<table>
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<th>Course No.</th>
<th>Course Title</th>
<th>Nature of subject</th>
<th>No of Student enrolled</th>
<th>Dept. offering the subject</th>
<th>Weekly Load ( Hours )</th>
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<td>Elective (E)</td>
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<td>MATH-201E</td>
<td>Mathematics III / Basics of Industrial Sociology, Economics &amp; Management.</td>
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<td>MAT-204E</td>
<td>Computational Techniques</td>
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<td>Signals &amp; Systems</td>
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<td>ECE-206E</td>
<td>Fields &amp; Waves</td>
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**4th Semester**
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.

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

Reference Book
1. Complex variables and Applications : R.V. Churchil; Mc. Graw Hill
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)

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<th>L</th>
<th>T</th>
<th>P</th>
<th>THEORY : 100 Marks</th>
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<tr>
<td>3</td>
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<td>SESSIONAL : 50 Marks</td>
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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,

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 1/3rd Rule & 3/8th 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:
2. Numerical Analysis By Goel & Mittal, Pragati Prakashan.
4. Mathematical Analysis in Engg. By Cang C. Mai
4th Semester

ELECTRONICS INSTRUMENTATION AND MEASUREMENTS
(ECE-202E)

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

UNIT-I:
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.

UNIT-III:
DIGITAL INSTRUMENTS: Digital Indicating Instruments, Comparison with analog type, digital display methods, digital methods of time and frequency measurements, digital voltmeters.

UNIT-IV:
TRANSUDCERS: 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
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)

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

UNIT 1 FUNDAMENTALS OF DIGITAL TECHNIQUES:

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

UNIT 2 COMBINATIONAL DESIGN USING MST DEVICES

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:

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

TEXT BOOK:
REFERENCE BOOKS:
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


UNIT-II


SYSTEM

UNIT-III

Classification linear and non-linear, time invariant and time varying, Lumped and distributed. Deterministic and Stochastic. Casual and non casual, 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.  
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.

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.
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).
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.
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.
4. To verify the operation of Multiplexer and Demultiplexer.
5. To verify the operation of Comparator.
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.
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)

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List of Experiments

β 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-Raphsons 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.
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.