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 2011)

BE (PTDC) Second Sem. Branch : Electronics & Telecom. Engineering

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
MA-02	Mathematics - II	3	1	-	10	20	30	70	100	4
EC-05	Electronics Engg. Materials	3	1	-	10	20	30	70	100	4
EE-12	Network Analysis & Synthesis	3	1	-	10	20	30	70	100	4
EC-12	Linear Control Theory	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
EE-13L	Network Analysis & Synthesis	-	-	2	20	-	20	30	50	2
EC-13L	Linear Control Lab	-	-	2	20	-	20	30	50	2
EC-54L	Professional Activity - I	-	-	2	20	-	20	30	50	2
EC-60L	Seminar/Group Discussion	-	-	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. Common	**ENGINEERING MATHEMATICS - II**	MA-02	Min "D"	Min "D"	5.0

ENGINEERING MATHEMATICS-II

UNIT-I

Second order ordinary differential equation with variable coefficients using methods, one solutionis known, Removal of First Derivative, Change of independent variable Method of Operational factor, Method of variation of parameters, solution of Second order ordinary differential equation by series method.

Unit-II

Bessel's equation, recurrence relations, Orthogonality, Generating Function of $J_n(x)$, Trigonomatric expansion involving Bessel's functions , Legendre's equation, , Legendre's Polynomial $P_n(x)$, Rodrigue's formula, Recurrence relation's, Generating functiuon of $P_n(x)$, Orthogonality, error function .

Unit-III

Partial differential equation, Formulation of PDE, solution of first order linear PDE, first order non-linear PDE, Homogenous linear PDE with constant coefficients of second and higher order, Method of separation of variable. Appluication of PDE in solution of one dimensional Heat and Wave equation

Unit-IV

Vector Calculus, Vector differentiation, Velocity and Acceleration, Gradient, Divergence and Curl, Line and Surface iIntgral, Stoke and Gauss's divergence theorem.

Unit-V

Binomial, Poisson and Gaussian (Normal) Distribution and their properties, Curv fitting bymethod of least square, Elementary concept of Reliability, Forecasting and decision theory

Reference Books:-

1. Higher Engineering Mathematics by B.V. Ramana TMH.
2. Adv.Engineering Maths by Ervin Kreszig, Wiley India IIT Student ed. 8th.
3. Higher Engineering Mathematics- By B.S. Grewal.
4. Mathematical Statistics- by Ray & Sharma.
5. Advance Engineering Mathematics-Wylie and Barrett.TMH.
6. Introduction to Theory of statistics- Mood,TMH.
7. Partial Differential Equation-Duchateau Schaum Series TMH.

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	
	ELECTRONICS ENGINEERING MATERIALS	EC-05	Min "D"	Min "D"	5.0

ELECTRONICS ENGINEERING MATERIALS

UNIT – I Elementary Quantum Physics Photons-Light as a wave, the photoelectric effect, Compton Scattering, Black Body Radiations, The electron as a wave- De-Broglie Relationship, Time dependent Schrodinger equation, Potential well problem, Infinite potential well : Free electron, a confined electron, Confined electron in a Finite potential well, Electron Tunneling through a finite potential barrier, Heisenberg's uncertainty principle Tunneling phenomenon: Quantum leak ,hydrogen atom according to old & New Quantum Mechanics.

UNIT – II Elementary Material Science & Band Theory of Solids

Atomic structure, Bohr Model, Bonding & Types of Solids, Kinetic molecular theory, Molecular velocity & energy Distribution, Heat, thermal fluctuations & Noise thermally activated Processes, The crystalline state, Crystalline defects & Their significance, Bulk crystal growth, epitaxial growth, single crystal Czochralski growth, Glasses & Amorphous semiconductors, Classical theory of electrical & Thermal conduction in solids, Temp dependence of resistivity, Ideal pure metals, Mixture rules & Electrical switches ,Hall effect & Hall Devices, Thermal conduction, Electrical Conductivity of nonmetals ,Hydrogen Molecule: Molecular orbital theory of bonding, Band theory of solids, Semiconductor, Electron effective mass, Density of states in a energy band, Statistics-Collection of particles, Quantum theory of metals, Fermi energy significance., Thermionic emission, phonons, band theory metals: electric diffraction in crystals.

UNIT – III Semiconductors

Intrinsic semiconductor- Silicon crystal & Energy band diagram, Concentration of electron & holes, conduction in semiconductor, Extrinsic semiconductor- n type doping, p-type doping, compensation doping, Temperature dependence of conductivity-Carrier concentration temperature dependence ,Drift mobility: Temperature & Impurity dependence, Conductivity temp dependence, Degenerate & Non –degenerate semiconductors, Recombination & minority carrier injection- Direct & indirect recombination, minority carrier lifetime, Diffusion & Conduction Equation & Random motion, Continuity Equation- Time dependent Continuity equation, Steady State Continuity equation, Optical absorption, Luminescence, Direct & indirect band gap semiconductor.

UNIT – IV Dielectric Materials & Insulation

Matter polarization & Relative permittivity-Relative permittivity, Dipole moment & electronic polarization, Electron polarization-Covalent solids, Polarization mechanism- Ionic, Orientational (Dipolar),interfacial, total Polarization, Frequency dependence- Dielectric constant & Dielectric loss, Gauss' law & Boundary conditions, Dielectric strength & Insulation breakdown, Capacitor dielectric materials, Piezoelectricity, Ferroelectricity & Pyroelectricity , Electric displacement & Depolarization field.

UNIT- V Magnetic Materials

Magnitization of Matter-Magnetic dipole moment, Atomic magnetic moments, magnetization vector M, Magnetising field or magnetic field intensity H, Magnetic permeability & Magnetic susceptibility, Magnetic material classification- Di, para, ferro, Anti ferro, Ferri, Ferro magnetic Origin & the exchange interaction ,saturation magnetisation & Curve temp,, Magnetic Domain: ferro magnetic materials, Soft & hard magnetic materials, Superconductivity.

Textbooks: 1. Solid Electronics Devices: Ben. G .Streetman& Banerjee 2. Electronic Engineering Materials & Devices: John Allison 3. Electrical Engineering Materials: A. J. Dekker 4. Semiconductor Device fundamentals: Robert .F.Pierret 5. Introduction to semiconductor Materials & Devices: M. S. Tyagi 6. Principle of Electronic Material & Device: Safa.O. Kasap 7. Semiconductor Materials –An Introduction: B. G Yacobi

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	
	NETWORK ANALYSIS & SYNTHESIS	EE-12	Min "D"	Min "D"	5.0

Network Analysis & Synthesis

Unit I

Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal and Mesh analysis, analysis of magnetically coupled circuits, Transient analysis :- Transients in RL, RC & RLC Circuits, initial conditions, time constants. Steady state analysis- Concept of phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks, Dot convention, coupling co-efficient, tuned circuits, Series & parallel resonance.

Unit II

Network Theorems for AC & DC circuits- Thevenins & Norton's, Superpositions, Reciprocity,
Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

Unit III

Laplace transform method of network characterization -impulse response and transfer function of system-poles and zeros , transform of waveform synthesized with step ramp, Gate and sinusoidal functions, causality and stability, Frequency domain analysis – Laplace transform solution of Integro-differential equations, Initial & final value theorem, Network Theorems in transform domain.

Unit – IV

Two port networks -Characteristic Parameters of symmetrical and asymmetrical two port networks and their design: image impedance ,iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient ,iterative transfer coefficient, Lattice and Bridged-T networks, reactive matching networks, matching techniques, Insertion Loss, symmetrical and asymmetrical attenuators and their design.

Unit V

Passive Filters: Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.

Positive real function, LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, Synthesis-Coefficient.

Textbooks:

1. J.D. Ryder: Networks and Transmission Lines, 2nd edition, PHI
2. M.E. Van Valkenburg, Network Analysis, (PHI)
3. M.E. Valkenberg: Introduction to Modern Network synthesis, Wiley Eastern Ltd.
4. F.F.Kuo, Network Analysis.
5. Mittal GK; Network Analysis; Khanna Publisher
6. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
7. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH

COURSE CONTENTS (w.e.f. July 2010)

Category of Course	Course Title	Course Code	Credits-4			Theory Papers
			L	T	P	
DBC	**LINEAR CONTROL THEORY**	EC-12	3	1	-	Max. Marks- Min.Marks- Duration – 3 hrs.

LINEAR CONTROL THEORY

Unit I

Basic Control System Introduction and Classification of control System, open and closed loop systems Linear Control System, Mathematical models of physical systems, Transfer function, Block Diagram Representation, Signal flow Graph, MIMO, Mason's gain formula, Linearization.

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Unit II

Error Analysis -Effects of Feedback on gain and time constant, pole location, bandwidth, Sensitivity, Disturbance signal, Control over System .Standard Test Signals, Time Response of 1st Order System, Design of Higher order system, Steady-State Errors and Error coefficients, error Constants, Effects of Additions of Poles and Zeros to Open Loop and Closed Loop System, Design Specification of Dynamic first and higher order system, Performance Indices.

Unit III

Time Domain Stability Analysis- Concept of Stability of Linear Systems, Effects of Location of Poles on Stability, Necessary Conditions for Stability, Routh-Hurwitz Stability Criteria, Relative Stability Analysis, Root Locus technique, Experimental determination of transfer function.

Frequency Domain Stability Analysis- Performance Specification in Frequency Domain, Co-relation between frequency Domain and Time Domain, Bode Plot, Minimum-Phase and Non-Minimum Phase System, Polar Plots, Inverse Polar Plot, Nyquist Stability Criterion, Assessment of Relative Stability (Phase Margin, Gain Margin and Stability), Constant-M and N Circle, Nichols Chart.

Unit IV

Approaches to System Design, Types of Compensation, Design of Phase-Lag, Phase Lead and Phase Lead-Lag Compensators in Time and Frequency Domain, Proportional, Derivative, Integral and PID Compensation. Modeling of discrete -time systems -sampling -mathematical derivations for sampling sample and hold -Z-transforms-properties -solution of difference equations using Z transforms -examples of sampled data systems -mapping between s plane and z plane

Unit V

State variables Analysis and Design- Concept of State Variables and State Model, State Space Representation of Systems, Solution of State Equation, Transfer Function Decomposition, Discrete time system.

Text Books:

1. Ziemer R.E., Tranter W.H. & Fannin D.R., "Signals and Systems", Pearson Education Asia
2 Ogata K., "Modern Control Engineering", Prentice Hall India
3. Nagarath I.J. & Gopal M., "Control System Engineering", Wiley Eastern Ltd.
4.Kuo B.C., "Digital Control Systems", Oxford University Press

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	
	NETWORK ANALYSIS & SYNTHESIS LAB	EE-13L	Min "D"	Min "D"	5.0

NETWORK ANALYSIS & SYNTHESIS LAB

1. To verify the operation of parallel resonance RLC circuit and measurement of resonance frequency and band with.
2. To verify the operation of series resonance RLC circuit and measurement of resonance frequency and band with.
3. To verify the frequency characteristics of high pass RC circuit.
4. To verify the frequency characteristics of low pass RC circuit.
5. To study of Y parameters & Z parameters of two port T network.
6. To study of network theorems in AC circuit
   a. Thevenin's b. Norton's c. Superposition
7. To study of network functions.

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	
	LINEAR CONTROL LAB	EC-13L	Min "D"	Min "D"	5.0

LINEAR CONTROL LAB

List of Experiment

1. Study of AC & DC Servo amplifiers.
2. Study of Second order Control System.
3. Speed & Torque Characteristics of DC Servo motor.
4. Experiment on stepper motor.
5. Experiment on PID Controller.
6. Study of compensation network.
7. Speed & Torque Characteristics of AC Servo 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	
	PROFESSIONAL ACTIVITY- I	EC-54L	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.

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	EC-60L			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.