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)

B.E. Second Year **Branch : Electrical** **Sem :Third**

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
					SESSIONAL EXAM			ESE	SUB TOTAL	
		L	T	P	TA	CT	TOTAL			
MA-03	Mathematics - III	3	1	-	10	20	30	70	100	4
CH-03	Energy Ecology Environment & Society	3	1	-	10	20	30	70	100	4
EE-03	Circuit Theory	3	1	-	10	20	30	70	100	4
EE-05	Electrical Engineering Materials	3	1	-	10	20	30	70	100	4
EE-07	Electrical Measurements & Measuring Instruments	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
EE-06L	Electrical Workshop	-	-	2	20	-	20	30	50	2
EE-04L	Circuit Lab	-	-	2	20	-	20	30	50	2
CS-05L	Computer Programming Lab - II	-	-	2	20	-	20	30	50	2
EE-08L	Electrical Measurements & Measuring Instruments Lab	-	-	2	20	-	20	30	50	2
EE-58L	Self Study/ Professional Activity	-	-	2	50	-	50	-	50	2
EE-59L	Seminar/Group Discussion	-	-	2	50	-	50	-	50	2
	Total	**15**	**5**	**12**	**230**	**100**	**330**	**470**	**800**	**32**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 800
Total Periods : 32, Total Credits : 32

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	
	MATHEMATICS- III	MA03	Min "D"	Min "D"	5.0

MATHEMATICS – III

Unit – I : Fourier Series : Conditions for a fourier expansion, having finite number of discontinuities, change of interval and half- rang series.

Laplace transform and inverse Laplace transform of simple functions, their elementary properties and application in solution of ordinary differential equations.

Unit – II : Analytic functions, Harmonic conjugates, Cauchy-Reimann equations, line integral, cauchy's theorem, Cauchy's integral formula, poles, residues, Residues theorem, evaluation of real integral, Bilinear transformation.

Unit – III : Difference operators, errors and approximation, interpolation (Newtons interpolation formulae, Central interpolation formulae, Lagranges interpolation, Newtons divided difference interpolation – formula inverse interpolation.

Numerical differentiation, maxima and minima.

Unit – IV : Numerical integration by using simpson's method, weddels rule, Gauss-Legendre open quadrature formula.

Solution of algebraic and transcendental equations by using Regula-Falsi, Newton-Rephson, iterative, Graffes root squaring method, Bairstow's method.

Unit – V : Solution of simultaneous algebraic equatins by using gauss elimination, Gauss-Jorden, Crout's jacobbi iterative, Gauss-siedal, Relaxation methods.

Solution of ordinary differential equations (Taylor series, Picard's Modified Euller method, Runge-kutta, predictor corrector method.)

References :

1. Laplace transform, by R.V. Churchill
2. Higher Engineering Mathematics by B.V Ramanna, TMH
3. Advanced Engineering Mathematics by Kreysizig E, willey Eastern Limited.
4. Introductory Methods of Numerical Analysis by S.S. Sastry
5. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.

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	
	ENERGY ECOLOGY ENVIRONMENT & SOCIETY	CH03	Min "D"	Min "D"	5.0

ENERGY ECOLOGY ENVIRONMENT & SOCIETY

Unit I : **Energy sources and energy storing devices**

World and Indian energy scenario, types of energy sources – renewable and non-renewable energy sources. Solar energy storage ,application & maintenance of solar cell panel, introduction & applications of hydro, wind, biomass, ocean, tidal, wave and geothermal. Synergy between energy and environment. Global environment issues, greenhouse gas emission, global warming, green energy solution.

Batteries – Primary and Secondary batteries- Alkaline battery – Lead (Pb) acid storage battery , Ni-cadmium battery ,Lithium battery ,Fuel cell , Hydrogen Oxygen fuel cell ,Photo galvanic cell.

Unit II : Ecosystem Structure & scope of ecology, Natural cycles of the environment, Hydrogen cycle, Oxygen Cycle, Carbon cycle, Nitrogen cycle, Phosphate cycle, Sulphur cycle, Biodiversity.

Society:- Environmental problems and impact of P.A.T(Population, Affluence and Technology). Environmentally beneficial and harmful technologies, environment impact assessment policies (EIA).Ethics and regulatory act of environment.

Soil Pollution Sources & control measures. MSW, HWM.

Unit III : **Air pollution-** Chemical composition of atmosphere, -primary, Secondary; pollutants, Chemical and photochemical reaction, effects of CO, SOx, NOx, HC and particulates. Causes & effects of acid rain, ozone depletion: Monitoring and control of air pollutants.

Noise pollution- introduction physiological effect, measurement and control of noise pollutants.

Unit IV : Water pollution- sources causes of water pollution , types and nature of water pollutant. Pollution load determination i.e. particulates ,suspended matter, total dissolved solids ,dissolved gases DO, BOD & COD. EL NINO phenomenon. Waste water treatment

Domestic – Aerobic & anaerobic treatment. Industrial waste water treatment (ETP plant.) Electro dialysis membrane technique and filtration by activated charcoal and synthetic resins.

Unite V : Corrosion & its prevention- Theories of Corrosion and Mechanism – Dry (Direct Chemical attack), Wet (Electro Chemical Theory) Atmospheric corrosion, Galvanic Series, Galvanic & Concentration Cell Corrosion, Corrosion by sea water. Factors Influencing & control of Corrosion – Proper Design, Use of pure metal and metal alloys, passivity, cathodes protection – Sacrificial anode and Impressed Current. Modifying the environment, Use of inhibitors.

TEXT BOOKS

1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.
3. A text book of Environmental Chemistry and Pollution control by S.S. Dara & Dr. D. D. Mishra, S. Chand & Co, New Delhi
4. Energy,Environment Ecology and Society by Dr.Pushpendra,Vayu Education of India New Delhi .
5 Energy, Environment Ethics and Society, by Dr.S.Deswal & Dr.A.Deswal Dhanpat Rai Publishing Company, New Delhi

REFERENCE BOOKS

1. J.C. Kuriakose and J. Rajaram, "Chemistry in Engineering and Technology", Vol.1 & 2, Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi
2. Mars G. Fontana, "Corrosion Engineering", Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi.
3. F.Chau, Y. Liang, J. Gao and X. Shao, "Chemometrics", Wiley Inter Science.

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	
	CIRCUIT THEORY	EE03	Min "D"	Min "D"	5.0

CIRCUIT THEORY

UNIT – I :

Review of Circuit Elements and energy sources : Basic laws like KVL, KCL, current & voltage distribution : source conversion, star-delta transformation etc, different methods of circuit analysis.

UNIT – II :

Network theorems applicable in AC & DC circuits, Thevenin's Theorem, Norton's theorem, Superposition, maximum power transfer, Milliman's theorem, reciprocity, Substitution theorem, Compensation theorem, Tellegen's theorem.

UNIT – III :

Graph Theory (Network Topology)

Introduction, Concept of Network graph, Terminology , Twig, linka, tree formation, incidence matrix, Tie-set matrix. Cut set matrix, duality, Network equilibrium.

UNIT- IV :

Resonance Selectivity :

Introduction, Series resonance, parallel resonance , physical interpretations of selectivity.
Analysis of coupled circuits,
Self inductance, mutual inductance, coefficient of coupling modeling, Dot convention, tuned coupled circuit, Conductivity coupled equivalent circuits.

UNIT- IV :

Analysis of three phase circuit, Balanced & unbalanced system, Power measurement of 3 phase circuits.

References :

1. Network Analysis and Synthesis by ME Van-Valkeburg.
2. Network and Systems by D.Roy Choudhury Wiley Eastern Limited.
3. Circuit Theory (Analysis & Synthesis) by A.Chakrabarti :Dhanpat Rai & Co.P.Ltd.
4. Network Analysis by G.K.Mithal, Khanna : Pub. Delhi.

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	
	ELECTRICAL ENGINEERING MATERIALS	EE05	Min "D"	Min "D"	5.0

ELECTRICAL ENGINEERING MATERIALS

UNIT – I : CONDUCTING MATERIALS :

Electron theory, conductivity, factor affecting conductivity, classification & properties of conducting materials. Effect of temperature variation, Alloys and their properties. Application of conducting materials with their suitability in – Electrical Machines, power Systems, Electrical instruments etc. super conducting materials, their properties & Applications.

UNIT – II : SEMICONDUCTING MATERIALS :

General concepts , variation of electrical conductivity, Elements having semiconducting properties, general application, Hall effect & energy levels, conduction in semiconductors, Impurities, mobility, current flow in semi conductors, P-N Junction formation by alloying, Zener effect, Hall effect & its applications.

UNIT – III MAGNETIC MATERIALS :

Magnetism, classification of magnetic materials, properties & applications of magnetic materials, magnetic hysteresis, eddy currents, magnetostriction, Hysteresis loop for hard and soft magnetic materials.

UNIT – IV : INSULATING MATERIALS :

Electrical, mechanical & chemical properties of insulating materials, volume & surface resistivity, classification of insulating materials . Dielectric materials : their properties & application.

UNIT – V :

General properties of transformer oil, commonly used varnishes, solidifying insulating materials, resins, bituminous waxes, drying oils, insulating textiles, varnished adhesive tapes, inorganic fibrous materials & other insulting materials such as mica, ceramic, Bakelite, abonite, glass, PVC, Rubber, and other plastic molded materials.

References :

1. Electrical Engineering Materials by Kortisky
2. Electrical Engineering Materials by A.J. Deccker
3. Di-electrics by Anderson
4. Materials for Electrical Engineering by B.M. Tareev

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	
	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS	EE07	Min "D"	Min "D"	5.0

ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

Unit I Measurement and error, Accuracy and precision, sensitivity, resolution, Error & Error analysis, Effect of temperature, Internal friction, Stray field, Hysteresis and Frequency variation & method of minimizing them, Loading effects, due to shunt connected and series connect ed instruments, Testing & calibration of instruments.

Galvanometers – Theory & operation of ballistic galvanometer, D'arsonal galvanometer, galvanometer motion & damping, Sensitivity, Flux meter, Vibration galvanometer, Spot deflection galvanometer.

Unit II Definition of analog & digital instruments, Classification of analog instruments, their operating principle, Operating force, Damping, Controlling.

PMMC, MI, Electrodynamometer, Hotwire, Electrostatic, Induction, Rectifier, Ferro dynamic & Electro thermic, Expression for control & deflection torque, their advantages, disadvantages & error. Extension of range of instruments using shunt & multiplier.

Unit III Instrument transformers – Potential and current transformers, ratio and phase angle errors, testing of instrument transformers, Difference between CT and PT, errors and reduction of errors.

Measurement of Power – Power in AC and DC Circuit, Electrodynamometer, types of wattmeter, Construction, theory, operation & error. Measurement of power in three phase circuit, one, two & three wattmeter method, Measurement of reactive power by single wattmeter. Measurement of power using CTs & PTs.

Unit IV Measurement of Energy – induction type energy meter – construction & operation, electronic energy meter, construction and working, testing of energy meter.

Potentiometer – DC potentiometer standardization – Lab type Crompton's potentiometer, application of DC potential meter.

Unit V Miscellaneous Instruments & Measurements

Power factor meter , Frequency meter, Multimeter, Megger & Ratiometer.

Resistance Measurement – Classification of low, medium & high resistance – Voltmeter, Ammeter, Wheatstone Bridge, Kelvin's double bridge & loss of charge methods, Earth resistance measurement.

Magnetic Measurement – B-H Curve, Hysteresis Loop determination, Power loss in sheet metal – Lloyd Fischer square for measurement of power loss

Books Recommended:

1. E W Golding & F C Widdis, Vedition, ," Electrical Measurement & Measuring Instruments ",Wheeler Publishing
2. A.K. Sawhney," Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai & Sons Publications
3. Buckingham & Price ,"Electrical Measurements", Prentice Hall

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	
	ELECTRICAL WORKSHOP	EE06L	Min "D"	Min "D"	5.0

ELECTRICAL WORKSHOP

(Suggested Exercise)

1. Study of different types of wires and determination of gauge of wire through SWG.
2. Study of different types of LT & HT cables
3. Study and practice of wire joints.
4. Study and practice of cable laying and joints of cable
5. Description of various insulators.
6. Study of various types of wirings.
7. Study of various types of LT and HT poles/Towers.
8. Study and practice of DC machine winding.
9. Development of tube light circuit using thermal/Bimetallic starter.
10. Development of series circuit band.
11. Development of circuit of two lamps operating with single switch.
12. Study of DC/AC machine starters.

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	
	CIRCUIT LAB	EE04L	Min "D"	Min "D"	5.0

CIRCUIT LAB
(Suggested Exercise)

1. Verification of KCL in DC circuit
2. Verification of KVL in DC circuit
3. Verification of Thevenin's Theorem in DC circuit
4. Verification of Newton's Theorem in DC circuit
5. Verification of Super position theorem
6. Measurement of Real, reactive and Apparent power in 3P circuits.
7. Find out the resonance frequency in RLC series circuit.
8. Find out the resonance frequency in RL, RC parallel circuits.
9. Verification of Faradey's law.
10. Comporision of Rac and Rdc
11. Verification of Telegence Theorem.
12. Verification of KCL in AC circuit
13. Verification of KVL in AC circuit
14. Verification of Thevenin's Theorem in AC circuit
15. Verification of Newton's theorem in AC circuit
16. Verification of Super position theorem in AC circuit
17. Study of filters.
18. Maximum power transfer theorem using two port network
19. Two port network ADCD parameter.
20. Two port network Y parameter.
21. Two port network Z parameter.
22. Two port network LC parameter.

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	
	COMPUTER PROGRAMING LAB-II	CS05L	Min "D"	Min "D"	5.0

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)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS LAB	EE08L	Min "D"	Min "D"	5.0

List of Experiments

1. Measurement of resistance by Wheatstone bridge.
2. Measurement of low resistance by Kelvin's double bridge.
3. To calibrate AC watt-hour meter by a standard wattmeter.
4. Study of Llyod's Fischer square method.
5. To plot the following characteristics of a given CT.
    a. Burden V/S Secondary current
    b. Burden V/S Secondary voltage
6. Measurement of three phase power by two wattmeter method.
7. Measurement of high resistance by using megger.
8. Study of earth tester and measurement of earth resistance.
9. Testing of energy meter.

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	
	SELF STUDY/ PROFESSIONAL ACTIVITY	EE58L	Min "D"	Min "D"	5.0

Objective of Self Study : is to induce the student to explore and read technical aspects of his area of interest/ hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

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	
	SEMINAR/GROUP DISCUSSION	EE59L	Min "D"	Min "D"	5.0

Objectives of Group Discussion & Seminar is to improve the Mass Communication and Convincing/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.