Jabalpur Engineering College, Jabalpur
Semester IV Credit Based Grading System (CBGS) w.e.f. July 2017
Scheme of Examination
Bachelor of Engineering B.E. (Electronics & Telecommunication Engineering)
Subject wise distribution of marks and corresponding credits
Scheme of Examination w.e.f. July-2017 (Academic Session-2017-18)

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted					Total Marks	Hours / week.			Total Credits	Total Marks
			Theory			Practical							
			End Sem	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work		L	T	P		
1	MA4201	Mathematics-III	70	20	10	-	-	100	3	1	-	4	
2	EC4002	Analog Communication	70	20	10	30	20	150	3	1	2	6	
3	EC4003	Analog Integrated Circuits	70	20	10	30	20	150	3	1	2	6	
4	EC4004	Electronic Instrumentation	70	20	10	30	20	150	3	1	2	6	
5	EC4005	Electromagnetic Theory	70	20	10	-	-	100	3	1	-	4	
6	EC4006	Departmental Lab-I (Departmental Choice) Electronic workshop	-	-	-	30	20	50	-	-	2	2	
7	EC4007	Programming Tools (Departmental Choice) (Internal Assessment) MAT Lab	-	-	-	-	50	50	-	-	2	2	
8	EC4008	Professional Ethics/ Security and Regulation act (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
		Total	350	100	50	120	180	800	15	5	12	32	800

MST: Minimum of two mid semester tests to be conducted.

L: Lecture   **T: Tutorial**   **P: Practical**

- **Students have to go for Industrial Training /Internship of 4 weeks at the end of IV Semester.**

Dr. SHAILJA SHUKLA

DEAN

Academics

Jabalpur Engineering College

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B.E. (CBGS) IV SEMESTER
ELECTRONICS & TELECOMMUNICATION ENGINEERING
MATHEMATICS- III

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Mathematics- III	MA4201	Min. "D"	Min. "D"	5.0

Unit-I:

Fourier integrals, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms and their elementary properties, Convolution theorem, Applications of Laplace and Fourier transformations to solve the Boundary value problems.

Unit-II:

Hankel and Mellin transformations. Their elementary properties. Wavelet Transforms, CWT, Properties of CWT, Z – transform and inverse Z-transform of elementary functions, Shifting theorems, convolution theorem, Initial and final value theorem, Applications of Hankel and Mellin transformations to solve the Boundary value problems.

Unit -III:

Vector space and Linear transformation: Some basic concepts, Vector space, General properties of vector spaces, Vector subspaces, Linear combination, finite dimensional vector space, Linearly dependent and independent vectors, Basis, Linear and Direct sum of two sub spaces.
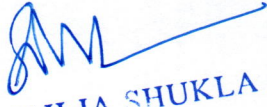
Unit -IV:

Analytic functions, Cauchy Reimann equations in Cartesian and polar coordinates, harmonic and conjugate harmonic functions.Complex integration, line integral, Cauchy's integral theorem, Cauchy integral theorem, Residue theorem, evaluation of simple real integrals, Taylors and Laurent series.

Unit -V:

Conformal mappings, mappings of elementary functions, Bilinear transformations, Joukvowaski's transformation, Schwarz - Christoffel transformation. Basic concepts of reliability, failure law, Evaluation of reliability of a component from test data, system reliability, Components in series and parallel, Redundancy.

Books Reference:

1. Advanced Engineering mathematics by E. Kreyszig John Willey & Sons
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Numerical Methods in Engineering and science by B.S. Grewal, Khanna Publishers .
4. Higher Engineering Mathematics by B.V. Ramana TMH.
5. Numerical Methods by E. Balagurusamy, Tata Mc Graw- Hill Publishing CompanyLtd., New Delhi.

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DEAN
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B.E. (CBGS) IV SEMESTER
ELECTRONICS & TELECOMMUNICATION ENGINEERING
ANALOG COMMUNICATION

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Analog Communication	EC4002	Min. "D"	Min. "D"	5.0

Unit – I:

Amplitude Modulation System : Representation of band pass signals, Frequency Translation, A Method of Frequency Translation, Recovery of Baseband Signal, Amplitude Modulation, Maximum Allowable Modulation, Spectrum of an Amplitude Modulated Signal, Generation and Detection of AM waves. Suppressed Carrier Systems (DSB-SC), Single Sideband Modulation, Vestigial Sideband Modulation, Comparison of various AM Systems, Frequency Division Multiplexing, AM Transmitter and AM Radio Broadcasting.

Unit-II:

Angle Modulation System : Angle modulation, Phase & Frequency Modulation, Relation between Phase & Frequency Modulation, Phase & Frequency Deviation, Spectrum of an FM Signal, Features of Bessel Coefficient, Narrowband FM, Wideband FM, Bandwidth of FM Signal, Effect of Modulation Index on Bandwidth, Phasor Diagram of FM signal, FM Generation and Detection, FM Radio Broadcasting.

Unit - III:

Random Variables: Random Variables, CDF, PDF, relation between CDF & PDF, Average Value of Random Variables, Variance of Random Variable, Tchebycheff's Inequality, Guassian Probability Density, Error Function, Rayleigh Probability Density, Correlation between Random Variables, Central Limit Theorem, Autocorrelation.

Unit –IV:

Random Processes: Description of Statistical Average, Stationary, Random Processes and Linear System, Power Spectrum of Stochastic Processes, Transmission over LTI System, Gaussian processes , White processes, Band limited Processes and Sampling, Band pass Processes.

Unit –V:

Effect of Noise on Analog Communication Systems: Effect of noise on a Baseband Signal, DSB-SC AM, SSB AM, and Conventional System, The PLL, Effect of Additive Noise on Phase Estimation, Threshold effect in Angle Modulation, Pre-Emphasis and De-Emphasis Filtering, Comparison of Analog Modulation System, Characterization of Thermal Noise Sources, Effective Noise Temperature and Noise Figure, Transmission Losses, Repeaters for Signal Transmission.

Reference Books:
1. H.Taub & D.L.Schilling: Principles of Communication System; TMH
2. Simon Haykins- Communication System; John Wiley
3. B P Lathi- Modern Digital and Analog Communication, Oxford University.
4. J.Prokis and Salehi- Communication Engineering System, Prentice Hall.
5. Hwie. P. Hsu- Schaum's Outline of Analog and Digital Communication

ANALOG COMMUNICATION LAB

List of Experiments (Suggested Exercise):

1. Study of AM, DSB – SC & SSB.
2. Study of AM Transmitter.
3. Study of AM receiver.
4. Study of FM Generation by Armstrong Method.
5. Study of FM Generation by Reactance Modulator.
6. Study of Super heterodyne receiver.
7. Study of Sampling Theorem and Reconstruction of Band limited signal

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Analog Communication

B.E. (CBGS) IV SEMESTER
ELECTRONICS & TELECOMMUNICATION ENGINEERING
ANALOG INTEGRATED CIRCUITS

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	**Analog Integrated Circuits**	**EC4003**	**Min. "D"**	**Min. "D"**	**5.0**

Unit –I:

Integrated Circuit Fabrication: Introduction, Classification, IC Chip Size and Circuit Complexity, Fundamentals of Monolithic IC Technology, Basic Planar Processes, Fabrication of a Typical Circuit, Active and Passive Components of ICs, Fabrication of FET, Thin & Thick Film Technology

Unit -II:

Operational Amplifier: Ideal Operational amplifier, Operational Amplifier Internal Circuit, FET Operational Amplifier, Operational amplifier DC Characteristics : Input bias Current, Input offset Current, Input offset Voltage, Thermal Drift, Operational amplifier AC Characteristics : Frequency Response, Stability of an OP-AMP, Frequency Compensation (External & Internal), Slew Rate.

Unit- III:

Basic Operational Amplifier Applications: Instrumentation amplifier, AC amplifier, Voltage to current and current to Voltage Converter, Op-amp circuits using diodes, Sample and hold circuits ,Log & antilog amplifier Multiplier & Divider, Differentiator, Integrator, Electronic Analog Computation, Operational Tran conductance Amplifier(OTA).

Unit- IV:

Comparator: Regenerative Comparator (Schmitt Trigger), Square Wave generator (Astable Multivibrator), Mons table Multi vibrator, Triangular Wave Generator, Basic Principle of Sine Wave Oscillators,

Voltage Regulator: Series OP-AMP Regulator, IC Voltage Regulators, 723 General Purpose Regulators, Switching Regulator,

Active Filters: RC Active filters, Transformation, State variable filter, Switched capacitor filters, Active filters using OTA's.

Unit -V

IC 555 Timers: Description of Functional Diagram, Monostable Operation, Astable Operation, Schmitt Trigger,

Phased- Locked Loops: Basic Principles, Phase Detector /Comparator, Voltage Controlled Oscillator (VCO), Low Pass Filter, Monolithic Phase- Locked Loop, PLL Applications.

D-A & A-D Converters: Basic DAC Techniques, A-D Converters.

Reference Books:

1. Millman and Halkias : Integrated Electronics, TMH
2. Gayakwad: OP-AMP and Linear Integrated Circuits, Pearson Education
3. D. Roy Choudhury and Shail B. Jain: Linear Integrated Circuits, New Age
4. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, PHI
5. Sedra and Smith : Microelectronics, Oxford Press
6. Graham Bell : Electronics Devices and Circuits, PHI
7. Donald A Neamen: Electronic Circuits Analysis and Design, TMH
8. S. Rama Reddy: Electronic Devices and Circuits, Alpha Science International Limited

ANALOG INTIGRATED CIRCUITS LAB

List of experiments (Expandable):

1. Design and Performance of IC Voltage Regulator.
2. Wave form of Mono sable, Bi stable
3. Design and Performance Evaluation of FET amplifiers.
4. Application of Integral & Differential amplifier
5. To Design and Construct a shunt and series Regulator and find line and load regulation
6. Study of switching regulator
7. Study of General purpose regulator
8. Study of Schmitt trigger
9. Study and characteristics of Op-AMP
10. Design and assembling of Op-AMP based ckts.

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Analog Integrated Circuits

B.E. (CBGS) IV SEMESTER
ELECTRONICS & TELECOMMUNICATION ENGINEERING
ELECTRONIC INSTRUMENTATION

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Electronic Instrumentation	EC4004	Min. "D"	Min. "D"	5.0

Unit-I:

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.

Unit-II:

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.

Unit-III:

AC Bridges: Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), We in 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.

Unit – IV:

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.

Unit-V: Digital Measurement and Instruments:

Advantages of Digital Instrument over Analog Instrument, Digital-toanalogconversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, Weighted converter using Op-ampand 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.

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

ELECTRONIC INSTRUMENTATION LAB

List of Experiments (Expandable):
1. Study of CRO and Function Generator.
2. Displacement measurement by LVDT.
3. Force measurement by strain gauge.
4. Measurement of Capacitor, Self-induction using Q-meter.
5. Temperature measurement by the mister, RTD and thermocouple.
6. Optical Transducer- Photo conductive, Photo voltaic, Photo-diode, Photo-Transistor
7. Designee of digital to analog converter.
8. PLC operation and applications (for example: relay, timer, level, traffic light

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B.E. (CBGS) IV SEMESTER
ELECTRONICS & TELECOMMUNICATION ENGINEERING
ELECTROMAGNETIC THEORY

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Electromagnetic Theory	EC4005	Min. "D"	Min. "D"	5.0

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 :

Magneto statics: 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 loss 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.

Reference Books:

1. Hayt, W.H. and Buck, J.A. 'Engineering Electromagnetic Tata McGraw Hill Publishing
2. Co. Ltd., New Delhi Seventh edition.
3. Jordan E.C. and Bal main K.G. 'Electromagnetic' wave and radiating systems. PHI
4. Second edition.
5. Krauss J. D. 'Electromagnetic ' Tata McGraw Hill Fifth edition.
6. Ramo S, Whinnery T.R. and Vanduzer T, 'Field and Waves in Communication
7. Electronics' John Wiely and Sons Third edition.
8. Elements of Engineering Electromagnetic, N.N. Rao, 5th Ed., PHI.
9. Electromagnetic Waves and Antennas: Collins: TMH.

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B.E. (CBGS) IV SEMESTER
ELECTRONICS & TELECOMMUNICATION ENGINEERING
DEPARTMENTAL LAB-I (DEPARTMENTAL CHOICE)
ELECTRONIC WORKSHOP

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Departmental Lab-I (Departmental Choice) Electronic workshop	EC4006	Min. "D"	Min. "D"	5.0

List of Experiments:

1. Identify various electronics component
2. Measurement and verification of values of resistances.
3. Study of operation of CRO.
4. Study of operation of DSO.
5. Measurement of current and values in series and parallel circuits.
6. Designing of power supply.
7. Designing of circuit for LED glowing.
8. Designing of circuit for As table multi vibrator.
9. Designing of circuit for Monostablemultivibrator.
10. Designing of circuit for Bistablemultivibrator.
11. Designing of circuit for Clipper.
12. Designing of circuit for Clamper.
13. Designing of circuit for Half wave rectifier.
14. Designing of circuit for Full wave rectifier.
15. Designing of circuit for Bridge rectifier.
16. Designing of circuit for voltage multiplier.
17. Designing of circuit for Half Adder.
18. Designing of circuit for Full Adder.
19. Designing of circuit for AND gate using NAND and NOR gate.
20. Designing of circuit for AND gate using NAND and NOR gate.

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