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 : Electronics & Tele.** **Sem : Fourth**

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
					SESSIONAL EXAM			ESE	SUB TOTAL	
		L	T	P	TA	CT	TOTAL			
EC-15	Electronic Circuits	3	1	-	10	20	30	70	100	4
EC-10	Signals & Systems	3	1	-	10	20	30	70	100	4
EC-06	Digital Circuit & Systems	3	1	-	10	20	30	70	100	4
EC-12	Linear Control Theory	3	1	-	10	20	30	70	100	4
EC-14	Electromagnetic Theory	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
EC-16L	Electronic Circuits Lab	-	-	2	20	-	20	30	50	2
EC-13L	Linear Control Lab	-	-	2	20	-	20	30	50	2
EC-21L	Simulation Lab	-	-	2	20	-	20	30	50	2
EC-09L	Digital Circuit & Systems Lab	-	-	2	20	-	20	30	50	2
EC-56L	Professional Activity	-	-	2	50	-	50	-	50	2
EC-58L	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	
B.E/PTDC	**ELECTRONIC CIRCUITS**	EC-15	Min "D"	Min "D"	5.0

ELECTRONIC CIRCUITS

UNIT –I Transistor Biasing & Thermal Stabilization:

Introduction to load line analysis, operating Point, Biasing methods of transistor: Biasing, Thermal runaway, Stability factors, Biasing methods, Biasing of FET & MOSFET, Bias Compensation, Comparison of Biasing Methods.

UNIT –II Amplifier Fundamentals:

Gain & Frequency Response of Amplifiers, BJT amplifier configuration, Common Source & Common Drain (Source follower) FET Amplifier, High frequency Effects & Hybrid π Model for CE Transistor, High frequency Common Source & Common Drain(Source follower) amplifier, Cascode amplifier, Wideband Amplifier, Darlington Configuration, Miller's Capacitance(miller's Theorem)

UNIT – III Multistage, Tuned & Differential Amplifier:

Multistage amplifier – Cascading of transistor amplifier, Coupling methods, Analysis of RC coupled CE amplifier , Small signal transformer coupled transistor amplifier ,Direct coupled amplifier, spurious responses in amplifiers.

Tuned Amplifier: Single Tuned, Double Tuned, & Stagger Tuned Amplifiers.

Differential Amplifier : Difference Amplifier, The Differential amplifier, Inverting & Non inverting inputs Differential input, common mode input, CMRR.

UNIT–IV Power Amplifiers:

Power amplifiers, Feedback amplifier and oscillator, Class B Amplifier, Distortion, Effect of cascading of amplifiers on Bandwidth, Power amplifier, Class A, class B and Class C amplifier, Distortion , effect of cascoding of amplifier, Pushpull amplifier. Negative Feedback amplifiers and feedback configurations, : Positive Feedback amplifier, Bharkhausen's Criteria, Different types of oscillator circuits

UNIT– V Logic families : RTL, DTL, TTL, ECL, IIL AND PMOS, NMOS & CMOS Logic etc. Linear wave shaping circuits, Bistable, Monostable and Astable multivibrator, Schmitt Trigger circuits and schemitt Nand gate, Gated FlipFlop and gates multivibrators, Interface between TTL to MOS vice versa

REFERENCES:

Millman and Halkias : Integrated Electronics, TMH
Boylestad and Nashelsky: Electronic Devices and Circuit Theory, PHI
Sedra and Smith : Microelectronics, Oxford Press
Graham Bell : Electronic Devices and Circuits, PHI
Donald A Neamen: Electronic Circuits Analysis and Design, TMH
S. Rama Reddy: Electronic Devices and Circuits, Alpha Science International Limited
Push pull Amplifier,

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	**SIGNAL AND SYSTEMS**	EC-10	Min "D"	Min "D"	5.0

SIGNAL AND SYSTEMS

Unit I Signals and Systems.

Signals: Classification of signals, Continuous-Time and Discrete-Time Signals, Periodic and Aperiodic, Even and Odd, Causal and Non-Causal, Deterministic and Random, Energy and power signals, Energy Theorem, Power Theorem, Cross-correlation, auto-correlation, ESD, PSD, Singularity Functions.

Systems: Classification of System and Basic System Properties, System with & without memory, invertibility & inverse system, Causality, Stability, Time-Invariance, Linearity.

LTI system: Response, Convolution Integral, Properties & Eigen Function of LTI system, System described by difference and differential equation.

Unit II Fourier analysis of Signals

Fourier series: Fourier series representation of Continuous-Time periodic signals, convergence & properties of Continuous-Time Fourier series, Fourier series representation of Discrete-Time periodic signals, properties of Discrete-Time Fourier series, Fourier series and LTI systems

Fourier transforms: Representation of Aperiodic signals, Continuous-Time Fourier transform, Discrete-Time Fourier transform, Spectrum plot, Fourier transform of periodic signal, Properties and Applications of Fourier transform(Hilbert transform), Frequency Response of LTI Systems.

Unit III Sampling

Sampling theorem, Reconstruction of original signals from its samples, Alising, Anti-alising, Interpolation, Sample & Hold Circuit, Multirate Sampling, Sampling of band-pass signals, Discrete-time processing of Continuous-time Signals, Sampling of discrete time signals.

Unit IV Z-Transform

Z-Transform, Region of Convergence, Inverse Z-Transform, Properties of Z-Transform, Applications of Z-Transform, Analysis and Characteristic of LTI Systems using Z-Transform, System Function Algebra and Block Diagram Representation, Unilateral Z-Transform.

Unit V Laplace Transform

Laplace transform, Region of Convergence, Inverse Laplace Transform, Properties of Laplace Transform, Applications of Laplace Transform, Laplace Transform of Some Common Signals, Unilateral Laplace transform, Relation between different transforms.

Reference books:

1. Oppenheim, Willsky and Nawab: Signals and Systems, PHI
2. Simon Haykins, B.V.Vean: signals and systems, John Wiley & Sons, Inc.
3. H. P. Hsu: Schaum's Outline of Signals & Systems, MGH
4. David McMahon: Signals and Systems demystified, MGH
5. B.P.Lathi: Linear Systems & Signals, Oxford Series

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	**DIGITAL CIRCUITS & SYSTEM**	EC-06	Min "D"	Min "D"	5.0

DIGITAL CIRCUITS & SYSTEM

Unit I

Boolean algebra and switching function: Minimization of switching function. Concept of prime implicant etc. Karnuagh's map method, Quine & McCluskey's method, cases with don't care terms and multiple output, switching function, introduction to logic gates NAND, NOR realization of switching function.

Unit II

Design and analysis of combinational circuits : Design and analysis of code convertor. half – adders, half-subtractor, full adders, fullsubtractor circuits. Series & parallel adders and BCD adders. look-ahead carry generator and adders. Decoders, Encoders, multiplexers & demultiplexers. Designing of combinational circuits with ROM and PLA.

Unit III

Specification of sequential system: Characterizing equation & definition of synchronous sequential machines Realization of State table from verbal description , Mealy and moore machines state table and transition diagram. Minimization of the state table of completely specifies sequential machines.

Unit IV

Design and Analysis of sequential circuits: Design and analysis of registers, synchronous & asynchronous counters etc. introduction to asynchronous sequential machines. Races and hazards.

Unit V

Algorithmic state machine: Controllers and data system designing.

Books:

i) W. H. Gothman, "Digital Electronics" (PHI)
ii) R.J. Tocci, "Digital System Principles & Application"
iii) Z. Kohair (TMH), "Switching & Automata Theory"
iv) M. Mano (PHI) "Digital Logic & Computer Design"
v) M. Mano (PHI) "Digital Design".

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	**LINEAR CONTROL THEORY**	EC-12	Min "D"	Min "D"	5.0

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.

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	
B.E/PTDC	**ELECTROMAGNETIC THEORY**	EC-14	Min "D"	Min "D"	5.0

ELECTROMAGNETIC THEORY

UNIT I Coordinate systems and transformation: Cartesian coordinates, circular cylindrical coordinates, spherical coordinates .Vector calculus: Differential length, area and volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector .Green's and Stoke's theorem, Laplacian of a scalar.

UNIT II Electrostatics: Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses' Law – Maxwell's equation, Electric dipole and flux lines, energy density in electrostatic fields. Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, dielectric constants, continuity equation and relaxation time, boundary condition. Electrostatic boundary value problems: Poisson's and Laplace's equations, general procedures for soling Poisson's or Laplace's equations, resistance and capacitance, method of images.

UNIT III Magnetostatics: Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, Maxwell's equation, application of ampere's law, magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential.

Magnetic forces, materials and devices: Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy.

UNIT IV Waves and applications: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, displacement current, Maxwell's equation in final form. Electromagnetic wave propagation: Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plain waves in good conductors, power and the pointing vector, reflection of a plain wave in a normal incidence.

Transmission lines: Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power, The Smith chart, Some applications of transmission lines.

UNIT V Radiation, EMI and EMC: Retarded Potentials and concepts of radiation, Radiation from a small current element. Radiation resistance**:** Introduction to Electromagnetic Interference and Electromagnetic compatibility, EMI coupling modes, Methods of eliminating interference, shielding, grounding, conducted EMI, EMI testing: emission testing, susceptibility testing.

Text Book:

1. Hayt, W.H. and Buck, J.A. 'Engineering Electromagnetics Tata McGraw Hill Publishing Co. Ltd., New Delhi Seventh edition.
2. Jordan E.C. and Balmain K.G. 'Electromagnetic' wave and radiating systems. PHI Second edition.
3. Krauss J. D. 'Electromagnetics ' Tata McGraw Hill Fifth edition.
4. Ramo S, Whinnery T.R. and Vanduzer T, 'Field and Waves in Communication electronics' John Wiely and Sons Third edition.
5. Elements of Engineering Electromagnetics, N.N. Rao, 5th Ed., PHI.
6. Electromagnetic Waves and Antennas: Collins: 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	
B.E/PTDC	**ELECTRONIC CIRCUITS LAB**	EC-16L	Min "D"	Min "D"	5.0

ELECTRONIC CIRCUITS LAB

List of Experiments (Expandable):

1) Design and Performance of transistor Amplifier in CE, CB and CC Configuration.
2) Design and Performance Evaluation of FET amplifier.
3) To Study & Measure the following Parameters of the Darlington pair Emitter Follower Amplifier.
   a) Voltage
   b) Phase relationship between i/p & O/P
   c) i/p & o/p Impedance
4) To Study the Operation of a Boot strap integrator.
5) To Study the Performance Characteristics of a Transformer Coupled Amplifier.
   a) To plot the frequency Response Curve
   b) To find the lower & upper cut off frequency & Find out the B W of the Amplifier.
6) To Study Push – Pull Amplifier using transistor.
7) To Study & Determine Gain & CMRR of Differential Amplifier.
8) To Study R C Phase Shift Oscillator & Calculate the frequency of Oscillation.
9) To Study L C Colpitt Oscillator & Calculate the frequency of Oscillation.
10) To Study L C Hartley Oscillator & Calculate the frequency of Oscillation.
11) To Study Wien's Bridge Oscillator & Calculate the frequency of Oscillation.

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

LINEAR CONTROL LAB

List of Experiments (Expandable)

(1) Time Response of second order system.

(2) Effect of feedback on servomotors.

(3) Determination of transfer function of A-C servomotor.

(4) Determination of transfer function of D-C servomotor.

(5) State space model for classical transfer function using MATLAB.

(6) Simulation of transfer function using operational amplifier.

(7) Characteristics of AC servomotor.

(8) Use of MATLAB for root loci and bode plots of type-1, type- 2 system.

(9) Study of lead and lag compensating networks.

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	**SIMULATION LAB**	EC-21L	Min "D"	Min "D"	5.0

SIMULATION LAB

List of Experiments (Expandable)

(1) Implementation of linear convolution sequence using MATLAB .

(2) Compensation N/W design through MATLAB simulation.

(3) Designing PID controller.

(4) Designing of amplifier using MAT LAB by measuring its Bandwidth and Rise Time.

(5) Designing of Hamming code, Encoder & Decoder.

(6) Performance analysis of CRO using simulink.

(7) Analysis & design of login gates using simulink by measuring propagation delay & Transmission delay.

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 EC	**DIGITAL CIRCUIT & SYSTEMS LAB**	EC-09L	Min "D"	Min "D"	5.0

DIGITAL CIRCUIT & SYSTEMS LAB

LIST OF EXPERIMENTS

1. To study the operation & working of various types of logic gets with the help of electronic kit.
2. To study of Binary Adder.
3. To study of Encoder & Decoder.
4. To study of multiplexer and demultiplexer.
5. Experiment on multivibrator, Astable, Bistable, Monostable.
6. Study of Binary subtractor.
7. Study of Analog to Digital convertor.
8. Study of Digital to Analog convertor.

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 (SEMINAR)**	EC-56L	Min "D"	Min "D"	5.0

PROFESSIONAL ACTIVITY (SEMINAR)

Objective – The aim of professional activity is to impart training in developing capabilities of students in expressing views on technical topics. Students can choose any topics related to electronics & communication branch theoretically or can fabricate practical working models on which lecture could be delivered . Practical working model demonstration in group is also permitted. Model fabrication under the professional activity shall be encouraged. Students who have visited, some technical places can also write & present report on it.

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	**SEMINAR & GROUP DISCUSSION**	EC-58L	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.