

# **SCHEME OF EXAMINATION**

**&**

## **DETAILED SYLLABUS**

**for**

### **BACHELOR OF TECHNOLOGY (Electrical & Electronics Engineering)**

**GURU GOBIND SINGH  
INDRAPRASTHA UNIVERSITY  
KASHMERE GATE, DELHI**

**BACHELOR OF TECHNOLOGY**  
(B.TECH.) DEGREE COURSE (Common to all branches)

**FIRST SEMESTER EXAMINATION**

| Code No.                   | Paper  | L         | T/P       | Credits   |
|----------------------------|--|-----------|-----------|-----------|
| <b>THEORY PAPERS</b>       |  |           |           |           |
| ETMA 101                   | Applied Mathematics – I                                      | 3         | 1         | 4         |
| ETPH 103                   | Applied Physics – I  | 2         | 1         | 3         |
| ETCH 105                   | Applied Chemistry – I  | 2         | 1         | 3         |
| ETME 107                   | Manufacturing Process  | 2         | 0         | 2         |
| ETCS 109                   | Introduction to Computers and Auto CAD                       | 2         | 1         | 3         |
| ETEL 111                   | Communication Skills – I                                     | 2         | 1         | 3         |
| ETEL 113*                  | Impact of Science & Technology on Society                    | 1         | 0         | 1         |
| <b>PRACTICAL/VIVA VOCE</b> |  |           |           |           |
| ETPH 151                   | Applied Physics Lab. – I                                     | -         | 2         | 1         |
| ETCH 153                   | Applied Chemistry Lab. – I                                   | -         | 2         | 1         |
| ETCS 155                   | Introduction to Auto CAD<br>Office Automation and Web Design | -         | 3         | 2         |
| ETME 157                   | Workshop Practice  | -         | 3         | 2         |
| ETME 159                   | Engineering Graphics Lab.                                    | -         | 2         | 1         |
|                            | <b>TOTAL</b>   | <b>14</b> | <b>17</b> | <b>26</b> |

**ETEL-113\* is NUES**

**BACHELOR OF TECHNOLOGY**  
(B.TECH.) DEGREE COURSE (Common to all branches)

**SECOND SEMESTER EXAMINATION**

| Code No.                   | Paper                       | L         | T/P       | Credits   |
|----------------------------|-----------------------------|-----------|-----------|-----------|
| <b>THEORY PAPERS</b>       |                             |           |           |           |
| ETMA 102                   | Applied Mathematics – II    | 3         | 1         | 4         |
| ETPH 104                   | Applied Physics – II        | 2         | 1         | 3         |
| ETCH 106                   | Applied Chemistry – II      | 2         | 1         | 3         |
| ETCS 108                   | Introduction to Programming | 2         | 1         | 3         |
| ETME 110                   | Engineering Mechanics       | 2         | 1         | 3         |
| ETEC 112                   | Electrical Science          | 2         | 1         | 3         |
| ETEL 114                   | Communication Skills – II   | 2         | 1         | 3         |
| <b>PRACTICAL/VIVA VOCE</b> |                             |           |           |           |
| ETPH 152                   | Applied Physics Lab. – II   | -         | 2         | 1         |
| ETCH 154                   | Applied Chemistry Lab. – II | -         | 2         | 1         |
| ETCS 156                   | C Programming Lab.          | -         | 2         | 1         |
| ETME 158                   | Engineering Mechanics Lab.  | -         | 3         | 2         |
| ETEC 160                   | Electrical Science Lab.     | -         | 2         | 1         |
|                            | <b>TOTAL</b>                | <b>15</b> | <b>18</b> | <b>28</b> |

**BACHELOR OF TECHNOLOGY**

(Electrical &amp; Electronics Engineering)

## THIRD SEMESTER EXAMINATION

| Code No.                   | Paper                                       | L         | T/P       | Credits   |
|----------------------------|---|-----------|-----------|-----------|
| <b>THEORY PAPERS</b>       |   |           |           |           |
| ETMA 201                   | Applied Mathematics – III                   | 3         | 1         | 4         |
| ETEE 203                   | Analog Electronics-I                        | 3         | 1         | 4         |
| ETEC 205                   | Circuits & Systems                          | 3         | 1         | 4         |
| ETEE 207                   | Electrical Engineering<br>Materials         | 3         | 1         | 4         |
| ETEE 209                   | Electro Mechanical Energy<br>Conversion – I | 3         | 1         | 4         |
| ETCS 211                   | Data Structures                             | 3         | 1         | 4         |
| <b>PRACTICAL/VIVA VOCE</b> |   |           |           |           |
| ETEE 251                   | Electro Mechanical Energy<br>Conversion Lab | 0         | 2         | 1         |
| ETEC 253                   | *Circuits & Systems lab                     | 0         | 2         | 1         |
| ETEE 255                   | *Analog Electronics – I Lab.                | 0         | 2         | 1         |
| ETCS 257                   | Data Structures Lab.                        | 0         | 2         | 1         |
|                            | <b>Total</b>                                | <b>18</b> | <b>14</b> | <b>28</b> |

**\*Some lab experiments must be performed using any circuit simulation software e.g. PSPICE.**

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## FOURTH SEMESTER EXAMINATION

| Code No.                   | Paper                                       | L         | T/P       | Credits   |
|----------------------------|---|-----------|-----------|-----------|
| <b>THEORY PAPERS</b>       |   |           |           |           |
| ETEE 202                   | Electro - Mechanical Energy Conversion – II | 3         | 1         | 4         |
| ETEE 204                   | Analog Electronics – II                     | 3         | 1         | 4         |
| ETEE 206                   | Power System – I                            | 3         | 1         | 4         |
| ETEE 208                   | Control Engineering – I                     | 3         | 1         | 4         |
| ETEE 210                   | Electromagnetic Field Theory                | 3         | 1         | 4         |
| ETEE 212                   | Power Station Practice                      | 3         | 1         | 4         |
| <b>PRACTICAL/VIVA VOCE</b> |   |           |           |           |
| ETEE 252                   | Electro Mechanical Energy Conversion Lab    | 0         | 2         | 1         |
| ETEE 254                   | *Analog Electronics Lab                     | 0         | 2         | 1         |
| ETEE 256                   | Power System –I Lab                         | 0         | 2         | 1         |
| ETEE 258                   | Control Engineering Lab                     | 0         | 2         | 1         |
|                            | <b>Total</b>                                | <b>18</b> | <b>14</b> | <b>28</b> |

**\*Some lab experiments must be performed using any circuit simulation software e.g. PSPICE.**

**NOTE:** 4-6 weeks training will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester.

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## FIFTH SEMESTER EXAMINATION

| Code No.                   | Paper   | L         | T/P       | Credits   |
|----------------------------|---|-----------|-----------|-----------|
| <b>THEORY PAPERS</b>       |   |           |           |           |
| ETEE 301                   | Digital Electronics                           | 3         | 1         | 4         |
| ETEE 303                   | Object Oriented Programming using C++         | 3         | 1         | 4         |
| ETEE 305                   | Communication Systems & Circuits              | 3         | 1         | 4         |
| ETEE 307                   | Electrical Measurement & Instrumentation      | 3         | 1         | 4         |
| ETCS 309                   | Database Management Systems                   | 3         | 1         | 4         |
| ETMS 311                   | Organizational Behavior                       | 3         | 1         | 4         |
| <b>PRACTICAL/VIVA VOCE</b> |   |           |           |           |
| ETEE 351                   | Digital Electronics Lab.                      | 0         | 2         | 1         |
| ETEE 353                   | Object Oriented Programming using C++ Lab     | 0         | 2         | 1         |
| ETEE 355                   | Communication Systems & Circuits Lab.         | 0         | 2         | 1         |
| ETEE 357                   | Electrical Measurement & Instrumentation Lab. | 0         | 2         | 1         |
| ETCS 359                   | Database Management Systems Lab.              | 0         | 2         | 1         |
| ETEE 361                   | #^Practical Training                          | -         | -         | 1         |
|                            | <b>Total</b>                                  | <b>18</b> | <b>16</b> | <b>30</b> |

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^Practical training was conducted after fourth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.

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## SIXTH SEMESTER EXAMINATION

| Code No.                   | Paper                            | L         | T/P       | Credits   |
|----------------------------|----------------------------------|-----------|-----------|-----------|
| <b>THEORY PAPERS</b>       |                                  |           |           |           |
| ETEE 302                   | Microprocessor                   | 3         | 1         | 4         |
| ETEE 304                   | Power System– II                 | 3         | 1         | 4         |
| ETEE 306                   | Power Electronics                | 3         | 1         | 4         |
| ETIT 308                   | Digital Signal Processing        | 3         | 1         | 4         |
| ETEE 310                   | Utilization of Electrical Energy | 3         | 1         | 4         |
| ETEE 312                   | VLSI Design & its Applications   | 3         | 1         | 4         |
| <b>PRACTICAL/VIVA VOCE</b> |                                  |           |           |           |
| ETEE 352                   | Microprocessor Lab.              | 0         | 2         | 1         |
| ETEE 354                   | Power System-II Lab.             | 0         | 2         | 1         |
| ETIT 356                   | Digital Signal Processing Lab.   | 0         | 2         | 1         |
| ETEE 358                   | Power Electronics Lab.           | 0         | 2         | 1         |
| ETEE 360                   | Electrical Energy Lab.           | 0         | 2         | 1         |
| <b>Total</b>               |                                  | <b>18</b> | <b>16</b> | <b>29</b> |

**NOTE:** 4-6 weeks training will be held after sixth semester. However, Viva-Voce will be conducted in the seventh semester.





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## EIGHTH SEMESTER EXAMINATION

| Code No.                         | Paper   | L         | T/P       | Credits   |
|----------------------------------|---|-----------|-----------|-----------|
| <b>THEORY PAPERS</b>             |   |           |           |           |
| ETEE 402                         | Advanced Control Systems                          | 3         | 1         | 4         |
| ETEE 404                         | Flexible A.C. Transmission Systems                | 3         | 1         | 4         |
| <b>ELECTIVE (SELECT ANY ONE)</b> |   |           |           |           |
| ETEE 406                         | Optimization Techniques                           | 3         | 1         | 4         |
| ETEE 408                         | Application of Power Electronics to Power Systems | 3         | 1         | 4         |
| ETEE 410                         | Object Oriented Software Engineering              | 3         | 1         | 4         |
| ETEE 412                         | Digital image Processing                          | 3         | 1         | 4         |
| ETEE 414                         | Advanced Computer Networks                        | 3         | 1         | 4         |
| ETEE 416                         | High Voltage Engineering                          | 3         | 1         | 4         |
| ETEE 418                         | Embedded Systems                                  | 3         | 1         | 4         |
| ETEE 420                         | Instrumentation                                   | 3         | 1         | 4         |
| ETEE 422                         | Power Quality Management                          | 3         | 1         | 4         |
| ETEE 424                         | Special Purpose Machines                          | 3         | 1         | 4         |
| ETEE 426                         | Power Plant Instrumentation                       | 3         | 1         | 4         |
| <b>PRACTICAL/VIVA VOCE</b>       |   |           |           |           |
| ETEE 452                         | Advanced Control System Lab.                      | 0         | 2         | 1         |
| ETEE 454                         | Practical Based on Elective                       | 0         | 2         | 1         |
| ETEE 456                         | *Major Project                                    | 0         | 14        | 7         |
|                                  | <b>Total</b>                                      | <b>09</b> | <b>21</b> | <b>21</b> |

\*The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

**NOTE:**

1. The total number of the credits of the B.Tech. (E&E) Programme = 214
2. Each student shall be required to appear for examinations in all courses. However, for the award of the degree a student shall be required to earn the minimum of 200 credits.

**Paper Code: ETMA-101****L T C****Paper: Applied Mathematics – I****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

**UNIT I**

**COMPLEX NUMBERS AND INFINITE SERIES:** De Moivre's theorem and roots of complex numbers. Euler's theorem, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses. Convergence and Divergence of Infinite series, Comparison test d'Alembert's ratio test. Higher ratio test, Cauchy's root test. Alternating series, Leibnitz test, Absolute and conditional convergence. [No. of

**Hrs. 10]****UNIT II**

**CALCULUS OF ONE VARIABLE:** Successive differentiation. Leibnitz theorem (without proof) McLaurin's and Taylor's expansion of functions, errors and approximation.

Asymptotes of Cartesian curves. Curvature of curves in Cartesian, parametric and polar coordinates, Tracing of curves in Cartesian, parametric and polar coordinates (like conics, astroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardioid, Lemniscate of Bernoulli, equiangular spiral). Reduction Formulae for evaluating



Finding area under the curves, Length of the curves, volume and surface of solids of revolution. [No. of Hrs. 15]

**UNIT III**

**LINEAR ALGEBRA – MATRICES:** Rank of matrix, Linear transformations, Hermitian and skew – Hermitian forms, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Diagonalisation of a matrix, Eigen values and eigen vectors. Cayley – Hamilton theorem (without proof).

**[No. of Hrs. 09]****UNIT IV**

**ORDINARY DIFFERENTIAL EQUATIONS:** First order differential equations – exact and reducible to exact form. Linear differential equations of higher order with constant coefficients. Solution of simultaneous differential equations. Variation of parameters, Solution of homogeneous differential equations – Cauchy and Legendre forms. (No. of Hrs. 10]

**TEXT BOOKS:**

1. Kresyzig, E., "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).
2. Jain, R. K. and Iyengar, S. R. K., "Advanced Engineering Mathematics", Narosa, 2003 (2<sup>nd</sup> Ed.).

**REFERENCE BOOKS:**

1. Mitin, V. V.; Polis, M. P. and Romanov, D. A., "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001.
2. Wylie, R., "Advanced Engineering Mathematics", McGraw-Hill, 1995.
3. "Advanced Engineering Mathematics", Dr. A. B. Mathur, V. P. Jaggi (Khanna publications)

**Paper Code: ETPH – 103****L T C****Paper: APPLIED PHYSICS – I****2 1 3**

| INSTRUCTIONS TO PAPER SETTERS:   | MAXIMUM MARKS: 75 |
|--|-------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                   |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                   |

**UNIT - I**

**Interference of Light:** Interference due to division of wavefront and division of amplitude, Young's double slit expt., Interference, Principle of Superposition, Theory of Biprism, Interference from parallel thin films, wedge shaped films, Newton rings, Michelson interferometer.

**Diffraction:** Fresnel Diffraction, Diffraction at a straight edge, Fraunhofer diffraction due to N slits, Diffraction grating, absent spectra, dispersive power of Grating, resolving power of prism and grating.

**[No. of Hrs. 8]****UNIT - II**

**Polarization:** Introduction, production of plane polarized light by different methods, Brewster and Malus Laws. Double refraction, Quarter & half wave plate, Nicol prism, specific rotation, Laurent's half shade polarimeter.

**Optical Instruments :** Ramdson & Huygen Eye pieces, Electron microscope.

**[No. of Hrs. 8]****UNIT - III**

**Laser:** Introduction, temporal and spatial coherence, principle of Laser, stimulated and spontaneous emission, Einstein's Coefficients, He-Ne Laser, Ruby Laser, Application of Lasers.

**Fibre Optics:** Introduction, numerical aperture, step index and graded index fibres, attenuation & dispersion mechanism in optical fibers (Qualitative only), application of optical fibres, optical communication (block diagram only)

**[No. of Hrs. 8]****UNIT - IV**

**Mechanics:** Central and non-central forces, Inverse square force, SHM, Damped, undamped and forced Oscillations.

**Special theory of Relativity:** Frame of reference, Michelson-Morley experiment, basic postulates of special relativity, Lorentz transformations (space – time coordinates & velocity only), mass energy relation.

**[No. of Hrs. 8]****TEXT BOOKS:**

1. A. Ghatak, "Optics"
2. N. Subrahmanyam and Brij Lal, "Optics"

**REFERENCE BOOKS:**

1. Jenkins and White, "Fundamentals of Optics"
2. C. Kittle, "Mechanics", Berkeley Physics Course, Vol.- I.
3. A. Beiser, "Concepts of Modern Physics"

**Paper Code: ETCH – 105****L T C****Paper: Applied Chemistry – I****2 1 3**

| INSTRUCTIONS TO PAPER SETTERS:   | MAXIMUM MARKS: 75 |
|--|-------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                   |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                   |

**UNIT - I**

Water: Specifications for water, analysis of water – alkalinity, hardness and its determination (EDTA method only). Water for domestic use, Water softening processes – Lime – Soda process, Ion exchange method, boiler feed water, boiler problems-scale, sludge, priming and foaming, caustic embitterment and corrosion, their causes and prevention, removal of silica, removal of dissolved gases, carbonate and phosphate conditioning, colloidal conditioning, calgon treatment, Numerical problems on alkalinity, hardness, Lime-Soda process and Ion exchange method, EDTA method.

**[No. of Hrs: 08]****UNIT - II**

**Fuels:** Classification, combustion and chemical principles involved in it, calorific value: gross and net calorific values and their determination by bomb calorimeter and Boy's gas calorimeter.

**Solid Fuels:** Proximate and ultimate analysis of coal and their importance, High and low temperature carbonisation, Coke: Its manufacture by Otto Hoffman oven.

**Liquid Fuels:** Conversion of coal into liquid fuels (Bergius process and Fisher-Tropsch Process) and mechanism, Petroleum: its chemical composition and fractional distillation, cracking of heavy oil residues – thermal and catalytic cracking, knocking and chemical structure, octane number and cetane number and their significance, power alcohol, Analysis of flue gases by Orsat's apparatus, Numerical on calorific value, combustion, proximate and ultimate analysis of coal, flue gas analysis.

**[No. of Hrs: 08]****UNIT - III**

**Environmental Pollution and Control:** Air Pollution: Types of pollutants, source effects, sink and control of primary pollutants – CO, NO<sub>x</sub>, HC, SO<sub>x</sub> and particulates, effects of pollutants on man and environment – photochemical smog and acid rain.

Water Pollution: Classification of pollutants, their sources, waste water treatment – domestic and industrial.

**Soil Pollution:** Composition of soil, classification and effects of soil pollutants and their control.

**Solid Waste Pollution:** Classification, waste treatment & Disposal methods (Composting, sanitary landfilling, thermal processes, recycling and reuse).

**Hazardous Wastes:** Classification – radioactive, biomedical and chemical, treatment and disposal – physical, chemical and biological processes.

**[No. of Hrs: 08]****UNIT - IV**

**Solutions:** Ideal and non-ideal solutions, Raoult's Law, Distillation of binary solutions, Henry's Law, Nernst distribution law, Arrhenius theory and special behaviour of strong electrolytes.

**Corrosion:** Types of corrosion (dry, wet, atmospheric and soil corrosion), theories of corrosion, protective measures against corrosion.

**[No. of Hrs: 08]**

**TEXT BOOKS:**

1. Chemistry in Engineering & Technology (Vol I & II) (Latest ed.), By J.C. Kuriacose & J. Rajaram
2. Environmental Chemistry & Pollution Control (Latest ed.), By S.S. Dara
3. Applied Chemistry (Latest ed.), By H.D. Gesser

**Paper Code: ETME 107****L T C****Paper: Manufacturing Processes****2 0 2**

| INSTRUCTIONS TO PAPER SETTERS:   | MAXIMUM MARKS: 75 |
|--|-------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                   |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                   |

**UNIT - I****Casting Processes:**

Principles of metal casting: Pattern materials, types and allowance; Study of moulding, sand moulding, tools, moulding materials, classification of moulds, core, elements of gating system, casting defects, description and operation of cupola: special casting processes e.g. die-casting, permanent mould casting, centrifugal casting, investment casting. **[No. of Hrs. 6]**

**UNIT - II****Smithy and Forging:**

Basic operation e.g. upsetting, fullering, flattening, drawing, swaging: tools and appliances: drop forging, press forging.

**Bench Work and Fitting**

Fitting, sawing, chipping, thread cutting (die), tapping; Study of hand tools, Marking and marking tools. **[No. of Hrs. 6]**

**UNIT - III****Metal joining:**

Welding principles, classification of welding techniques; Oxyacetylene Gas welding, equipment and field of application, Arc-welding, metal arc, Carbon arc, submerged arc and atomic hydrogen welding, Electric resistance welding: spot, seam, butt, and percussion welding; Flux: composition, properties and function; Electrodes, Types of joints and edge preparation, Brazing and soldering. **[No. of Hrs. 6]**

**UNIT – IV****Sheet Metal Work:**

Common processes, tools and equipments; metals used for sheets, standard specification for sheets, spinning, bending, embossing and coining. **[No. of Hrs. 5]**

**TEXT BOOKS:**

1. Manufacturing Process by Raghuvanshi.
1. Manufacturing Technology by P.N.Rao (TMH publications)

**REFERENCE BOOK:**

1. Workshop Technology by Hazra-Chowdhary
2. Production Engineering by R.K.Jain
3. Workshop Technology by Chapman

**Paper Code: ETCS 109****L T C****Paper: Introduction to Computer Systems****2 1 3**

|  |                          |
|--|--------------------------|
| <b>INSTRUCTIONS TO PAPER SETTERS:</b>  | <b>MAXIMUM MARKS: 75</b> |
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                          |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                          |
|  |                          |

**UNIT - I****Introduction to Computer:**

Overview of Computer organization and historical perspective computer applications in various fields of science and management.

Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions.

Binary arithmetic, Floating-point arithmetic, signed and unsigned numbers.

**[No. of Hrs. 8]****UNIT - II****Introduction to OS and Office Automation**

Concept of computing, Introduction to Operating Systems such as DOS, windows 2000/Xp, UNIX, Client Server Technology, etc. (only brief user level description).

Introduction to Word Processing, Spread Sheet & Presentation software e.g. MS-Word, MS-Excel, MS-Power Point.

**[No. of Hrs. 8]****UNIT - III****Introduction to Auto CAD**

Coordinate System, 2D drafting: lines, circles, arc, polygon, etc., Editing, 3D, Solid modeling, Rendering, Use of Auto CAD for engineering drawing practices.

**[No. of Hrs. 8]****UNIT - IV****Web Technologies**

Introduction to World Wide Web, Search engines, e-mail, news, gopher, Audio & Video Conferencing, Internet Protocols: FTP, telnet, TCP/IP, SMTP, HTTP, Languages used for WEB Technology: HTML, practical examples using DHTML and Static HTML

**[No. of Hrs. 8]****TEXT BOOKS:**

1. Rajaraman, "Fundamentals of Computers", Prentice Hall of India, 3<sup>rd</sup> Edition.
2. Mark Middlebrook, "Autocad 2004 for Dummies", Wiley Dreamtech, 2000.
3. Vikas Gupta, "Comdex Computer Course Kit", Dreamtech Press, 2004.

**REFERENCE BOOKS:**

1. Alexis Leon & Mathews Leon, "Fundamentals of Computer Science & Communication Engineering", Leon Techworld, 1998.
2. Omura, "Mastering Autocad 2000 for Mechanical Engineers" BPB Publications, 2<sup>nd</sup> Edition, 1998.
3. A.S. Tanenbaum, "Computer Networks", Pearson Education India Ltd., 3<sup>rd</sup> Edition, 2002.

**Paper Code: ETEL-111****L T C****Paper: Communication Skills – I****2 1 3**

|  |                          |
|--|--------------------------|
| <b>INSTRUCTIONS TO PAPER SETTERS:</b>  | <b>MAXIMUM MARKS: 75</b> |
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                          |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                          |

**UNIT - I**

**Remedial Grammar:** Errors of Accidence and syntax with reference to Parts of Speech; Agreement of Subject and Verb; Tense and Concord; Conditional Clauses; Use of connectives in Complex and Compound sentences; Question tags and short responses.

**[No. of Hrs: 06]****UNIT - II**

**Vocabulary and Usage:** Word Formations (by adding suffixes and prefixes); Technical Word Formation; Synonyms, Antonyms, Homophones, and Homonyms; One Word Substitution; Misappropriations; Indianisms; Redundant Words; Phrasal Verb Idioms.

**[No. of Hrs: 06]****UNIT - III****Technical Writing:**

(A) Scientific Attitude and Impersonal Style; Plain Statements, Definitions; Description and Explanations (of objects, instruments, Processes, Scientific Principles, etc.)

Summarizing and abstracting; Expressing ideas within a restricted word limit; Paragraph Writing (Paragraph division, introduction and the conclusion, Variety in sentences and paragraphs)

Interpretation and use of charts, graphs and tables in technical writing.

Punctuation

(B) Reading at various speeds (slow, fast, very fast); reading different kinds of texts for different purpose (e.g. for relaxation, for information, for discussion at a later stage, etc.); reading between the lines.

Comprehension of Unseen Passages

**[No. of Hrs: 10]****UNIT - IV**

**Text:** The following prose pieces from *Best Science Writing : Reading and Insights* edited by Robert Gannon prescribed text (Hyderabad: University Press (India) Limited, 1991).

1. Chapter 2: "After 63 years, Why Are They Still Testing Einstein?" by C.P. Gilmore

2. Chapter 5: "Star Wars : The Leaky Shield" By Carl Sagan

3. Chapter 10: "Chaos : The Ultimate Asymmetry" by Arthur Fisher

4. Chapter 11: "Bill Moss, Tentmaker" by Robert Gannon

5. Chapter 12: "Totality - A Report" by Michael Rogers

**[No. of Hrs: 10]****TEXT BOOKS:**

1. Maison, Margaret M. Examine Your English, Hyderabad: Orient Longman, 1980

2. Sharma, R.S. Technical Writing. Delhi: Radha Publication, 1999

3. Sudarsanam, R. Understanding Technical English. Delhi: Sterling Publishers Pvt. Ltd., 1992

4. Gannon, Robert, Edt. Best Science Writing: Readings and Insights. Hyderabad: University Press (India) Limited, 1991.



**Paper Code: ETEL-113**

**Paper: Impact of Science & Technology on Society**

| <b>L</b> | <b>T</b> | <b>C</b> |          |
|----------|----------|----------|----------|
|          | <b>1</b> | <b>0</b> | <b>1</b> |

**\*Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.

**Paper Code: ETPH-151****Paper: APPLIED PHYSICS LAB – I**

|          |          |          |
|----------|----------|----------|
| <b>L</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>2</b> | <b>1</b> |

**List of Experiments**

- (1) To plot a graph between the distance of the knife-edge from the center of the gravity and the time period of bar pendulum. From the graph, find
  - (a) The acceleration due to gravity
  - (b) The radius of gyration and the moment of inertia of the bar about an axis.
- (2) To determine the moment of inertia of a flywheel about its own axis of rotation.
- (3) To determine the value of acceleration due to gravity using Kater's pendulum.
- (4) To determine the frequency of A.C. mains using sonometer and an electromagnet.
- (5) To determine the frequency of electrically maintained tuning fork by Melde's method.
- (6) To determine the dispersive power of prism using spectrometer and mercury source.
- (7) To determine the wavelength of sodium light by Newton's Ring.
- (8) To determine the wavelength of sodium light using diffraction grating.
- (9) To determine the refractive index of a prism using spectrometer.
- (10) To determine the specific rotation of cane sugar solution with the help of polarimeter.
- (11) To find the wavelength of He-Ne Laser using transmission diffraction grating.
- (12) To determine the numerical aperture (NA) of an Optical Fibre.
- (13) Compute simulation (simple application of Monte Carlo) e.g. Brownian motion, charging & discharging of capacitor.

**Note:** *Any 8-10 experiments out of the list may be chosen. Proper error – analysis must be carried out with all the experiments.*

**Paper Code: ETCH – 153****Paper: Applied Chemistry Lab – I**

|          |          |          |
|----------|----------|----------|
| <b>L</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>2</b> | <b>1</b> |

**List of Experiments**

1. To determine the percentage composition of a mixture of Sodium hydroxide and Sodium Chloride.
2. To determine the amount of Sodium Carbonate in the given mixture of Sodium Carbonate and Sodium Bicarbonate.
3. Determine the amount of Oxalic Acid and Sulphuric Acid/Hydrochloric Acid in one litre of solution given standard Sodium Hydroxide and Potassium Permanganate.
4. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.
5. To determine the no. of water molecules of crystallization in Mohr's salt provided standard dichromate solution using internal indicator.
6. Determine the amount of Cu in the copper ore solution provided hypo solution.
7. Iodometric Titration of  $K_2Cr_2O_7$  v/s  $Na_2S_2O_3$  to determine the percentage purity of  $K_2Cr_2O_7$  sample.
8. Argentometric titration one each of Vohlard's method and of Mohr's method.
9. Complexometric Titrations.
10. Detrmination of dissolved Oxygen in given sample if water.

**TEXT BOOKS:**

1. Vogel's Textbook of Quantitative Chemical Analysis (Latest ed.), Revised by G.H. Jeffery, J. Bassett, J. Mendham & R.C. Denney
2. Applied Chemistry: Theory and Practice (Latest ed.), By O.P. Vermani & A.K. Narula

**Paper Code: ETCS 155****L P C****Paper: Introduction to AutoCAD, Office Automation and Web Design 0 3 2****List of Experiments**

1. Use Microsoft-Word to perform the following:
  - a) Send out invitation letter to several people using mail merge facility.
  - b) Create tabular data in word and insert graph to represent data.
  - c) Create a Macro and use it in an application.
  
2. Use Microsoft-Excel to perform the following:
  - a) Create a Macro and use it in an application
  - b) Enter the name and marks of 10 students and perform various mathematical functions on it.
  - c) Enter first quarter performance of five companies and create a pie chart showing there shareholders in the market.
  
3. Use Microsoft Power-Point to perform the following
  - a) Create a slide show on any subject of your choice using minimum five slides.
  - b) Create slideshow in operating sound.
  - c) Create an animation using group, ungroup, order, textbox image insert etc.
  
4. Use HTML to design a Home page for IGIT using all the features of HTML like buttons, frames, marquee check boxes etc..
  
5. Use AutoCAD to do the following:
  - a) Use of Drawing & Editing Properties: Modify Object Properties and a know how of layers, colors and prototype drawing.
  - b) Draw line (Poly line, multi line, linear line), polygon, ellipse, circle, arc, rectangle and use cross hatching, regions, boundary, spline, donut, fillet and extent commands.
  - c) Dimensioning commands, styles, control scale factors, drawing set-up, grip editing objects snaps, utility commands.
  - d) Projection of points, lines and solids,
  - e) Section of Solids
  - f) Development and Intersection of Surface
  - g) Isomeric Projections

***Create a WEB page containing hyperlinks to the pages having information about Science and Technology.***

**Paper Code: ETME-157**  
**Paper: Workshop Practice**

| <b>L</b> | <b>P</b> | <b>C</b> |
|----------|----------|----------|
| <b>0</b> | <b>3</b> | <b>2</b> |

### **UNIT - I**

**Materials:** Spectrography method for finding composition of materials.

**Wood Working Shop:** Making of various joints, Pattern making.

### **UNIT - II**

**Foundry Shop:** Bench moulding with single piece pattern and two piece pattern.

Floor moulding – Making of bend pipe mould etc.

Machine moulding – Making of mould using Match-plate pattern.

Core making- Making and baking of dry sand cores for placing in horizontal, vertical and hanging positions in the mould cavity.

**Fitting Shop:** Learning use of fitting hand tools, marking tools, marking gauge.

Exercises: Jobs made out of MS Flats, making saw – cut filling V-cut taper at the corners, circular cut, fitting square in square, triangle in square.

### **UNIT - III**

**Welding Shop:** Electric arc welding, Edge preparations, Exercises making of various joints. Bead formation in horizontal, vertical and overhead positions.

**Gas Welding:** Oxy-Acetylene welding and cutting of ferrous metals.

**Soldering:** Dip soldering.

**Brazing:** With Oxy-Acetylene gas.

### **UNIT - IV**

**Sheet Metal Shop:** Learning use of sheet-metal tools, Exercises: Making jobs out of GI sheet metal. Cylindrical, Conical and Prismatic shapes.

**Project Shop:** Extrusion of soft metals, Plastic coating of copper wires, Plastic moulding.

**Paper Code: ETME-159****L P C****Paper: Engineering Graphics Lab****0 2 1****UNIT - I**

**General:** Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications,

**Projections of Point and Lines:** Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

**UNIT – II**

**Planes other than the Reference Planes:** Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

**Projections of Plane Figures:** Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

**UNIT - III**

**Projection of Solids:** Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

**CADD**

-

**UNIT - IV****Isometric Projection**

**Nomography :** Basic Concepts and use.

**TEXT BOOKS:**

1. Engineering drawing by N.D.Bhatt (Charotar Publications).

**REFERENCE BOOKS:**

1. Engineering Drawing by S.C.Sharma & Navin Kumar (Galgotia Publications)
2. Engineering Drawing by Venugopalan.
3. Engineering Drawing by P.S.Gill

**Paper Code: ETMA-102****L T C****Paper: Applied Mathematics - II****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****MAXIMUM MARKS: 75**

- |    |   |
|----|---|
| 1. | Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |
| 2. | Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |

**UNIT - I****CALCULUS OF SEVERAL VARIABLES:**

Partial differentiation, ordinary derivatives of first and second order in terms of partial derivatives, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables and its application to approximate errors. Maxima and Minima of two variables, Lagrange's method of undetermined multipliers and Jacobians.

**[No. of Hrs. 12]****UNIT - II****FUNCTIONS OF COMPLEX VARIABLES:**

Derivatives of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic Conjugates, Conformal mapping, Standard mappings – linear, square, inverse and bilinear. Complex line integral, Cauchy's integral theorem, Cauchy's integral formula, Zeros and Singularities / Taylor series, Laurent's series, Calculation of residues. Residue theorem, Evaluation and real integrals.

**[No. of Hrs. 12]****Unit - III****VECTOR CALCULUS:**

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical physical interpretations, Directional: derivatives, Properties.

Line integrals and application to work done, Green's Lemma, Surface integrals and Volume integrals, Stoke's theorem and Gauss divergence theorem (both without proof).

**[No. of Hrs. 10]****UNIT - IV****LAPLACE TRANSFORMATION:**

Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution and convolution theorem. Solving linear differential equations using Laplace transform. Unit step function, Impulse function and Periodic function and their transforms.

**[No. of Hrs. 10]****TEXT BOOKS:**

1. E. Kresyzig, "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).
2. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa, 2003 (2<sup>nd</sup> Ed.).
3. Dr. A. B. Mathur, V. P. Jaggi, "Advanced Engineering Mathematics", Khanna Publishers.

**REFERENCE BOOKS:**

1. V. V. Mitin, M. P. Polis and D. A. Romanov, "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001.
2. R. Wylie, "Advanced Engineering Mathematics", McGraw-Hill, 1995.

**Paper Code: ETPH-104****Paper: APPLIED PHYSICS – II**

| L | T | C |
|---|---|---|
| 2 | 1 | 3 |

| INSTRUCTIONS TO PAPER SETTERS:   | MAXIMUM MARKS: 75 |
|--|-------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                   |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                   |

**UNIT - I**

Electromagnetic Theory (EMT)

Motion of Charged Particles in crossed electric & magnetic fields, Velocity Selector & Magnetic focussing, Gauss law, continuity equation, inconsistency in Ampere's Law, Maxwell's equations (differential and integral forms), Poynting vector, Poynting Theorem (Statement only), propagation of plane electromagnetic waves in conducting and non-conducting medium. [No. of

**Hrs. 8]****UNIT - II**

Quantum Mechanics &amp; Statistical Physics:

De-Broglie Hypothesis, Davisson Germer experiment, wave function and its properties, expectation value, Wave Packet, Uncertainty principle. Schrodinger Equation for free Particle, Time Dependent Schrodinger Equation, Particle in a box (1-D), Single step Barrier, Tunneling effect.

Qualitative Features of Maxwell Boltzman, Bose-Einstein and Fermi-Dirac statistics distribution, functions & their comparison (no derivation) [No. of Hrs. 8]

**UNIT - III****Solid State Physics**

Formation of energy bands in metals, semiconductors and insulators; intrinsic and extrinsic semiconductors, Fermi energy levels for doped, undoped semiconductors and pn junction; Tunnel diode, Zener diode.

**Superconductivity:** Meissner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's equation, properties of superconductors & applications. [No. of Hrs. 8]

**UNIT - IV****X-Rays:** production and properties, Crystalline and Anorphous solids (Brief) Bragg's Law, Applications.

**Ultrasonics:** Introduction, Production of Ultrasonics (Magnetostriction and piezoelectric methods), engineering applications. [No. of Hrs. 8]

**TEXT BOOKS:**

1. A. BEISER, "Concept of Modern Physics"
2. Rajam, "Atomic Physics"
3. Greiner, "Quantum Physics"
4. Griffith, "Introduction to Electrodynamics"

**REFERENCE BOOKS:**

1. Jordan & Balmain, "Electromagnetic waves and Radiating Systems"
2. Kittel, "Solid State Physics"
3. R.L. Singhal, "Solid State Physics"
4. Schiff, "Quantum Mechanics"



**Paper Code: ETCH – 106****L T C****Paper: Applied Chemistry – II****2 1 3**

| INSTRUCTIONS TO PAPER SETTERS:   | MAXIMUM MARKS: 75 |
|--|-------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                   |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                   |

**UNIT - I****Chemical Bonding:**

Potential Energy curve for H<sub>2</sub> molecule, co-ordinate bond, Werner's theory, effective atomic numbers, isomerism in co-ordinate compounds. Hydrogen bonding, Vander Waal's forces, hybridization including d-orbitals, Valence shell Electron Repulsion Theory (VSEPR). Discussion of structures of IF<sub>3</sub>, SnCl<sub>2</sub>, CO<sub>3</sub><sup>2-</sup>, Molecular Orbital theory, Linear combination of atomic orbitals (LCAO) method. Structures of simple heteronuclear diatomic molecules such as CO, NO, HF, HCl.

**[No. of Hrs: 08]****UNIT - II**

**Gaseous State:** Gas laws and Kinetic theory of gases, Distribution of molecular velocities, Mean free path, Real gases – non ideal behaviour, causes of deviation from ideal behaviour, Vander Waal's equation. Liquefaction of gases. Numericals based on above topics.

**Thermochemistry:** Hess's Law, Heat of a reaction, Effect of temperature on heat of reaction at constant pressure (Kirchoff's eq.), heat of dilution, heat of hydration, heat of neutralization and heat of combustion, Flame temperature.

**[No. of Hrs: 08]****UNIT - III**

**Catalysis:** Criteria for catalysis : Homogeneous catalysis – acid-base, Enzymatic catalysis, Catalysis by metal salts, Heterogeneous catalysis, concepts of promoters, inhibitors and poisoning, physisorption, chemisorption, surface area.

**The Phase Rule:** Definitions of various terms, Gibb's Phase rule, Application of phase rule to one component system – the water system and Sulphur system. Two component system : Lead – Silver, FeCl<sub>3</sub> – water, Na<sub>2</sub>SO<sub>4</sub> – water.

**No. of Hrs: 08]****UNIT - IV**

**Polymers and Composites:** Functionality, Degree of polymerization, concept of molecular weight (number average, weight average & numerical based on them), Linear, branched and cross-linked polymers, Tacticity of polymers, Homo and Copolymers (Classification based on repeat unit), Structure – property relationship of polymers. Industrial applications of important thermoplastic, thermosetting polymers, Elastomers, Natural Polymers.

Conducting Polymers : Properties and applications.

Composites : Classification, Fibre and particle reinforced composites. **[No. of Hrs: 08]**

**TEXT BOOKS:**

1. J.D. Lee, "Inorganic Chemistry", Latest ed.
2. J.C. Kuriacose & J. Rajaram, "Chemistry in Engineering & Technology, Vol I & II, Latest ed.
3. Puri, Sharma & Pathania, "Principles of Physical Chemistry", Latest ed.
4. V.R. Gowarikar, N.V. Viswanathan & Jayadev Sreedha, "Polymer Science", Latest ed.

**Paper Code: ETCS 108****L T C****Paper: Introduction to Programming****2 1 3**

| <b>INSTRUCTIONS TO PAPER SETTERS:</b> |   | <b>MAXIMUM MARKS: 75</b> |  |
|---------------------------------------|---|--------------------------|--|
| 1.                                    | Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                          |  |
| 2.                                    | Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                          |  |

**UNIT - I**

**Introduction to Programming:** Concept of algorithms, Flow Charts, Data Flow diagrams etc., Introduction to the Editing tools such as vi or MS-VC editors, Concepts of the finite storage, bits bytes, kilo, mega and gigabytes. Concepts of character representation, Number Systems & Binary Arithmetic.  
**[No. of Hrs. 8]**

**UNIT - II**

**Programming using C:** The emphasis should be more on programming techniques rather than the language itself. The C Programming language is being chosen mainly because of the availability of the compilers, books and other reference materials.

Example of some simple C program. Concept of variables, program statements and function calls from the library (Printf for example)

C data types, int, char, float etc., C expressions, arithmetic operation, relational and logic operations, C assignment statements, extension of assignment of the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions, C Statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.

**[No. of Hrs. 8]****UNIT - III**

**Iterations and Subprograms:** Concept of loops, example of loops in C using for, while and do-while. Optionally continue may be mentioned.

One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations.

Concept of Sub-programming, functions Example of functions. Argument passing mainly for the simple variables.

**[No. of Hrs. 8]****UNIT - IV**

**Pointers and Strings:** Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Unions. Defining C structures, passing strings as arguments Programming examples.

**[No. of Hrs. 8]****TEXT BOOKS:**

1. Yashwant Kanetkar, "Let us C", BPB Publications, 2<sup>nd</sup> Edition, 2001.
2. Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4<sup>th</sup> Edition, 2002.

**Paper Code: ETME 110****L T C****Paper: Engineering Mechanics****2 1 3****INSTRUCTIONS TO PAPER SETTERS:****MAXIMUM MARKS: 75**

- |    |   |
|----|---|
| 1. | Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |
| 2. | Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |

**UNIT - I****Force system:** Free body diagram, Equilibrium equations and applications.**Friction:** Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrust bearings, Belt drive- derivation of equation.

$$T_1/T_2 = e^{\mu\theta} \text{ and its application}$$

**[No. of Hrs. 8]****UNIT - II****Structure:** Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.**Distributed Force:** Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia.**[No. of Hrs. 8]****UNIT - III****Kinematics of Particles:** Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.**Kinetics of Particles:** Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.**[No. of Hrs. 8]****UNIT - IV****Kinematics of Rigid Bodies:** Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism.**Kinetics of Rigid Bodies:** Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.**Shear force and bending Moment Diagram.****[No. of Hrs. 8]****TEXT BOOKS:**

1. A.K.Tayal, "Engg Mechanics", Umesh Publications
2. Sadhu Singh, "Engg Mechanics", Khanna Publishers

**REFERENCE BOOKS:**

1. Irving H. Shames, "Engg Mechanics", PHI publications
2. U.C.Jindal, "Engg Mechanics", Galgotia Publications
3. Beer & Johnston, "Engg Mechanics", TMH
4. Subramanyam, "Engg Mechanics"

**Paper Code: ETEC-112****L T C****Paper: ELECTRICAL SCIENCE****2 1 3**

| <b>INSTRUCTIONS TO PAPER SETTERS:</b>  | <b>MAXIMUM MARKS: 75</b> |
|--|--------------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                          |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                          |

**UNIT - I****Circuit Analysis**

Ohm's Law, KCL, KVL Mesh and Nodal Analysis, Circuit parameters, energy storage aspects, Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer Theorem, Millman's Theorem, Star-Delta Transformation. Application of theorem to the Analysis of dc circuits.

**[No. of Hrs. 8]****UNIT - II****A.C.Circuits**

R-L, R-C, R-L-C circuits (series and parallel), Time Constant, Phasor representation, Response of R-L, R-C and R-L-C circuit to sinusoidal input Resonance-series and parallel R-L-C Circuits, Q-factor, Bandwidth.

**[No. of Hrs. 7]****UNIT - III****Measuring Instruments**

Principles, Construction and application of moving coil, moving iron, dynamometer type, induction type instruments, extension of range of ammeter, voltmeter (shunt and multiplier), Two-wattmeter method, for the measurement of power, Cathol-ray Oscilloscope and Applications.

**[No. of Hrs. 7]****UNIT - IV****Transformers**

Construction and Working principles and phaser diagrams of Single-phase Transformer, Emf equation, Equivalent circuit, Regulation and efficiency, and Auto transformer.

**Rotating Machines**

Construction and working principles of dc motor and generator and its characteristics Applications of DC machines

Construction and working principles of 3-j-Induction motor, Torque-speed characteristics, and Industrial applications.

**[No. of Hrs. 10]****TEXT BOOKS:**

1. P.C. Sen "Principles of Electric Machines and Power Electronics", Wiley Eastern 2003.
2. Vincent DEL TORO "Electrical Engineering Fundamental's Prentice Hall India", Ed 2002.

**Paper Code: ETEL-114****L T C****Paper: Communication Skills – II****2 1 3**

| INSTRUCTIONS TO PAPER SETTERS:   | MAXIMUM MARKS: 75 |
|--|-------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  |                   |
| 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                   |

**UNIT – I**

**Basic Concepts in Communication:** Communication as sharing; context of communication; the speaker/writer and the listener/reader; medium of communication; barriers to communication; accuracy, brevity, clarity and appropriateness in communication.

**[No. of Hrs: 05]****UNIT - II**

**Writing Skills:** Types of writings (Expository, Descriptive, Analytic, Argumentative, Narrative etc) and their main features. Resumes and CV's and Cover letters. Memos and Notices. Basics of Formal Reports.

**[No. of Hrs: 08]****UNIT - III**

**Verbal, Non-Verbal and Listening Skills:** Elementary Phonetics (Speech Mechanism, The Description of Speech Sounds, The Phoneme, the syllable; Prosodic Features, Word Accent, Features of Connected Speech); Paralanguage and Body language; and Classroom Presentations, Hearing and Listening; Essentials of Good Listening: Achieving ability to comprehend material delivered at relatively fast speed.

**[No. of Hrs: 08]****UNIT - IV**

**Group Discussion:** Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).

**[No. of Hrs: 09]****TEXT BOOKS:**

1. R. K. Bansal, and J. B. Harrison, "Spoken English For India: A Manual of Speech and Phonetics", Hyderabad: Orient Longman, 1983.
2. Lewis, Hedwig. "Body Language: A Guide For Professionals. New Delhi: Response Books", A division of Sage Publication, 2000
3. Sides, H. Charles, "How to Write & Present Technical Information", Cambridge: CUP, 1999.
4. Forsyth, Sandy & Lesley Hutchison, "Practical Composition", Edinburgh Oliver & Boyd, 1981

Paper Code: ETPH-152

L P C

Paper: Applied Physics Lab – II

0 2 1

### List of Experiments

1. To determine the internal resistance of Leclanche cell using potentiometer.
2. To study the charging and discharging of a capacitor and to find out the time constant.
3. To find the thermal conductivity of a poor conductor by Lee's disk method.
4. To study the thermo emf using thermocouple and resistance using Pt. Resistance thermometer.
5. To determine the velocity of ultrasound waves using an ultrasonic spectrometer in a given liquid (Kerosene Oil)
6. To measure the frequency of a sine-wave voltage obtain from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave voltage from two signal generator.
7. To determine the temp. coefficient of resistance of platinum by Callender & Griffith's Bridge.
8. To study Hall effect.
9. To determine plank's constant.

**Note:**

Atleast 8 experiments must be carried out.

Proper error – analysis must be carried out with all the experiments.

**Paper Code: ETCH – 154****L P C****Paper: Applied Chemistry Lab – II****0 2 1****List of Experiments**

1. Determine the heat of hydration of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ / $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ .
2. Determine the heat of neutralization of strong Acid (say  $\text{H}_2\text{SO}_4/\text{HCl}$ ) with strong base ( $\text{NaOH}$ ).
3. Determine the heat of neutralization of Weak Acid with strong base.
4. Determine the molecular weight of a substance by Rast Method.
5. Determine the reaction rate constant for 1<sup>st</sup> order reaction.
6. Determine the surface tension of a liquid using drop weight method.
7. To determine the viscosity of the given liquid (density to be determined).
8. Preparation of a Polymer.
9. To determine the cell constant of a conductivity cell.
10. Titration of strong acid/strong base conduct metrically.

**TEXT BOOKS:**

1. B.D. Khosla, A. Gulati & V.C. Garg, "Practical Physical Chemistry", Latest ed
2. S.K. Bhasin and Sudha Rani, "Laboratory Manual on Engineering Chemistry", Latest ed.

**Paper Code: ETCS 156****Paper: C Programming Lab.**

|          |          |          |          |
|----------|----------|----------|----------|
|          | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>2</b> | <b>1</b> |          |

**List of Experiments**

1. Write a program to produce ASCII equivalent of given number
2. Write a program to find divisor or factorial of a given number.
3. Write a program to evaluate the following algebraic expressions after reading necessary values from the user
  - v  $(ax+b)/(ax-b)$
  - v  $2.5 \log x - \cos 30 + |x^2 - y^2| + \sqrt{2xy}$
  - v  $(x^5 + 10x^4 + 8x^3 + 4x + 2)$
4. Write a program to find sum of a geometric series
5. Write a program to cipher a string
6. Write a program to check whether a given string follows English capitalization rules
7. Write a program to find sum of the following series  
 $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{20}$
8. Write a program to search whether a given substring exist in an input string or not and then delete this string from input string.
9. Write a recursive program for tower of Hanoi problem
10. The fibonacci sequence of numbers is 1,1,2,3,5,8,..... Based on the recurrence relation  
 $F(n) = F(n-1) + F(n-2)$  for  $n > 2$   
 Write a recursive program to print the first m Fibonacci number
11. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
  - a) Addition of two matrices
  - b) Subtraction of two matrices
  - c) Finding upper and lower triangular matrices
  - d) Trace of a matrix
  - e) Transpose of a matrix
  - f) Check of matrix symmetry
  - g) Product of two matrices.
12. Write a program that takes two operands and one operator from the user perform the operation and then print the answer
13. Write a program to print the following outputs:
 

|   |   |   |   |   |  |   |   |   |   |   |
|---|---|---|---|---|--|---|---|---|---|---|
| 1 |   |   |   |   |  | 1 |   |   |   |   |
| 2 | 2 |   |   |   |  | 2 | 2 |   |   |   |
| 3 | 3 | 3 |   |   |  | 3 | 3 | 3 |   |   |
| 4 | 4 | 4 | 4 |   |  | 4 | 4 | 4 | 4 |   |
| 5 | 5 | 5 | 5 | 5 |  | 5 | 5 | 5 | 5 | 5 |
14. Write functions to add, subtract, multiply and divide two complex numbers  $(x+iy)$  and  $(a+ib)$  Also write the main program.
15. Write a menu driven program for searching an sorting with following options:-
  - a) Searching (1) Linear searching (2) Binary searching
  - b) Sorting (1) Insersection sort (2) Selection sorting
16. Write a program to copy one file to other, use command line arguments.
17. Write a program to mask some bit of a number (using bit operations)
18. An array of record contains information of managers and workers of a company. Print all the data of managers and workers in separate files.



**Paper Code: ETME 158****Paper: Engineering Mechanics Lab**

|          |          |          |          |
|----------|----------|----------|----------|
|          | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>3</b> | <b>2</b> |          |

**List of Experiments**

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the Wheel and Axle
7. To determine the MA, VR, h of Worm Wheel ( 2-start)
8. Verification of force transmitted by members of given truss.
9. To verify the law of moments using Bell crank lever
10. To find CG and moment of Inertia of an irregular body using Computation method.

**Paper Code: ETEC 160****Paper: Electrical Science Lab**

| <b>L</b> | <b>P</b> | <b>C</b> |
|----------|----------|----------|
| <b>0</b> | <b>2</b> | <b>1</b> |

**List of Experiments**

1. Verification of Thevenin's theorem
2. Verification of Superposition theorem
3. Phasor Diagram and Power factor of LCR circuit.
4. Measurement of Power and Power factor in single phase Load using three ammeters/voltmeters.
5. Calibration of Energy Meter/Wattmeter/Voltmeter/Ammeter
6. Two wattmeter method of measuring power in three phase circuit (resistive load only)
7. Load test on Single Phase Transformer, Regulation and Efficiency of Transformer
8. Short Circuit/Open Circuit tests on Single Phase transformer
9. Measure the armature and field resistance of a D.C. Machine
10. Connection and starting of a Three Phase Induction Motor using direct on line or Star Delta Starter.
11. Starting and Speed Control of a D.C. shunt motor
12. Resonance

**Code No.: ETMA 201****L T C****Paper: Applied Mathematics - III****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT - I**

Laplace Transformation: Laplace Transformation, Inverse Laplace transformation Convolution Theorem, application to linear differential equations with constant coefficients, Unit step function, impulse functions/periodic functions

**[No. of Hrs.: 11]****UNIT – II**

Fourier Series: Fourier Series, Euler's formulae, even and odd functions, having arbitrary periods, half range expansion, Harmonic analysis

Fourier Transforms: Fourier transform, Sine and Cosine transforms, Application to differential equations

**[No. of Hrs.: 11]****UNIT – III**

Special Functions: Beta and Gamma functions, Bessels functions of first kind, Recurrence relations, modified Bessel functions of first kind, Ber and Bei functions, Legendre Polynomial, Rodrigue's formula, orthogonal expansion of function

**Unit-IV**

Partial Differential Equation: formation of first and second order linear equations, Laplace, Wave and heat conduction equation, initial and boundary value problems

**[No. of Hrs.: 11]****Text Books:**

1. Engineering Mathematics , B. S. Grewal, Khanna Publication Aug 2000.
2. Engineering Mathematics , Jaggi & Mathur – Khanna Publication, 1985

**Reference Books:**

1. Engineering Mathematics , V.P Mishra, Galgotia Publication 2000.
2. Advanced Engineering Mathematics, Louis C. Barsett, Additional McGraw hill Int. 6<sup>th</sup>edition.

**Code No.: ETEE 203****L T C Paper: Analog****Electronics – I****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I****Semiconductor Diodes and Rectifiers:**

Introduction, general characteristics, energy levels, extrinsic materials n & p type, ideal diode, basic construction and characteristics, DC & AC resistance, equivalent circuits, drift & diffusion currents, transition & diffusion capacitance reverse recovery times, temperature effects, diode specifications, different types of diodes (Zener, Varactor, Schouky, Power, Tunnel, Photodiode & LED), Half wave & full wave rectifiers. Switched Mode Power Supply.

**[No. of Hrs. :11]****Unit II**

**Bipolar junction transistor:** Introduction, Transistor, construction, transistor operations, BIP characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations, Eber-Moll's model.

**Bias Stabilization:**

Need for stabilization, fixed bias, emitter bias, self bias, bias stability with respect to variation in  $I_{CO}$   $V_{BE}$  &  $\beta$ , Stabilization factors, thermal stability.

**[No. of Hrs. :11]****Unit III**

**Small signal amplifiers:** CB, CE, CC configurations, hybrid model for transistor at low frequencies, RC coupled amplifiers, mid band model, gain & impedance, comparisons of different configurations, Darlington pair, Hybrid  $\pi$ -model at high frequencies, Cascaded amplifiers.

**Multistage Amplifiers:**

Cascaded amplifiers, Calculation of gain Impedance and bandwidth, Design of multistage amplifiers.

**[No. of Hrs. :11]****Unit IV**

**Feedback Amplifiers:** Feedback concept, Classification of Feedback amplifiers, Properties of negative, Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

**Field Effect Transistor:**

Introduction, Classification, FET characteristics, Operating point, Biasing, enhancement & Depletion type MOSFETS.

**[No. of Hrs. :11]****Text Books:**

1. "Integrated Electronics: Analog & Digital Circuits & Systems", Jacob Millman, Christos C. Halkias, TMH. 2<sup>nd</sup> edition 1996
2. "Opamps and Linear Integrated Circuits", Gayakwad, PHI Pvt. Ltd. 3<sup>rd</sup> edition 2000

**Reference Books:**

1. Sedra and Smith - "Microelectronics Circuits", , Oxford University Press. 4<sup>th</sup> edition

**Code No.: ETEC 205**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>C</b> |          |
|          | <b>3</b> | <b>1</b> | <b>4</b> |

**Paper: Circuits & Systems****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit-I**

Introduction to continuous and discrete signals, their classification and types, periodic waveforms and signal synthesis, LTI systems and their properties; system modeling in terms of differential equations and transient response of R, L, C circuits for impulse, step, ramp, sinusoidal and exponential signals.

**[No. of Hours: 11]****Unit-II**

Laplace Transform: Review of properties and applications of Laplace transform of complex waveform and transient response of R, L, C series, parallel, series-parallel circuits for all kinds of excitations.

**[No. of Hours: 11]****Unit-III**

Graph theory and its applications, two port networks – z, y, ABCD, h, g, inverse ABCD parameters their interconversion, interconnection of two 2-port networks, concept of transform impedance, Network theorems: Reciprocity, Superposition, Thevenin, Norton, Millman, Maximum Power Transfer and Tellegan

**[No. of Hours: 11]****Unit IV**

**Elements of Network Synthesis:** Foster's I and II, Cauer's I& II forms, Synthesis of LC, RC, RL Networks

**[No. of Hours: 11]****Text Books:**

1. Valkenburg, "Network analysis" PHI, 2000.
2. D. R. Choudhary, "Networks and Systems" New Age International, 1999.

**Reference Books**

1. Bhise, Chadda, Kulshreshtha, "Engineering network analysis and filter design" Umesh publication, 2000.
2. Kuo, "Network analysis and synthesis" John Wiley and Sons, 2<sup>nd</sup> Edition.

**Code No.: ETEE 207****L T C****Paper: Electrical Engineering Materials****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Atomic bonding, crystallinity, Miller Indices, X-ray crystallography, structural imperfections, crystal growth.

Free electron theory of metals, factors affecting electric conductivity of metals, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, super conductivity.

**[No. of Hrs. : 14]****Unit II**

Polarization mechanism and dielectric constant, behavior of polarization under impulse and frequency switching, dielectric loss, spontaneous polarization, piezoelectric effect. Origin of permanent magnetic dipoles in materials, classifications, diamagnetism, paramagnetism, ferromagnetism, Magnetic Anisotropy magnetostriction.

**[No. of Hrs. : 10]****Unit III**

Energy band theory, classification of materials using energy band theory, Hall effect, drift and diffusion currents, continuity equation, P-N diode, volt-amp equation and its temperature dependence. Properties and applications of electrical conducting, semiconducting, insulating and magnetic materials.

**[No. of Hrs. : 14]****Unit IV**

Special purpose materials, Nickel iron alloys, high frequency materials, permanent magnet materials, Feebly magnetic materials, Ageing of a permanent magnet, Effect of impurities, Losses in Magnetic materials.

**[No. of Hrs. : 10]****Text Books:-**

1. A. J. Dekker, 'Electrical Engineering Materials', Prentice hall of India, India
2. C. S. Indulkar & S. Thiruvengadam, 'An introduction to Electrical Engineering Materials', S. Chand & Co., India
3. R. K. Rajput, 'Electrical Engineering Materials', Laxmi Publications, India

**Reference Books:-**

1. Ian P. Hones, 'Material Science for Electrical & Electronics Engineers', Oxford University Press
2. K. M. Gupta – Electrical Engineering Materials, Umesh Publication, 2<sup>nd</sup> edition 2003

**Code No.: ETEE 209****L T C****Paper: Electro Mechanical Energy Conversion – I 3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Principles of EMEC:** Introduction, Energy in Electro-Magnetic System, Flow of Energy in Electro-Mechanical Devices, Energy in Magnetic field and co-energy, Dynamics of Electromechanical Systems, Singly excited systems. Torque and EMF equations.

**[No. of Hrs. : 09]****Unit II**

**D. C. Machines: EMF and Torque equations, Armature windings, Armature Reaction, Demagnetizing and Cross-magnetizing armature MMF, Interpole and compensating windings, commutation. Characteristics of D.C.generators.**

D.C.motors and their characteristics

Starting of D.C.motors. Starter step calculation for a D.C. shunt and series motor. Speed control of D.C. motors. Ward Leonard control. Braking of d.c.motors. Efficiency and testing of d.c. machines, Hopkinson test.

**[No. of Hrs. : 14]****Unit III**

**1- Ø Transformers:** Transformer construction and practical considerations. Equivalent circuit, Exact and approximate, per unit values, Phasor diagram, Transformer testing: open circuit test, Short Circuit test, Sumpner's test, Efficiency and voltage regulation, All day efficiency, Auto-transformer.

**[No. of Hrs. : 12]****Unit IV**

**3 – Ø Transformer:** Three-phase Bank of Single-phase Transformers, Parallel operations of 1 and 3 phase transformers, 3 to 2 and 6 phase conversion. Load division between transformers in parallel. Three winding transformers, Tertiary winding, Tap Changing, Transformers for special purpose, Welding, Traction, Instruments and pulse Transformers.

**[No. of Hrs. : 09]****Text Books:-**

1. I. J. Nagrath and D. P. Kothari - Electrical Machines (Tata McGraw Hill) 3<sup>rd</sup> edition 1996
2. Fitzgerald, Kingsley - Electrical Machinery (McGraw Hill) 6<sup>th</sup> edition 2004
3. P. C. Sen - Electrical Machinery 2003

**Reference Books:**

1. J. Hindmarsh - Electrical Machines and their Applications
2. P. K. Mukherjee & S. Chakravoti - Electrical Machines, (Dhanpat Rai Publications), 2<sup>nd</sup> edition
3. Ashfaq Hussain - Electric Machines (Dhanpat Rai Publications), 2001
4. Bhattacharya – Electrical Machines, 1998

**Code No.: ETCS 211****Paper: Data Structures**

|          |          |          |
|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>C</b> |
| 3        | 1        | 4        |

|   |                          |
|---|--------------------------|
| <b>INSTRUCTIONS TO PAPER SETTERS:</b>   | <b>MAXIMUM MARKS: 75</b> |
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.<br>2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. |                          |

**UNIT – I**

**Fundamentals of algorithm analysis:** Big ‘O’ notations, Time and space complexity of algorithms., Elementary data structures and their applications

**Arrays:** ordered lists, representation of arrays, sparse matrices, linked lists: singly and doubly linked lists, stacks, queues, multiples stacks and queues, Applications: polynomial arithmetic, infix, postfix and prefix arithmetic expression conversion and evaluations. **[No. of Hrs: 12]**

**UNIT – II**

Trees: Binary trees: Definition, traversal, threaded binary tree, Counting Binary Tree.

Graphs: Representation, traversal, connected components, shortest path and transitive closure, topological sort, activity network, critical path, path enumeration. Dijkstra’s Algorithm, Floyd Warshall’s Algorithm, Minimum Spanning Tree Definitions.

**[No. of Hrs: 11]****UNIT – III**

Searching & Sorting: Binary Search Tree, Insertion & Deletion, AVL Trees, Hash function, Hash table, Internal sort: Radixsort, Insertion sort, Exchange sort, Selection sort, Quicksort, Shellsort, Mergesort, Heaport, External sort: K-way mergesort, balanced mergesort, polyphase mergesort **[No. of Hrs: 11]**

**UNIT – IV**

Files: Files, Queries and sequential organization; Cylinder surface indexing, Hashed Indexed, Tree Indexing, B-Trees, Trie Indexing, Sequential file organizational, random file organization, Hashed file organization, Inverted files, cellular partitions. **[No. of Hrs: 10]**

**TEXT BOOKS:**

1. E. Horowitz and S. Sahani, “Fundamentals of Data Structures”, Galgotia Booksource Pvt. Ltd, 1999.
2. R. L. Kruse, B. P. Leung, C. L. Tondo, “Data Structures and program design in C”, PHI, 2000.

**REFERENCES BOOKS:**

1. Schaum’s outline series, “Data Structure”, TMH, 2002
2. Y. Langsam et. al., “Data Structures using C and C++”, PHI, 1999.
3. Yashwant Kanetkar, “Data Structure through C”, BPB, 2005.





**Code No.: ETEE 202****L T C****Paper: Electro-Mechanical Energy Conversion – II****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I****Poly phase Induction Machines – I**

Construction features, production of rotating magnetic field, phasor diagram, equivalent circuit, torque and power equations, torque-slip characteristics, no load and blocked rotor tests efficiency. Induction generator.

**Poly phase Induction Machines – II**

Starting and speed control (with and without e.m.f. injection in the rotor circuit), deep bar and double cage induction motors, cogging and crawling.

**[No. of Hrs. 13]****Unit II****Single Phase Induction Motor.**

Double revolving field theory, equivalent circuit, no load and blocked rotor tests, starting methods, repulsion motor.

**A.C. Commutator Motor:**

E.M.F. induced in commutator windings, single phase a.c. series motor, Universal motor

**[No. of Hrs.10]****Unit III****Synchronous Machines I**

Constructional features, armature windings, E.M.F. equation, winding coefficients, harmonics in the induced E.M.F., armature reaction, O.C. and S.C. tests, voltage regulation-Synchronous impedance method, MMF Method, Potier's triangle method and parallel operation, operation on infinite bus, cooling.

**[No. of Hrs. 10]****Unit IV****Synchronous Machines II**

Two reaction theory, power expressions for cylindrical and salient pole machines, performance characteristics.

**Synchronous Motor-**

Principle of operation, starting methods, phasor diagram torque-angle characteristics, V-curves hunting and damping, synchronous condenser, reluctance motor.

**[No. of Hrs. 11]****Text Books:**

1. M.G.Say, "Alternating Current machines", CBS Publishers, 2002
2. P.S.Bimbhra, "Electric Machinery", Khanna Publishers, 2004

**Reference Books:**

1. P.S.Bimbhra, "Generalized Theory of Electrical Machines", Khanna Publishers, 2004
2. I.J.Nagrath and D.P.Kothari, "Electrical Machines", Tata McGraw Hill, 1996
3. Ashfaq Hussain – Electric Machines, Dhanpat Rai & Sons 2001

**Code No.: ETEE 204****L T C****Paper: Analog Electronics - II****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Building Blocks of Analog ICs:** Differential amplifier, Op-amp Model, op-amp parameters, virtual ground, Inverting and non-inverting amplifiers, differential amp, Summers, Instrumentation amplifier, Voltage to current, current to voltage Converter, Integrator, Differentiators Current mirrors, Active Loads, Level shifters and output stages.

**[No. of Hrs. : 11]****Unit II**

**Waveform Generations:** Sinewave generator (Phase shift Wein bridge, Hartley & Colpitts), Ramp and sawtooth genertors, Linearity of waveforms, Astable multi - Vibrators, OTA-C Oscillators, Voltage controlled-oscillators.

**[No. of Hrs. : 11]****Unit III**

**Power Amplifiers:** Power dissipations in transistors, Harmonic distortion, Amplifiers Classification, (Class-A, Class-B, Class-C, Class-AB) Efficiency, Push-pull and complementary Push-pull amplifiers.

**Linear & Non Linear Waveshaping:** Clipping & Clamping Circuits Comparators, log/antilog circuits using Op-amps, precision rectifiers.

**[No. of Hrs. : 11]****Unit IV**

**Active RC Filters:** Idealistic & Realistic response of filters (LP, BP, HP), Butter worth & Chebyshev filter functions Low pass, Band pass, High Pass, all pass and Notch Filter using Opamps, Operational Transconductance amplifier (OTA)-C filters.

**Applications of IC Analog Multiplier:** IC phase locked loops, IC voltage regulators, IC function generators.

**[No. of Hrs. : 11]****Text Books:**

1. Gayakwad, "Opamps and Linear Integrated Circuits", PHI Pvt. Ltd., 3<sup>rd</sup> edition 2000
2. Choudhary and Jain, "Linear Integrated Circuits", New Age International (P) Limited Publishers, 2<sup>nd</sup> edition 2003

**Reference Books:**

1. Sedra and Smith, "Microelectronics Circuits", Oxford University Press, 1998

**Code No.: ETEE 206****L T C****Paper: Power System - I****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Power System Components:** Concept of active, reactive & complex power, load characteristics, Single line diagram of power system, brief description of power system elements such as, synchronous machine, transformer, transmission line, bus bar and circuit breaker etc.

Fundamentals of power system, single phase 3  $\phi$  transmission and supply systems: Different kinds of supply system and their comparison, choice of transmission voltage.

**Transmission line:** Configurations, type of conductors, Bundle conductors, resistance of line, skin & proximity effects.

**[No. of Hr.: 11]****Unit II**

**Overhead Transmission Lines:** Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines, representation and performance of short, medium and long transmission line, Ferranti effect, Transposition of transmission lines, surge impedance, surge loading.

**[No. of Hr.: 11]****Unit III**

**Corona and Interference:** Phenomenon of corona, corona loss, factors affecting corona, electrostatic and electromagnetic interference with communication lines, methods of reducing corona and interference.

**Overhead Lines Insulators:** Types of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential.

**[No. of Hr.: 12]****Unit IV**

**Mechanical Design of Transmission Line:** Catenary curve, calculation of sag and tension, effects of wind and ice loadings, sag template, vibration dampers.

**Insulated Cables:** Types of cables, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables.

**[No. of Hr.: 10]****Text Books:**

1. C.L. Wadhava, "Electrical Power Systems", New Age International, 2004
2. M. L. Sone, P. V. Gupta and U. S. Bhatnagar, "A course in Electrical Power", Dhanpat Rai & Sons, 1<sup>st</sup> edition 2005

**Reference Books:**

1. S. L. Uppal, "Electrical Power", Khanna Publishers, 13<sup>th</sup> edition 2003
2. W. H. Stevenson, "Elements of Power System Analysis", McGraw Hill, 1982
3. Ashfaq Hussain, "Electrical Power System" CBS Publishers and Distributors.

Code No.: ETEE 208

L T C

Paper: Control Engineering – I

3 1 4

**INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Input / Output Relationship:** Introduction to open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical, Mechanical and Thermal), derivation of transfer function for different of types of systems, block diagram & signal flow graph, Reduction techniques, Mason's Gain formula. [No. of Hrs. : 11]

**Unit II**

**Time – Domain Analysis:** Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID controllers. [No. of Hrs. : 10]

**Unit III****Frequency Domain Analysis:**

Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode plots), gain and phase margins, relative stability. Correlation with time domain, constant M & N circles, close loop frequency responses, from open loop response. [No. of Hrs. : 12]

**Unit IV**

**Concept of Stability:** Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Nyquist stability criterion, Root locus plots and their applications.

**Compensation Techniques:** Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques, feedback compensation using P, PI, PID controllers. [No. of Hrs. : 11]

**Text Books:**

1. B. C. Kuo, "Automatic control system", Prentice Hall of India, 7<sup>th</sup> edition 2001.
2. I. J. Nagrath & M. Gopal, "Control system Engineering New Age International", 1999
3. S. P. Eugene Xavier, "Modern control systems", S. Chand & Company.
4. K. Ogata, "Modern control Engineering", Pearson 2002.

**Reference Books:**

1. Norman S. Nise, "Control systems Engineering" John Wiley & Sons (Asia) Singapore.
2. Raymond T. Stefani, Design of Feedback Control System, Oxford University Press.

**Code No.: ETEE 210****L T C****Paper: Electromagnetic Field Theory****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Electromagnetic Theory:** Review of scalar and vector field, Dot and Cross products, coordinates-cylindrical, spherical etc. Vector representation of surface, physical interpretation of gradient divergence and curl, different coordinated systems.

**[No. of Hrs. : 09]****Unit II**

**Electrostatic Fields:** Electric field due to point-charges, line charges and surface charges, Electrostatic potential, Solution of Laplace and Poission's equation in one dimension, M-method of image applied to plain boundaries. Electric flux density, Boundary conditions, Capacitance, Electrostatic energy.

Ampere's law of force, Magnetic flux density, Ampere's circulate law, Boundary conditions, Faraday's law, Energy stored in magnetic fields.

**[No. of Hrs. : 11]****Unit III**

Continuity equations, Displacement current, Maxwell's equation, Boundary conditions, Plane wave equation and its solution in conducting and non-conducting media, Phasor notation, Phase velocity, Group velocity, Depth of penetration, Conductors and dielectrics, Impedance of conducting medium. Polarization, Reflection and refraction of plane waves at plane boundaries, Poynting vectors, and Poynting theorem.

**[No. of Hrs. : 12]****Unit IV**

Transmission line equations, Characteristic impedance, Distortion-less lines, Input impedance of a loss less line, Open and Short circuited lines, Standing wave and reflection losses, Impedance matching, Application of smith chart.

**[No. of Hrs. : 12]****Text Books:-**

1. J.F.D. Kraus - Electromagnetic
2. E.C.Jorden, D.G.Balmeim - Electromagnetic waves and Radiating system, 2<sup>nd</sup> edition 1998

**Reference Books:**

1. Hayt - Electromagnetic, TMH, 5<sup>th</sup> edition
2. J. D. Kraus, R. C. Keith - Electromagnetic

**Code No.: ETEE 212****L T C****Paper: Power Station Practice****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Introduction:** Importance of electrical energy, comparison with forms of energy, global energy scenario.

**Power plant Economics and Tarrifs:** Load curve, load duration curve, factors affecting cost of generation, tarrifs, depreciation, effect of low power factor and its improvement.

**Non-Conventional Energy Sources:** Introduction to Solar energy, geo-thermal energy, tidal energy, wind energy, bio-gas energy and M.H.D. Power generation. **[No. of Hrs.: 12]**

**Unit II**

**Thermal Power Plant:** Location and Site selection, general layout and working of plant, brief description of boilers, economizers, super heaters, draft equipments, fuel and ash handling plant.

**Gas Turbine Power Plant:** Lay out, Working and components of gas turbine power plant, combined gas and steam turbine plant. **[No. of Hrs.: 11]**

**Unit III**

**Hydro Electric Plant:** Location and site selection, general layout and operation of plant, Impulse, Reaction, Francis and Kaplan turbines, governing of turbines.

**Diesel Power Plant:** Layout and components of plant auxiliary equipments.

**[No. of Hrs.: 11]****Unit IV**

**Nuclear Power Plant:** Location and site selection, general layout and operation of plant, brief description of reactors, moderators and reflectors.

**Substation Layout:** Types of substations, bus-bar arrangements, typical layout of substations, substation equipments. **[No. of Hrs.: 10]**

**Text Books:**

1. M. V. Deshpande, "Elements of Electric Power Station Design", Wheeler Publishing Co.
2. B. R. Gupta, "Generation of Electrical Energy", Eurasia Publishing House.
3. B. G. A. Skrotzki & W. A. Vopat, "Power Station Engineering and Economy", Tata McGraw Hill. 22<sup>nd</sup> edition 2002

**Reference Books:**

1. S. L. Uppal, "Electrical Power", Khanna Publishers. 13<sup>th</sup> edition 2003
2. M. L. Soni, P. V. Gupta and U. S. Bhatnagar, "A Course in Electrical Power", Dhanpat Rai & Sons, 1<sup>st</sup> edition 2005





**Code No.: ETEE 301****L T C****Paper: Digital Electronics****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I**

Analog &amp; Digital signals, AND, OR, NOT, NAND, NOR &amp; XOR gates, Boolean algebra.

Standard representation of Logical functions, K-map representation and simplification of logical functions

Don't care conditions, X-OR &amp; X-NOR simplification of K-maps.

**[No. of Hrs.: 10]****Unit – II****Combinational Circuits:** Multiplexers, demultiplexers, Decoders & Encoders, Adders & subtractors, Code Converters, comparators, decoder/drivers for display devices, Logic Implementations using ROM, PAL, & PLA.

Flip Flops: S-R, J-K, D &amp; T flip-flops, excitation table of a flip-flop, race around.

**[No. of Hrs.: 12]****Unit – III****Sequential Circuits:** Shift registers, Ripple counter, Synchronous counters. State table, State diagram, State assignment & reduction, mealy and moore machines. **[No. of Hrs.: 11]****Unit – IV****TTL and CMOS Logic families**

Semiconductor Memories: Memory organization &amp; operation, classification and characteristics of memories, RAM, ROM and content addressable memory.

**[No. of Hrs.: 11]****Text Books:**

1. Taub & Schelling - Digital Integrated Electronics – McGraw Hill International Edition
2. Malvino & Leach - Digital Electronics and Circuit design — TMN

**Reference Books:**

1. G. Gopalan - Introduction to Digital Microelectronics Circuits
2. Ranbaey - Digital Integrated Circuits: A Design Perspective — PHI

**Paper Code: ETEE – 303****L T C****Paper: Object Oriented Programming using C++ 3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

**Introduction:** Introducing Object-Oriented Approach related to other paradigms (functional, data decomposition), Characteristics of Object-Oriented Languages.

**Basic terms and ideas:** Abstraction, Encapsulation, Information hiding, Inheritance, Polymorphism, Review of C, Difference between C and C++, cin, cout, new, delete operators. **[No. of Hrs: 11]**

**UNIT – II**

**Classes and Objects:** Abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behavior of an object, Constructors and destructors, instantiation of objects, Default parameter value, Copy Constructor, Static Class Data, Constant and Classes, C++ garbage collection, dynamic memory allocation. **[No. of Hrs: 11]**

**UNIT – III**

**Inheritance and Polymorphism:** Inheritance, Types of Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Type of Polymorphism – Compile time and runtime, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric polymorphism, Generic function – template function, function name overloading, Overriding inheritance methods **[No. of Hrs: 11]**

**UNIT – IV**

**Files and Exception Handling:** Persistent objects, Streams and files, Namespaces, Exception handling, Generic Classes

**Standard Template Library:** Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors. **[No. of Hrs: 11]**

**TEXT BOOKS:**

1. A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997.
2. R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
3. Schildt Herbert, “C++ Programming”, 2<sup>nd</sup> Edition, Wiley DreamTech, 2004

**REFERENCE BOOKS:**

1. D . Parsons, “Object Oriented Programming with C++”, BPB Publication, 1999.
2. Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
3. Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004.

**Code No.: ETEE 305****L T C****Paper: Communication Systems & Circuits****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I****Analog Modulation:**

Amplitude Modulation

Generation &amp; Demodulation of AM waves, DSBSC waves, Coherent Detection of DSBSC signal, Quadrature-Carrier Multiplexing. Generation of SSB waves, Demodulation of SSB waves.

**Angle Modulation:**

Frequency &amp; phase Modulation, narrow &amp; wide-Band FM, BW of FM waves, Generation &amp; Demodulation of FM waves, S/N ratio. Comparison of AM, FM &amp; PM.

Random Process

Probability, Random variable, probability density, mean, moments, transformation of random variables, stationary Process, mean, autocorrelation and covariance functions, ergodicity, power spectral density, response of linear systems to random signals, Gaussian distribution, central limit theorem.

**[No. of Hrs.: 13]****Unit – II****Pulse analog Modulation:**

Sampling theorem, Sampling of Low Pass and band pass signals, Aliasing, Aperture effect, PAM, PWM and PPM generation and demodulation, TDM, Cross talk, Spectral analysis of PAM, PWM and PPM Waves, S/N ratio for different pulse modulation.

**[No. of Hrs.: 09]****Unit – III****Pulse Digital Modulation:**

Pulse code modulation signal to quantization noise ratio, Companding, probability of error for POM in AWGN Channel, DPOM, DM and ADM modulators and demodulators, Prediction Filter, line coding, Inter symbol Interference.

Digital transmission through Carrier Modulation

Amplitude, Frequency and phase shift keying. Differential phase shift keying, CPFSK, MSK QPSK and QAM modulation &amp; detection, probability of error calculation, Matched Filter.

**[No. of Hrs.: 13]****Unit – IV****Introduction to Information Theory:**

Measurement of information, mutual information Shannon's Theorem SOWZEE coding, channel coding and channel capacity theorem. Huffman code, Lempel-ziv code.

**[No. of Hrs.: 09]****Text Books:**

1. S. S. Haykin, "An introduction to Analog and Digital Communication systems" Wiley Eastern 1989
2. B. P. Lathi, "Modern Analog & Digital Communication"; John Wiley

**Reference Books:**

1. Simon Haykin "Communication Systems" John Wiley & Sons
2. Taub & Schilling "Principles of communication systems" TMH

**Code No.: ETEE 307****L T C****Paper: Electrical Measurement & Instrumentation****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Measuring Instruments: Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – Extension of range of E. S. Voltmeters.

**[No. of Hrs.: 09]**

**Unit II**

Instrument transformers – CT and PT – Ratio and phase angle errors – design considerations – Testing of CT's – Silsbee's method – Variable mutual inductance methods.

Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers.

Measurement of Energy: single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – trivector meter, maximum demand meters.

**[No. of Hrs.: 11]**

**Unit III**

Type of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters – Frequency meters – resonance type and Weston type – synchrosopes.

Principle and operation of D. C. Cromptons potentiometer – standardization – Measurement of unknown resistance, current, voltage.

A.C. Potentiometers: Polar and coordinate types standardization – application.

**[No. of Hrs.: 11]****Unit IV**

Method of measuring low, medium and high resistance – sensitivity of Wheatstones bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance- loss of charge method – Price's guard method – Megger.

A.C. bridges – Measurement of inductance Maxwell's bridge, Hay's bridge, Anaderson's bridge, owen's bridge – Heaviside bridge and its modifications Measurement of capacitance equivalent circuit of an imperfect capacitor – Desauty bridge. Wien's bridge – Schering Bridge.

Measurement of strain –Gauge sensitivity-temperature compensation-load cell-Measurement pressure using electrical transducers as Secondary transducers-vacuum gauges-Torque measurement-Angular velocity using Tachometers and Digital methods-LVDT type accelerometer-Flow measurement using electromagnetic method-hot wire anemometer and ultrasonic types – Capacitance method for liquid level measurement.

**[No. of****Hrs.: 13]****Text Book:**

1. E. W. Gloding and F. C. Widdis - Electrical Measurements and measuring Instruments, Wheeler

Publishing, fifth Edition.

2. A. K. Shawney - Electrical & Electronic Measurement & Instruments, Dhanpat Rai & Sons Publications, 2000

**Reference Books:**

1. Buckingham and Price - Electrical Measurements, Prentice – Hall
2. Harris - Electrical Measurements
3. Reissland, M. U. - Electrical Measurements: Fundamentals, Concepts, Applications New age International (P) Limited, Publishers.
4. W. D. Cooper, “Modern Electronics Instrumentation & Measurement Technique” PHI, 1998

**Code No.: ETCS 309****L T C****Paper: Data Base Management Systems****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit-I**

Introduction : Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.

DBMS models: Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model

**[No. of Hrs.: 11]****Unit-II****Hierarchical model:** Concepts, Data definition, Data manipulation and implementation.**Relation Model:** Relational database, Relational Algebra, Relational Calculus**[No. of Hrs.: 11]****Unit -III****Network Model:** Network Data Model, DBTG Set Constructs, and Implementation.**Relational Database Design and Query Language:** SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency. **[No. of Hrs.: 11]****Unit-IV****Concurrency Control:** Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery.**New Applications:** Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries. **[No. of Hrs.: 11]****Text Books :**

1. C. J. Date, "An Introduction to Data Base Systems" Pearson Education, 2001
2. Silberschate, Korth, Sudarshan, "Database System Concepts" Mc. Graw Hill, 4<sup>th</sup> Edition, 2004

**Reference Books**

1. Desai, "An Introduction to Database Systems" Galgotia, 2003.
1. Navathe, "Fundamentals of Database Systems" Pearson Education, 3<sup>rd</sup> Edition.

**Code No.: ETMS 311****L T C****Paper: Organizational Behaviour****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

Meaning & Nature of Management, Management Systems and Processes, Managerial Skills, Tasks & Responsibilities of a Professional Manager.

**[No. of Hrs.11]****Unit-II**

Planning Types and Process, Management by Objectives, Decision-Making Models, Organizational context of decisions, Problem solving techniques and processes, Controlling: Process and Techniques

**[No. of Hrs.: 11]****UNIT - III**

Organizational Climate, Culture and Managerial ethos, Organisational structure & Design, Managerial Communication.

**[No. of Hrs.: 11]****UNIT - IV**

Individual Determinants of organizational, Behaviours: Perceptions, Learning, Personality, Attitudes & Values, Motivation, Job Anxiety & Stress, Analysing, Interpersonal relations, Group Dynamics, Management of Organizational Conflicts, Management of Change, Leadership Styles & Influence.

**[No. of Hrs.: 11]****TEXT BOOKS:**

1. Stephen P. Robbins, David & Decenzo, "Fundamentals of Management", 3<sup>rd</sup> Edition, Pearson Education, 2002.
2. Stoner, et. al., "Management", 6<sup>th</sup> Edition, PHI, 2002.
3. J. S. Chandan, "Organisational Behaviour", Vikas Publishing House, 2004.
4. John M. Ivancevich, T. N. Duening, "Business & Management: Principles and Guidelines", biztantra, Dreamtech, 2005.

**REFERENCES BOOKS:**

1. Joseph W. Weiss, "Organisational Behaviour & Change, Managing Diversity, Cross-Cultural Dynamics & Ethics", 2<sup>nd</sup> Edition, Vikas Publishing House, 2003
2. Richard Pettinger, "Introduction to Management", 3<sup>rd</sup> Edition, Palgrave MacMillan, 2002.
3. Udai Pareek, "Understanding Organisational Behaviour", 1<sup>st</sup> Edition, Oxford University Press, 2004.
4. Fred Luthans, "Organisational Behaviour," 9<sup>th</sup> Edition, McGraw Hill International Edition, 2004.

|  |          |          |          |
|--|----------|----------|----------|
| <b>Code No. : ETEE 351</b>             | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Digital Electronics Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Digital Electronics.

|  |          |          |          |
|--|----------|----------|----------|
| <b>Code No. : ETEE 353</b>                               | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Object Oriented Programming using C++ Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Object Oriented Programming using C++.

|   |          |          |          |
|---|----------|----------|----------|
| <b>Code No. : ETEE 355</b>                              | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Communication Systems &amp; Circuits Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Communication Systems & Circuits.

|   |          |          |          |
|---|----------|----------|----------|
| <b>Code No. : ETEE 357</b>                                      | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Electrical Measurement &amp; Instrumentation Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Electrical Measurement & Instrumentation.

|   |          |          |          |
|---|----------|----------|----------|
| <b>Code No. : ETCS 359</b>                | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Database Management Systems</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Database Management Systems.

|                                   |          |          |          |
|-----------------------------------|----------|----------|----------|
| <b>Code No. : ETEE 361</b>        | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: *Practical Training</b> | <b>0</b> | <b>0</b> | <b>1</b> |

\*NUES

Practical training conducted after fourth semester will be evaluated in the fifth Semester based on Viva-Voce.



**Code No.: ETEE 302****L T C****Paper: Microprocessors****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Introduction to Microprocessors :** Evolution of Microprocessors, Microprocessor & Micro controller, Internal architecture of 8 bit Microprocessor 8085, concept of fetch –decode and execute.

**[No. of Hrs.: 10]****Unit II**

**Assembly Language Programming :** 8085 instruction set, Addressing Modes, Data Transfer Instructions, Arithmetic and Logic Instructions, Program Control Instructions (Jumps, Conditional Jumps, Subroutine Call). Different examples of programming. **[No. of Hrs.: 11]**

**Unit III**

**Memory Interfacing :** Types of Memory, RAM and ROM Interfacing with Timing Considerations, DRAM Interfacing, Memory mapped I/O, I/O mapped I/O.(6)

**I/O Interfacing:** Concept of Interrupt , Interrupt in 8085.: Programmed I/O, Interrupt Driven I/O, DMA, Parallel I/O (8255-PPI, Centronics Parallel Port), Serial I/O (8251/8250, RS-232 Standard), 8259-Programmable Interrupt controller, 8237-DMA Controller, 8253/8254-Programmable Timer/Counter, Interfacing of Stepper Motor. **[No. of Hrs.: 11]**

**Unit IV**

**Architecture of a 16-bit Microprocessors :** Internal Organization of 8086, Bus Interface Unit, Execution Unit, Register Pin diagram, Instruction set, Assembly language programming, Assembler directives, Procedures and Macros, 8086 Minimum mode, System Timing diagram, Interrupt and Interrupt service procedures.

Introduction to Intel 80386

**[No. of Hrs.: 12]****Text Books:**

1. R.Gaonkar, Microprocessor Architecture, Programing & Application, Penram International Publishing.
2. Hall D. V., Microprocessors Interfacing, TMH (2<sup>nd</sup> Edition)

**Reference Books:**

1. Liu, G. A. Gibson, Microcomputer Systems: The 8086 / 8088 Family, PHI 2<sup>nd</sup> Ed.
2. M. Rafiqzaman, Microprocessors Theory & Applications, PHI
3. B. Ram, Microprocessor and Microcomputers, Dhanpat Rai Pub.
4. Naresh Grover, Microprocessors: Comprehensive Studies, Dhanpat Rai Pub.
5. Kenneth J. Ayala “The 8051 Micro controller“, Penram International Publishing 1996

**Code No.: ETEE 304****L T C****Paper: Power System - II****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I:**

**Fault Calculations:** Per unit system, calculation of symmetrical and unsymmetrical fault currents in power system networks using the symmetrical components, use of current limiting reactors.

**[No. of Hrs.: 09]****Unit – II:**

Protective Relays and circuit Breakers; Basic operating principle, types of relays, distance and inverse definite minimum time relays, phase and amplitude comparators, development of static relays basic elements of a static relay.

Fuse: Introduction, Types & Applications.

Circuit Breakers: Principle, Types, Ratings & Applications.

**[No. of Hrs.: 12]****Unit – III:****Protective Scheme & Over Voltage Protection**

Protection of feeders, merz-price and translays systems, protection of generators and transformers, carrier current protection, protection against surges, surge diverters, surge absorbers, use of ground wires on transmission lines, methods of grounding method, insulation coordination.

**[No. of Hrs.: 12]****Unit – IV:****Compensation in Power System**

Introduction of compensation in power systems, characteristics of uncompensated and compensated lines, series and shunt compensations elementary concept of FACTS.

**[No. of Hrs.: 11]****Text Books:**

1. C L Wadhva, "Electrical Power System" Wiley Eastern Ltd., 3<sup>rd</sup> edition 2000
2. M. L. Soni, P. V. Gupta and U.S. Bhatnagar, "A course in electrical power" Dhanpat Rai & Sons.

**Reference Books:**

1. Narain G. Hingonani "Understanding FACTS" IEEE Press, year of publication 1999
2. Paul M. Anderson "Power System Protection" IEEE Press.

**Code No.: ETEE 306**  
**Paper: Power Electronics**

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|---|---|---|
| 3 | 1 | 4 |

**INSTRUCTIONS TO PAPER SETTERS:**

**Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Power Converter Components: Power Transistor and Triac, Commutation, Thyristor, Power MOSFET, IGBT, Thyristor characteristics, Rating, Protection and colling of Thyristors, Gate circuit requirements, Single pulse and carrier frequency gating, Firing circuits based on RC, UJT, 555 and comparator circuits. Darlingtong and series parallel combination of Thyristors, GTO & MOSFET Basics.

**[No. of Hrs.: 11]**

**Unit II**

Controlled Rectifiers: Cycloconverters and ac controllers, Half wave rectifier, Analysis of single phase controlled rectifiers with different types of loads, effect of transformer leakage inductance. Three phase converters and line commutated inverters. Single and three converters with inter phase reactors. Dual converters, Regulated D. C. power supplies using thyristors and Triacs.

**[No. of Hrs.: 12]**

**Unit III**

Inverters: Principle of inverters, half and full bridge single phase inverters, analysis with resistance and inductive loads, feedback diodes, Three phase inverters, MC-Murray-Bedford half bridge inverters, PWM inverters.

**[No. of Hrs.: 10]**

**Unit IV**

Choppers: Principle of choppers, analysis of chopper circuits, Multiquadrant choppers, parallel voltage and current commutated choppers.

**[No. of Hrs.: 11]**

**Text Books:**

1. M. H. Rashid, Power Electronics Circuits, Devices & Applications, PHI, 1999
2. J. Michael Jakob, Power Electronics: Principles & Applications, Vikas Publishing House Pvt. Ltd.

**Reference Books:**

1. Cyrill W. Lauder, Power Electronics, TMH
2. Vithayathis, J, Power Electronics : Principles and Applications, TMH
3. Dr. P. S. Bimhra "Power Electronics", Khanna Publishing, 4<sup>th</sup> edition 2001
4. Singh - "Power Electronics", Kanchandani TMH, 1999
5. P. C. Sen – Power Electronics, TMH, 1998

**Code No.: ETIT 308****L T C****Paper: Digital Signal Processing****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

Discrete time signals and systems, Z-transforms, structures for digital filters, design procedures for FIR and IIR filters. Frequency transformations: linear phase design; DFT. Methods for computing FFT. Noise analysis of digital filters, power spectrum estimation.

Signals and signal Processing: characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signals Processing applications.

Time Domain Representation of Signals & Systems: Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI Discrete-Time systems, state-space representation of LTI Discrete-Time systems, random signals.

**[No. of Hrs.: 11]****UNIT – II**

Transform-Domain Representation of Signals: the Discrete-Time Fourier Transform, Discrete Fourier Transform, DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse z-transform, properties of z-transform, transform domain representations of random signals, FFT Algorithms. **[No. of Hrs.: 11]**

**UNIT – III**

Transform-Domain Representation of LTI Systems: the frequency response, the transfer function, types of transfer function, minimum-phase and maximum-Phase transfer functions, complementary transfer functions, Discrete-Time processing of random signals.

Digital Processing of Continuous-Time Signals : sampling of Continuous Signals, Analog Filter Design, Anti-aliasing Filter Design, Sample-and-hold circuits, A/D & D/A converter, Reconstruction Filter Design. **[No. of Hrs.: 11]**

**UNIT – IV**

Digital Filter Structure: Block Diagram representation, Signal Flow Graph Representation, Equivalent Structures, FIR Digital Filter Structures, IIR Filter Structures, Parallel all pass realization of IIR transfer function, Digital Sine-Cosine generator.

Digital Filter Design: Impulse invariance method of IIR filter design, Bilinear Transform method of IIR Filter Design, Design of Digital IIR notch filters, FIR filter Design based on truncated Fourier series, FIR filter design based on Frequency Sampling approach.

Applications of DSP.

**[No. of Hrs.: 11]****TEXT BOOKS:**

1. Sanjit K. Mitra, "DSP a Computer based approach", TMH, 2<sup>nd</sup> Ed., 2001.
2. Allan Y. Oppenheim & Ronald W. Schacter, "Digital Signal Processing", PHI, 2004.

**REFERENCE BOOKS:**

1. J. R. Johnson, "Introduction to Digital Signal Processing", PHI, 2000.
2. B. Somanthan Nair, "Digital Signal Processing: Theory, Analysis & Digital Filter Design", PHI, 2004

**Code No.: ETEE 310****L T C****Paper: Utilization of Electrical Energy****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I****Electric Drives:**

Types of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

**[No. of Hrs.: 09]****Unit II****Electric Heating and Welding**

Advantages and methods of electric heating, resistance heating induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between a.c. and d.c. welding.

**[No. of Hrs.: 10]****Unit III****Illumination:**

Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light, discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

**[No. of Hrs.: 10]****Unit IV****Electric Traction**

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostatic braking and regenerative braking.

Mechanics of train movement. Speed-time curves for different services-trapezoidal and speed time curves – calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation and coefficient of adhesion.

**[No. of Hrs.: 15]****Text Books:-**

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Utilization of Electrical Power including Electric drives and Electric traction – by N. V. Suryanarayana, New Age International (P) Limited, Publishers, 1996.

**Reference Books:**

1. Art & Science of Utilization of Electrical Energy – by Partab, Dhanpat Rai & Sons.
2. Generation, Distribution and Utilization of Electrical Energy – by C. L. Wadhwa, New Age International (P) Limited, Publishers, 1997

**Code No.: ETEE 312****L T C****Paper: VLSI Design & Its Applications****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I**

Evolution of VLSI. MOS Devices and Circuits, MOS Transistors-Depletion and enhancement mode transistors, Transistor as a Switch, MOS inverter, inverter delay, Parasitic effects Pull up/Pull-down ratios for inverting logic.

**[No. of Hrs.11]****Unit – II**

Basic NAND, NOR, XOR, and XNOR gates, multiplexes, Memory, bars transistors, super buffers, NMOS combinational Network with bars transistors and inverters, PLAs clocked logic, two-phase clock, register stage, Introduction to CMOS gates.

**[No. of Hrs.12]****Unit – III**

Processing Technology, Explanation of different stages in fabrication.

**[No. of Hrs.10]****Unit – IV**

Design Methodology, Steps in the Design of a VLSI, VLSI design tools.

**[No. of Hrs.11]****Text Books:**

1. Basic VLSI Design Systems and circuits – Douglas A Pucknell, Kamnan Eshnaghian PHI
2. Modern VLSI Design – Wayne Wolf Peason Education. 2<sup>nd</sup> Edition.

**Reference Books:**

1. CMDS Circuit Design, Layout and Simulation, R. J. Bakes, H w li, D.E. Boyce, PHI, 2000
2. Digital Integrated Circuits J. M. Rabacy, PHI 2<sup>nd</sup> Edition.
3. Introduction to VLSI ckts and systems by – J. P. Vyennmura, John and wiely, 1<sup>st</sup> edition.

|                                   |          |          |          |
|-----------------------------------|----------|----------|----------|
| <b>Code No. : ETEE 352</b>        | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Microprocessor Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Microprocessor.

|                                       |          |          |          |
|---------------------------------------|----------|----------|----------|
| <b>Code No. : ETEE 354</b>            | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Power System - III Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Power System - III.

|  |          |          |          |
|--|----------|----------|----------|
| <b>Code No. : ETIT 356</b>                   | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Digital Signal Processing Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Digital Signal Processing.

|                                      |          |          |          |
|--------------------------------------|----------|----------|----------|
| <b>Code No. : ETEE 358</b>           | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Power Electronics Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Power Electronics.

|                                      |          |          |          |
|--------------------------------------|----------|----------|----------|
| <b>Code No. : ETEE 360</b>           | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Electrical Energy Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Electrical Energy.

**Code No.: ETEE 401****L T C****Paper: Electrical Drives****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I****Introduction:**

Solid state controlled electric drive-Concept, elements and salient features, power converter motor system, closed loop control of electric drives, sensing of speed and current, review of power converter circuits, performance parameters.

**Permanent Magnet Machines:**

Unique features of PM Machines, Permanent magnet materials, Power limitations of PM machines, Permanent magnet d.c. machines, Permanent Magnet synchronous Machines, Applications of Permanent magnet machines.

**[No. of Hrs.13]****Unit II**

**Control of D. C. Drives:** Control of d.c. separately and series excited motor drives using controlled converters (single phase and three phase) and choppers, static Ward-Leonard, control scheme, power factor improvement, solid state electric braking scheme, closed loop control schemes.

**[No. of Hrs.11]****Unit III**

**Control of A. C. Motor Drives:** Control of three phase induction motor drive using a.c. voltage controllers, cyclo converters. Voltage source and current source inverters; concept of field oriented control, slip power controlled slip ring induction motor drives, closed loop control schemes, self controlled synchronous motor drives, brushless dc motor drive, switched reluctance motor drive.

**[No. of Hrs.11]****Unit IV**

**Microprocessor Control of Electric Drive:** Functions of microprocessor in electric drive control, salient features of microprocessor control, microprocessor based control schemes for d.c. induction and synchronous motor drives, applications.

**[No. of Hrs. 09]****Text Books:**

1. G. K. Dubey, "Power Semiconductor controlled Drives", Narosa Publications, 1999
2. J. M. D./ Mruphy & I. G. Turnbull, "Power Electronic Control of a.c. motors", Pergamon Press.

**Reference Books:**

1. B. K. Bose, "Power Electronics and ac Drives", Pearson, 2002
2. S. B. Dewan & G. R. Stemon & A. Straughen, "Power semiconductor Drives", Wiley Inter Science
3. V. Subrahmanyam, "Thyristor Control of Electric Motors", Tata McGraw Hill
4. P. C. Sen, "Thyristor dc Drives", Wiley International
5. S. A. Nasar: Electric Machines and Power Systems.



**Code No.: ETEE 403****L T C****Paper: HVDC Transmission****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Economic & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC & DC Transmission, Application of DC Transmission System – Planning & Modern trends in D. C. Transmission.

**[No. of Hrs.09]****Unit II**

Analysis of HVDC Converters: Choice of Converter configuration – analysis of Graetz – characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star – star mode – their performance.

**[No. of Hrs.10]****Unit III**

Converter & HVDC System Control – Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system; Starting and stopping of DC link, Power Control; Reactive Power Control: Reactive power requirements of steady-states; Sources of reactive power.

Power flow Analysis in AC/DC systems: Modelling of DC Links – Solution of DC loadflow – P. U. System for d.c. quantities.

Converter fault & Protection: Converter faults – Protection against over current and over voltage in converter station – surge arresters – smoothing reactors – DC breakers – Effects of proximity of AC DC Transmission Lines.

**[No. of Hrs.13]****Unit IV**

Harmonics & Filters: Generation of Harmonics – adverse effects of harmonics – Calculation of voltage & Current harmonics – Effect of Pulse number on harmonics – Use of Filters for suppression of harmonics – Types of AC filters: Single tuned filters – High pass filters.

**[No. of Hrs.12]****Text Books:-**

1. HVDC Power Transmission Systems: Technology and System Interactions- by K. R. Padiyar, New Age International (P) Limited, and Publishers.
2. HVDC Transmission – J. Arrillaga, Peter Peregrinus.
3. Direct Current Transmission – by E. W. Kimbark, John Wiley & Sons.

**Reference Books:**

1. HVDC Power Converters and Systems – B. J. Cory, Mc Donald.
2. EHVAC and HVDC Transmission Engineering and Practice – S. Rao
3. Power Transmission by Direct Current – by E. Uhlmann, Springer-Verlag.

**Paper Code– ETEE - 405****L T C****Paper Computer Networks****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

Uses of Computer Networks, Network Architecture, Reference Model (ISO-OSI, TCP/IP-Overview, IP Address Classes, Subnetting), Domain Name Registration & Registrars

The Physical Layer: Theoretical basis for data communication, transmission media-Magnetic Media, Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable, Fibre Cable, Structured Cabling, Cable Mounting, Cable Testing, Wireless transmission, the telephone system, narrowband ISDN, broadband ISDN and ATM.

**[No. of Hrs.: 11]****UNIT – II**

The Data Link Layer: Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, Examples of Data Link Protocols.

**[No. of Hrs.: 11]****UNIT - III**

The Medium Access Sublayer: The channel allocation problem, multiple access protocols, IEEE standard 802 for LANS and MANS, high-speed LANs, satellite networks, Network devices-repeaters, hubs, switches and bridges.

**[No. of Hrs.: 11]****UNIT – IV**

The Network Layer: Network layer design issues, routing algorithms, congestion control algorithm, internetworking, the network layer in the internet, the network layer in ATM networks.

**[No. of Hrs.: 11]****TEXT BOOKS:**

1. A. S. Tananbaum, “Computer Networks”, 3<sup>rd</sup> Ed, PHI, 1999.

**REFERENCE BOOKS:**

1. U. Black, “Computer Networks-Protocols, Standards and Interfaces”, PHI, 1996.
2. W. Stallings, “Computer Communication Networks”, PHI, 1999.
3. Laura Chappell (ed), “Introduction to Cisco Router Configuration”, Techmedia, 1999.
4. Michael A. Miller, “Data & Network Communications”, Vikas Publication, 1998.
5. William A. Shay, “Understanding Data Communications & Networks”, Vikas Publication, 1999.

**Code No.: ETEE 407****L T C****Paper: Biomedical Instrumentation****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Introduction:** The age of Biomedical Engineering, Development of Biomedical Instrumentation, Man-Instrumentation system, Components, Physiological system of the body, problem encountered in measuring a living system.

**Transducers & Electrodes:** The Transducers & Transduction principles, Active transducers, Passive Transducers, Transducer for Biomedical Applications.

**Sources of Bioelectric Potentials:** Resting & Action potentials, propagation of active potential, The Bioelectric potentials – ECG, EEG, EMG and Evoked responses.

**Electrodes:** Electrodes theory, Biopotential Electrodes – Microelectrodes Body surface electrodes, Needle Electrodes, Biochemical Transducers, Reference electrodes, PH electrodes, Blood Gas electrodes.

**[No. of Hrs.11]****Unit II**

**Human Anatomy & Physiology:** Bioelectric potentials, leads & electrodes, Transducers for biological applications, Biomaterials.

**Monitor and Recorders:** Biopotential, amplifiers, recorders, monitors, Galvanometric, potentiometric, ultra violet, electrostatic, ink jet recorder video monitors, colour printers, Electro Physiological recorders, ECG-working principles & clinical applications.

**[No. of Hrs.12]****Unit III**

**Nervous system measurement:** Anatomy of Nervous system, Neuronal communication, EPSP & IPSP, Neuronal firing measurements, EEG-block diagram, various Rhythms, EEG in diagnostics, EMG and applications.

**[No. of Hrs.09]****Unit IV**

**Ophthalmology Instruments:** Electro retinogram, Electrooculogram, Ophthalmoscope, Tonometer for eye pressure measurement.

**Therapeutic Instruments:** Diathermy, Defibrillator, cardiac pacemaker, stimulators, Laser applications in machine, X-Rays production & use, Radiographic Diagnostic and Therapeutic, Film construction and processing, Interaction with body. Fundamentals of radiation therapy.

**[No. of Hrs.12]****Text Books:**

1. Khandpur R. S. / Biomedical Instrumentation/TMH
2. Tompkins/ Biomedical DSP: C Languages Examples and Laboratory Experiments for the IBM PC/PHI

**Reference Books:**

1. Cormwell/Biomedical Instrumentation and Measurements /PHI
2. W.F. Ganong / Review of Medical Physiology / 8<sup>th</sup> Asian Ed. / Medical Publishers, 1977
3. J. G. Webster ed / Medical Instrumentation / Houghton Mifflin, 1978
4. A. M. Cook and J. G. Webster, eds / Therapeutic Medical Devices / PHI, 1982

**Code No.: ETEE 409****L T C****Paper: Reliability Engineering & Application to Power Systems 3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probability density and distribution functions – binomial distributions – expected value and standard deviation of binomial distribution.

**[No. of Hrs.10]****Unit II**

Network Modelling and Reliability Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method

Reliability functions  $F(t)$ ,  $R(t)$ ,  $H(t)$  and their relationships – exponential distributions – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF

**[No. of Hrs.11]****Unit III**

Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models – Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle time, for one, two component, repairable models – evaluation of cumulative probability and cumulative frequency of encountering merged states.

**[No. of Hrs.12]****Unit IV**

Generation system reliability analysis – reliability model of a generation system – recursive relation for unit addition and removal – load modeling – merging of generation load model – evaluation of transition rates for merged state model – cumulative probability, cumulative frequency of failure evaluation – LOLP, LOLE.

Composite system reliability analysis decomposition method – distribution system reliability analysis – radial networks – weather effects on transmission lines – Evaluation of load and energy indices.

**[No. of Hrs.11]****Text Books:**

1. Reliability Evaluation of Egg. System – R. Billinton, R. N. Allan, Plenum Press
2. Reliability Evaluation of Power System – R. Billinton, R. N. Allan, Plenum Press

**Reference Books:**

1. An Introduction to Reliability and Maintainability Engineering. Charles E. Ebeling, Tata McGraw Hill edition.

**Code No.: ETEE 411****Paper: Modelling and Simulation of  
Electrical Machine**

|          |          |          |          |
|----------|----------|----------|----------|
|          | <b>L</b> | <b>T</b> | <b>C</b> |
| <b>3</b> | <b>1</b> | <b>4</b> |          |

**INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I**

Energy state functions. Basic principles of electromechanical energy conversion, general expressions of generated voltage and force/torque; basic modeling of electrical machine from coupled circuit point of view; techniques of transformations, general volt ampere and torque equations under stationary and rotating reference from instantaneous symmetrical components and generated operational equivalent circuits, space vector concepts. **[No. of Hrs.10]**

**Unit – II**

**Modelling of D.C. Machines:** Analysis under motoring and generating, simulation for transient and dynamic conditions, voltage build up in generators, effects of load change, run-up and dynamic operators of motors under different excitations, response under load change, reversal and braking. **[No. of Hrs.09]**

**Unit – III**

**Modeling of Synchronous Machines:** d-q- transformations fixed to field structure-steady and dynamic equations, phaser diagrams for cylindrical rotor and salient pole machines, electromagnetic and reluctance torques, response under short circuit conditions, subtransient, transient and steady state conditions, simulation of vector controlled synchronous motors, computer simulation using mathematical softwares. **[No. of Hrs.10]**

**Unit – IV**

**Modeling of Induction Machines:** Equations under stationary and rotating reference frames, derivation of equivalent circuits, correlation of inductances, run-up transients, dynamics under load change, speed reversal and braking; computer simulation to predict dynamic response, simulation of induction motors under soft start; VVVF and vector controlled drives. Unbalanced and asymmetrical operations, symmetrical components and rotating field theory – modeling and simulation of single phase motors.

Modeling and analysis of Permanent Magnet, Switched Reluctance and Stepper Motors.

Development of computer softwares using latest simulation tools to predict the behaviour of different machines. **[No. of Hrs.15]**

**Text Books:**

1. Bernard Adkins, “The General Theory of Electrical Machines”, Chapman & Hall Ltd.
2. Paul C. Krause, “Analysis of Electric Machinery”, Mc-Graw Hill.

**Reference Books:**

1. C. V. Jones, “Unified Theory of Electrical Machines”, Butterworths Publishers.
2. D. C. White and H. H. Woodson, “Electromechanical Energy Conservation”, Mc-Graw Hill.
3. I. P. Kopylov, “Mathematical Models of Electric Machines”, Mir Publisher.

**Code No.: ETEE 413****L T C****Paper: Non-Conventional Energy System****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit - I**

**Introduction:** Various non-conventional energy resources – Introduction, availability, classification, relative merits and demerits.

**Solar Cells:** Theory of solar cells, solar cell materials, solar cell power plant, limitations.

**Solar Thermal Energy:** Solar radiation flat plate collectors and their materials, applications and performance, focusing of collection and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

**[No. of Hrs.: 12]****Unit - II**

**Geothermal Energy:** Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environment consideration.

**Magneto-hydrodynamics (MHD):** Principle of working of various types of fuel cells and their working, performance and limitations.

**[No. of Hrs.: 10]****Unit - III**

**Thermo-electrical and thermionic conversion:** Principle of working, performance and limitations.

**Wind Energy:** Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics, performance and limitations of energy conversion systems.

**[No. of Hrs.: 11]****Unit - IV**

**Bio-mass:** Availability of bio-mass and its conversion theory.

Ocean Thermal Energy Conversion (OTEC), Availability, theory and working principle, performance and limitation.

**Wave and Tidal Wave:** Principle of working performance and limitations. Waste Recycling Plant.

**[No. of Hrs.: 11]****Text Books:**

1. C D Rai - Non Conventional energy sources, Khanna Publishers, 2004.
2. Rao, Parulakar – Energy Technology, Khanna Publishers, 2002

**Reference Books Books:**

1. Andra Gabel, "A Handbook for Engineers and Economists".
2. A. Mani, "Handbook of Solar radiation Data for India".
3. Peter Auer, "Advances in Energy System and Technology". Vol. I & II Edited by Academic Press.
4. F. R. the MITTRE, "Wind Machines" by Energy Resources and Environmental Series.
5. Frank Kreith, "Solar Energy Hand Book".
6. N. Chermissinogg and Thomes, C. Regin, "Principles and Application of Solar Energy".
7. N. G. Clavert, "Wind Power Principles".
8. W. Palz, P. Chartier and D. O. Hall, "Energy from Biomass".

**Paper Code– ETEE - 415****L T C****Paper SOFTWARE ENGINEERING****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

**Introduction:** Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models

**Software Requirements analysis & specifications:** Requirement engineering, requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

**[No. of Hrs.: 11]****UNIT – II**

**Software Project Planning:** Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, COCOMO-II, Putnam resource allocation model, Risk Management.

**Software Design:** Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design

**[No. of Hrs.: 11]****UNIT - III**

**Software Metrics:** Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics

**Software Reliability:** Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models, Basic Model, Logarithmic Poisson Model, Software Quality Models, CMM & ISO 9001.

**[No. of Hrs.: 11]****UNIT - IV**

**Software Testing:** Testing process, Design of test cases, functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Path Testing, Data flow and mutation testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing, Testing Tools & Standards.

**Software Maintenance:** Management of Maintenance, Maintenance Process, Maintenance Models, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

**[No. of Hrs.: 11]****TEXT BOOKS:**

1. K. K. Aggarwal & Yogesh Singh, “Software Engineering”, 2<sup>nd</sup> Ed., New Age International, 2005.
2. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 5<sup>th</sup> Ed., McGraw Hill Int. Ed., 2001.

**REFERENCE BOOKS:**

1. Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, TMH, 1996.
2. James Peter, W. Pedrycz, “Software Engineering: An Engineering Approach”, John Wiley & Sons, 2004.
3. I. Sommerville, “Software Engineering”, Addison Wesley, 2004
4. K. Chandrasekhkar, “Software Engineering & Quality Assurance”, BPB, 2005.

**Code No.: ETEE 417****L T C****Paper: Optical Communication****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I****Introduction:**

Measurement of Information, Channel Capacity, Communication System Architecture, Basic Optical Communication System, Advantage of Optical Communication System.

**Propagation in Dielectric Waveguides:**

Introduction, Step-index Fibers, Graded Index Fibers, Modes & Rays, Stab Wave Guide.

**[No. of Hrs.: 10]****Unit – II****Attenuation in Optical Fibers:**

Introduction, Absorption, Scattering, Very Low Loss Materials, All Plastic & Polymer-Clad-Silica Fibers.

**Wave Propagation:**

Wave propagation in Step-Index & Graded Index Fiber, Overall Fiber Dispersion-Single Mode Fibers, Multimode Fibers, Dispersion-Shifted Fiber, Dispersion, Flattened Fiber, Polarization.

**[No. of Hrs.: 11]****Unit – III****Source & Detectors:**

Design & LED's for Optical Communication, Semiconductor Lasers for Optical Fiber Communication System, Semiconductor Photodiode Detectors, Avalanche Photodiode Detector & Photo multiplier Tubes.

**[No. of Hrs.: 11]****Unit – IV****Optical Fiber Communication System:**

Telecommunication, Local Distribution Series, Computer Networks Local Data Transmission & Telemetry, Digital Optical Fiber Communication System-First Generation, System-Second Generation Future System.

Data Communication Networks – Network Topologies, Mac Protocols, Analog System.

Advanced Multiplexing Strategies – Optical TDM, Sub carrier Multiplexing, WDM Network.

Architectures: SONET/SDH. Optical Transport Network, Optical Access Network, Optical Premise Network.

Applications-Military Applications, Civil, Consumer & Industrial Applications.

**[No. of Hrs.: 12]****Text Books:**

1. Optical Electronics – A. Yariv – SBS College Publishing, Newyork 1985
2. Optical Information Processing – F. T. S. Yu – Wiley, Newyork, 1983



**Code No.: ETEE 419****L T C****Paper: Telemetry & Data Acquisition System****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I**

**Sampling fundamentals:** Introduction to sampling theorem and sampling process, convolution, computing minimum sampling rate, Aliasing Errors.

**Digital Modulation Techniques:** Review of PCM, DPCM, Methods of binary data transmission, Data Formats, DM code converters, PSK, QPSK, FSK, Probability of error, Phase ambiguity Resolution and differential encoding, Error detection Error correction, Error correcting codes.

**[No. of Hrs.: 14]****Unit – II**

**Data handling system:** Block schematic, Sensors, Signal conditioners, Multiplexing – high level and low level, ADC – Range and Resolution, Word Format, Frame format, Frame of Synchronizer codes, RF links, X24, RS422, RS423, RS232C interfaces, Multi terminal configuration, Multiplier & concentrator, Data Modems, Data transmission over telephone lines.

**[No. of Hrs.: 10]****Unit – III**

**Data reception systems:** Bit Synchronizers, Frame Synchronizers, Sub frame Synchronizers, PLL, Display System.

**Remote Control:** Communication Based Processing Control Systems, Pipelines, Operational security system components, Pipeline control, Power system control, Programmable controllers for factor automation.

**[No. of Hrs.: 10]****Unit – IV**

**Command:** Tone Command system, Tone Digital Command system, ON/OFF command and Data commands.

**Aerospace Telemetry:** Signal Formation and Conversion, Multiplexing Techniques in Telecontrol installations, Reliability in Telecontrol installations.

**[No. of Hrs.: 10]****Text Books:**

1. Telemetry principles, By Patranabis TMS.
2. Telemetry Systems, Border & Mayewise.

**Reference Books:**

1. Data Communication, Schweber, McGraw Hill

**Code No.: ETEE 421****L T C****Paper: Electrical Energy Conservation****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I****Energy Auditing**

Introduction, Economics Analysis of investments, Present value criterion, Average rate of return criterion, Return on investment, Payback period criterion. **[No. of Hrs.: 09]**

**Unit II****Electrical Load Management**

Introduction, Transformer, Reduction of transformer losses, Power factor improvement, Methods of improving power factor, Location of capacitor installation, Demand Management, Energy efficiency issues. **[No. of Hrs.: 11]**

**Unit III****Electric motors**

Introduction, Selection and application, Factors affecting performance, operational improvements, Retrofit improvements, Field testing, Energy Efficiency motors, Existing motor details, Power factor correction, variable speed drives, Energy saving controllers. **[No. of Hrs.: 12]**

**Unit IV****Lighting**

Introduction, Illumination, Glare, Colour and colour rendering, Incandescent, Fluorescent, high intensity discharge, Low pressure sodium, Energy efficiency, Replacing lamps and fixtures, Improving lighting control, maintenance.

**Energy management Information System**

Introduction, Field transducers, PLC, Communication network energy bench marking. **[No. of Hrs.: 12]**

**Text Books:**

1. Handbook on Energy Audits & Management – A.X.Tyagi – Teri, New Delhi

**Code No.: ETEE 423****L T C****Paper: Soft Computing****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit -I**

**Neural Networks:** History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks. **[No. of Hrs.: 11]**

**Unit-II**

**Fuzzy Logic:** Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

**Operations on Fuzzy Sets:** Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

**Fuzzy Arithmetic:** Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. **[No. of Hrs.: 11]**

**Unit-III**

**Fuzzy Logic:** Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

**Uncertainty based Information:** Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets. **[No. of Hrs.: 11]**

**Unit-IV**

**Introduction of Neuro-Fuzzy Systems,** Architecture of Neuro Fuzzy Networks.

**Application of Fuzzy Logic:** Medicine, Economics etc. **Genetic Algorithm:** An Overview, GA in problem solving, Implementation of GA **[No. of Hrs.: 11]**

**Text Books:**

1. AI & Expert system, Janki Raman ,MacMillen,2003
2. Artificial Intelligence, Knight ,TMH,1991.
3. Artificial Intelligence, G.F luger,Pearson education,2003

**References Books :**

1. Artificial Intelligence, Patricks henry ,Winston,Pearson education,2001
2. Artificial Intelligence, Nilsson , Morgon, Kufmann 1998.

|                                      |          |          |          |
|--------------------------------------|----------|----------|----------|
| <b>Code No. : ETEE 451</b>           | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Electrical Drives Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Electrical Drives.

|                            |          |          |          |
|----------------------------|----------|----------|----------|
| <b>Code No. : ETEE 453</b> | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Electives</b>    | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Electives

|                            |          |          |          |
|----------------------------|----------|----------|----------|
| <b>Code No. : ETEE 455</b> | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: #Seminar</b>     | <b>0</b> | <b>2</b> | <b>1</b> |

#NUES

A college committee will evaluate the performance of the students & marks will be awarded accordingly.

|                             |          |          |          |
|-----------------------------|----------|----------|----------|
| <b>Code No. : ETEE 457</b>  | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Minor Project</b> | <b>0</b> | <b>8</b> | <b>4</b> |

Students may choose a project based on any subject of Electrical & Electronics Engineering. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

|                                    |          |          |          |
|------------------------------------|----------|----------|----------|
| <b>Code No. : ETEE 459</b>         | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: #^Practical Training</b> | <b>0</b> | <b>0</b> | <b>1</b> |

#NUES

^Practical training conducted after sixth semester will be evaluated in the Seventh Semester based on Viva-Voce.

**Code No.: ETEE 402****L T C****Paper: Advanced Control Systems****3 1 4**

| <b>INSTRUCTIONS TO PAPER SETTERS:</b>   | <b>Max. Marks-75</b> |
|---|----------------------|
| 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.   |                      |
| 2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks. |                      |

**Unit – I:****State Space Analysis of Control System**

Introduction, state space representation of continuous linear time invariant system, transfer function and state variables, solution of state equations, state and output controllability and observability.

**[No. of Hrs.10]****Unit – II :****Analysis of Discrete System**

Introduction to discrete time system, sample and hold circuits, presentation by difference equation and its solution, pulse transfer function, representation of discrete system in state variable form and its solution.

**[No. of Hrs.12]****Unit – III :****Non-Linear Control Theory**

Introduction to Non-linear control, Linearisation techniques techniques of non-linear system-phase plane and describing function techniques, stability criteria of Liapunov and papov, statical linearisation methods.

**[No. of Hrs.12]****Unit – IV :****Adaptive Control**

Introduction, model reference adaptive control systems, controller structure, self-tuning regulators, various adaptive control systems, Fuzzy logic and its applications.

**[No. of Hrs.10]****Text Books:**

1. B.Ogata-State Space Analysis, Modern Control System, Pearson 4<sup>th</sup> edition, 2002
2. M. Gopal-Modern Control System Theory, New Age International, 2003.

**Reference Books:**

1. Brian D.O.Adnerson & John B. Moore, Optimal Control
2. Shastri & Badson, Adaptive Control, PHI
3. S. Das Gupta, Control System Theory, Khanna Pub.
4. Raymon T. Sufani, Design of Feedback Control System, Oxford University Press.
5. J. J. Stoline, Nonlinear Control System.

**Code No.: ETEE 404****L T C****Paper: Flexible AC Transmission Systems****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I****Reactive Power Control:**

Concept of reactive power control, methods of voltage control.

**Uncompensated Transmission Line:**Loadability characteristics of O/H lines, on open – circuit, uncompensated transmission line under load, effect of line length, load power, p.f. on voltage and reactive power, real power & stability. **[No. of Hrs.10]****Unit II****Compensation of Lines:**

Objectives of compensation, types of compensation – surge impedance compensation, line length compensation, compensation by sectioning, passive &amp; active compensators, uniformly distributed fixed compensation, its effect on voltage control, line charging reactive power, uniformly regulated shunt compensation, passive shunt compensation

**Dynamic Performance of Transmission Lines:**Dynamics of ac Power Systems and the effect of reactive power control. **[No. of Hrs.12]****Unit III**

Static Compensation:

Principle, properties, types – TCR, TSC etc.

**Sub synchronous Resonance:** Introduction, methods of controlling SSR.**Synchronous Condensers:** Introduction, characteristics, and its operation. **[No. of Hrs.12]****Unit IV****Unified Power Flow Controller:**

Interphase Power Controller:

**Reactive Power Management:**

Introduction, objectives, modeling, benefits.

**[No. of Hrs.10]****Reactive Power Optimization****Text Books:-**

1. N.G. Hingorani, Gyugi - Understanding Facts, Concepts, Technology of Flexible AC Transmission Systems IEEE Press, year of publications 1999
2. T.J.E. Miller – Reactive Power Control in Electric Systems, John Wiley & Sons, 1982

**Code No.: ETEE 406****L T C****Paper: Optimization Techniques****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Introduction and Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

Classical Optimization Techniques: Single variable Optimization – multivariable Optimization without constraints – necessary and sufficient conditions for minimum / maximum – multivariable Optimization with equality constraints.

Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraint – Kuhn – Tucker conditions.

**[No. of Hrs.11]****Unit II**

Linear Programming: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

Transportation problem: finding initial basic feasible solution by north - west corner rule, least cost method and vogel's approximation method – testing for optimality of balanced transportation problems.

**[No. of Hrs.11]****Unit III**

Unconstrained Nonlinear Programming: One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

Unconstrained Optimization Techniques: Univariate method, Powell's method and steepest descent method.

**[No. of Hrs.10]****Unit IV**

Constrained Nonlinear Programming: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method: Basic approach of Penalty Function method: Basic approach of Interior and Exterior penalty function method, Introduction to convex Programming Problem.

Dynamic Programming:

Dynamic Programming multistage decision processes – types – concept of sub Optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution – exemplified illustrating the tabular method of solution.

**[No. of Hrs.12]**

**Text Books:**

1. “Engineering optimization: Theory and practice” – by S. S. Rao, New Age International (P) Limited, 3<sup>rd</sup> edition, 1998

**Reference Books:**

1. “Optimization Methods in Operations Research and system Analysis” – K. V. Mital and C. Mohan, New Age International (P) Limited, 3<sup>rd</sup> edition, 1996
2. Operations Research – by Dr. S. D. Sharma
3. “Operations Research: An Introduction” – by H. A. Taha, PHI Pvt. Ltd., 6<sup>th</sup> edition
4. Linear Programming – by G. Hadley.



**Code No.: ETEE 408****L T C****Paper: Application of Power Electronics to Power Systems****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Steady state and dynamic problems in AC Systems, Flexible AC transmission systems

(FACTS)]

**[No. of Hrs.: 09]****Unit II**

Static phase shifters (SPS), Static condense (STATCON). Static synchronous series compensator (SSSC) and unified power flow controller (UPFC)

Modeling and Analysis of FACTS controllers. Control strategies to improve system stability

**[No. of Hrs.13]****Unit III**

Power Quality problems in distribution systems, harmonics, harmonics creating loads, modeling, harmonic proration series and parallel resonances, harmonic power flow.

**[No. of Hrs.10]****Unit IV**

Mitigation of harmonics, filters, passive filters, Active filters, shunt series hybrid filters, voltage sags &amp; swells, voltage flicker, Mitigation of power quality problems using power electronic conditioners, IEEE standards.

**[No. of Hrs.12]****Text Books:**

1. Narain G. Hingonano and Laszlo Gyugyi "Understanding FACTS"

**Reference Books:**

1. G. T. Heydt, Power, Quality, Stars in a circle publications, Indiana, 1991
2. T. J. E. Miller, Static Reactive Power Compensation, John Wiley & Sons, New York, 1982

**Paper Code: ETEE – 410****L T C****Paper: Object Oriented Software Engineering****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

Introduction to Software Engineering: Software Engineering Development, Software Life Cycle Models, Comparison of various models

Requirement Elicitation: Introduction to Object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model-Action & Use cases, Requirements Elicitation Activities, Managing Requirements Elicitation.

**[No. of Hrs.: 11]****UNIT – II**

Architecture: Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model

Analysis: Introduction, the requirements model, the analysis model

**[No. of Hrs.: 11]****UNIT – III**

Construction: Introduction, the design model, block design, working with construction

Testing: introduction, on testing, unit testing, integration testing, system testing, the testing process

**[No. of Hrs.: 11]****UNIT – IV**

Modelling with UML: Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams.

Case Studies

**[No. of Hrs.: 11]****TEXT BOOKS:**

1. Ivar Jacobson, “Object Oriented Software Engineering”, Pearson, 2004.
2. Grady Booch, James Runbaugh, Ivar Jacobson, “The UML User Guide”, Pearson, 2004.
3. Wendy Boggs, Boggs, Michael Boggs “Mastering UML with Rational Rose”, BPB Publication, 2003.

**REFERENCES BOOKS:**

1. Stephen R. Scach, “Classical & Object Oriented Software Engineering with UML and Java: McGraw Hill, 1999.
2. Richard C. Lee, William M. Tepfenhard, “UML and C++, A Practical guide to object-oriented Development”, Pearson Education, 2002.

**Paper Code: ETEC – 412****L T C****Paper: Digital Image Processing****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

Introduction and digital image fundamentals : Digital image Representation , Fundamental steps in image processing ,elements of digital image processing systems , sampling and quantization , some basic relationship like neighbors , connectivity , Distance measure between pixels . Imaging Geometry Image Transforms: Discrete Fourier Transform , some properties of the two-dimensional Fourier transform , fast Fourier transform, Inverse FFT

**[No. of Hrs.: 11]****Unit-II**

Image Enhancement : Spatial domain methods, frequency domain methods , Enhancement by point processing , spatial filtering .low[pass filtering , High pass filtering Homomorphic filtering , Colour image processing

**[No. of Hrs.: 11]****Unit –III**

Image Restoration : Degradation model, Diagonalization of Circulant and block- Circulant Matrices , Algebraic Approach to restoration , Inverse filtering , Wiener filter , Constrained least square Restoration , Interactive Restoration , Restoration in spatial Domain. Image Compression : Coding , Interpixel and psycho visual Redundancy , Image compression models error free comparison , lossy compression , Image compression standards. **[No. of Hrs.: 11]**

**Unit-IV**

Image segmentation: Detection of Discontinuities Edge linking and boundary detection Thresholding , region oriented segmentation ,motion based segmentation.

Representation and Description : Representation schemes like chain coding , polygonal Approximation , signatures , boundary segments , skeleton of region , boundary description , regional descriptors , Morphology . Recognition and Interpretation : Elements of image analysis , pattern classes , Decision theoretic methods , structural methods, interpretation

**[No. of Hrs.: 11]****Text Books:**

1. Digital image processing, Rafael C. Gonzalez & R.E . Woods,Pearson ,5<sup>th</sup> edition 2005
2. Digital Image Processing, A.K. Jain ,PHI, 2004
3. Digital Image Processing, Chanda & Majumdar ,PHI,2002

**Reference Books:**

1. Digital Image Processing ,Nick efford,Pearson education 2004.
2. Digital Image Processing , Kenneth R. Castlema

**Paper Code: ETEE – 414****L T C****Paper: Advanced Computer Networks****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

Review of Physical &amp; Data link layer, ISDN, Frame Relay, ATM

**[No. of Hrs.: 11]****UNIT – II**

Network Layer: ARP and RARP, Routing algorithms and protocols, Congestion control algorithm, Router Operation, Router configuration, Internetworking, IP Protocol, IPv6 (an overview).

**[No. of Hrs.: 11]****UNIT – III**

Transport Layer: UDP, TCP (Flow Control, Error Control, Connection Establishment)

**[No. of Hrs.: 11]****UNIT – IV**

Application layer: DNS, SNMP, RMON, Electronic Mail, WWW.

Network Security: Firewalls (Application and packet filtering), Cryptography, Virtual Print,

**[No. of Hrs.: 11]****TEXT BOOKS:**

1. B. A. Forouzan, "TCP/IP Protocol Suite", TMH, 2<sup>nd</sup> Ed., 2004.

**REFERENCE BOOKS:**

1. U. Black, "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
2. W. Stallings, "Computer Communication Networks", PHI, 1999.
3. W. Stallings, "SNMP, SNMPv2, SNMPv3, RMON 1&2", 3<sup>rd</sup> Ed., Addison Wesley, 1999.
4. Michael A. Miller, "Data & Network Communications", Vikas Publication, 1996.
5. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication, 1999.
6. A. S. Tananbaum, "Computer Networks", 3<sup>rd</sup> Ed, PHI, 1999.
7. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.

**Code No.: ETEE 416****L T C****Paper: High Voltage Engineering****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit I**

**Break Down Phenomenon:** Basic Process of breakdown, breakdown phenomenon in gaseous, liquid, solid & composite dielectrics, breakdown in vacuum insulation.

Generation of High Test Voltages:

Generation of high d.c. voltage by voltage multiplier circuit and electrostatic generators, generation of high a.c. voltage by cascade transformer and resonant transformers.

generation of impulse voltage, triggering and synchronization of impulse generator, generation of high impulse current.

**[No. of Hrs.: 12]****Unit II**

**Measurement of High Voltage and Current:**

Resistance, capacitance and R. C. potential dividers, sphere gap, electrostatic voltmeter, generating voltmeter, impulse voltage measurement, measurement of high d.c. and impulse currents.

**[No. of Hrs.: 11]****Unit III**

**High Voltage Phenomenon and Insulation Coordination:**

Requirement of high voltage test circuit, I. S. specifications, impulse and power frequency tests of transformers, lightning arresters, bushings, power cables, circuit breakers and isolators, measurement of resistivity, dielectric constant and loss factor, partial discharge measurement.

**[No. of Hrs.: 10]****Unit IV**

**Over Voltage Phenomenon and Insulation Coordination:**

Lightning and switching phenomenon as causes of over voltages, protection of transmission line and substation against over voltage, insulation coordination. **[No. of Hrs.: 11]**

**Text Books:**

1. E. Kuffel & W. S. Zaengol, "High Voltage Engineering", Pergamon Press
2. M. S. Naidu & V. Kamaraju, "High Voltage Engineering", Tata McGraw Hill

**Reference Books:**

1. M. P. Chaurasia, "High Voltage Engineering", Khanna Publishers.
2. R. S. Sha, "High Voltage Engineering"
3. C. L. Wadhwa, "High Voltage Engineering", Wiley Eastern Ltd.

**Code No.: ETEE 418****L T C****Paper: Embedded Systems****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**UNIT – I**

**Introduction to an embedded systems design & RTOS:** Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.

Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

**[No. of Hrs.: 11]****UNIT – II**

**Overview of Microcontroller:** Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits and PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming

**[No. of Hrs.: 11]****UNIT – III**

Communication with 8051: Basics of Communication, Overview of RS-232, I<sup>2</sup>C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Programming of External hardware interrupts, Programming of the serial communication interrupts, Interrupt priority in the 8051

**[No. of Hrs.: 11]****UNIT - IV**

Interfacing with 8051: Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard, Interfacing a DAC to the 8051, 8255 Interfacing with 8031/51, 8051/31 interfacing to external memory

**[No. of Hrs.: 11]****TEXT BOOKS:**

1. Raj Kamal, "Embedded Systems", TMH, 2004.
2. M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2004.

**REFERENCES BOOKS:**

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
2. K.J. Ayala, "The 8051 Microcontroller", Penram International, 1991.
3. Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
1. 4. Dr. Prasad, "Embedded Real Time System", Wiley Dreamtech, 2004.

**Code No.: ETEE 420****L T C****Paper: Instrumentation****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I**

Review of Instrumentation Amplifier, Magnetic Recorder, Digital recorders of memory type, storage Oscilloscope, Sampling Oscilloscope and Spectrum Analyser.

Special Purpose Transformers, Constant Voltage Transformer, Types of Rectifiers – Signal Phase Rectifier. Three Phase Rectifier. Three Phase Controller Rectifier, Switch Mode Power supply (SMPS), Inverter and Uninterrupted Power Supply (UPS). **[No. of Hrs.: 12]**

**Unit – II**

Timers, Dashpot timers, Motor driven Timers, Stepper motor and their types, Permanent magnet and variable reluctance type a.c. Motor Controllers – Variable Frequency inverters and cycloconverters. **[No. of Hrs.: 10]**

**Unit – III**

Automatic weighing system, Carbon dioxide controller for a carburizing furnace, Control of relative humidity in a textile moistening process and warehouse, Induction Heating, Dielectric Heating. **[No. of Hrs.: 10]**

**Unit – IV**

Programmable Logic Controller (PLC), General characteristics and system layout, Operational procedures, Control of coils and contacts, PC ladder Instruction – Address and Registers. Timers and Counters, The sequencer, analog operation and loop control.

Robotics – Robot and their uses. Robot Auxillary control devices and systems, Controlling and Programming, A pick-and-place Robot, Work cells controlling and programming.

**[No. of Hrs.: 12]****Text Books:**

1. Helfrick and Coopes, “Modern Electronic Instrumentation and Measurement Techniques”
2. Barney, “Intelligent Instrumentation”

**Reference Books:**

1. CS Rangan & GR Sharma “Instrumentation Devices and Systems”

**Code No.: ETEE 422****Paper: Power Quality Management**

|          |          |          |          |
|----------|----------|----------|----------|
|          | <b>L</b> | <b>T</b> | <b>C</b> |
| <b>3</b> | <b>1</b> | <b>4</b> |          |

**INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I : Power Quality Problems & Monitoring**

Overview and Definitions of power quality, sources of pollution, international power quality standards, and regulations.

**[No. of Hrs.: 09]****Unit – II : Power Quality Problems**

Surges, voltage sag and swell, over voltage under voltage, outage voltage, and phase angle imbalance, electric noise, harmonics, frequency deviation monitoring.

**[No. of Hrs.: 12]****Unit – III : Power System Harmonics**

Harmonic analysis, harmonic sources – the static converters, transformer magnetization and non-linear machines, arc furnaces, fluorescent lighting. Harmonic effect within the power system, interference with communication harmonic measurements.

**[No. of Hrs.: 12]****Unit – IV**

Design, measure to minimize the frequency and duration of outages in distribution systems voltage regulators, harmonic filters, power conditioners, uninterruptible power suppliers, emergency and stand by power systems, application of power conditioners. Power distribution systems design, measure to minimize voltage disturbances.

**[No. of Hrs.: 11]****Text Books:**

1. N. G. Hingonani, Gyugi, Understanding FACTS concepts, Technology of flexible AC Transmission systems, IEEE Press, 1999

**Reference Books:**

1. T.J.E Milles – Reactive Power Control in electric systems, John Wiley & Sons 1982



**Code No.: ETEE 424****L T C****Paper: Special Purpose Machines****3 1 4****INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I**

Permanent magnet machines, introduction, unique features of PM machines, permanent magnet materials, power limitations of PM machines, permanent magnet DC machines, permanent magnet synchronous machine, applications of permanent magnet machines. **[No. of Hrs.: 12]**

**Unit – II**

AC commutator motors, Schrage motors, universal motors - torque, phasor diagram and performance characteristics. Two –phase servomotor, analysis – using symmetrical components, torque – speed curve, drag cup rotor. DC servomotor. **[No. of Hrs.: 12]**

**Unit – III**

Reluctance motor. Hysteresis motor. DC tachometer. AC tachometer. **[No. of Hrs.: 09]**

**Unit – IV**

Synchros and control transformers. Linear induction machines, description of LIM's, propulsion and levitation systems, mechanical handling equipment, strip tension winding.

**[No. of Hrs.: 11]****Text Books:**

1. Fitzgerald, Kingly, Umans “Electrical Machinery”, Tata Mc Graw Hill, 2004
2. B. R. Gupta, Vandana Singhal “Electric Machines”, New Age International Publishers, 2003

**Reference Books:**

1. Syed A. Nasar “Electric Machines and Power System” Volume I, Electric Machines, Tata Mc Graw Hill, 2002
2. Smarjit Ghosh “Electrical Machines” Pearson, 2005
3. Rakosh Das Begamudre “Electro Mechanical Energy Conversion with Dynamics of Machines”, New Age International, 2003

**Code No.: ETEE 426****Paper: Power Plant Instrumentation**

|          |          |          |
|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>C</b> |
| <b>3</b> | <b>1</b> | <b>4</b> |

**INSTRUCTIONS TO PAPER SETTERS:****Max. Marks-75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Unit – I**

**An Overview:** Brief survey of methods of power generation. Hydro, thermal, nuclear, solar and wind etc. Dependence of instrumentation on the method of power generation-thermal power plants-general structures, pulverization and burners – fans, dampers and actuators – super heaters steam traps – Economizers Recirculators and regenerators, Cooling towers – feed water generators Turbine cooling systems, Radiation detectors.

**[No. of Hrs.: 11]****Unit – II**

**Control loops and inter and Annunciation System:** Combustion control – control of main header, pressure, air/fuel ratio control – furnace draft and excess control, drum level (three element control) main and re-heat systems temperature control, burner tilting up by pass damper super heater-spray and gas re-circulation controls, Hot well level control – interlock – MFT Turbine trip conditions – pulverizer control.

**[No. of Hrs.: 12]****Unit – III**

**Turbine monitoring and control:** Condenser vacuum control – gland steam exhaust pressure control-speed, vibration, shell temperature monitoring – lubricating oil temperature control-hydrogen generator cooling system.

**[No. of Hrs.: 10]****Unit – IV**

**Analysis in power plant:** Thermal conductive type, paramagnetic type-Oxygen analyzer, hydrogen purity meter-chromatography-PH meter, fuel analyzer, pollution monitoring and control.

**Computer in power plants:** load dispatching

**[No. of Hrs.: 11]****Text Books:**

1. E. L. Wakil, M. M. Power Plant Technology, McGraw Hill, 10984
2. Richard Dolezal and Ludrik Varcop, Process dynamics Automatic Control of Steam Generation Plant, Elsevier Publishing Co. Amsterdam, 1972.

**Reference Books:**

1. J. Balasubramonian & R. K. Jain, Modern Power Plant Engineering, Khanna Publishers, New Delhi, 1987.
2. Stephen Michael Elonka & Antony Lawrence Kohan, Standard Boiler Operations: Questions & Answers, TMH.
3. Modern Power Station Practice Vol. 6: Instrumentation Control & Testing, Pergaman Press, Oxford, 1971.

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| <b>Code No. : ETEE 452</b>                 | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Advanced Control System Lab.</b> | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Advanced Control System.

|                            |          |          |          |
|----------------------------|----------|----------|----------|
| <b>Code No. : ETEE 454</b> | <b>L</b> | <b>P</b> | <b>C</b> |
| <b>Paper: Electives</b>    | <b>0</b> | <b>2</b> | <b>1</b> |

Practical will be based on Electives

|                             |          |           |          |
|-----------------------------|----------|-----------|----------|
| <b>Code No. : ETEE 456</b>  | <b>L</b> | <b>P</b>  | <b>C</b> |
| <b>Paper: Major Project</b> | <b>0</b> | <b>14</b> | <b>7</b> |

Students may choose a project based on any subject of Electrical & Electronics Engineering. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.