Bachelor of Technology (Electronics and Communication Engg.)
Scheme of Courses/Examination
(4th SEMESTER

Course No.	Course Title	Nature of subject	No of Student enrolled	Dept. offering the subject	Weekly Load (Hours)		
		Compulsory(C) Elective (E)			L*	T*	P*
MATH- 201E / HUM-201E	Mathematics III / Basics of Industrial Sociology, Economics & Management.	C	66	Applied Sciences Humanities	3	1	1
MAT-204E	Computational Techniques	C	66	Computers	3	1	1
ECE-202E	Electronics Instrumentation & Measurements	C	66	Electronics	3	1	1
ECE-204E	Digital Electronics	C	66	Electronics	3	1	1
EE-208E	Signals & Systems	C	66	Electronics	3	1	1
ECE-206E	Fields & Waves	C	66	Electronics	3	1	1
ECE-208E	Electronics Measurements Lab.	C	66	Electronics	-	-	-
ECE-210E	Digital Electronics Lab.	C	66	Electronics	-	-	-
MAT-206E	Computational Techniques Lab.	C	66	Computers	-	-	-
				Total	18	6	6

4th Semester

4th Semester

MATH-201 E **MATHEMATICS - III**

L	T	P
3	1	-

Theory	:	100 Marks
Sessional	:	50 Marks
Total	:	150 Marks
Duration of Exam	:	3 Hrs.

UNIT – I

Fourier Series: Euler's Formulae, Conditions for Fourier expansions, Fourier expansion of functions having points of discontinuity, change of interval, Odd & even functions, Half-range series.

Fourier Transforms : Fourier integrals, Fourier transforms, Fourier cosine and sine transforms. Properties of Fourier transforms, Convolution theorem, Perseval's identity, Relation between Fourier and Laplace transforms, Fourier transforms of the derivatives of a function, Application to boundary value problems.

UNIT-II

Functions of a Complex Variables : Functions of a complex variable, Exponential function, Trigonometric, Hyperbolic and Logarithmic functions, limit and continuity of a function, Differentiability and analyticity.

Cauchy-Riemann equations, Necessary and sufficient conditions for a function to be analytic, Polar form of the Cauchy-Riemann equations, Harmonic functions, Application to flow problems, Conformal transformation, Standard transformations (Translation, Magnification & rotation, inversion & reflection, Bilinear).

UNIT-III

Probability Distributions : Probability, Baye's theorem, Discrete & Continuous probability distributions, Moment generating function, Probability generating function, Properties and applications of Binomial, Poisson and normal distributions.

UNIT-IV

Linear Programming : Linear programming problems formulation, Solution of Linear Programming Problem using Graphical method, Simplex Method, Dual-Simplex Method.

Text Book

1. Higher Engg. Mathematics : B.S. Grewal
1. Advanced Engg. Mathematics : E. Kreyzig

Reference Book

1. Complex variables and Applications : R.V. Churchil; Mc. Graw Hill
2. Engg. Mathematics Vol. II: S.S. Sastry; Prentice Hall of India.
3. Operation Research : H.A. Taha
4. Probability and statistics for Engineer : Johnson. PHI.

Note : Examiner will set eight question, taking two from each unit. Students will be required to attempt five questions taking at least one from each unit.

4th Semester

COMPUTATIONAL TECHNIQUES

(MAT-204E)

L	T	P		
3	1	-	THEORY	: 100 Marks
			SESSIONAL	: 50 Marks
			TOTAL	: 150 Marks
			TIME	: 3Hrs.

Part – A

1. Matrix Inversion: -
Gauss Elimination Method, Gauss Jordan Method, Crout's Method, Doolittle Method, Choleski's Method, Improvement in the accuracy of an inverse, The Escalator Method for Matrix Inversion, Inverse of a complex matrix.

2. Operational Research: -
Linear Programming Problems formulation, Solving linear programming problems using Graphical Method, Simplex Method, Dual Simplex Method.

Part –B Numerical Methods with Programming in Language 'C'

3. Numerical Solution of Algebraic & Transcendental equation: -
Bisection Method, Regula Falsi Method, Newton Raphson Method, Secant Method, Convergence of Secant Method, Rate of Convergence of Newton's Method & Condition of Convergence of Newton Raphson's Method.

4. Solution of Simultaneous Equations: -
Crout's Triangularisation Method, Jacobi's Iteration Method, Gauss Seidal Iteration Method, Relaxation Method, Newton's Method for Non Linear System of equation & Iterative Methods.

5. Numerical Solution of Ordinary Differential Equation: -
Picard's Method, Euler's Method, Modified Euler Method, Euler's improved Method, Runge-Kutte Method, Milne's & Adams-Bashforth Predictor-Corrector Method.

Part – C

6. Finite Differences: -
Difference Operators, Newton Forward & Backward Interpolation formula, Gauss central difference formulae, Bessel & Stirling formulae, Lagrange's & Newton Divided Difference, Interpolation formula for unequal intervals, Numerical Differentiation, Numerical Integration – Trapezoidal rule, Simpson's $1/3^{rd}$ Rule & $3/8^{th}$ rule, Weddle's Rule.

7. Difference Equations: -
Formation of Difference Equation, Solution of Linear Difference Equations.

NOTE:
Question paper is to be set in three parts taking at least two questions from each part of the syllabus. There will be a total of eight questions in all. Students will be required to attempt five questions selecting at least one question from each part.

Books Recommended: -

1. Numerical Methods for Scientific & Engineering Computation by M K. Jain, R.K. Jain, S.R.K. Iyengar, New Age Publications.
2. Numerical Analysis By Goel & Mittal, Pragati Prakashan.
3. Higher Engg. Mathematics by B. S. Grewal.
4. Mathematical Analysis in Engg. By Cang C. Mai
5. Numerical Mathematical Analysis by James B. Scarborough.

4th Semester

ELECTRONICS INSTRUMENTATION AND MEASUREMENTS (ECE-202E)

L	T	P
3	1	-

THEORY : 100 Marks
SESSIONAL : 50 Marks
TOTAL : 150 Marks
TIME : 3Hrs.

UNIT-I:
MEASUREMENT AND ERROR: Functional elements arid generalized configuration of a measuring Instrument, Characteristics of instruments, errors in measurements and their statistical analysis.
MEASUREMENT OF RESISTANCE: Wheat stone bridge, Carey-Foster Bridge, Kelvin double bridge, Measurement of Insulation resistance.

UNIT-II:
A-C BRIDGES: Maxwell Inductance bridge. Maxwell Inductance Capacitance Bridge, Anderson's Bridge, Hay's Bridge, De-Sauty's Bridge, Schering's bridge and Wein's bridge.
VOLTAGE INDICATING AND RECORDING DEVICES: Analog voltmeters and Potentiometers, Self balancing potentiometer and X-Y recorders, Galvanometers - Oscillographs, Cathode - Ray Oscilloscopes, Magnetic Tape Recorders.

UNIT-III:
ELECTRONIC INSTRUMENTS: Wave analyzer, Distortion meter: Q-meter. Measurement of Op-Amp parameters.
DIGITAL INSTRUMENTS: Digital Indicating Instruments, Comparison with analog type, digital display methods, digital methods of time and frequency measurements, digital voltmeters.

UNIT-IV:
TRANSDUCERS: Classification of Transducers, Strain Gauge, Displacement Transducers - Capacitive Transducers, LVDT, Piezo-electric Transducers, Temperature Transducers - resistance thermometer, Thermocouples and Thermistors, Liquid level measurement Low pressure (vacuum) measurement.
DATA ACQUISITION SYSTEMS: A to D and D to A converters, Analog and Digital Data Acquisition Systems, Multiplexing, Spatial Encoders, Telemetry.

TEXT BOOK:
A Course in Electrical and Electronics Measurements and Instrumentation: A.K. Sawhney; Dhanpat Rai & Sons.

REFERENCE BOOKS:

1. Electronics Instrumentation and Measurement Techniques: Cooper W.D & Helfrick A.D.; PHI
2. Doeblin E.O., Measurement Systems: Application & Design, Mc Graw Hill.

NOTE:
Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all.

4th Semester

DIGITAL ELECTRONICS
(ECE-204E)

L	T	P
3	1	-

THEORY	:	100	Marks
SESSIONAL	:	50	Marks
TOTAL	:	150	Marks
TIME	:	3 HRS	

UNIT 1 FUNDAMENTALS OF DIGITAL TECHNIQUES:
Digital signal, logic gates: AND. OR, NOT. NAND. NOR- EX-OR, EX-NOR, Boolean algebra. Review of Number systems. Binary codes: BCD, Excess-3. Gray codes.

COMBINATIONAL DESIGN USING GATES:
Design using gates. Karnaugh map and Quine Mcluskey methods of simplification.

UNIT 2 COMBINATIONAL DESIGN USING MST DEVICES
Multiplexers and Demultiplexers and their use as logic elements. Decoders. Adders / Subtracters. BCD arithmetic Circuits. Encoders. Decoders / Drivers for display devices.

SEQUENTIAL CIRCUITS:
Flip Flops: S-R- J-K. T. D, master-slave, edge triggered- shift registers, sequence generators. Counters. Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

UNIT 3 DIGITAL LOGIC FAMILIES:
Switching mode operation of p-n junction, bipolar and MOS-devices. Bipolar logic families: RTL, DTL, DCTL. HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic. Interfacing of CMOS and TTL families.

UNIT 4 A/D AND D/A CONVERTERS:
Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for
D/A converters. A/D converters: Quantization, parallel -comparator, successive approximation, counting type.
Dual-slope ADC, specifications of ADCs.

PROGRAMMABLE LOGIC DEVICES:
ROM, PLA. PAL, Introduction to FPGA and CPLDs.

TEXT BOOK:
1. Modem Digital Electronics (Edition III): R. P. Jain; TMH

REFERENCE BOOKS:

1. Digital Integrated Electronics: Taub & Schilling: MGH
2. Digital Principles and Applications: Malvino & Leach: McGraw Hill.
3. Digital Design: Morris Mano: PHI,

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

4th Semester

EE-208-E **SIGNAL AND SYSTEMS.**

L	T	
3	1	Theory: 100 Marks Sessional: 50 Marks Total : 150 Marks Time: 3 Hrs.

SIGNAL

UNIT-I

Types of signals:- Deterministic and Stochastic, periodic and a periodic, impulse functional sequences, analog and discrete, singular functions. Signal representation in terms of singular functions, orthogonal functions and their use in signal representation. Fourier series, Fourier and La-place transforms. Convolution theorem, geometrical interpretation and application.

UNIT-II

Probability concepts, random variable, pdf, cdf, moments, distributions, correlation functions. Characterization of stochastic signals.

Discretisation of analog signals – sampling, sampling theorem and its proof. Effect of under sampling, recovery of analog signals from sampled signal. Characterization of Discrete signals – in terms of impulse sequences, Z-transforms. Properties, inversion and applications of La-place, Fourier and Z-transforms.

SYSTEM

UNIT-III

Classification linear and non-linear, time invariant and time varying, Lumped and distributed. Deterministic and Stochastic. Casual and non causal, Analog and Discrete/Digital memory and memory less, 1 port and N – port, SISO, SIMO, MISO, MIMO.

UNIT-IV

System modeling in terms of differential, equations, state variables, difference equations and transfer functions.

Linear time invariant system properties, elementary idea of response determination to deterministic and stochastic signals. Concept of impulse response.

REF. BOOKS :

1. Fred J Taylor –"Principles of Signals and System", MGH.
2. Simon Haykins – "Signal & Systems", Wiley Eastern
3. A Papoulis – "Circuit and System" Modern Approach HRW

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.

4th Semester
FIELDS & WAVES
(ECE-206E)

L	T	
3	1	Theory: 100 Marks Sessional: 50 Marks Total : 150 Marks Time: 3 Hrs.

UNIT-1
ELECTRIC FIELD AND CURRENT

Coulomb's law. Electric field intensity, field due to a continuous volume charge distribution, field of a line charge, field of a sheet of charge, electric flux density, Gauss's law and applications, electric potential, the dipole, current density, continuity of current, metallic conductors, conductor properties and boundary conditions, the method of images, the nature of dielectric materials, boundary conditions for perfect dielectric materials, capacitance of two wire line, Poisson's and Laplace's equations, uniqueness theorem.

UNIT-II
MAGNETIC FIELD AND MAXWELLI EQUATION

Biot - Savart law. Ampere's law, magnetic vector potentials, force on a moving charge, differential current element, force and torque on a closed circuit, the boundary conditions, the magnetic circuit, potential energy and forces on magnetic materials.
Faraday's law, Maxwell's equations in point form and integral form Maxwell's equations for sinusoidal variations, retarded potentials.

UNIT-III
THE UNIFORM PLANE WAVE

Wave motion in free space and perfect dielectrics, plane waves in lossy dielectrics. The Poynting vector and power considerations, propagation in good conductors, skin effect, reflection of uniform plane waves, SWR.

UNIT-IV
TRANSMISSION LINES AND WAVEGUIDES

The Transmission line equations, graphical methods, Smith chart, time-domain and frequency-domain analysis. TE, TM, TEM waves, TE and TM modes in rectangular and circular waveguides, cut-off and guide wavelength, wave impedance and characteristic impedance, dominant modes, power flow in waveguides, excitation of waveguides, dielectric waveguides.

REFERENCES:

1 Jordan E C & Balmain K G, Electromagnetic Waves and Radiating Systems, PHI.
2 David K. Chang, Field and Waves Electromagnetics, Addison Wesley.
3 Hayt W H JR., Engineering Electromagnetics, Tata McGraw Hill, Fifth edition.

NOTE:
Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all.

4th Semester
ELECTRONICS MEASUREMENTS LAB
(ECE-208E)

L	T	P
-	-	3

Sessional : 50 Marks
Viva : 50 Marks
Total : 100 Marks
Time : 3hrs.

LIST OF EXPERIMENTS:

1. To measure the unknown Inductance in terms of capacitance and resistance by using Maxwell's Inductance bridge.
2. To measure unknown Inductance using Hay's bridge.
3. To measure unknown capacitance of small capacitors by using Schering's bridge.
4. To measure 3-phase power with 2-Wattmeter method for balanced and unbalanced bridge.
5. To measure unknown capacitance using De-Sauty's bridge.
6. To measure unknown frequency using Wein's frequency bridge.
7. To measure unknown low resistance by Kelvin's Double bridge.
8. To test the soil resistance using Meggar (Ohm meter).
9. To calibrate Energy meter using standard Energy meter.
10. To plot the B-H curve of different magnetic materials.
11. To calibrate the Voltmeter using Compton Potentiometer.
12. To convert the Voltmeter into Ammeter using Potentiometer.
13. Insulation testing of cables using Digital Insulation Tester.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all.

4th Semester
DIGITAL ELECTRONICS LAB
(ECE-210E)

LIST OF EXPERIMENTS:

1. Familiarization with Digital Trainer Kit and associated equipment.
2. Study of TTL gates AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
3. Design and realize a given function using K-Maps and verify its performance.
4. To verify the operation of Multiplexer and Demultiplexer.
5. To verify the operation of Comparator.
6. To verify the truth table of S-R, J-K, T, D Flip-flops.
7. To verify the operation of Bi-directional shift register.
8. To design and verify the operation of 3-bit asynchronous counter.
9. To design and verify the operation of asynchronous Up/down counter using J-K FFs.
10. To design and verify the operation of asynchronous Decade counter.
11. Study of TTL logic family characteristics.
12. Study of Encoder and Decoder.
13. Study of BCD to 7 segment Decoder.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all.

4th Semester

COMPUTATIONAL TECHNIQUES LAB
(MAT-206E)

L	T	P
-	-	3

Sessional : 50 Marks
Viva : 25 Marks
Total : 75 Marks
Time : 3hrs.

List of Experiments

§ The Source codes for the following problems are to develop by the students & results should be verified.

1. Solution of Non-Linear Equation in single variable using the method of successive Bisection.
2. Solution to non-linear equation in single variable using the Newton-Raphons method.
3. Solution to non linear equation in single variable using the Secant method.
4. Solution to a system of simultaneous algebraic equations using the Gaussian elimination procedure.
5. Solution to a system of simultaneous algebraic equations using the Gauss-Seidel iterative method.
6. Numerical solution to an ordinary differential equation using the Eulers method.
7. Numerical solution to an ordinary differential equation using the Range-Kutta Method.
8. Numerical solution to an ordinary differential equation using the Predictor Corrector Method.
9. Numerical Solution to the Laplace equation using the method of finite differences.
10. Solution to system of simultaneous equations using Gauss-Seidal iterative method employing the technique of successive relaxation**.**

NOTE:

At least eight experiments are to be performed from above list and the concerned institution as per the scope of the syllabus can set remaining two.