundary value conditions for electric field. Capacitance & capacitances of various types of capacitors. Energy stored and energy density in static electric field. Current density, conduction & convection current density ohms law in point form, equation of continuity.

Unit – III

Static Magnetic Field, Biot-Savart's law, Magnetic Field intensity due to straight current carrying filament, circular, square and solenoidal current carrying wire. Relationship between magnetic flux, flux density & magnetic field intensity.

Ampere's circuital law and its applications, magnetic field intensity due to infinite sheet and various other configurations, Ampere's circuital law in point form. Magnetic force, moving charge in a magnetic field, Lorentz force on straight and long current carrying conductors in magnetic field, force between two long & parallel current carrying conductors. Magnetic dipole & dipole moment, a differential current loop as dipole, torque on a current carrying loop in magnetic field, Magnetic Boundary conditions.

Unit – IV

Scalar magnetic potential and its limitations, vector magnetic potential and its properties, vector magnetic potential due to different simple configurations; Self and Mutual inductances, determination of self & mutual inductances, self inductance of solenoid, toroid coils, mutual inductance between a straight long wire & a square loop. Energy stored in magnetic field & energy density.

Faraday's law, transformer & motional EMFs. Dislacement current, maxwell's equations as Generalization of circuit equations, Maxwell's equation in free space, Maxwell's equation for harmonically varying Field static and steady fields. Maxwell's equations in differential & integral form.

Unit – V

Electro Magnetic Waves : Uniform plane wave in time domain in free space, sinusoidally time varying uniform plane wave in free space, wave equation and solution for material medium, Uniform plane wave in dielectrics and conductors. Poynting vector theorem , instantaneous, average and complex pointing vector, power loss in a plane conductor, energy storage. Polarisation of waves. Reflection by conductors and dielectric – normal & Oblique incidence. Reflection at surface of a conducting medium surface impedance, transmission line analogy.

Note : Field plotting of electomegnetic systems on a PC using standard softwares. Application for low and high frequency devices, Suggested Softwares, GEMINI (Infolytica), ANSYS, ANSOFT, NISA.

Books Recommended :

1. Elements of Electromagnetic – Mathew N.O. Sadiku (Oxford)
2. Electromagnetic fields – P.V. Gupta (Dhanpat Rai)
3. Elements of Engineering Electromagnetic – N.N.Rao (PHI)
4. Engineering Electromagnetic – William H.Hayt (TMH)
5. Electromagnetic – John D. Kraus (Mc Graw Hill)
6. Electromagnetic wave & Radiating System – Jordan Balmian (PHI)
7. Fields and Wave Electromagnetic – David K. Cheng (Addison Wesley)
8. Electromagnetic Field – S.P. Seth (Dhanpat Rai & Sons)

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	ELECTRICAL & ELECTRONICS INSTRUMENTATION	EE-18	Min "D"	Min "D"	5.0

ELECTRICAL & ELECTRONICS INSTRUMENTATION

Unit-I : Cathode Ray Oscilloscope (CRO)
Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, post deflection acceleration, Screen for CRTs, Graticule, Vertical & Horizontal deflection system, Time base circuit, Oscilloscope probes, Application of CROs, Special purpose CROs- Multi input, Dual trace, Dual beam, Sampling, Storage (Analog & Digital) Oscilloscopes.

Unit-II : A.C. Bridges :
Maxwells bridge, (Maxwells inductance & inductance capacitance) Hays bridge, Schering Bridge, High Voltage & relative permittivity) Weins bridge, Wagner's Earth detector, Impedance measurement by Q meter .

Unit-III :Non Electrical Quantities (Transducers):
Classification of Transducers, strain gauge, Displacement Transducer (LVDT) & (RVDT) ,(RTD) Thermistor, Thermocouple, Piezo- -Electric transducers, Optical Transducer, photo emissive, Photoconductive, photo voltaic, Photo diode, Photo Transistor, Nuclear Radiation Detector, Capacitive Transducer.

Unit –IV: Wave analyzer
(Frequency selective and Heterodyne) Harmonic Distortion Analyzer, Spectrum Analyzer Network analyzer, Single and Function Generators , sweep frequency generator, pulse and square wave Generator, Beat Frequency Oscillator
Digital display system and indicators, instruments used in computer controlled instrumentation RS 232 & IEEE 488, GPIB electric interface.

Unit-V : Digital Measurement and Instruments :
Advantages of Digital instruments over analog instruments, Digital to analog conversion (DAC) Variable resistive type R-2R Ladder Type, Binary ladder, Weighted converter using op amp and transistor, Practical DAC. Analog to digital conversion (ADC) ramp Technique, Dual slope Integrating Type, Integrating Type (voltage to frequency) Successive Approximations, digital voltmeters and multi-meters, Resolution and sensitivity of digital meter, PLC structure, Principal of operation, response time and application Digital panel meter, Data acquisition system.

References:

1. H.S. Kalsi : Electronics Instrumentation TMH
2. K.Sawhney : Instrumentation and Measurements, Dhanpat Rai and Co.
3. Helfric and Cooper : Modern Electronic Instrumentation and Measurement Techniques Pearson.

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	MICROPROCESSORS & MICROCONTROLLERS	EE-23	Min "D"	Min "D"	5.0

MICROPROCESSORS & MICROCONTROLLERS

Unit – I : Microprocessor 8086

Introduction to 16-bit 8086 microprocessors, architecture of 8086, pin configuration, interrupts, minimum mode and maximum mode, timing diagram, Memory interfacing, Comparative study of Salient features of 8086, 80286 and 80386.

Unit – II : Microprocessor 8086 Programming

Instruction set of 8086, Addressing mode, Assembler directives & operations, assembly and machine language programming, subroutine call and returns, concept of stack, stack structure of 8086, timings and delays,

Unit – III : Input-output interfacing :

Memory Mapped I/O and peripherals I/O PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, programmable interval timer 8254, USART 8251, 8 bit ADC/DAC interfacing and programming.

Unit – IV : Microcontroller 8051

Intel family of 8 bit microcontrollers, Architecture of 8051. Pin description, I/O configuration, interrupts, Interrupt structure and interrupt priorities, port structure and operation, Accessing internal & external memories and different mode of operations, Memory organization, Addressing mode, instruction set of 8051 and programming.

Unit – V : 8085 Interfacing, Applications and serial communication :

8085 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based thyristor firing circuit, 8051 connections to RS-232, 8051 Serial communication, Serial communication modes, serial communication programming, Serial port programming in C.

Books Recommended :

1. Hall Douglas V. Microprocessor and Interfacing, Programming and Hardware, second edition, Macmillan,McGraw Hill.
2. Ray A.K.Bhurchandi K.M. Advance Microprocessor and peripheral first edition, TMH
3. Kenneth J.Ayala, The 8086 microprocessor, programming and interfacing the PC Indian edition CENGAGE Learning.
4. Mohd.Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcintroller and Embedded Systems Pearson education, 2005
5. Kanneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
6. V. Udayashankara and M.S. Mallikarjunaswamy, 8051 Microcontroller, McGraw Hill.
7. Mckinlay, The 8051 Microcontroller and Embedded Systems- using assembly and C, PHI, 2006/ Pearson. 2006

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**ELECTRICAL & MACHINE – II LAB**	**EE- 21L**	Min "D"	Min "D"	5.0

ELECTRICAL & MACHINE – II LAB

(Suggested Exercise)

List of Experiments :

1. To perform load test on 3-phase induction motor & determine torque, output power, input power, efficiency, p.f. & slip.
2. To perform No-Load & Block rotor test on 3-phase induction motor
3. To determine regulation of Alternator using synchronous impedance method
4. To determine regulation of Alternator using Potier method.
5. To synchronize an incoming alternator to Busbar using bright & dark lamp method.
6. To determine V & inverted V curves of synchronous motor
7. Study of stepper motor.
8. Study of PMBLDC motor
9. Study of Switch Reluctance motor.

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**ELECTRICAL & ELECTRONICS INSTRUMENTATION LAB**	**EE-19L**	Min "D"	Min "D"	5.0

ELECTRICAL & ELECTRONICS INSTRUMENTATION LAB
(Suggested Exercise)

List of Experiments:-

1. Measurement of inductance of a coil using Anderson Bridge.
2. Measurement of capacitance of a capacitor using schering bridge.
3. LVDT and capacitance transducers characteristics and calibration.
4. Resistance strain gauge- Strain Measurement and calibration.
5. Measurement of R,L,C & Q using LCR-Q meter.
6. Study & measurement of frequency using Lissajous patterns.
7. Measurement of pressure using pressure sensor.
8. Study of Piezo-electric Transducer and Measurement of impact using Piezo-electric Transducer
9. Measurement of Displacement using LVDT.
10. Measurement of speed of a Motor using photoelectric transducer.
11. Study & Measurement using ph meter.
12. Temperature measurement & Control using thermo couple & using thermistor.

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**MICROPROCESSORS LAB**	EE- 24L	Min "D"	Min "D"	5.0

MICROPROCESSORS LAB

(Suggested Exercise)

List of Experiments :

1. Assembly Language Programs Microprocessor 8086
2. Assembly Language Programs of Microcontroller 8051
3. Assembly Language Programs of Interfacing chips

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**PROFESSIONAL ACTIVITY**	**EE-55L**	Min "D"	Min "D"	5.0

PROFESSIONAL ACTIVITY
(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.