# KURUKSHETRA UNIVERSITY KURUKSHETRA
## SCHEME OF STUDIES AND EXAMINATION
### B.Tech.
#### ELECTRICAL ENGINEERING SEMESTER – III
**(2005-06)**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Marks of Sessional</th>
<th>Examination</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH-201-E/</td>
<td>Mathematics - III / Basics of</td>
<td>L 3 T 1 P 4 Total 4</td>
<td>50</td>
<td>Theory 100</td>
<td>-</td>
</tr>
<tr>
<td>HUM-201-E</td>
<td>Economics and Management</td>
<td></td>
<td></td>
<td>Practical -</td>
<td></td>
</tr>
<tr>
<td>*EE-201-E</td>
<td>Transmission and Distribution</td>
<td>L 3 T 1 P 4 Total 4</td>
<td>50</td>
<td>Theory 100</td>
<td>-</td>
</tr>
<tr>
<td>*EE-203-E</td>
<td>Network Analysis &amp; Synthesis</td>
<td>L 3 T 1 P 4 Total 4</td>
<td>50</td>
<td>Theory 100</td>
<td>-</td>
</tr>
<tr>
<td>EE-205-E</td>
<td>Analog Electronics</td>
<td>L 3 T 1 P 4 Total 4</td>
<td>50</td>
<td>Theory 100</td>
<td>-</td>
</tr>
<tr>
<td>EE-207-E</td>
<td>Electrical Machines-I</td>
<td>L 3 T 1 P 4 Total 4</td>
<td>50</td>
<td>Theory 100</td>
<td>-</td>
</tr>
<tr>
<td>EE-209-E</td>
<td>Electrical Measurements &amp; Measuring Instruments</td>
<td>L 3 T 1 P 4 Total 4</td>
<td>50</td>
<td>Theory 100</td>
<td>-</td>
</tr>
<tr>
<td>*EE-211-E</td>
<td>Electrical Measurements &amp; Measuring Instruments lab</td>
<td></td>
<td>25</td>
<td>Theory 25</td>
<td>25</td>
</tr>
<tr>
<td>EE-213-E</td>
<td>Analog Electronics Lab</td>
<td>L 2 T 2 P 2 Total 2</td>
<td>25</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td>EE-215-E</td>
<td>Electric Machines-I lab.</td>
<td>L 3 T 3 P 3 Total 3</td>
<td>25</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td>*EE-217-E</td>
<td>Network Analysis &amp; Synthesis Lab.</td>
<td>L 2 T 2 P 2 Total 2</td>
<td>25</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td>*EE-219-E</td>
<td>Electrical Workshop</td>
<td>L 2 T 2 P 2 Total 2</td>
<td>25</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>L 18 T 7 P 9 Total 35</td>
<td>425</td>
<td>600</td>
<td>125</td>
</tr>
</tbody>
</table>

*Common with all branches.*

Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
### KURUKSHETRA UNIVERSITY KURUKSHETRA
### SCHEME OF STUDIES AND EXAMINATION
### ELECTRICAL ENGINEERING SEMESTER - IV 2005-2006

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Sessional</th>
<th>Examination</th>
<th>Total Marks</th>
<th>Duration of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH-201-E/HUM-201-E</td>
<td>Mathematics - III / Basics of Industrial Sociology, Economics and Management</td>
<td>3 1 1 4 50 100</td>
<td>150</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE-202-E</td>
<td>Power generation &amp; Control</td>
<td>3 1 1 4 50 100</td>
<td>150</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE-204-E</td>
<td>Digital Electronics</td>
<td>3 1 1 4 50 100</td>
<td>150</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE-206-E</td>
<td>Communication Systems</td>
<td>3 1 1 4 50 100</td>
<td>150</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE-208-E</td>
<td>Signal &amp; System</td>
<td>3 1 1 4 50 100</td>
<td>150</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE-210-E</td>
<td>Electrical Machine -II</td>
<td>3 2 1 5 30 100</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE-212-E</td>
<td>Power System Lab. -I</td>
<td>- 2 2 25</td>
<td>25</td>
<td>50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EE-214-E</td>
<td>Electrical Machine Lab -II</td>
<td>- 3 3 25</td>
<td>25</td>
<td>50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EE-216-E</td>
<td>Signal &amp; System Lab</td>
<td>- 2 2 25</td>
<td>25</td>
<td>50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EE-218-E</td>
<td>Digital Electronics Lab</td>
<td>- 2 2 25</td>
<td>25</td>
<td>50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EE-220-E</td>
<td>Communication Systems Lab</td>
<td>- 2 2 25</td>
<td>25</td>
<td>50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>18 8 9 35 425 600</td>
<td>125</td>
<td>1150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Practical Training of 6 weeks duration during summer vacation, evaluation in V Sem.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
**FIFTH SEMESTER SCHEME OF EXAMINATION FOR B.TECH DEGREE COURSE**

**ELECTRICAL ENGINEERING (2005-06)**

<table>
<thead>
<tr>
<th>Course No</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Examination Schedule</th>
<th>Total Marks</th>
<th>Duration of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE-301-E</td>
<td>FIELDS &amp; WAVES</td>
<td>L 4 T 1 P D 1</td>
<td>T 5</td>
<td>Theory 100</td>
<td>50</td>
</tr>
<tr>
<td>EE-303-E</td>
<td>CONTROL SYSTEM</td>
<td>L 4 T 1 P D 1</td>
<td>T 5</td>
<td>Theory 100</td>
<td>50</td>
</tr>
<tr>
<td>EE-305-E</td>
<td>POWER ELECTRONICS-I</td>
<td>L 3 T 1 P D 1</td>
<td>T 4</td>
<td>Theory 100</td>
<td>50</td>
</tr>
<tr>
<td>EE-307-E</td>
<td>ANALOG ELECTRONIC CIRCUITS</td>
<td>L 3 T 1 P D 1</td>
<td>T 4</td>
<td>Theory 100</td>
<td>50</td>
</tr>
<tr>
<td>EE-309-E</td>
<td>ELECTRONIC MEASUREMENT &amp; INSTRUMENTS</td>
<td>L 3 T 1 P D 1</td>
<td>T 4</td>
<td>Theory 100</td>
<td>50</td>
</tr>
<tr>
<td>ECE-311-E</td>
<td>MICROPROCESSORS &amp; INTERFACING</td>
<td>L 3 T 2 P D 1</td>
<td>T 5</td>
<td>Theory 100</td>
<td>50</td>
</tr>
<tr>
<td>EE-311-E</td>
<td>CONTROL SYSTEM LAB</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EE-313-E</td>
<td>MICROPROCESSORS APPLICATION LAB</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EE-315-E</td>
<td>ELECTRONIC MEASUREMENT &amp; INSTRUMENTS LAB.</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EE-317-E</td>
<td>POWER ELECTRONICS - I LAB</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EE-319-E</td>
<td>INDUSTRIAL TRAINING REPORT</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>L 20 T 7 P D 8</td>
<td>T 35</td>
<td>Theory 600</td>
<td>450</td>
</tr>
</tbody>
</table>


Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
### SIXTH SEMESTER SCHEME OF EXMINATION FOR B.TECH DEGREE COURSE
#### ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Examination Schedule</th>
<th>Total Marks</th>
<th>Duration of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE-302-E</td>
<td>POWER SYSTEM ANALYSIS &amp; PROTECTION</td>
<td>3 L 1 T</td>
<td>L 4 P/D 100</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>EE-304-E</td>
<td>MICROCONTROLERS &amp; APPLICATIONS</td>
<td>3 L 1 T</td>
<td>L 4 P/D 100</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>EE-306-E</td>
<td>DIGITAL SIGNAL PROCESSING</td>
<td>4 L 1 T</td>
<td>L 5 P/D 100</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>EE-308-E</td>
<td>POWER ELECTRONICS -II</td>
<td>3 L 1 T</td>
<td>L 4 P/D 100</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>EE-310-E</td>
<td>ELECTRIC DRIVES &amp; TRACTION</td>
<td>4 L 1 T</td>
<td>L 5 P/D 100</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>EE-312-E</td>
<td>ADVANCED PROGRAMMING</td>
<td>3 L 1 T</td>
<td>L 4 P/D 100</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>EE-314-E</td>
<td>ADVANCED PROGRAMMING LAB</td>
<td>3 L 3 T</td>
<td></td>
<td>75</td>
<td>3</td>
</tr>
<tr>
<td>EE-316-E</td>
<td>MICROCONTROLERS APPLICATIONS LAB</td>
<td>2 L 2 T</td>
<td></td>
<td>75</td>
<td>3</td>
</tr>
<tr>
<td>EE-318-E</td>
<td>POWER ELECTRONICS -II LAB</td>
<td>2 L 2 T</td>
<td></td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>EE-320-E</td>
<td>ELECTRIC DRIVES LAB</td>
<td>2 L 2 T</td>
<td></td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>20 L 9 T 35 P/D</td>
<td>600</td>
<td>1150</td>
<td></td>
</tr>
</tbody>
</table>

Note: Students shall devote 8 weeks to industrial training after sixth semester exam outside the college campus at approved works.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Examination Schedule</th>
<th>Total Marks</th>
<th>Duration of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE-401-E</td>
<td>Electrical Machine Design</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>EE-403-E</td>
<td>High Voltage Engineering</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>EE-405-E</td>
<td>Discrete Data Non linear Control System</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>*</td>
<td>Departmental Elective -I</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>**</td>
<td>Departmental Elective -II</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>***</td>
<td>Departmental Elective -II Lab</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EE-423-E</td>
<td>Power System Lab</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>EE-425-E</td>
<td>Circuit Simulation Lab</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>EE-427-E</td>
<td>Seminar</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>EE-429-E</td>
<td>MINOR PROJECT</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EE-431-E</td>
<td>MAJOR PROJECT</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>EE-433-E</td>
<td>SUMMER TRAINING REPORT</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>17</td>
<td>5</td>
<td>13</td>
<td>35</td>
</tr>
</tbody>
</table>

**DEPARTMENTAL ELECTIVES**

**VII Sem. *DE-I options**

- Non Conventional Sources Of Energy & Management
- Fuzzy Logic & Neural Network
- Installation, testing, commissioning and maintenance of Electrical Equipments
- Reliability

**VII Sem. **DE-II with ***DE-II Lab. Option – I**

- VHDL & Digital Design
- VHDL Lab

**VII Sem. **DE-II with ***DE-II Lab. Option – II**

- Transducers & Their Applications
- Transducers Applications Lab

**Note:** The students are required to give presentation & viva on summer training report.
### EIGHTH SEMESTER SCHEME OF EXAMINATION FOR B.TECH DEGREE COURSE
#### ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Examination Schedule</th>
<th>Total Marks</th>
<th>Duration of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE-402-E</td>
<td>Computer Methods In Power System</td>
<td>4 1 0 0 5</td>
<td>100 50 0</td>
<td>150 3</td>
<td></td>
</tr>
<tr>
<td>EE-404-E</td>
<td>Electrical Engg. Materials &amp; Processes</td>
<td>3 0 0 0 3</td>
<td>100 50 0</td>
<td>150 3</td>
<td></td>
</tr>
<tr>
<td>EE-406-E</td>
<td>Operation Research</td>
<td>4 1 0 0 5</td>
<td>100 50 0</td>
<td>150 3</td>
<td></td>
</tr>
<tr>
<td>**</td>
<td>Departmental Elective -I</td>
<td>3 1 0 0 4</td>
<td>100 50 0</td>
<td>150 3</td>
<td></td>
</tr>
<tr>
<td>**</td>
<td>Departmental Elective –II</td>
<td>4 1 0 0 5</td>
<td>100 50 0</td>
<td>150 3</td>
<td></td>
</tr>
<tr>
<td>***</td>
<td>Departmental Elective -II Lab</td>
<td>- - 0 0 0</td>
<td>- 25 25</td>
<td>50 3</td>
<td></td>
</tr>
<tr>
<td>EE-424-E</td>
<td>Computer Methods In Power System Lab</td>
<td>- - 0 0 0</td>
<td>- 25 25</td>
<td>50 3</td>
<td></td>
</tr>
<tr>
<td>EE-426-E</td>
<td>Seminar</td>
<td>- - 0 0 0</td>
<td>- 25 25</td>
<td>50 3</td>
<td></td>
</tr>
<tr>
<td>EE-428-E</td>
<td>Major Project</td>
<td>- - 6 6 0</td>
<td>- 75 75</td>
<td>150 3</td>
<td></td>
</tr>
<tr>
<td>EE-430E</td>
<td>Comprehensive Viva-Voce</td>
<td>- - 0 0 0</td>
<td>- 75 75</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>EE-432E</td>
<td>General Fitness &amp; Professional Aptitude</td>
<td>- - 0 0 0</td>
<td>- 75 75</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>18 4 13 35 500</td>
<td>400 275 1175</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### DEPARTMENTAL ELECTIVES

**VIII Sem.** DE-1 options

- Special Electrical Machines
- Software Engineering
- Power System Planning
- Utilization Of Electrical Energy

**VIII Sem.** DE-II with ***DE-II Lab. Option – I

- Internet Fundamentals
- Internet Fundamentals Lab

**VIII Sem.** DE-II with ***DE-II Lab. Option – II

- Microwave & Radar Engg.
- Microwave Lab

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
Basics of economics & management (HUM-201E)

UNIT – 1
Meaning of Industrial Economics, reduction function, its types, least cost combination, law of variable production, law of returns; constant & Diminishing.
Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC, U-shaped short run AC curve.
Price & output determination under monopoly in short run & long run, price discrimination, price determination under discriminating Monopoly, comparison between Monopoly & perfect completion

UNIT – II

UNIT – III
planning & organizing
Planning, steps in planning, planning premises, difference between planning policy & strategy, Authority & responsibility, centralization & decentralization.

UNIT – IV
Staffing , directing & Controlling – Manpower Planning, Recruitment & section styles of leadership, communication process and barriers, control process and steps in controlling.

Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.

Text Books:
2. “Economics Analysis” K.P. Sudharam & E.N. Sudharam (Sultan Chand & Co.)

Reference Books:
2. Business Organization and Management : M.C. Gupta
UNIT – I
Fourier series: Euler’s Formulae, Conditions for Fourier expressions, Fourier expansion of functions having points of discontinuity, change of interval, Odd & even functions, Half – range series.

UNIT – II
Functions of 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, Applications to flow problems, Conformal transformation, Standard transformations (translations, Magnifications & 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 methods, Simplex Method, Dual-Simplex Method.
Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.

Text Books:

Reference Books:
1. Complex variables and Applications: R.V. Churchil; McGraw Hill.
4. Probability ans statistics for Engineer: Johnson, PHI.
EE-201E (Transmission and Distribution)

L     T     P     Sessional:  50 marks
3     1     0     Theory:     100 marks
Total: 150 marks

UNIT – 1

GENERAL
Importance of electric power, power system components, Growth of Power systems in India, power supply network, effect of voltage in conductor size, comparison of conductor vol. in typical systems elementary high voltage DC transmission and its advantages and disadvantages.

UNIT – II

LINE PARAMETERS:-
Evaluation of inductance, capacitance, resistance for single phase, three phase symmetrical, transposed, untransposed single circuit, double circuit lines, skin and proximity effect.

PERFORMANCE OF LINES:-
Classification of line as short, medium and long, representation and detailed performance analysis of these lines including ABCD parameters, detailed measurements and universal power circle diagram.

UNIT – III

MECHANICAL CONSIDERATIONS:-
Various types of line conductors, line supports, poles and towers, sag calculations, effect of wind, ice, and temperature, stringing chart, sag template, line vibration.
Insulators:- Various types of insulators, voltage distribution, string efficiency, methods of increasing string efficiency.

CORONA:-
Phenomenon of CORONA, disruptive critical voltage, corona loss, radio interference.

UNIT – IV

UNDER GROUND CABLES:-
Classifications and construction, insulation resistance, capacitance, capacitance determination, power factor in cables, capacitance grading, use of inter sheaths, losses, heat dissipation and temperature rise in cables, current rating, comparison with overheat lines.

Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.

Reference Books:
2. IJ Nagrath and DP Kothari “Power System Engineering” Taha MGH.
UNIT – I
TOPOLOGY:
Principles of network topology, graph matrices, network analysis using graph theory.

TRANSIENT RESPONSE:
Transient Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform.

UNIT – II
NETWORK FUNCTIONS:
Terminal pairs or Ports, Network functions for one-port networks, poles and zeros of Network functions, Restrictions on pole and zero locations for driving point functioning and transfer functions, time domain behavior from the pole-zero plot.

UNIT – III
CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORK:
Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance, parameters, transmission parameters, hybrid parameters, relationships between parameters sets, inter-connection of two port networks.

UNIT – IV
TYPES OF FILTERS AND THEIR CHARACTERISTICS:
Filter fundamentals, high-pass, low-pass, and band-pass, and band-reject filters.

NETWORK SYNTHESIS:
Positive real functions. Synthesis of one port and two port networks, elementary ideas of Active networks.

Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.

Text Books:

Reference Books:
1. Introduction to modern Network Synthesis: Van Valkenburg; John Wiley.
2. Network Analysis: Van Valkeburg; PHI.
3. Basic circuit theory: Dasoer Kuh; McGraw Hill.

EE-205-E ANALOG ELECTRONICS

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
SEMICONDUCTOR DIODE:
P-N Junction and its V-I Characteristics, P-N junction as rectifier, switching characteristics of Diode.

DIODE CIRCUITS:
Diode as a circuit element, the load-line concept, half-wave and full rectifiers, elipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

UNIT – II
TRANSISTORAT LOW FREQUENCIES:
Bipoler junction transistor: operation, characteristics, Ebers-moll model of transistor, hybrid model, h- parameters (CE, CB, CC configurations), analysis of a transistor amplifier circuits using h-parameters, emitter follower, miller’s Theorem, frequency response of R-C coupled amplifier.

TRANSISTOR BIASING:
Operating point, bias stability, collector to base, self-bias, bias compensation, thermistor & sensitor compensation.

UNIT – III
TRANSISTOR AT HIGH FREQUENCIES:
Hybrid P model, CE short circuit current gain, frequency response, alpha, cutoff, gain bandwidth product, emitter follower at high frequencies.

FIELD EFFECT TRANSISTORS:
Junctiion field effect transistor, pinch off voltage, volt-ampere characteristics, small signal model, MOSFET Enhancement & Depletion mode V-MOSFET, common source amplifier, source follower, biasing of FET, Applications of FET as a voltage variable resistor (VVR)

UNIT – IV
OPERATIONAL AMPLIFIER:

REGULATED POWER SUPPLIES:
Series and shunt voltage regulations, power supply parameters, three terminal IC regulators, SMPS

Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.

Text Books:
1. Integrated Electronics; Miliman & Halkias; McGraw Hill
2. Electronic circuit analysis and design (Second edition ) D.A.V neamen: TMH

Reference Books:

EE- 207E  ELECTRICAL MACHINE – I

L  T  P  Sessional: 50 marks
3 1 0  Theory: 100 marks
Total: 150 marks

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
UNIT – 1
TRANSFORMERS: Principle, construction of core, winding & tank, operation, testing of single phase transformer, equivalent circuit, phasor diagram parameters determination, P.U representation of parameters, regulation, losses & efficiency, separation of iron losses.

UNIT – II
Various types of connection of three phase transformer, their comparative features, Zigzag connection.
Parallel operation of single phase & three phase transformers. Auto-Transformer: Principle, construction, comparison with two winding transformers, applications.

UNIT – III
Nature of magnetizing current, plotting of magnetizing current from B-H curve, inrush current, harmonics, effect of construction on input current, connection of three phase transformer.
Phase-Conversion: Three to two phase, three to six phase and three to twelve phase conversions. Introduction to three winding, tap-changing & phase- shifting transformers.

UNIT – IV
D.C. MACHINES: Elementary DC machine, principle & construction of D.C. generator, simplex lap wave winding E.M.F. equation, armature reaction compensating winding, commutation, methods of excitation, load characteristics, parallel operation. Principle of DC motors, torque and output power equations, load characteristics, starting, speed control, braking, testing, efficiency & applications.

Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.
Text Books:
2. Performance & Design of DC Machines: A.E Clayton & N.N Hancock; ELBS.
Reference Books:
1. Electric machinery, Fitzgerald & Kingsley, MGH.
2. Theory of alternating current machinery, A.S Langsdorf, TMH.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
UNIT – I


UNIT – II
MEASURING INSTRUMENTS: Construction, operating principle, Torque equation, Shape of scale, use as Ammeter or as Voltmeter (Extension of Ranger). Use on AC/DC or both. Advantages & disadvantages, errors (both on AC/ DC) of PMMC types, Electrodynamics Type, moving iron type (attraction, repulsion & combined types). Hot wire type & induction type, electrostatic type instruments.

UNIT – III
WATTMETERS & ENERGY METERS: Construction, operating principle, torque equation, shape of scale, errors, Advantages & disadvantages of Electrodynamics & induction type wattmeters; single phase induction type Energy meter, Compensation & creep in energy meter.

POWE FACTOR & FREQUENCY METERS: Construction, operating principle, torque equation, advantages & disadvantages of Single phase power factor meters (Electrodynamics & moving iron types) & Frequency meters (Electrical Resonance type, Ferro dynamic & Electrodynamics types).

UNIT – IV
LOW & HIGH RESISTANCE MEASUREMENTS: Limitations of Wheat stone bridge; Kelvin’s double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm Bridge & meggar.


Note: Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.

Text Books:

Reference Books:
1. Electronics Measurements by E.W. Golding
4. Measuring Systems by E.O. Doblin; TMH.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
LIST OF EXPERIMENTS:

1. To identify the meters from the given lot.
2. To convert & calibrate a D’Arsonnal type galvanometer into a voltmeter & an ammeter.
3. To calibrate an energy meter with the help of a standard wattmeter & a stop watch.
4. To measure power & p.f. by 3-ammeter method.
5. To measure power & p.f. by 3-voltmeter method.
6. To measure power & p.f. in 3-phase circuit by 2-wattmeter method.
7. To measure capacitance by De Sauty’s bridge.
8. To measure inductance by Maxwell’s bridge.
9. To measure frequency by Wien’s bridge.
10. To measure the power with the help of C.T & P.T.
11. To measure magnitude & phase angle of a voltage by rectangular type potentiometer.
12. To measure magnitude & phase angle of a voltage by polar type potentiometer.
13. To measure low resistance by Kelvin’s Double bridge.
14. To measure high resistance by loss of charge method.

Note: At least seven experiments should be performed from above list. Remaining three experiments may either be performed from above list or designed & set by concerned institution as per scope of syllabus.
LIST OF EXPERIMENTS:

1. Study of Half wave & full wave rectifiers.
2. Study of power supply filters.
3. Study of Diode as clipper & clamper.
4. Study of Zener diode as a voltage regulator.
5. Study of CE amplifier for voltage, current & Power gians and input, output impedance’s.
6. Study of CC amplifier as a buffer.
7. To study the frequency response of RC coupled amplifier.
8. Study of 3-terminal IC regulator.
9. Study of transistor as a constant current source in CE configuration.
10. Study of FET common source amplifier.
11. Study of FET common Drain amplifier.
12. Graphical determination of small signal hybrid paramters of bipolar junction transistor.
13. Study & design of a D.C voltage doublers.

Note: At least Ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set the concerned institute as per the scope of the syllabus.
LIST OF EXPERIMENTS:

1. To find turns ratio of a 1-phase transformer.
2. To perform open & short circuit tests on a 1-phase transformer.
3. To perform Sumpner’s Back to Back test on 1-phase transformer.
4. Parallel operation of two 1-phase transformers.
5. To convert three phase to 2-phase by Scott-connection.
6. To perform load test on DC shunt generator.
7. Speed control of DC shunt motor.
8. Swinburne’s test of DC shunts motor.
9. Hopkinson’s test of DC shunts M/Cs.

Note: At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set the concerned institute as per the scope of the syllabus.
LIST OF EXPERIMENTS:

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuits.
4. To calculate and verify “Z” parameter of a two port network.
5. To calculate and verify “Y” parameter of a two port network.
6. To determine equivalent parameter of parallel connection of two port network.
7. To plot the frequency response of low pass filter and determine Half-power frequency.
8. To plot the frequency response of high pass filters and determines Half-power frequency.
9. To plot the frequency response of band-pass filters and determines the band width.
10. To calculate and verify “ABCD” parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.

Note: At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set the concerned institute as per the scope of the syllabus.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, symbols, and abbreviations.
2. To study stair case wiring.
3. To study house wiring i.e. battens, lest, casing-capping, and conduit wiring.
4. To study fluorescent tube light.
5. To study high pressure mercury vapor lamp (H.P.M.V)
6. To study Sodium lamp.
7. To study repairing of home appliance such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamics & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs, and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design, fabricate a PCB for a circuit, wire-up and test.

Note: At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set the concerned institute as per the scope of the syllabus.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
BASICS OF INDUSTRIAL SOCIOLOGY, ECONOMICS AND MANAGEMENT

HUM-201-E

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Sessional: 50 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>-</td>
<td>Theory: 100 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total: 150 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Duration: 3 Hrs.</td>
</tr>
</tbody>
</table>

Unit-I
Meaning of social change, nature of social change, theories of social change. The direction of social change, the causes of social change. Factors of social change – the technological factors, the cultural factors, effects of technology on major social institutions, social need of status system, social relations in industry.

Unit –II
Meaning of industrial economic, production function, its types, least cost combination, law of variable proportion, laws of return- increasing, constant & diminishing. Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC, U-shaped short run AC Curve.

Unit-III
Meaning of management, characteristics of management, management Vs administration, management – Art, Science & profession, Fayol’s principles of management.

Unit-IV
Marketing management – definition & meaning, scope of marketing management, marketing research – meaning, objectives.
Purchasing management – meaning & objectives, purchase procedure, inventory control techniques.

Note: Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

Text Books:
**POWER GENERATION AND CONTROL (EE-202-E)**

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Sessional: 50 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>-</td>
<td>Theory : 100 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total : 150 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Duration : 3 Hrs.</td>
</tr>
</tbody>
</table>

**Unit – I**

**Load and loading forecasting:**
Load curves, maximum demand, load factor, diversity factor, capacity factor, utilization factor, types of load, load forecasting.

**Power plant economics**
Choice of type of generation, size of generator and number of units, cost of electrical energy, depreciation of plant, effect of load factor on cost of Electrical Energy.

**Tariffs and power factor improvement**
Different types of tariffs and methods of power factor improvement.

**Unit-II**

**Thermal power plants**
Choice of site, main and auxiliary equipment fuel gas flow diagram, water stream flow diagram, working of power plants and their layout, characteristics of turbo generators.

**Hydro electric plants**
Choice of site, classification of hydro electric plants, main parts and working of plants and their layouts, characteristics of hydro electric generators.

**Unit-III**

**Nuclear power plants**
Choice of site, classification of plants, main parts, layout and their working, associated problems.

**Diesel power plants**
Diesel plant equipment, diesel plant layout and their working, application of diesel plants.

**Combined working of plants**
Advantages of combined operation plant requirements of base load and peak load operation. Combined working of run off river plant and steam plant.

**Unit-IV**

**Power station equipment and control**

i) **Excitation system**- Purpose and requirements of excitation system, brushless excitation system.

ii) **Voltage regulators** – Function and characteristics of automatic voltage regulators, solid regulator.

iii) **Speed Governing** – Purpose of speed governing system, Hydraulic type, speed governing system for steam turbines and steam turbines and hydro turbines.

iv) **Automatic generation control** - types of interconnection, advantages of interconnection, real and reactive power control, single area automatic generation control, automatic generation control for two area system, types of automatic generation control for interconnection power systems.

**Text Books:**
2. I.J. Nagnath and D.P. Kothar “Power System Engineering” TMGH

**Note:** eight questions are to be set in total covering entire course selecting two questions from 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.

---

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
DIGITAL ELECTRONICS (EE-204-E)

L     T     P     Sessional: 50 Marks
3     1     -     Theory : 100 Marks

Total : 150 Marks
Duration : 3 Hrs.

Unit-I

Fundamentals of Digital Techniques:
Digital signal, logic gates, AND, OR, NOT, NAND, NOR, EX-OR, Boolean algebra, review of number systems, binary codes, BCD, Excess-3, Gray, EBCDIC, ASCII, Error detection and correction codes.

Unit-II

Combination Design using Gates:
Design using gates, Karnaugh map and quine mclukey methods of simplification.

Combinational design using MSI Devices
Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders/Subtractors, BCD arithmetic circuits, Encoders, Decoders/Drivers for display devices.

Unit-III

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.

A/D AND D/A Converters:
Sample and hold circuits, 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.

Unit-IV

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 CMSO logic families. Tristate logic, interfacing of CMOS and TTL families.

Programmable logic devices:
ROM, PLA, PAL, FPGA and CPLDS.

Text Books:
1. Modern Digital Electronics (Edition III) : R.P. Jain, TMH.
2. Digital Integrated Electronics: Taub & Schilling, MGH
3. Digital Principles and Applications: Malvino & Leach, MGH

Note: Eight questions are to be set in total covering entire course selecting two questions from 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.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
COMMUNICATION SYSTEM (EE-206-E)

L T P Sessional: 50 Marks
3 1 -
Theory: 100 Marks
Total: 150 Marks
Duration: 3 Hrs.

Unit-I

Introduction to communication systems:
The essentials of a communication system, modes and media’s of communication, classification of signals and systems, Fourier Analysis of signals.

Unit-II

Amplitude modulation:
Amplitude modulation, generation of AM waves, Demodulation of AM waves, DSBSC, Generation of DSBSC waves, single side band modulation, generation of SSB waves, demodulation of SSB waves, vestigial sideband modulation (VSB).

Angle modulation:
Basic definition, phase modulation (PM) & frequency modulation (FM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation.

Unit-III

Pulse analog modulation:
Sampling theory, time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation.

Pulse digital modulation:
Elements of pulse code modulation, noise in PCM systems, measure of information, channel capacity, channel capacity of a PCM system, differential pulse code modulation (DPCM). Delta modulation (DM).

Unit-IV

Digital modulation techniques:
ASK, FSK, BPSK, QPSK, M-ary PSK.

Introduction to noise:
External noise, Internal noise, S/N ratio, noise figure.

Text Books:
2. Communication systems: Singh & sapre, TMH.

References books:
1. Electronic Communication Systems: Kennedy, TMH.
2. Communication Electronics: Frenzel, TMH.
3. Communication Systems: Taub & Schilling, TMH

Note: Eight questions are to be set in total covering entire course selecting two questions from 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.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
SIGNAL & SYSTEMS (EE-208-E)

L T P
3 1 -

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

SIGNAL
Unit-I
Types of Signals:-

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.

Text 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 from 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.
ELECTRICAL MACHINES-II (EE-210-E)

L T P Sessional: 50 Marks
3 2 - Theory : 100 Marks
Total : 150 Marks
Duration: 3 Hrs.

Unit-I

Basic Concept of Electrical Machines:
Basic concept of electrical machines: winding factors, generated e.m.f. and m.m.f distributed a.c. winding, rotating magnetic field.

Unit-II

Induction machines:-
a) Construction features, production of torque, phasor diagram, equivalent circuit, performance analysis, torque slip characteristics.
b) Testing running light and blocked rotor test, load test.
c) Effect of rotor resistance, deep bar and double cage induction motor.
d) Generator operation.
e) Starting – Starting method of squirrel cage and wound rotor induction motor.
f) Effect of space harmonics.

Unit-III

Signal phase induction motors:-
a) Constructional features, double revolving field theory, equivalent circuit, determination of parameters.
b) Split phase starting methods & application.

Unit-IV

Synchronous machines:-
a) Constructional features.
b) Cylindrical rotor machines.
i) Synchronous generator – Generated emf, circuit model and phasor diagram, armature reaction, synchronous impedance, voltage regulation and different methods for its estimation.
ii) Synchronous motor – Operating principle, circuit model, phasor diagram, effect of load.
iii) Operating characteristics of synchronous machines V-curves starting methods of synchronous motors.
c) Salient pole machine:- Two reaction theory, analysis of phasor diagram, power angle characteristics, determination of $x_d$ and $x_q$.
d) Parallel operation of alternators:- Synchronous and load division.

Text Books:

2. Nagrath & Kothari “Electric Machines” TMH
3. Fitzgerald & Kingsley “Electric Machinery” MGH.

Note: Eight questions are to be set in total covering entire course selecting two questions from 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.
1. a) To measure the dielectric strength of transformer oil.
   b) To find string efficiency of string insulator.
      i) Without guard ring.
      ii) With guard ring.
2. To measure ABCD parameters of transmission line.
3. To plot power angle characteristics of transmission line.
4. Parallel operation of two alternators.
5. To create unbalanced voltage system and to measure the sequence voltage by segregating network.
6. To study the characteristics of transmission line represented by
   i) T-network
   ii) Pie-network.
7. To study the characteristics of differential relay.
8. Testing and calibration of energy meter.
9. To plot the characteristics of an IDMT static relay.

Note: Eight questions are to be set in total covering entire course selecting two questions from 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.
1. Determine mechanical losses by light running of a 3-phase induction motor.

2. To perform load test on a 3-phase induction motor & DC generator set and to determine the efficiency of induction motor.

3. Study and starting of 1-phase induction motor. To perform light running and block rotor test and to determine the parameters of the equivalent circuit.

4. To perform the open circuit test and block rotor test on 3-phase induction motor and draw the circle diagram.

5. To find out the rotor resistance of a poly phase induction motor.

6. To calculate regulation by synchronous impedance method:
   i) Conduct open and short circuit test on a three phase alternator.
   ii) Determine and plot variation of synchronous impedance with $I_f$
   iii) Determine SCR
   iv) Determine regulations for 0.8 lagging power factor, 0.8 leading power factor and unity power factor.

7. To plot V curves of a synchronous machine.

8. a) Determination of $X_0$ of a synchronous machine.
    b) Measurement $X_d + X_q$ (Directo axis and Quadran axis)

9. To measure $X_q$ of synchronous machine (negative sequence reactance).

10. To calculate regulation by ZPF method.

11. To study the parallel operation of synchronous generator.

**Note:** At least ten experiments are to be performed; at least seven experiments should be performed from above list. Remaining three experiments may either perform from the above list or designed and set by the concerned institution as per the scope of the syllabus.
1. To study the time properties of a signal.
2. To verify the basis properties of linear systems (Superposition Theorem etc).
3. To demonstrate how sampling rules affect the output.
4. To study the sampling theorem for low pass signals and band pass signals.
5. To study the LPF and HPF using RC circuits.
6. To study band pass and band reject filters using RC circuits.
7. To study the response of Pulse Amplitude Modulation & Demodulation process.
8. To study the response of Pulse Width Modulation & Demodulation process.
9. To study the response of Pulse Position Modulation & Demodulation process.
10. To study the special response on a spectrum analyzer? Having unit impulse input and sine input (for various circuits).
11. To study signal synthesis via the sum of various harmonics.

Note: At least ten experiments are to be performed; at least seven experiments should be performed from the above list. Remaining three experiments may either perform from the above list or designed and set by the concerned institution as per the scope of the syllabus.
1. Study of TTL gates- AND, OR, NOR, NAND, NOT, EX-OR, EX-NOR.
2. Design & realize a given function using K-Map and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using JK flip flop & drive a seven segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using JK flip flop & drive a seven segment display using the same.
10. To design and realize sequence generator for a given sequence using JK Flip flop.
11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift register and verify its operation of a ring counter and a Johnson counter.

Note: At least ten experiments are to be performed; at least seven experiments should be performed from above list. Remaining three experiments may either perform from the above list or designed and set by the concerned institution as per the scope of the syllabus.
COMMUNICATION SYSTEM LAB (EE-220-E)

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Sessional: 25 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>2</td>
<td>Exam: 25 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total: 50 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Duration: 3 Hrs.</td>
</tr>
</tbody>
</table>

1. Study of amplitude modulation and determination of modulation index.
2. Study of frequency modulation and determination of modulation index.
4. Study of pulse amplitude modulation.
5. Study of pulse width modulation.
6. Study of pulse frequency modulation.
7. Study of pulse code modulation.
8. Study of frequency shift keying.
9. Study of ASK and QASK
10. Study of PSK and QPSK.
11. Project related to the scope of the course.

Note: At least ten experiments are to be performed; at least seven experiments should be performed from above list. Remaining three experiments may either perform from the above list or designed and set by the concerned institution as per the scope of the syllabus.
UNIT – 1
Review of vector analysis, orthogonal co-ordinate systems, review of vector calculus in all the three coordinate systems: Line, surface & volume integrals, gradient, divergence & curl of vector & their physical significance, Divergence theorem, stokes theorem, soleniodal and irrotational fields.
Gauss Law in electrostatics & its applications, uniform line, surface & volume charge distributions, concept of electric field & electric potentials, electric field & potential due to a linear dipole, Spherical & cylindrical capacitor, energy density in electric field, method of images.

UNIT-II
Magnetrostatics: Magnetic flux density and magnetizing field intensity, Biot Savart’s law, Amperes circuitual law & its applications. Magnetic vector potentials, Magnetic filed energy, boundary conditions for both the electric & magnetic fields at the interface of various types of media. Laplace, Poisson’s equation & continuity equation, displacement current density, conduction current density, Maxwell’s equation in differential & integral forms, time harmonic cases & their physical significance, retarded potentials.

UNIT- III
UPW: Plane waves & uniform plane waves and their properties , wave equations in various media, Polarization & its types, intrinsic impedance, propagation constant, reflection & refraction of uniform plane waves at the interface of conductor- dielectric & dielectric-dielectric (both normal and oblique incidence). Relaxation time, skin effect, skin depth & surface impedance, Poynting vector theorem and its physical significance.

UNIT- IV
Transmission lines: Distributed parameters, circuit parameters, concepts of voltage & current flow on a transmission line, line equations, characteristics impedance. Reflection of transmission line, maxima & minima, standing wave ratio of a transmission line, impedance matching, Smith’s chart & its applications, coaxial type transmission line
Introduction to Waveguide: (Qualitative study only) concept of wave guide and TE, TM, & TEM modes in rectangular and circular wave guides. Cut off and guide wave length, characteristic impedance, and dielectric wave guide.

Note: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question form each unit
Reference Books:
1. Electromagnetic Fields & Wave by Sadiku (Oxford Univ. Press)
2. Field & Waves electromagnetic by D.K. Cheng. (Pearson Education)
3. Electromagnetic by J.D. Kraus.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
Introduction: The control system-open loop & closed loop, servomechamism.
Mathematical Models of Physical System: Differential equation of physical systems, transfer function, block algebra, signal flow-graphs, mason’s formula & its application.
Feedback Characteristics of Control System: Feedback and non-feed back systems, effects of feedback on sensitivity (to parameter variations), overall gain stc.

UNIT- II
Time Response Analysis: Standard test signals, time response of first order and second order systems, steady – state errors and error constants, design specification of second-order-systems.
The Root locus Techniques: The Root Locus concept, construction / development of root loci for various systems, stability considerations.

UNIT- III

UNIT- IV
Compensation of control systems: Necessity of compensation, phase lag compensation, phase lead compensation, feedback compensation.
State Variable Analysis: Concept of state, state variable and state model, state models for linear continuous time systems, dignolization solution of state equations, concept of controllability and observability.
Control Components: Working principles of synchros, AC & DC tacho-generators, servomotors, magnetic amplifiers, stepper motor.

Note: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question form each unit.

Text Books:
2. Automatic Control Systems: B.C. Kuo; PHI
3. modern Control Engg: K.Ogata , PHI.
UNIT – 1

INTRODUCTION:
Role of power electronics, review of construction and characteristics of power diode, Shottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, IGBT and SIT.

Rating and protections, series and parallel connections, R, RC, and UJT firing circuit and other firing circuits based on ICs and microprocessors; pulse transformer and opto-coupler, communication techniques.

AC REGULATORS:
Types of regulators, equation of load current, calculation of excitation angle, output voltage equation, harmonics in load voltage and synchronous tap changer, three phase regulator.

UNIT – II

CONVERTORS:
One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continues and discontinuous modes of operation, input power factor of converter, reactive power demand effect of source inductance, introduction to four quadrant/ dual converter, power factor improvement techniques, forced commutated converter, MOSFET and transistor based converters.

UNIT- III

CYCLOCONVERTERS (A.C. to A.C CONVERTER):
Basic principles of frequency conversion, types of cycloconverters, non-circulating and circulating types of cycloconverters.

Classification, principle of operation of step up and step down cycloconverter, single phase to single phase cycloconverter with resistive and inductive load. Three phase to three phase cycloconverter. Output voltage equation of cycloconverter.

Note: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question form each unit.

Text Books:
1. Power Electronics : MH Rashid; PHI

Referenced Books:
1. Power electronics: PC Sen; TMH.
2. Power Electronics: HC Rai; Galgotia
3. Thyristorised power Controllers: GK Dubey, PHI
UNIT – I
REVIEW: Review fo working of BJT, JFET & MOSFET & their small signal equivalent circuits, Biasing of BJT, JFET, MOSFET circuits.
SINGLE AND MULTISTAGE AMPLIFIERS:
Classification of amplifiers, analysis of various single stage amplifier configuration, multistage amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, effect of an emitter bypass capacitor on low frequency response, multistage CE amplifier.

UNIT – II
FEEDBACK AMPLIFIER:
Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback. Voltage shunts feedback.
OSCILLATORS:
Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, general form of oscillator circuit, Wien- bridge oscillator, crystal oscillator.

UNIT – III
POWER AMPLIFIERS:
Study of class A,B and C operations, Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier: efficiency & distortion: Class A and Class B push-pull amplifiers; class C Power amplifier.

UNIT – IV
LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS:
Review of op-amp, Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier AC coupled amplifier, AC voltage follower, integrator, and differentiator
NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS:
Comparators, sample & hold circuits, logarithmic amplifier, anti-log amplifier logarithmic multiplier, waveform generators, Miller & Bootstrap sweep generators, regenerators comparator (Schmitt Trigger), multivibrators, ADC.

Note: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question form each unit.
Text books:
1. Integrated Electronics: Milman Halkias, TMH
2. Microelectronic Circuits: Sedra & Smith
3. Operational Amplifiers: Gaikwad
4. Electronics circuits Analysis & design ( 2nd edition ) ; D.A. Neamen: TMH

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
UNIT – 1

UNIT – II
DIGITAL INSTRUMENT: Digital Indicating instruments, comparison with analogs type digital display methods, theory and applications of digital voltmeters, Electronics Galvanometers, Q- Meters. FREQUENCY MEASUREMENTS: Study of decade counting assembly (DCA), Measurements of frequency using cavity wave meter. Heterodyne frequency meter, Digital frequency meters.

UNIT – III
TRANSUCERS: Classification types: Photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, stain, pressure, temperature, liquid level. SIGNAL CONDITIONING & ACQUISITION SYSTEM: Signal conditioning, DC & AC signal conditioning A/D converter, D/A converter, Use of op-amp in signal conditioning, basic components of analog and digital data acquisition system.

UNIT – IV
INSTRUMENTS FOR SIGNALS GENERATION: Square wave and pulse generators, function generators, Random noise generators, frequency synthesizer.

Note: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question form each unit.

Reference Books:
2. Electronics Instruments & Measurements techniques: by Helffick & Cooler (PHI)
UNIT – I
INTRODUCTION: Evaluation of microprocessors, technological trends in microprocessor development. The Intel family tree, CISC Versus RISC, Applications of Microprocessors
8086 CPU ARCHITECTURE: 8086 Block diagram; description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU. 8086 Pin diagram descriptions, Generating 8086 CLK and reset signals using 8284. WAIT state generation, microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module.

UNIT – II
8086 INSTRUCTION SET: Instruction formats, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions; Assembler directives.
8086 PROGRAMMING TECHNIQUES: Writing assembly language programs for logical processing, arithmetic processing, timing delays; loops, data conversions, writing procedures: data tables, modular programming, and macros.

UNIT – III
MAIN MEMORY SYSTEM DESIGN: Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode. Address decoding techniques. Interfacing SRAMS; ROMS/PROMS. Interfacing and refreshing DRAMS. DRAM Controller – TMS4500.

UNIT – IV
BASIC I/O INTERFACE: Parallel and Serial I/O Port design and address decoding, Memory mapped I/O Vs Isolated I/O Intel’s 8255 and 8251 – description and interfacing with 8086. ADCs and DACs, -types, operation and interfacing with 8086. Interfacing keywords, alphanumeric displays, multiplexed displays and high power devices with 8086.
INTERRUPT AND DMA: Interrupt driven I/O. 8086 interrupt mechanism; interrupt types and interrupt vector table. Intel’s 8259. DMA operation. Intel’s 8237. Microcomputer video displays.
Note: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question form each unit.

Suggested Books:
2. J Uffenbeck, The 8086/8088 family, PHI.
3. liu, Gibson, Microcomputer Systems- The 8086/8088 family, (2nd ed- PHI).
EE–311–E  CONTROL SYSTEM LAB

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Sessional: 25marks</th>
<th>Theory: 25marks</th>
<th>Total: 50 marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS:

1. Experiment to study D.C. position control system.
2. Experiment to study linear system simulator.
3. Experiment to study light intensity control using P & PI controller with provision for disturbance and transient speed control.
4. Experiment to study D.C. motor speed control.
5. Experiment to study the stepper motor characteristics and its control through microprocessor kit.
6. Experiment to study Temperature control system.
7. Experiment to study Compensation design.
8. Experiment to study relay control system.
9. Experiment to study Potentials metric Error Detector.
10. Experiment to study SC Position control system.
11. Experiment to study synchros.

Note: At least 7 experiments are to be performed from the above list; other than this, two more experiments are to be performed depending upon the scope.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
Before starting with the experiments, teacher should make the students conversant with the following theoretical concept:

A.  
   i) Programming Modes of Intel’s 8086.  
   ii) Addressing Modes of Intel’s 8086.  
   iii) Instruction Formats of Intel’s 8086.

B.  
   Instruction Set of Intel’s 8086.

C.  
   Assembler, and Debugger.

LIST OF EXPERIMENTS:

I.  
   a) Familiarization with 8086 Trainer Kit.  
   b) Familiarization with Digital I/O, ADC anf DAC Cards.  
   c) Familiarization with Turbo Assembler and Debugger S/Ws.

II.  
    Write a program to arrange block of data in  
    a) Ascending and b) Descending order.

III.  
    i) Program for finding largest number from an array.  
    ii) Program for finding smallest number from an array.

IV.  
    Write a program to find out any power of a number such that \( Z = X^N \)  
    Where \( N \) is programmable and \( X \) is unsigned number.

V.  
    Write a program to measure to generate:  
    (i) Sine Waveform  
    (ii) Ramp Waveform  
    (iii) Triangular Waveform using DAC Card.

VI.  
    Write a program to measure frequency/Time period of the following functions:  
    (i) Sine Waveform  
    (ii) Square Waveform  
    (iii) Triangular Waveform using DAC Card.

VII.  
    Write a program to increase, decrease the speed of a stepper motor and reverse  
    its direction of rotation using stepper motor controller card.

VIII.  
    Write a programmable delay routine to cause a minimum delay = 2MS and a maximum  
    delay = 20 minutes in the increments of 2MS.

IX.  
    i) Use DOS interrupt to read keyboard string/character.  
    ii) Use BIOS interrupt to send a string/character to printer.

X.  
    Write a program to:  
    i) Create disk File  
    ii) Open, write to and close a disk file  
    iii) Open, Read from and close a disk file  
    iv) Reading data stamp of a file using BIOS interrupt

XI  
    i) Erasing UVPROMs and EPROM’s  
    ii) Reprogramming PROMs using computer compatible EPROM Programmer

XII  
    Studying and Using 8086 In-Circuit Emulator.

XIII  
    Write a Program to interface a two digit number using seven segment LEDs  
    Using 8086 & 8255 PPI

Note: At least 7 experiments are to be performed from the above list, other than this, two more experiments are to be performed depending upon the scope.
LIST OF EXPERIMENTS:

1. Experiment to measure displacement using LVDT.
2. Experiment to study & display parameter (Liquid flow etc.) using LDR.
3. Experiment to measure temperature coefficient of material using thermocouple.
4. Experiment to measure temperature using RTD.
5. Experiment to measure pressure using strain gauge.
6. Experiment to measure the distortion in amplifiers using distortion meter.
7. Experiment to study Op-Amp as instrumentation amplifier.
8. Experiment to study Op-Amp as half wave & full wave precision rectifier.
9. To study & analyze CRO sampling & storage CRO, digital CRO.
10. Experiment to study Op-Amp as AD/DA converter.
11. To study Nixie tubes, LED, LCD, discharge devices & familiarize with digital frequency meter, frequency synthesizers.
12. Experiment to measure the speed of D.C motor using magnetic pick-up.
13. Experiment to measure the seed of D.D motor using Photo-electric pick-up.
14. To study Q-meter digital data acquisition systems random noise generator.

Note: At least 7 experiments are to be performed form the above list, other than this, two more experiments are to be performed depending upon the scope
1. Experiment to study characteristics of diode, thyristor and triac.
2. Experiment to study characteristics of transistor and MOSFET.
3. Experiment to study R and R-C firing circuits
4. Experiment to study UJT firing circuit.
5. Experiment to study complementary voltage commutation using a lamp flasher.
6. Experiment to study complementary voltage commutation using Ring counter.
7. Experiment to study thyristorised D.C circuit breaker.
8. Experiment to study A.C phase control.
9. Experiment to study full wave converter.
10. Experiment to study series inverter.
11. Experiment to study DC chopper.
12. Experiment to study of bridge inverter.
13. Experiment to study of single phase cycloconvertor.

Note: At least 7 experiments are to be performed from the above list, other than this, two more experiments are to be performed depending upon the scope.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
POWER SYSTEM ANALYSIS AND PROTECTION (EE-302-E)

L T P Sessional: 50 Marks
3 1 - Theory : 100 Marks
Total : 150 Marks
Duration : 3 Hrs.

Unit – I

Introduction:-
Per unit quantities characteristics & representation of components of a power system, synchronous machines, transformers, lines cables and loads. Single line diagram, impedance diagram, line reactance diagrams.

Protective Relaying:
Scheme of protection of generators, transformers, transmission lines & bus-bars, carrier current protection, functional characteristics of relays, operating principle of electromagnetic and static relays, over current, directional over current, directional over current, differential relay, impedance relay.

Unit-II

Neutral grounding: Need for neutral grounding, various types of neutral grounding.

Unit-III

Fault Analysis:- Symmetrical faults, calculation of faults currents, use of current limiting reactors. Unsymmetrical faults: types of transformation in power system analysis, symmetrical components transformation, sequence impedance of power system elements.
Sequence network of power system analysis of unsymmetrical short faults sequence components filters, network analysis & its application to interconnected system.

Unit –IV

Transients in Power Systems: Transient electric phenomenon, lighting & switching surges, traveling waves, reflection & refraction of waves with different line termination, protection against dangerous pressure rises.

Text Books:-
1. Elements of power system analysis by W.D. Stevenson.
3. The transmission & Distribution of electric energy by H. Cotton.
5. A Course in Electrical Power by Soni, Gupta & Bhatnagar
6. Power System Analysis & Stability by S.S. Vadhera
7. Electrical Power System by C.L. Wadhwa

Note: The question paper shall have eight questions in all organized into four section having two question from each of the four unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
MICROCONTROLLERS & APPLICATIONS (EE-304-E)

Unit – I

Introduction:

Unit-II

8051 Architecture:

Unit-III

8051 Instruction Set and Programming:

Unit-IV

8051 Applications:
interfacing keyboards programs for small keyboards and matrix keyboards. Interfacing multiplexed displays, numeric displays and LCD displays. Measuring frequency and pulse width. Interfacing ADCs & DACs. Hardware circuits for handling multiple interrupts. 8051 serial data communication modes- modes 0, modes 1, mode 2, mode 3.

Text Books:-
1. K.J. Ayala, The 8051 microcontroller 2nd edition Penram international
2. intel’s manual on “Embedded Microcontrollers”

Note: The question paper shall have eight questions in all organized into four section having two question from each of the four unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
DIGITAL SIGNAL PROCESSING (EE-306-E)

L  T  P  Sessional:  50 Marks
4  1  -  Theory :  100 Marks
4  -  -  Total : 150 Marks
4  -  -  Duration : 3 Hrs.

Unit – I
Frequency domain sampling and DFT, properties of DFT, Linear filtering using DFT, frequency analysis of signals using DFT, radix 2, radix 4, goertzel algorithm.

Unit-II
Implementation of Discrete Time System:
Direct form, cascade form, frequency sampling and lattice structures for FIR systems, direct forms, transposed form, cascade form parallel form. Lattice and lattice ladder structures for IIR systems. State space structures quantization of filter co-efficient structures for all pass filters.

Unit –III

Unit-IV
Design of IIR Filters:
Design of IIR filters from analog filters, design by approximation of derivatives, impulse invariance method bilinear transformation method characteristics of Butterworth, Chebyshev, and Elliptical analog filters and design of IIR filters.

Text Books:-
1. John G. Proakis, Digital Signal Processing, PHI
2. S.K. Mitra, Digital Signal processing, TMH
3. rabiner and Gold, Digital Signal processing, PHI
4. salivahan, Digital Signal processing, TMH
5. Digital Signal processing, Alon V. Oppenheim, PHI

Note: The question paper shall have eight questions in all organized into four sections having two questions from each of the four unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
POWER ELECTRONICS-II (EE-308-E)

L T P Sessional: 50 Marks
3 1 - Theory : 100 Marks

Total : 150 Marks
Duration : 3 Hrs.

Unit – I
D.C. to D.C. Converter:
Classification of choppers, principle of operation, steady state analysis of class A choppers, step up chopper, steady state, switching mode regulator: bluk, boost, buck-boost, cuk regulators, current commutated and voltage communicated chopper, basic scheme, output voltage control techniques, one, two and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

Unit-II
D.C. to A.C. Converter:
Classification, basic series and improved series inverter, parallel inverter, single phase voltage source inverter, steady state analysis, half bridge and full bridge inverter: modified Mc murray and modified Mc murray Bedford inverter, voltage control in single phase inverters, PWM inverters reduction of harmonics, current source, three phase bridge inverter.

Unit-III
Inverters:
Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray- Bedford half bridge and bridge inverters, brief description of parallel and series inverter (CSI), transistor and MOSFET based inverters.

Unit-IV
Power supplies:
Switched mode DC and AC power supplies
Application: Dielectric and induction heating. Block diagram of DC motor speed control.

Drives:
Introduction to electric drives: DC drives-converter and chopper fed DC drives, AC drives-stator voltage control, V/F control, rotor resistance control, static Scherbius system and static Kramer systems.

Text Books:
1. M.H. Rashid, Power Electronics: Circuits Devices and Application, PHI
4. M.Ramamoorthy an introduction to thyristors & their applications east west press.

Note: The question paper shall have eight questions in all organized into four sections having two questions from each of the four unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
ELECTRIC DRIVE AND TRACTION (EE-310-E)

L T P       Sessional :  50 Marks
4 1 -       Theory :     100 Marks
Total      : 150 Marks
Duration :  3 Hrs.

Unit – I

Introduction:
Definition & Classification of different type of drives, review of characteristics and components of electric drives, speed control methods of various a.c. and d.c. drives, its advantages and applications, acceleration and retardation time, energy consideration.

Braking of drives: Various methods of braking of a.c. and d.c. drives, automatic control arrangement, characteristics and application, acceleration and retardation time, energy consideration.

Induction motor (A.C) drives: Basic principle of induction motor drives, 3-phase a.c. voltage controller fed I.M. drive, variable frequency control, voltage source inverter (VSI) and current source inverter (CSI), cycloconverter fed IM drive, slip power control, static rotor resistance control, chopper control of 3-phase slip ring induction motor.

Unit-II

D.C. drives: Rectifier controlled circuits, single phase fully controlled and half controlled rectifier fed separately excited d.c. motor, 3-phase fully and half controlled fed separately excited d.c. motor, performance and characteristics of single phase and 3-phase rectifier controlled d.c. drives. Control techniques of d.c. drives using chopper, multi quadrant control of chopper fed motors.

Unit-III

Dynamics of electric drives: Components & classification of load torque, fundamental load torque equation, permissible frequency of starting and stopping, definite time, speed torque conventions. Speed and current limit control, automatic starting and pulling operation of synchronous motors.
Digitally controlled (Microprocessor control of electric drives): Application areas and functions of HP in drive technology, block diagram of arrangement and comparison with other method, components for digital control, vector control of IM drive using HP.

Unit-IV

Traction Drives: Nature of traction load, motors, conventional d.c. and a.c. traction drives, their characteristics, d.c. traction using chopper controlled d.c. motors, poly phase a.c. motors for traction drives, speed time relationship, tractive effort for propelling a train, power of a traction motor.
Rating of motors: Determination of motor rating, nature of loads and classes of motor duty, frequency of operation of motor subjected to intermittent loads, pulse loads etc. thermal model of motor for heating and cooling.

Text Books:
1. Electric drives by S.K. Pillai, Wiley.
2. Thyristor D.C. Drives by S.K. Sen
3. Control system in industry by Siskind, MGH
4. Electric Machines & Drives by Fransver.

Note: The question paper shall have eight questions in all organized into four sections having two questions from each of the four unit. Students will be required to attempt five questions in all, selecting at least one question from each unit. Note: Students are advised to verify scheme and syllabus from Kurukshetra University.
ADVANCED PROGRAMMING (EE-312-E)

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Sessional: 50 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>-</td>
<td>Theory : 100 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total : 150 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Duration : 3 Hrs.</td>
</tr>
</tbody>
</table>

**Unit – I**

**Review:** Review of C language, standard library, basics of C environment, pre-processors directives, illustrative simple C programs, header files.
Review of elementary data structures arrays, stacks, queues, link list with respect to storage representation and access methods.

**Unit-II**

**Searching Method:** Sequential, binary, indexes searches.

**Sorting:** Internal and external sorting, methods, bubble, insertion, selection, merge, heap, radix and quick sort. Comparison with respect to their efficiency.

**Unit-III**

**Introduction to C++, C++ environment:** objects, classes & their associations, object modeling techniques, namespaces, basics of OOP concepts: data encapsulation, abstraction, inheritance, reusability, polymorphism (compile time & run time). Illustrative C++ programs on the above topics.

**Unit-IV**

**Topic in C++: Access specifiers:** public, private & protected. Constructor: constructor with default arguments, parameterized constructors, copy constructors, destructors, function overloading, operator overloading, friend function & classes, types of inheritance, virtual functions. Illustrative C++ programs on the above topics.

**Text Books:**

1. Trembley and Sorenson, “An Introduction of data structures with application” MGH
2. Goodman, S.E. and Hetedniemi, S.T. “Introduction to the design and Analysis” MGH
3. Herbert Schildt, “C++ complete reference” TMH

Note: The question paper shall have eight questions in all organized into four sections having two questions from each of the four unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ADVANCE PROGRAMMING LAB (EE-314E)

L T P                                                                                                                      Sessional : 50
Marks                                                                                                                     Practical : 25
- - 3                                                                                                                     Total : 75
Marks

1) WAP to implement stack
2) WAP to implement queues
3) WAP to perform following operations on linked list. A) Insertion of a node
   B) Deletion of a node
4) WAP to sort a list following a) insertion sort b) quick sort c) bubble sort
5) WAP to implement searching techniques.
6) WAP to find addition and multiplication of two matrices using classes
7) WAP that shows the use of copy constructor and destructor
8) Implement a program using compile time polymorphism (function and operator
    overloading)
9) Create two classes DM and DB which store the value of distances. DM store
   distance in meters and centimeters and DB in feet and inches. WAP that can read
   values for the class objects and add one object of DM with another object DB.
   Use a friend function to carry out the addition operation. The object that stores the
   results may be a DM object or DB object, depending on units in which the result
   are required. The display should be in the format of feet and inches or meters and
   centimeters depending on the object on display.
10) WAP which shows the use of inheritance (multiple and multilevel)
11) WAP to find the roots of quadratic equation using run time polymorphism

NOTE:- At least 9 experiments are to be performed from the above list.
MICROCONTROLLER APPLICATIONS LAB
6th semester EE-316E

L T P Sessional : 50
Marks
- 2 Practical : 25
Marks

Total : 75
Marks

Part - A
1) Copy a byte from TCON to register R2 using at least four different methods.
2) Store the number 8 DH in RAM locations 30H to 34H.
3) Add the unsigned numbers found in internal RAM locations 25H, 26H and 27H together and put the result in RAM locations 31H (MSB) and 30H (LSB).
4) WAP to subtract 2-data bytes indicated by strings i.e. Subtract a string of 8-bit data indicated by R1 from a string of data indicated by R0. The number of data is indicated by R2.
5) The number A6H is placed somewhere in external RAM between locations 0100H and 0200H. Find the address of that location and put that address in R6 (LSB) and R5 (MSB). Find the address of the first two internal RAM locations between OH and 60H, which contain consecutive numbers. If so, set the carry flag to 1, else clear the flag.
6) WAP to find minimum value of date in memory block 9000 to 9OFF and store the result in 9100H.
7) WAP to arrange the given ten numbers in ascending order.
8) WAP to generate BCD up counter and send each count to port A.
9) Multiply the unsigned number in register R3 by the unsigned number on port 2 and put the result in external RAM locations 10H (MSB) & 11 H (LSB).

Part – B

1) An assembly language program to find the smaller of two numbers.
2) An assembly language program to find the smallest number in an array of ten numbers.
3) An assembly language program to find whether the given number is even or odd.
4) An assembly language program to perform 16-bit division.
5) An assembly language program to input five numbers, calculate their sum & display the result.
6) An assembly language program to display your name on seven segment display.
7) An assembly language program to interface A/D & D/A converters.

NOTE:- At least 10 experiments are to be performed with atleast 5 from Part-A & atleast 4 from Part-B separately.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
POWER ELECTRONICS-II LAB
6th semester EE-318E

<table>
<thead>
<tr>
<th>L T P</th>
<th>Sessional : 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marks</td>
<td>Practical : 25</td>
</tr>
<tr>
<td>- - 2</td>
<td>Total : 50</td>
</tr>
<tr>
<td>Marks</td>
<td></td>
</tr>
</tbody>
</table>

1) To plot the graph between average output voltage $V_o$, v/s Speed of DC motor, DC generator $\frac{1}{2}$ HP using Chopper Ckt. (variable pulse width control strategies.)
2) To find the speed control of three phase induction motor using cycloconverter.
3) To find the output voltage of Switched mode regulators, Buck-boost, cuk regulators by varying the duty cycle.
4) Draw the voltage waveform across thyristors, capacitors and average output voltage of Jones & Morgan Chopper ckt. Give the comparison between two.
5) To find the output frequency of a single phase series inverter by varying (R,L,C components).
6) To draw the waveform of a parallel inverter using two SCR’s.
7) To draw the average output voltage of three phase to single phase cycloconverter (Bridge type) for alpha = 30,45,60,90.
8) To find the r.m.s value of output voltage by varying delta angle of single phase IGBT based P.W.M. inverter using:
   i) Multiple P.W.M. Technique
   ii) Sinusoidal P.W.M. Technique
9) To reduce the harmonics of inverter by using phase displacement control technique.
10) To study the operation of single phase dual converter, and also verify the equation $a1 + a2 = 180$ degree.
11) To find the average output voltage of step up MOSFET based chopper ckt.

NOTE:- At least 9 experiments have to be performed in the semester. At least 8 experiments should be performed from above list.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
ELECTRIC DRIVES LAB  
6th semester EE-320E

L T P                                                                                                                     Sessional : 25
Marks                                                                                                                     Practical : 25
- - 2                                                                                                                     Total        : 50
Marks

1) Study of Industrial Applications of various Mills.

2) Study of different types of a loading on a particular load.
   (a) Intermediate loading
   (b) Continuous loading

3) Three phase fully controlled rectifier fed separately excited DC motor (1H.P.) at different firing angle for obtaining speed torque characteristics. Complete unit with motor and accessories for obtaining torque (bely-pully arrangement).

4) Single phase half controlled rectifier fed DC Series motor (1H.P.) at different firing angle for obtaining speed torque characteristics. Complete unit with motor and accessories for obtaining torque (bely-pully arrangement).

5) Chopper Control of DC series motor (1 H.P.) for obtaining torque characteristics.

6) Chopper control of separately excited DC motor (1H.P.) for obtaining speed torque characteristics.

7) A) VSI controlled induction motor drives (either through controlled rectifier or chopper).
   B) CSI controlled induction motor drives (either through controlled rectifier or chopper).

8) Half wave cycloconvertor fed induction motor drives for obtaining speed torque characteristics, Torque frequency for constant V/f ratio.

9) a) VSI controlled synchronous motor drives with load commutation.
   b) CSI controlled synchronous motor drives with load commutation.

10) Self controlled synchronous motor drives employing a cycloconvertor.

11) Regenerative Braking of separately excited Dc motor.

12) AC Dynamic Braking (Rheostatic) of 2-phase Induction motor.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
13) Vector control of induction motor using microprocessor.
14) Microcontroller based speed control of any motor.

NOTE:- The students must perform atleast 10 experiments from the above list.
ELECTRICAL MACHINE DESIGN
EE-401-E

UNIT I
GENERAL: General features & limitations of electrical machine design, types of enclosures, heat dissipation, temperature rise, heating & cooling cycles, rating of machines, cooling media used & effect of size and ventilation.

DC MACHINES: Output equation, choice of specific loadings, choice of poles and speed, Design of conductors, windings, slots field poles, field coils, commutator and machine design.

UNIT II
TRANSFORMERS: Standard specifications, output equations, design of core, coil, tank and Cooling tubes, calculation of circuit parameters, magnetizing current, losses and efficiency, Temperature rise and regulations from design data.

SYNCHRONOUS MACHINES: Specifications, ratings and dimensions, specific loadings, main dimensions, low speed machines, turbo generators, armature conductors, cooling.

UNIT III
INDUCTION MOTORS:
Three Phase Induction Motor: Standard specifications, output equations, specific loadings, main dimensions, conductor size and turns, no. of slots, slot design, stator core, rotor design, performance calculations.

Single Phase Induction Motor: output equations, specific loadings, main dimensions, design of main and auxiliary winding, capacitor design, equivalent circuit parameters, torque, efficiency.

UNIT IV
Computer Aided Design: Computerization of design procedures, development of computer programs & performance predictions, optimization techniques & their application to design problems.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

TEXT BOOKS

REFERENCES
2. CG Veinott, Theory and design of small induction machines, MGH, 1959.
3. A Shanmugasundarem, Electrical machine design databook

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
HIGH VOLTAGE ENGINEERING
EE-403-E

UNIT - 1:
Conduction & Breakdown in Gases, Liquid & Solid Dielectrics:
Liquid Dielectrics - Conduction & breakdown in pure & commercial liquids, suspended particle theory, stressed oil volume theory, liquid dielectrics used in practice.
Solid Dielectrics - Intrinsic, electromechanical, & thermal breakdown, composite dielectric, solid dielectrics used in practice.

UNIT – 2
Application of insulating materials in power transformers, rotating machines, circuit breakers, cables & power capacitors.
Generation of high D.C., A.C. impulse voltage & impulse currents. Tripping & control of impulse generators.
Measurement of high D.C., A.C. (Power frequency & high frequency) voltages, various types of potential dividers, generating voltmeter, peak reading A.C. voltmeter, Digital peak voltmeter, electrostatic voltmeter, Sphere gap method, factors influencing the spark voltage of sphere gaps.

UNIT - 3
High Voltage Testing of Electrical Apparatus:
Testing of insulators, bushings, circuit breakers power capacitors & power transformers. Over voltage Phenomenon & Insulation Co-ordination:
Theory of physics of lightning flashes & strokes. Insulation co-ordination, volt time and circuit time characteristics.
Boys camera, standard voltage & current shapes produced in Lab., Horn gap single diveters, ground wires, surge absorbers.

UNIT – 4
EHV Transmission & Corona Loss:
Need for E.H.V. transmission, use of bundled conductors, corona characteristics of smooth bundled conductors with different configurations, corona loss, factors, affecting the corona. Shunt & Series compensation of E.H.V. lines. Tuned power lines. & H.V.D.C. Transmission:
Advantages, disadvantages & economics of H.V.D.C. transmission system. Types of D.C. links, converter station equipment, their characteristics.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

Suggested Books :
2. RS Jha, "HV Engg."
5. Kimbark, "HVDC Transmission".

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
UNIT -1 Sampling & Reconstruction:
Time invariant vs. time variant systems. Introduction to discrete time system, Computer controlled system: Mathematical treatment of sampling process, Sampling theorem. Reconstruction from sampled signal, Transfer function of discrete data system: transfer function of discrete data system with cascade elements, transfer function of Z.O.H, Transfer function of closed loop discrete data system.

UNIT -2 Discrete Z- Transform: Z- Transform of discrete time functions:-
Stability Analysis:
Stability test of discrete data system: Jury's stability criterion, modified Routh's criterion, Schur Cohn criterion.

UNIT -3 Non-linear systems:
Linear & non-linear systems classification & comparison, special features of non-linear systems, properties of non linear system. Linear verses Non-linear control system, different types of non-linearities Limit cycle, jump resonance, sub harmonics.

UNIT -4 Non-linear control

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

Books Recommended:
1. Control system by Ogata PHI Education.
2. Digital control system by M. Gopal TMH education ...
3. Non Linear Control by Slotin & Li
UNIT I: Introduction: Limitations of Conventional Energy sources, uses & growth of alternate energy sources, Basic schemes & application of direct energy conversion.

Energy Management: Principles of energy conservation, Energy Audit, energy conservation approach/technologies, co-generation, waste heat utilization, power factor improvement, regeneration methods, energy storage, efficient energy management, techniques, energy management system in India.

UNIT II: MHO Generators: Basic principle, gaseous conduction & Hall effect, generator & motor effect, different types of MHO generators, practical MHO generators, applications & economic aspects.

Thermo-Electric Generators: Thermoelectric effects, Thermoelectric converters, figure of merit, properties of thermoelectric materials, brief description of construction of thermoelectric generators, applications & economic aspects.

UNIT III: Photo Voltaic Effect & Solar Energy:- Photo Voltaic effect, different types of photoelectric cells, cell fabrication, characteristics of photo voltaic cells, conversion efficiency, solar batteries, solar radiation analysis, solar energy in India, solar collector, solar furnaces & applications.

UNIT IV: Miscellaneous Sources: Fuel cells, principle of action, general description of fuel cells, conversion efficiency, operational characteristics & applications. Low level hydro plants, definition of low head hydropower, Choice of site, choice of turbines. Wind power, history of wind power, wind machines, theory of wind power, characteristics of suitable wind power sites, Bio mass energy, conversion processes. Different bio mass energy resources, electric equipment, precautions, and applications.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:
1. Energy Resources; Demand & Conservation with special reference to India by KashbariTMH
3. Direct Energy Conversion by Kettani, M.
5. Energy Technology Hand Book by Considine.
8. Energy storage for Power system, A Ter-Gazarian (peter Peragimus Ltd.)

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
FUZZY LOGIC & NEUTRAL NETWORKS  
EE-409-E

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>

Theory: 100 Marks  
Sessional: 50 Marks  
Duration: 3 Hrs

UNIT I:  
Introduction to Fuzzy sets, Crisp sets, Basic concepts of Fuzzy sets, L-fuzzy sets, level 2-fuzzy sets, type 2-fuzzy sets. Fuzzy sets Vs. Crisp sets. Fuzzy Arithmetic, Algebraic operations, set-theoretic operations, fuzzy relation on sets & fuzzy set compositions of Fuzzy relations, properties of the minimum-maximum composition.

UNIT II:  
Introduction to Fuzzy control, Fuzzy logic controller components, Construction of Fuzzy sets (Direct methods, Indirect method), Introduction to Expert system, Case study on fuzzy logic controller, Application of Fuzzy control.

UNIT III:  
Introduction to Neural Networks, Artificial Neuron model, Neural Network controller, Multilayer Network, Back propagation Algorithm (Forward, Backward), learning control Architecture (Indirect learning, General, Forward Inverse), Simplex matrix operation.

UNIT IV:  
Application of Neural Network: The traveling salesman problem, Time series prediction.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. James A. Anderson" Introduction to Neural Networks", Prentice Hall India.  
3. Nil Junbong " Fuzzy Neural Control Principles & Algorithm", PHI.  
5. Klir George J. " Fuzzy sets and Fuzzy Logic Theory and Applications", PHI.  
6. J.M Zurada , " Introduction to Artificial Neural Network", Jaico Publishers

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
UNIT 1
Installation, testing, commissioning and maintenance of: Generators, & Power transformers. UNIT 2

UNIT 2
Installation, testing, commissioning and maintenance of:
AC and DC motors

UNIT 3
Installation, testing, commissioning and maintenance of:
Ckt breakers, Isolators, PT, CT, Bus bars.

UNIT 4
Installation, testing, commissioning and maintenance of:
Transmission lines, Cables, Capacitors, Synchronous condensers. Neutral grounding, Power factor improvement

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

Reference books
1. Testing, commissioning operation and maintenance of electrical equipment By S.ROA, KHANNA PUB.
2. Testing, commissioning operation and maintenance of electrical equipment By T ARLOK SINGH

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
UNIT 1:
INTRODUCTION: Definition of reliability, failure data analysis, mean failure ratio, MTTF, MTBF, graphical plot, MTTF in terms of failure density, generalization, reliability in terms of failure density (integral form), reliability in other situation.
HAZARD MODELS: Introduction, constant hazard linearly increasing hazard, Weibull model, on density function and distribution function, and reliability analysis, important distribution and its choice, expected value, standard deviation and variance, theorem concerning expectation and variance.

UNIT 2:
SYSTEM RELIABILITY: Introduction, series system with identical component, reliability bounds-classical approach Bayesian approach application of specification hazard models, an rout-of-an structure methods for solving complex system, systems not reducible to mixed configuration, mean time to failure system, logic diagrams, Markov model and graph. RELIABILITY IMPROVEMENT AND FAULT TREE ANALYSIS: Introduction, improvement by component, redundancy, element redundancy, unit redundancy, optimization, stand by redundancy, reliability-cost trade off, fault tree construction, calculation of reliability from fault tree.

UNIT 3:
MAINTAINABILITY, A VAILABILITY AND REPAIRABLE SYSTEM: Introduction, maintainability, availability, system down time, reliability and maintainability trade off, instantaneous repair rate MTTR, reliability and availability function.

UNIT 4:
RELIABILITY ALLOCATION AND APPLICATION: Reliability allocation for a series system, approximation of reliability in a computer system and nuclear power plant, failure models and effects analysis (FMEA)

NOTE:
The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit. Each question will be of equal marks.

Suggested Books:
2. L.A.Srinath, Reliability engineering, (EWP New Delhi).

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
UNIT I:
INTRODUCTION: History. Why use VHDL? Hardware design construction, design levels, HDLs Hardware simulation and synthesis. Using VHDL for design synthesis, terminology. PROGRAMMABLE LOGIC DEVICES :Why use programmable logic? What is a programmable logic device ? Block diagram, macrocell structures and characteristics of PLDs and CPLDs. Architecture and features of FPGAs. Future direction of programmable logic.

UNIT II:
BEHAVIORAL MODELING: Entity declaration, architecture body, process statement, variable assignment, signal assignment. Wait, If, Case, Null, Loop, Exit, Next and Assertion statements. Inertial and transport delays, Simulation deltas, Signal drivers.
DATA FLOW AND STRUCTURAL MODELLING: Concurrent signal assignment, sequential signal assignment, Multiple drivers, conditional signal assignment, selected signal assignment, block statements, concurrent assertion statement, component declaration, component instantiation.

UNIT III:

UNIT IV:
ADVANCED TOPICS: Generate Statements, Aliases, Qualified expressions, Type conversions, Guarded signals, User defined attributes, Predefined attributes., VHDL synthesis.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

Suggested Books:
1. D. Perry, VHDL, 3rd Ed.- TMH.
2. J Bhasker, A.VHDL- Primer, PHI.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
LIST OF EXPERIMENTS:

1. Write a VHDL Program to implement a 3:8 decoder.
2. Write a VHDL Program to implement a 8:1 multiplexer using behavioral modeling.
3. Write a VHDL Program to implement a 1:8 demultiplexer using behavioral modeling.
4. Write a VHDL Program to implement 4 bit addition/subtraction.
5. Write a VHDL Program to implement 4 bit comparator.
6. Write a VHDL Program to generate Mod-10 up counter.
7. Write a VHDL Program to generate the 1010 sequence detector. The overlapping patterns are allowed.
8. Write a program to perform serial to parallel transfer of 4 bit binary number.
9. Write a program to perform parallel to serial transfer of 4 bit binary number.
10. Write a program to design a 2 bit ALU containing 4 arithmetic & 4 logic operations.

NOTE: At least 10 experiments are to be performed with at least 7 from above list, remaining 3 may either be performed from the above list or designed & set by concerned institution as per the scope.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
# TRANSDUCER & THEIR APPLICATION

**EE-419-E**

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Theory: 100 Marks</th>
<th>Sessional: 50 Marks</th>
<th>Duration: 3 Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>-</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**UNIT - I**

Definition of transducer. Advantages of an electrical signal as output. Basic requirements of transducers, Primary and Secondary Transducer, Analog or digital types of transducers. Resistive, inductive, capacitive, piezoelectric, photoelectric and Hall effect transducers.

**UNIT-II**


**UNIT - III**


**UNIT - IV**


**NOTE:**

The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

**Suggested Books:**


Note: Students are advised to verify scheme and syllabus from Kurukshetra University
LIST OF EXPERIMENT

1. To Measure Temperature using RTD.
2. To Measure Displacement using L.V.D.T.
3. To Measure Load using Load Cell.
5. Light Measurement using LDR & Photo Cell.
6. To Measure Angular Displacement using Capacitive Transducer.
7. To Measure the Variation in Water Level using Capacitive Transducer.
8. To Measure Speed of DC Motor using Reluctance Method.
9. To Measure Strain using Strain Gauge.
10. To Measure Speed using Photo Interrupter Method.

NOTE: At least 10 experiments are to be performed with at least 8 from above list, remaining 2 may either be performed from the above list or designed & set by concerned institution as per the scope. Students are advised to verify scheme and syllabus from Kurukshetra University.
1. To find out the dielectric strength of transformer oil.

2. To find zero sequence component of three phase line.

3. To draw the characteristics of thermal overload relay.

4. To study an IDMT over current relay to obtain and plot it's characteristic curves i.e. the graph between current and time.

5. To measure the ABCD parameters of a given transmission line.

6. To plot the power angle characteristics of given transmission lines.

7. To find the string efficiency of a string insulator with/without guard rings.

8. To study the characteristics of transmission line for t-network & pie- network.

9. To study and testing of a current transformer.

10. To study various types of distance relay

NOTE: At least 10 experiments are to be performed with at least 8 from above list, remaining 2 may either be performed from the above list or designed & set by concerned institution as per the scope.
CIRCUIT SIMULATION LAB
EE-425-E

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Practical: 25 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>T</td>
<td>P</td>
<td>Total</td>
<td>Sessional: 25 Marks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>Duration: 3 Hrs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Design of Low pass filter with a Cut of frequency of 10KHz and gain = 2
2. Design a Band Pass filter with lower cut of frequency = 1 KHz and upper cut of frequency of = 2KHz and gain = 2.
3. Design a high pass filter with cut of frequency = 10KHZ and gain = 2
4. Design a positive and negative clipper using op amp 741
5. Design a positive and negative clamer using op amp 741.
6. Design a practical integrator with a frequency of 2 KHz
7. Design a practical differentiator with a frequency of 4 KHz.
8. Design a square wave generator with frequency of 2 KHz.
9. Design a Wein bridge oscillator with frequency of 1 MHz.
10. Design a phase shift oscillator with frequency of 1 Khz.
11. To study RLC series resonance.
12. To study RLC parallel resonance.

NOTE: At least 10 experiments are to be performed with at least 8 from above list, remaining 2 may either be performed from the above list or designed & set by concerned institution as per the scope

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
COPuter Methods in Power System
EE-402-E

L T P Sessional: 50 Marks
4 1 - Theory: 100 Marks
Total: 150 Marks
Duration: 3 Hrs

UNIT-1
General: Impact of computers, orientation of engineering problems to computers, review of matrices and matrix operations.
Incidence and Network Matrices: Network graph, various incidence matrices, generalized element representation, primitive network and primitive network matrices, formation of various network matrices by singular transformations, inter-relations between various incidence matrices and network.

UNIT-2
Bus Impedance and admittance matrices: Building algorithms for bus impedance matrix, modification of bus impedance matrix for change of reference bus and for network changes, formation of bus admittance matrix and modification of three-phase network elements, treatment under balanced and unbalanced excitation, transformation matrices, and unbalanced elements.

UNIT-3
Short-Circuit Studies: Introduction, network short circuit studies using Z bus, short circuit calculations using symmetrical components for various types of faults.
Load-Flow Studies: Introduction, importance of load flow studies, classification of buses, load flow equations, iterative methods, computer algorithms and load flow solutions using Gauss Seied and Newton Raphson methods, decoupled and fast decoupled load flow solutions, representation of regulating and off nominal ration transformers, comparison of load flow solution methods.

UNIT-4
Sparsity: Introduction, optimally ordered triangular factorization, schemes of optimal ordering

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
ELECTRICAL ENGG. MATERIALS AND PROCESS
EE-404-E

L T P  Sessional:  50 Marks
3 0 -  Theory :  100 Marks
          Duration:  3 Hrs

UNIT-1
Conductors, Properties of conductors, ACSR, High resistivity materials and their properties, Alloys, Soldering and brazing materials, superconductivity, super conductor materials and their applications.

UNIT-2
Insulators, classifications of insulators, dialectical materials, glass and ceramics refractory materials and their uses, optical fibers, laser and opto-electronics materials, semiconductor materials, properties of semiconductor materials thermosetting and thermoplast materials.

UNIT-3

UNIT-4
Processes used in Plano technology e.g. Lapping, polishing, cleaning, masking, photolithography, diffusion, oxidation and metallization, welding wire bonding, packaging and encapsulation, Heating induction and dielectric, Electron beam welding and cutting annealing, cold &Hot rolling.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
OPERATION RESEARCH  
EE-406-E  

L    T   P    Sessional:  50Marks  
4   1   -  Theory :  100 Marks  
Duration :  3 Hrs  

UNIT-1  
Development of operation research, characteristics and scope of operation research, operation research in  
Management, model in operation research, model formation, types of mathematical models, limitation of  
operation research.  
L.P. models, simplex method, the algebra of simplex method, (Minimization problems), the big M method,  
post optimality analysis, essence of duality theory, Application of sensitivity analysis.  

UNIT-2  
Introduction to model, matrix terminology, formulation and solution of Transportation model (least cost  
method, Voyel’s Approximation method), least time transportation problem, Assignment problems.  
Introduction to net work logic, Numbering of events (Fulkerson Rule), PERT calculation Forward Path,  
back-ward path, Slack, probability, comparison with PERT, Critical path, Floats, Project cost, crashing the  
et work, updating (PERT and CPM)  

UNIT-3  
Introduction, applications of simulation, advantages and limitations of simulation techniques, generation of  
random numbers, Time-flow mechanism, simulation languages.  
Steps in decision theory approach, Decision Machinery environment, Decision machining under certainly  
and uncertainly, Decision machining under condition of risk, Decision trees, minimum enchained criterias,  
advantage and limitations of decision tree solutions, post optimality, Definition of arguments models,  
comparison with transport model, Mathematical representation of assignment model, Formulation and  
solution of argument models, variation of the argument model, Alternate optimal solutions.  

UNIT-4  
Introduction, Applications of queuing theory, waiting time and idle time costs, single channel queuing theory  
and multi channel queuing theory with Poisson, arrivals, and exponential services, Numerical on single  
channel and multi channel queuing theory.  
Theory of games, competitive games, Rules and terminology in game theory, Rules for game theory- saddle  
point, dominance, mixed strategy(2x2games), mixed strategy (2x n games or m x 2 games), mixed strategy  
(3x 3 games), two person zero sum games, n-person zero sum games.  

NOTE: The question paper shall have eight questions in all organized into four sections,  
each section having two questions from each of the four units. The candidate shall have  
to attempt five questions in all, selecting at least one question from each unit.
UNITAZTION OF ELECTRICAL ENERGY
EE-414-E

L T P Sessional:  50 Marks
3 1 - Theory :  100 Marks
Total : 150 Marks
Duration:  3 Hrs.

UNIT 1: Illumination:  Term used in illumination, Laws of illumination, sources of light, arc lamp incandescent lamp, discharge lamp, sodium vapour, mercury vapour lamp, florescent tubes, lightening schemes, method of lightning calculation.

UNIT II: Electrical Heating:  Advantages of Electrical Heating, various types of Electrical heating, Power frequency and High frequency heating, Degree of heating element, Equivalent circuit of arc furnace, Resistance heating, Arc heating, Induction heating, dielectric heating etc.

Electric Welding:  All types of electrical welding, resistance welding, arc welding, electrical winding equipment, Comparison between AC & DC welding, types of electrodes, advantages of coated electrodes.

UNIT III: Electroplating:  Basic principle, faraday’s law of electrostatics, terms used, Application of electrolysis, factors governing electro deposition, power supply.

Refrigeration & Air Conditioning:  Basic principle, various compression cycle & system its application, electric circuit of refrigerator, air conditioner.

UNIT IV: Traction Motors:  Different system of electric traction, comparison between AC & DC system, block diagram of traction system ,Starting-Speed control and braking-Speed control and braking –Speed time curves,-Mechanics of Train movement- Tractive effort for acceleration – Power and energy output from driving axles-Specific energy output and consumption-Train resistance.

NOTE:  The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
INTERNET FUNDAMENTALS
EE-416-E

L T P Sessional: 50 Marks
4 1 - Theory : 100 Marks
Total : 150 Marks
Duration: 3 Hrs

Unit-1


UNIT-2
World Wide Web: Introduction, Miscellaneous Web Browsers details, searching the www: directories search engines, and meta search engines, search fundamentals, search strategies, working of the search engines, Telnet and FTP, HTTP, Gopher commands, TCP/IP.

UNIT-3
Electronic Mail:
Introduction, advantages and disadvantages, User IDs, Passwords, E-mail addresses, message components, message compositions, mailer features, Email Inner working, Email management, MIME types, newsgroups, mailing lists, chat rooms, secure-mails, SMTP, PICO, Pine, library, cards catalog, online ref. works.
Languages: Basics and advanced HTML, Basics of scripting languages- XML, DHTML, Java Script.

UNIT-4

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University
EE-418-E INTERNET FUNDAMENTALS LAB

L T P  Sessional: 25 marks
0 0 3 Theory: 25 marks

Total: 50 marks


LIST OF EXPERIMENTS:
1. To prepare the your Bio Data using HTML Tags.
2. Create a new document that takes the format of a business letter. Combine <P> and <BR> tags to properly separate the different parts of the documents. Such as the address, greeting, content and signature. What works best for each.
3. Create a document that uses multiple <BR> and <P> tags, and put returns between <PRE> tags to add blank lines to your document see if your browser sender them differently.
4. Create a document using the <PRE> tags to work as an invoice or bill of sale, complete with aligned dollar values and a total. Remember not to use the Tab key, and avoid using emphasis tags like <B> or <EM> within your list.
5. Create a seven items ordered list using Roman Numerals. After the fifth item, increase the next list value by 5.
6. Beginning with an ordered list, create a list that nests both an unordered list and a definition list.
7. Use the ALIGN attribute of an <IMG> tags to alling another image to the top of the first image, play with this feature, aligning images to TOP, MIDDLE and BOTTOM.
8. Create a Table fo Contents, Style page (using regular and section links) that loads a different document for each chapter or section of the document.
9. Create an HTML document to print the college time table using table tag.
10. Write the HTML code for implementing the form.
11. Create few HTML docs for each explaining about a state of India. The list of state must appear in a frame when we click on state, the details must appear in another frame.
12. Design Web Pages containing information of the Deptt using HTML tags & CSS.
13. Installing internet & external nodems (External & internal), NIC and assign IP address.
14. (a) Study of E-Mail system & various mail options. (b) Create your own Mial0ID in yahoo & add your signature. (c) Add names (mail-IDs) in your address books, compose and search an element.
15. Study the use of Meta Tags in the development of web page.

Note: At least 10 programs are to be performed from above list.
EE–424–E COMPUTER METHODS IN POWER SYSTEM LAB

L T P       Sessional: 25marks
0 0 3       Theory: 25marks
            Total: 50 marks

Pre-requisite: Perform the experiments using C/C++ Language.

List of Experiments:
1. Develop a program to do the following mathematical operations:
   i) Transpose of a matrix
   ii) Multiplication of two matrices
   iii) Addition & subtraction of two matrices.

2. The demand estimate is the starting point for planning the further electric power
   Supply. Mathematical curves of the trend. One of the simplest curve is \( P = P_0 \exp \{ a (t-t_0) \} \), where \( a \) is the average per unit growth rate
   \( P \) is the demand in year ‘t’ in GW
   \( P_0 \) is the given demand at year \( T_0 \) in GW.
   Develop a table to compute the system demand from 1984 to 2005 on yearly basis.
   Calculate also the average yearly demand over this period.

3. You have been given with network data consisting of element no. starting node &
   End node. Develop a program to make element node incident matrix. \( A \) and convert
   It into \( Y_{\text{bus}} \) as incidence matrix. \( A \) by choosing any bus as reference.

<table>
<thead>
<tr>
<th>Element No.</th>
<th>Starting Node</th>
<th>End Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

4. Write a program to formulate Y-Bus by non singular transformation
   \( Y_{\text{bus}} = [A]^{-1} [y] [A] \).

5. Develop a program to solve a set of 4 simultaneous liner equations using Gaussian
   Elimination method.

6. Develop a program to calculate Zbus of a given network using building algorithm.
   Assume that no mutual coupling is involved in between the different elements.

7. The Gauss Seidel method to find the solution of following equations
   \( X_1 + X_1X_2 + X_3 = 10 \)
   \( X_1 + X_2 + X_3 = 6 \)
   \( X_1X_2 - X_3 = 2 \)

8. You have given with a 6 bus system. Apply load flow technique using Gauss Seidel
   method to solve up to two iterations.

9. Develop a program to find Eigen Values for given Matrix.

Note: Students are advised to verify scheme and syllabus from Kurukshetra University