JABALPUR ENGINEERING COLLEGE, JABALPUR (M.P.)

Choice Based Credit System (CBCS)

Scheme of Examination w.e.f.

Bachelor of Engineering (Electronics & Telecommunaction Engineering)

SEMESTER III

S.No	Subject Category	Subject Code	Subject Name	Maximum Marks Allitted									Hours / Week			Tota Credi
				Theory						Practical						
				TESE End Sem	Minor I	CT Minor II	Quiz	Assignments / Tutorials	TTA Problem Solving	PESE End Sem	PLW Lab Work	Viva Voce / Assignments	L	T	P	
1	EAS	EC-231	MATERIAL SCIENCE	60	10	10	5	5	10				3	1		4
2	DC	EC-232	SIGNALS & SYSTEMS Signals & Systems	60	10	10	5	5	10				3	1		4
3	DC	EC-233	NETWORK ANALYSIS & SYNTHESIS	60	10	10	5	5	10	10	20	20	3	0	2	4
4	DC	EC-234	MEASURMENTS & INSTRUMENTATION	60	10	10	5	5	10	10	20	20	2	1	2	4
5	DC	EC-235	ELECTRONIC DEVICES & CIRCUITS	60	10	10	5	5	10	10	20	20	2	1	2	4
6	HU	HU-236	COMMUNICATION SKILLS	60	10	10	5	5	10	10	20	20	1		2	2
7		EC-237	IDEA GENERATION									50			4	2
8		EC-238	LEARNING THROUGH EXPERTS											2	0	2
			TOTAL	360	60	60	30	30	60	40	80	130	14	6	12	26

L : Lecture T : Tutorial P : Practical

Note :

1 End Sem Theory Exam Min.Pass Marks 19 out of 60 and,4out of 10 for Practical Exam

2 For ' Idea Generation ', Learning through Experts';there will be no examination and credits will be awarded only on the basis of internal assessment.

3 fFor Material Science , 60% content will be common to all disciplines and 40% content will be based on parent discipline.

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COURSE CONTENT & GRADE (w.e.f. July 2016)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE III	MATERIALS SCIENCE	EC-231	Min "D"	Min "D"	5.0

MATERIALS SCIENCE

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.

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.

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.

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,

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

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Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC III	SIGNALS AND SYSTEMS	EC-232			

SIGNALS AND SYSTEMS

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, Crosscorrelation, 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.

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.

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.

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.

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

Corrected copy

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COURSE CONTENT & GRADE (w.e.f. July 2016)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE III	NETWORK ANALYSIS & SYNTHESIS	EC-233	Min "D"	Min "D"	5.0

Network Analysis & Synthesis

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.

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.

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.

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.

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

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Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE III	MEASURMENT & INSTRUMENTATION	EC-234	Min "D"	Min "D"	5.0

MEASURMENT & INSTRUMENTATION

Qualities of measurement – Performance characteristics, Static characteristics, Error in measurement, Types of static error, Sources of error, Dynamic Characteristics, Statistical Analysis, Standard.

Measurements of Current, Voltage, Power and Impedance - DC and AC Ammeter, DC Voltmeter-Chopper type and solid-state, AC voltmeter using Rectifier, Average, RMS, Peak Responding voltmeters, Ohm-meter, Shunt type Ohmmeter, Power meter, Bolometer and Calorimeter.

Cathode Ray Oscilloscope (CRO): Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration, Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROs-Multi input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital) Oscilloscope.

AC Bridges: Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), Wein bridge, Wagner earth detector, Impedance measurement by Q-meter.

Non-Electrical Quantities (Transducer): Classification of Transducers, Strain gauge, Displacement Transducer- Linear Variable Differential Transformer (LVDT) and Rotary Variable Differential Transformer (RVDT), Temperature Transducer - Resistance Temperature Detector (RTD), Thermistor, Thermocouple, Piezo-electric transducer, Optical Transducer-Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor, Nuclear Radiation Detector.

Wave Analyzer (Frequency selective and Heterodyne), Harmonic Distortion Analyzer, Spectrum Analyzer, Signal and Function Generators, Sweep Frequency Generator, Pulse and Square Wave Generator, Beat Frequency Oscillator.

Digital Measurement and Instruments: Advantages of Digital Instrument over Analog Instrument, 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.

Textbooks:

1. Instrumentation and Measurements: A. K. Sawhney
2. Modern Electronic Instrumentation and Measurement Techniques: Helfric and Cooper
3 Electronic Instrumentation: H. S. Kalsi

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COURSE CONTENT & GRADE (w.e.f. July 2016)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE III	ELECTRONIC DEVICES & CIRCUITS	EC-235	Min "D"	Min "D"	5.0

ELECTRONIC DEVICES & CIRCUITS

JUNCTION DIODE

Fabrication techniques of P-N Junctions, unsymmetrical junctions, open circuit P-N Junction, energy band diagram of an open circuit P-N junction, voltage current relationship of P-N junction diode, Diode resistance, The current components in an P-N junction diode, diode characteristic and its temperature dependence, Junction capacitances, junction diode switching times.

DIODE CIRCUITS

Diode as a circuit element, Piece-wise linear model, Load line concept, P-N junction diode as a Rectifier, Half wave rectifier ,Full-wave rectifier-Center-tapped and Bridge rectifier, Analysis of filters with Rectifiers- L,C,LC & Pi Filters, Voltage Multipliers, Clipper circuits - series and parallel clipper circuits , Clamper circuits - positive and negative clamper circuits , Comparators.

JUNCTION TRANSISTORS – BJT- Transistor fabrication techniques, Basic transistor operation, Transistor biasing, Current components in a transistor, Current amplification factors, Relationship between α and β, Base spreading resistance, Ebers –moll model, Transistor circuit configuration, Common Base Configuration ,Early effect and Base width Modulation, Common Emitter Configuration, Common Collector Configurations, Comparison of Characteristics of transistors in different Configurations, Transistor as an amplifier ,Transistor load lines, Transistor Maximum Ratings.

JUNCTION FIELD -EFFECT TRANSISTOR – FET-Junction Field - Effect transistor (JFET), Static Characteristics curves of FET, The pinch-off voltage(Vp),Volt ampere characteristics of JFET, FET as a Voltage dependent resistor, Metal-Oxide Semiconductor FET (MOSFET), Enhancement MOSFET(n-Channel, p-Channel), Depletion type MOSFET (n-Channel, p - Channel),Gate Protection in MOSFET, Symbols & Small Signal Models of JFET & MOSFET, Comparison of JFETs & MOSFETs,

SPECIAL SEMICONDUCTOR DEVICES-Thermistors, Sensistors, & Barretters, Gunn- Effect, Breakdown Diode, IMPATT & TRAPATT Devices, PIN Diode, Backward Diode, Schottky Diode, Tunnel Diode, Light Absorption Photoconduction ,Photoconductive Devices- Photoconductive cells & Photodiodes, Photovoltaic effect and Solar cells, Light emitting diode(LED), Thyristors- SCR,TRAIC,DIAC,SCS, Unijunction Transistor, Principle of Operation, Characteristic & Applications.

Text Books:

1. Integrated Electronics: Milman J. and Halkias
2. Microeletronics Circuits: Sedra A.S . and Smith K.C.
3. Electronic Devices & cicuit Theory: Boylestad R. and Nashelsky L.
4. Pulse Digital and Switching Waveforms: Milliman J. and Taub H.
5. Electronic Circuits – Analysis and Design: Neamen
6. Electronic Circuits: Schilling D. L. and Belove C.

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COURSE CONTENT & GRADE (w.e.f. July 2016)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE III	COMMUNICATION SKILL	CHU-236	Min "D"	Min "D"	5:0

COMMUNICATION SKILL

Max:60

Course Objectives:

- **Student will be able to learn and understand the four major Skills of Communication i.e. LSRW (Listening, Speaking, Reading and Writing)**
- **Student will be able to write effective job application to show employers that they deserve to be shortlisted for an interview**
- **Student will be able to meet high professional expertise with the help of much developed written and communication skills**
- **Students' comprehension skills will be enhanced.**

Constituents of Technical Communication: Fundamental of Grammar usage, Requisites of Sentence Construction, Proper Use Tenses, antonyms, idioms and phrases, synonyms, homophones; The art of Condensation, Paragraph Development Techniques, Writing Bibliography and References

Basics of Technical Communication: Distinction between Technical and General Communication, Flow of Communication, 7 C's of Effective Communication, Overcoming the Barriers to Communication, Role of Feedback in communication.

Listening and Reading Skills for Effective Communication: Importance of Listening in Communication, Difference between Listening and Hearing, Types of Listening. Techniques of Reading, SQ3R, Proof Reading.

Developing Oral Communication: Interpersonal Communication, Facilitators and Impediments of interview and Group Discussion, Presentation Strategies: Defining Purpose, Organizing Contents, Preparing Outline, Audio-Visual Aids, Nuances of Delivery, Importance of Paralanguage and Kinesics in Communication, Audience Awareness, Setting and Achieving Goals

Written Communication: Writing Curriculum Vitae, Letter and Cover Letter and job Application; Letter Components and Layouts, Principles of Effective Letter Writing, E-mail etiquettes, Notice Agenda and Minutes, Writing Proposals: Nature and Significance, Types of Proposals, Parts of a Formal Proposal; a brief recap of Formats of Report Writing.

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