SCHEME OF EXAMINATION

and

SYLLABUS

for

Bachelor of Technology
Electrical and Electronics Engineering

Offered by
University School of Engineering and Technology

1st SEMESTER TO 8th SEMESTER

Guru Gobind Singh Indraprastha University
Dwarka, Delhi – 110078 [INDIA]

www.ipu.ac.in
## BACHELOR OF TECHNOLOGY
(Common to all branches)
FIRST SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETMA-101</td>
<td></td>
<td>Applied Mathematics-I</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETPH-103</td>
<td></td>
<td>Applied Physics-I</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>ETME-105</td>
<td></td>
<td>Manufacturing Processes</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>ETEE-107</td>
<td></td>
<td>Electrical Technology</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>ETHS-109</td>
<td></td>
<td>Human Values and Professional Ethics-I#</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>ETCS-111</td>
<td></td>
<td>Fundamentals of Computing</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>--</td>
</tr>
<tr>
<td>ETCH-113</td>
<td></td>
<td>Applied Chemistry</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>M</td>
</tr>
</tbody>
</table>

**PRACTICAL/VIVA VOCE**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETPH-151</td>
<td></td>
<td>Applied Physics Lab-I</td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE-153</td>
<td></td>
<td>Electrical Technology Lab</td>
<td></td>
<td>2</td>
<td>1</td>
<td>M</td>
</tr>
<tr>
<td>ETME-155</td>
<td></td>
<td>Workshop Practice</td>
<td></td>
<td>3</td>
<td>2</td>
<td>M</td>
</tr>
<tr>
<td>ETME-157</td>
<td></td>
<td>Engineering Graphics Lab</td>
<td></td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ETCS-157</td>
<td></td>
<td>Fundamentals of Computing Lab</td>
<td></td>
<td>2</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>ETCH-161</td>
<td></td>
<td>Applied Chemistry Lab</td>
<td></td>
<td>2</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>NCC/NSS*#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>18</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

M: Mandatory for award of degree

*#NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards. The camps/classes will be held either during Weekends/Holidays or Winter/Summer Vacations.

#NUES (Non University Examination System)
### BACHELOR OF TECHNOLOGY
( COMMON TO ALL BRANCHES)
SECOND SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETMA-102</td>
<td></td>
<td>Applied Mathematics-II</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETPH-104</td>
<td></td>
<td>Applied Physics-II</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ETEC-106</td>
<td></td>
<td>Electronic Devices</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>ETCS-108</td>
<td></td>
<td>Introduction to Programming</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>ETME-110</td>
<td></td>
<td>Engineering Mechanics</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>--</td>
</tr>
<tr>
<td>ETHS-112</td>
<td></td>
<td>Communication Skills</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>--</td>
</tr>
<tr>
<td>ETEN-114</td>
<td></td>
<td>Environmental Studies</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>--</td>
</tr>
</tbody>
</table>

**PRACTICAL/VIVA VOCE**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETPH-152</td>
<td></td>
<td>Applied Physics Lab-II</td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETCS-154</td>
<td></td>
<td>Programming Lab</td>
<td></td>
<td>2</td>
<td>1</td>
<td>M</td>
</tr>
<tr>
<td>ETEC-156</td>
<td></td>
<td>Electronic Devices Lab</td>
<td></td>
<td>2</td>
<td>1</td>
<td>M</td>
</tr>
<tr>
<td>ETME-158</td>
<td></td>
<td>Engineering Mechanics Lab</td>
<td></td>
<td>2</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>ETEN-160</td>
<td></td>
<td>Environmental Studies Lab</td>
<td></td>
<td>2</td>
<td>1</td>
<td>--</td>
</tr>
</tbody>
</table>

**NCC/NSS**

- **TOTAL**: 17 15 27

M: Mandatory for award of degree

*NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards. The camps/classes will be held either during Weekends/Holidays or Winter/Summer Vacations.

#NUES (Non University Examination System)
## BACHELOR OF TECHNOLOGY
### (ELECTRICAL AND ELECTRONICS ENGINEERING)
#### THIRD SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETMA-201</td>
<td></td>
<td>Applied Mathematics – III</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETEC-203</td>
<td></td>
<td>Analog Electronics-I</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETEE-205</td>
<td></td>
<td>Materials in Electrical Systems</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>ETEE-207</td>
<td></td>
<td>Circuits and Systems</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETCS-209</td>
<td></td>
<td>Data Structures</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETEE-211</td>
<td></td>
<td>Electrical Machines-I</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
</tbody>
</table>

### PRACTICAL/VIVA VOCE

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETEC-251</td>
<td></td>
<td>Analog Electronics – I Lab.*</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE-253</td>
<td></td>
<td>Electrical Machines-I Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETCS-255</td>
<td></td>
<td>Data Structures Lab.</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE-257</td>
<td></td>
<td>Circuits and Systems Lab.*</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE-259</td>
<td></td>
<td>Scientific Computing Lab*</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NCC/NSS*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL** 18 15 28

*M: Mandatory for the award of degree.

*NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards.

@A few lab experiments must be performed using any circuit simulation software e.g. PSPICE/MATLAB/Scilab/R/Octave.
## BACHELOR OF TECHNOLOGY
*(ELECTRICAL AND ELECTRONICS ENGINEERING)*

### FOURTH SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>THEORY PAPERS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 202</td>
<td></td>
<td>Electrical Machines-II</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEC 204</td>
<td></td>
<td>Analog Electronics–II</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEE 206</td>
<td></td>
<td>Power System–I</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEE 208</td>
<td></td>
<td>Electrical and Electronics Measuring Instruments</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETEE 210</td>
<td></td>
<td>Electromagnetic Field Theory</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ETEE 212</td>
<td></td>
<td>Control Systems</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRACTICAL/VIVA VOCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 252</td>
<td></td>
<td>Electrical Machines-II Lab†</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEC 254</td>
<td></td>
<td>Analog Electronics-II Lab†</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 256</td>
<td></td>
<td>Power System-I Lab.†</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 258</td>
<td></td>
<td>Electrical and Electronics Measuring Instruments Lab.†</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 260</td>
<td></td>
<td>Control Systems Lab.†</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETSS 250</td>
<td></td>
<td>NCC/NSS*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>18</td>
<td>15</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

M: Mandatory for the award of degree.

*NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards.

NOTE: 4 weeks Industrial / In-house Workshop will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester (ETEE 359).

† A few lab experiments must be performed using any circuit simulation software e.g. PSPICE/MATLAB/ETAP.

**GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY**
# BACHELOR OF TECHNOLOGY
## ELECTRICAL AND ELECTRONICS ENGINEERING
### FIFTH SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY PAPERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETHS 301</td>
<td></td>
<td>Communication Skills for Professionals</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE-303</td>
<td></td>
<td>Power Electronics</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEE 305</td>
<td></td>
<td>Sensors and Transducers</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEE 307</td>
<td></td>
<td>Switching Theory and Logic Design</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEE 309</td>
<td></td>
<td>Communication Systems</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETMS 311</td>
<td></td>
<td>Industrial Management</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>PRACTICAL/VIVA VOCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 351</td>
<td></td>
<td>Sensors and Transducers Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 353</td>
<td></td>
<td>Power Electronics Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 355</td>
<td></td>
<td>Switching Theory and Logic Design Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 357</td>
<td></td>
<td>Communication Systems Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 359</td>
<td></td>
<td>#*Electrical and Electronic Workshop</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>M</td>
</tr>
<tr>
<td>ETHS 351</td>
<td></td>
<td>Communication Skills for Professionals Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>14</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# NUES
M: Mandatory for the award of degree.

*Viva-Voce for evaluation of Industrial Training / In-house Workshop will be conducted in this semester.

@ A few lab experiments must be performed using any circuit simulation software e.g. PSPICE/Scilab/ETAP.
# Bachelor of Technology (Electrical and Electronics Engineering)
### Sixth Semester Examination

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETEE 302</td>
<td></td>
<td>Power System – II</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEE 304</td>
<td></td>
<td>Utilization of Electrical Energy and Electric Traction</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>ETEC 306</td>
<td></td>
<td>Digital Signal Processing</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETEC 308</td>
<td></td>
<td>VLSI Design</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETEE 310</td>
<td></td>
<td>Microprocessor and Microcontroller</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ETEE 312</td>
<td></td>
<td>Power Station Practice</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>M</td>
</tr>
</tbody>
</table>

### Practical/Viva Voce

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETEE 352</td>
<td></td>
<td>Power System – II Lab“</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 354</td>
<td></td>
<td>Utilization of Electrical Energy Lab“</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEC 356</td>
<td></td>
<td>Digital Signal Processing Lab“</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ETEE 358</td>
<td></td>
<td>Microprocessors and Microcontrollers Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>18</td>
<td>14</td>
<td>28</td>
<td></td>
</tr>
</tbody>
</table>

M: Mandatory for award of degree  
#NUES (Non University Examination System)  
Note: Minimum of 4-6 weeks of industrial training related to EEE will be held after 6th semester; however, viva-voce will be conducted in 7th Semester (ETEE 459).  
Imp:- Elective Paper will be floated in 7th Semester, if one-third of the total students opt for the same. It is advised that the decision about the elective subject for 7th Semester is done before the 15th April every year before end of 6th semester.  
@ A few lab experiments must be performed using any circuit simulation software e.g. PSPICE/Scilab/ETAP.
# BACHELOR OF TECHNOLOGY
(ELECTRICAL AND ELECTRONICS ENGINEERING)
SEVENTH SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>THEORY PAPERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 401</td>
<td></td>
<td>Electrical Drives</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ETEE 403</td>
<td></td>
<td>Advanced Control Systems</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ETEE 405</td>
<td></td>
<td>EHV AC and HVDC Transmissions</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ELECTIVE- SELECT ANY TWO (ONE FROM EACH GROUP)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>GROUP-A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 419</td>
<td></td>
<td>Renewable Energy Resources</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 409</td>
<td></td>
<td>Power Distribution System</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 411</td>
<td></td>
<td>Telemetry and Data Acquisition Systems</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 413</td>
<td></td>
<td>PLC and SCADA Systems</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETAT 403</td>
<td></td>
<td>Mechatronics</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 417</td>
<td></td>
<td>High Voltage Engineering</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 421</td>
<td></td>
<td>Selected topics in EEE**</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>GROUP-B</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEC-403</td>
<td></td>
<td>Optoelectronics and Optical Communication</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETCS 425</td>
<td></td>
<td>Database Management Systems</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETIC 403</td>
<td></td>
<td>Biomedical Instrumentation</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEC 427</td>
<td></td>
<td>Digital System Design</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 431</td>
<td></td>
<td>Power line Carrier Communication</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEL 405</td>
<td></td>
<td>Electrical Machines Design</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ETHS 419</td>
<td></td>
<td>Sociology and Elements of Indian History for Engineers</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PRACTICAL: VIVA VOCE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE-451</td>
<td></td>
<td>Electrical Drives Lab</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ETEE-453</td>
<td></td>
<td>Advanced Control Systems Lab**</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ETEE-455</td>
<td></td>
<td>Practical Based on Electives Group A or B</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ETEE-457</td>
<td></td>
<td>*Seminar</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ETEE-457</td>
<td></td>
<td>Minor Project*</td>
<td>0</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>ETEE-459</td>
<td></td>
<td>Industrial Training</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td>15</td>
<td>16</td>
<td>25</td>
</tr>
</tbody>
</table>

# NON UNIVERSITY EXAMINATION SYSTEM
@ A few lab experiments must be performed using any circuit simulation software e.g. Scilab/LABVIEW.
* The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports.
$ Elective Paper will be offered if one-third of the total students opt for the same. It is mandatory that the decision about the elective subject is made before the 15th April every year before end of sixth semester. New Electives may be added as per requirement after getting it duly approved by BOS and AC respectively.
^Industrial training was conducted after sixth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.
**Syllabus may be revised every 2 years.
## BACHELOR OF TECHNOLOGY
(ELECTRICAL AND ELECTRONICS ENGINEERING)
EIGHTH SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Paper ID</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>THEORY PAPERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 404</td>
<td></td>
<td>Neuro-Fuzzy Systems</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ETEE 406</td>
<td></td>
<td>Power System Operation and Control</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETHS-402</td>
<td></td>
<td>Human Values and Professional Ethics-II</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ELECTIVE- SELECT ANY TWO (ONE FROM EACH GROUP)</strong> $</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>GROUP-A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 408</td>
<td></td>
<td>Application of Power Electronics to Power Systems</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETTI418</td>
<td></td>
<td>Digital Image Processing</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 412</td>
<td></td>
<td>Reliability Engineering and Application to Power System</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 414</td>
<td></td>
<td>Electrical Machine - III</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 416</td>
<td></td>
<td>Electrical Energy Conservation</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEL 402</td>
<td></td>
<td>Power System Analysis and Stability</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ETEE 418</td>
<td></td>
<td>Electrical System Design</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>GROUP-B</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETIC 410</td>
<td></td>
<td>Embedded Systems</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEC-420</td>
<td></td>
<td>Data Communication and Networks</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETCS 430</td>
<td></td>
<td>Object Oriented Programming Using C++</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 426</td>
<td></td>
<td>Power Plant Instrumentation</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEE 428</td>
<td></td>
<td>Intelligent and Smart Instrumentation</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEC 430</td>
<td></td>
<td>Digital Communication</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEC 432</td>
<td></td>
<td>Electrical Power Quality</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PRACTICAL/VIVA VOCE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETEE 452</td>
<td></td>
<td>Neuro and Fuzzy Systems Lab*</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ETEE 454</td>
<td></td>
<td>Practical Based on Elective</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ETEE 456</td>
<td></td>
<td>Major Project*</td>
<td>0</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>13</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

* A few lab experiments must be performed using any circuit simulation software e.g. MATLAB/LABVIEW
+ The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to major project should be delivered one month after starting of Semester.
$ Elective Paper will be float if one-third of the total students opt for the same. It is advice that the decision about the elective subject is done before the 15th November every year before end of seventh semester. New Electives may be added as per requirement after getting it duly approved by BOS and AC respectively.

**NOTE:**
1. The total number of the credits of the B.Tech. (EEE) 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 a minimum of 200 credits, including mandatory papers (M).

**FOR LATERAL ENTRY STUDENTS:**
1. The total number of the credits of the B.Tech. (EEE) Programme = 160.
2. Each student shall be required to appear for examinations in all courses Third Semester onwards. However, for the award of the degree a student shall be required to earn a minimum of 150 credits, including mandatory papers (M).
NOMENCLATURE OF CODES GIVEN IN THE SCHEME OF

B.TECH AND M.TECH

1. ET stands for Engineering and Technology.
2. PE stands for Power Engineering.
3. ME stands for Mechanical Engineering.
4. MT stands for Mechatronics.
5. AT stands for Mechanical and Automation Engineering.
6. EE stands for Electrical and Electronics Engineering.
7. EL stands for Electrical Engineering.
8. IT stands for Information Technology.
9. CS stands for Computer Science and Engineering.
10. CE stands for Civil Engineering.
11. EC stands for Electronics and Communications Engineering.
12. EN stands for Environmental Engineering.
13. TE stands for Tool Engineering.
14. MA stands for Mathematics.
15. HS stands for Humanities and Social Sciences.
16. SS stands for Social Services.
APPLIED MATHEMATICS-III

Paper Code: ETMA-201

<table>
<thead>
<tr>
<th>Paper: Applied Mathematics-III</th>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

INSTRUCTIONS TO PAPER SETTERS:

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 12.5 marks.

Maximum Marks : 75

Text Books:


Reference Books:

[R5] Schaum’s Outline on Fourier Analysis with Applications to Boundary Value Problem, Tata McGraw-Hill

OBJECTIVES:
The objective of this course is to teach the students the applications of fourier series, fourier transform, difference equation and numerical methods to solve various engineering problems.

UNIT-I

Fourier series: Definition, Euler’s formula, conditions for Fourier expansion, functions having points of discontinuity, change of intervals, even and odd functions, half range series, Harmonic analysis. Fourier Transforms: Definition, Fourier integral, Fourier transform, inverse Fourier transform, Fourier sine and cosine transforms, properties of Fourier transforms (linearity, scaling, shifting, modulation), Application to partial differential equations.

UNIT-II

Difference equation: Definition, formation, solution of linear difference equation with constant coefficients, simultaneous difference equations with constant coefficients; applications of difference equations. Z-transform: Definition, Z-transform of basic functions, properties of Z-transform (linearity, damping, shifting, multiplication), initial value theorem, final value theorem, convolution theorem, convergence of Z-transform, inverse of Z-transform, Application to difference equations.

UNIT-III


UNIT-IV


Text Books:


Reference Books:

[R5] Schaum’s Outline on Fourier Analysis with Applications to Boundary Value Problem, Tata McGraw-Hill
ANALOG ELECTRONICS-I

Paper Code: ETEC-203
Paper: Analog Electronics-I

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

INSTRUCTIONS TO PAPER SETTERS:

Objective: The objective of teaching this subject is to impart in depth understanding of the concepts of biasing in active circuits and employing simple models to represent nonlinear and active elements in circuits. It also includes the operation of the circuits at high frequencies and effects of feedback. The analysis of power amplifier & tuned amplifiers is also dealt with.

UNIT – I
Review of diode and BJT, Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self-bias, bias stability with respect to variations in I_C, V_BE & β, Stabilization factors, thermal stability. Bias compensation techniques.
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, Emitter follower, Darlington pair (derive voltage gain, current gain, input and output impedance). Hybrid-model at high frequencies (β model).

UNIT – II
Multistage Amplifiers: Cascade and cascode amplifiers, Calculations of gain, impedance and bandwidth. Design of multistage amplifiers.

UNIT – III
Field Effect Transistor: Introduction, Classification, FET characteristics, Operating point, Biasing, FET small signal Model, enhancement & Depletion type MOSFETS, MESFET, FET Amplifier configurations (CD,CG and CS).
Introduction to UJT, SCR, Triac and Diac (working, construction, characteristics and application), UJT relaxation oscillator.

UNIT – IV

Text Books:

Reference Books:
[R2] B. Kumar & Shail Bala Jain, “Electronic Devices And Circuits” PHI
MATERIALS IN ELECTRICAL SYSTEMS

Paper Code: ETEE-205  L  T/P  C
Paper: Materials in Electrical Systems  3  0  3

INSTRUCTIONS TO PAPER SETTERS

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

MAXIMUM MARKS: 75

Objective: Explain the basic concepts regarding the difference in behavior of different materials used in electrical and electronics industry, explaining the various properties of different materials and their application to devices, equipments and systems selection of proper materials for given application.

UNIT I
Conducting Materials:
Energy band diagram of conductors, semiconductors and insulators. Conductivity and Resistivity, factors affecting the resistivity, classification of conducting materials, electrical, mechanical and thermal properties and applications of low resistance materials like copper, aluminium, steel, silver, gold, platinum, brass and bronze; Electrical, mechanical and thermal properties and applications of high resistance materials like manganin, constantan, nichrome, mercury, tungsten and carbon. Introduction of super conductors.

UNIT II
Insulating Materials:
Classification of insulating materials, electrical, physical, thermal, chemical, mechanical properties of insulating materials. Thermoplastic and natural insulating materials, Gaseous and liquid insulating materials, properties and applications of ceramics and synthetic insulating materials.

UNIT III
Magnetic Materials:
Introduction and classification of magnetic materials, permeability, B-H curve, magnetic saturation, hysteresis loop, coercive force and residual magnetism, concept of eddy current and hysteresis loss, curie temperature, magnetostriction effect. Soft and hard magnetic materials, ferro and ferri magnetic materials, special purpose magnetic materials.

UNIT IV
Special Materials and components:
Properties and applications of different materials used in electrical systems like – thermocouples, bimetallic, fusing, and soldering. Introduction to different types of materials used in electromagnetic and electromechanical systems, resistors, capacitors, inductors, special semiconductors used in electrical engineering.

Text Books:
[T1] Electrical properties of materials by L. Solymer, Oxford University Press, 2014

Reference Books:
CIRCUITS & SYSTEMS

Paper Code: ETEE-207
Paper: Circuits & Systems

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

INSTRUCTIONS TO PAPER SETTERS:

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.

Objective: The purpose of this course is for each student to learn and further explore the techniques of advanced circuit analysis. The concepts and analytical techniques gained in this course (e.g., signals, Laplace transformation, frequency response) will enable students to build an essential foundation of many fields within electrical engineering, such as control theory, analog electronic circuits, signal processing.

UNIT-I
Introduction to signals, their classification and properties, different types of systems, LTI systems and their properties, periodic waveforms and signal synthesis, properties and applications of Laplace transform of complex waveform.

[T1,T2][No. of Hrs: 10]

UNIT-II

[T1,T2][No. of Hrs: 12]

UNIT-III

[T1,T2][No. of Hrs: 10]

UNIT IV
Positive real function and synthesis of LC, RC, RL Networks in Foster’s I and II, Cauer’s I & II forms, Introduction of passive filter and their classification, frequency response, characteristic impedance of low pass, high pass, Band Pass and Band reject prototype section.

[T1,T2][No. of Hrs: 10]

TEXT BOOKS:

REFERENCE BOOKS
DATA STRUCTURES

Paper Code: ETCS-209  
Paper: Data Structures  
L  T  C  
3  1  4

INSTRUCTIONS TO PAPER SETTERS:  
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, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, the student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand the programming and the various techniques for enhancing the programming skills for solving and getting efficient results.

UNIT – I:  
Introduction to programming methodologies and design of algorithms. Abstract Data Type, array, array organization, sparse array. Stacks and Stack ADT, Stack Manipulation, Prefix, infix and postfix expressions, their interconversion and expression evaluation. Queues and Queue ADT, Queue manipulation. General Lists and List ADT, List manipulations, Single, double and circular lists.  
[ T1,T2] [No. of hrs. 12]

UNIT – II:  
Trees, Properties of Trees, Binary trees, Binary Tree traversal, Tree manipulation algorithms, Expression trees and their usage, binary search trees, AVL Trees, Heaps and their implementation.  
[ T1,T2] [No. of hrs. 12]

UNIT – III:  
Multiway trees, B-Trees, 2-3 trees, 2-3-4 trees, B* and B+ Trees. Graphs, Graph representation, Graph traversal.  
[ T1,T2] [No. of hrs. 12]

UNIT – IV:  
Sorting concept, order, stability, Selection sorts (straight, heap), insertion sort (Straight Insertion, Shell sort), Exchange Sort (Bubble, quicksort), Merge sort (only 2-way merge sort). Searching – List search, sequential search, binary search, hashing concepts, hashing methods (Direct, subtraction, modulo-division, midsquare, folding, pseudorandom hashing), collision resolution (by open addressing: linear probe, quadratic probe, pseudorandom collision resolution, linked list collision resolution), Bucket hashing.  
[ T1,T2] [No. of hrs. 12]

Text Books:  

Reference Books:  
[R2] Tanenbaum; “Data Structures using C”, Pearson/PHI.  

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
ELECTRICAL MACHINES-I

Paper Code: ETEE-211 Paper: Electrical Machines-I

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

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.

Objective: Providing sound knowledge about the principles of operation of various electrical machines, their constructional features, and their behavior and characteristics under various condition of operation.

UNIT I


DC Generators: Constructional features, Armature winding details, lap & wave connections, EMF equation, separately excited, shunt, series and compound connected D.C. generators process of voltage build up in shunt generators, Characteristics and applications of separately/self-excited generators.

UNIT II

DC Generators (Contd.): Armature Reaction, Demagnetizing and Cross-magnetizing armature MMF, Interpoles and compensating windings, commutation process and its improvement.


UNIT III

Single phase 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.

UNIT IV

3 phase Transformers: Three-phase Bank of Single-phase Transformers, Parallel operations of 1-phase and 3-phase transformers, load division between transformers in parallel. Three winding transformers, Zigzag connections, vector grouping with clock convention, tertiary winding, tap changing, phase conversions-3phase to 2 phase and 3phase to 6 phase.

Special Purpose Transformers: Auto-transformers, Welding, Traction, Instruments and pulse Transformers.

TEXT BOOKS:


REFERENCE BOOKS:

ANALOG ELECTRONICS-1 LAB

Paper Code: ETEC-251
Paper: Analog Electronics-1 Lab

L  T/P  C
0  2   1

NOTE:- At least 8 Experiments out of the list must be done in the semester.

List of Experiments:

1. Plotting input and output characteristics and calculation of parameters of a transistor in common emitter configuration.
2. Transistor biasing circuit. Measurement of operating point (Ic and Vce) for a :-
   a) fixed bias circuit
   b) potential divider biasing circuit.
3. Plot the FET characteristics & MOSFET characteristics.
4. Two Stage R.C. Coupled Amplifier.
   To measure the overall gain of two stages at 1 KHz and compare it with gain of 1st stage.
   Also to observe the loading effect of second stage on the first stage
4. To plot the frequency response curve of two stage amplifier.
5. To study Emitter follower circuit & measurement of voltage gain and plotting of frequency response Curve.
6. Feedback in Amplifier. Single stage amplifier with and without bypass capacitor, measurement of voltage gain and plotting the frequency response in both cases.
7. To determine and plot firing characteristics of SCR by varying anode to cathode voltage and varying gate current.
8. To note the wave shapes and voltages at various points of a UJT relaxation oscillator circuit.
9. Transistorized push pull amplifier & Measurement of optimum load, maximum undistorted power (by giving maximum allowable signal) Efficiency and percentage distortion factor.
10. To study the characteristics of single tuned & double tuned amplifier.
EXP: 1 To study the construction and operation of various types of starters available in the laboratory for starting DC motors.
EXP: 2 To study the magnetization characteristics of a separately excited D.C generator at different speeds and to find the critical field resistance at those speeds.
EXP: 3 To perform the load test on D.C. shunt motor and to draw the performance characteristics.
EXP: 4 To control the speed of a DC shunt motor by using
   a) Field control
   b) Armature/Rheostatic control
   c) Supply voltage control
EXP: 5 To perform the Swinburne’s test on a D.C. shunt Machine and to pre determine its efficiency when running as a motor as well as generator and also draw the characteristic curves.
EXP: 6 To conduct load test on DC shunt generator and obtain its internal and external characteristics.
EXP: 7 To perform O.C./S.C. tests on a single phase transformer and determine equivalent circuit parameters.
EXP: 8 To perform Sumpner’s (back to back) test on two identical single phase transformers and draw the load efficiency graphs.
EXP: 9 To perform load test on a single-phase transformer and determine the following:
   (a) Voltage ratio of transformer.
   (b) Efficiency at different loads.
   (c) Voltage regulation of the transformer.
EXP: 10 To perform Polarity test on two single-phase transformers, connect them in parallel and study the load sharing between them.
EXP: 11 To convert a three-phase supply into two phase supply using Scott-connection between two single phase transformers with suitable tapping. Verify the following:
   (a) Turn ratio between windings of main and teaser transformers.
   (b) Voltage of both phases of two phase supply is equal.
   (c) Whether the phase angle between them is 90°.
EXP: 12 To connect three-phase transformers in Y-Y / Y- Δ, Δ-Δ/Δ- Y connections and study line /phase voltage relationships.
Books:
[T1] Laboratory Operations for Rotating Electric Machinery and Transformer Technology, Donald V. Richardson, Prentice Hall, 1980
NOTE: At least 8 Experiments out of the list must be done in the semester.
DATA STRUCTURES LAB

Paper Code: ETCS-255
Paper: Data Structures Lab

L T/P C
0 2 1

List of Experiments:

1. Perform Linear Search and Binary Search on an array.
   Description of programs:
   a. Read an array of type integer.
   b. Input element from user for searching.
   c. Search the element by passing the array to a function and then returning the position of the element from the function else return -1 if the element is not found.
   d. Display the position where the element has been found.

2. Implement sparse matrix using array.
   Description of program:
   a. Read a 2D array from the user.
   b. Store it in the sparse matrix form, use array of structures.
   c. Print the final array.

3. Create a linked list with nodes having information about a student and perform
   I. Insert a new node at specified position.
   II. Delete of a node with the roll number of student specified.
   III. Reversal of that linked list.

4. Create doubly linked list with nodes having information about an employee and perform Insertion at front of doubly linked list and perform deletion at end of that doubly linked list.

5. Create circular linked list having information about an college and perform Insertion at front perform Deletion at end.

6. Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linked list.

7. Create a Linear Queue using Linked List and implement different operations such as Insert, Delete, and Display the queue elements.

8. Create a Binary Tree (Display using Graphics) perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.

9. Implement insertion, deletion and display (inorder, preorder and postorder) on binary search tree with the information in the tree about the details of a automobile (type, company, year of make).

10. To implement Insertion sort, Merge sort, Quick sort, Bubble sort, Bucket sort, Radix sort, Shell sort, Selection sort, Heap sort and Exchange sort using array as a data structure.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
CIRCUITS AND SYSTEMS LAB

Paper Code: ETEE-257
Paper: Circuits and Systems Lab

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

List of Experiments

1. Study the transient response of series RLC circuit for different types of waveforms on CRO and verify using MATLAB.
2. Study the time response of a simulated linear system and verify the unit step and square wave response of first order and second order, type 0,1 systems.
3. Using MATLAB determine current in various resistors connected in network using mesh current and node voltage analysis.
4. To determine Z and Y parameters of the given two port network.
5. To determine ABCD parameters of the given two port network.
6. To verify Reciprocity Theorem for the given two port network.
7. To determine Hybrid parameters of the given two port network.
8. To design Cascade Connection and determine ABCD parameters of the given two port network.
9. To design Series-Series Connection and determine Z parameters of the given two port network.
10. To design Parallel-Parallel Connection and determine Y parameters of the given two port network.
11. To design Series-Parallel Connection and determine h parameters of the given two port network.
12. Study the frequency response of different filter circuits.

NOTE: At least 8 Experiments out of the list must be done in the semester.
SCIENTIFIC COMPUTING LAB

Paper Code: ETEE-259        L  T   C
Paper: Scientific Computing Lab 0 2 1

List of Experiments:

1. Introduction to MATLAB: Command Window, Figure Window, MATLAB Workspace and Workspace Browser and Related Applications like Plot of any functions, Evaluations of any function, Creation of New Directory, use of Edit Window.
2. Introduction of MATLAB Basics: Variable and Arrays, Sub-arrays, Displaying Data, Data Files, X-Y Plots, Debugging MATLAB Programmes and related applications like Formation of Matrices, Evaluation of expressions etc.
3. Basics of Programme Design: Logic Operators, Branches, Solution of quadratic equation and advance plotting features and related applications like time response of electrical networks etc.
4. MATLAB Loops and related applications: Calculations of RMS value, average value, Geometric mean, Harmonic mean.
5. Data types and plot types: Representation of complex number in rectangular and polar coordinates, Mesh plot, Contour plot, Histogram, in 2-D and 3-D.
6. Write the MATLAB program to calculate the sum of series
7. Create square matrices and perform various mathematical operations.
8. Write a program in M-file to determine the current in each resistor using the mesh current method. Any electric resistive network provided the values of voltage of resistances.
9. Write the program to find out whether a given no is ‘odd’ or ‘even’ using ‘if’ else structure.
10. Introduction to MATLAB SIMULINK environment and creating MAT Files. Draw simulink model to simulate any given function.
11. Obtain the step response for given transfer function and save the result in MATLAB workspace.
12. With the help of an example illustrate how the masked sub-systems are created.

Books:

NOTE:- At least 8 Experiments out of the list must be done in the semester.
ELECTRICAL MACHINES–II

Paper Code: ETEE- 202
Paper: Electrical Machines–II

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

INSTRUCTIONS TO PAPER SETTERS:

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.

MAXIMUM MARKS: 75

Objective: Providing sound knowledge about the principles of operation of various electrical machines, their constructional features, and their behavior and characteristics under various condition of operation.

Unit I: Poly phase Induction Machines
Constructional features, production of rotating magnetic field, working of 3-phase Induction motor, phasor diagram, equivalent circuit, power and torque relations, torque and slip relations, no load and blocked rotor tests and efficiency, speed control by rotor resistance, injected e.m.f, frequency variation and pole changing, DOL, Y-Δ and autotransformer starters, deep bar and double cage rotor motors, cogging and crawling, operation of Induction machine as generator and phasor diagram.

[T1,T2][No. of Hrs. : 11]

Unit II: Synchronous Alternators
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 parallel operation, operation on infinite bus, cooling. Two reaction theory, power expressions for cylindrical and salient pole machines, performance characteristics.

[T1,T2][No. of Hrs. : 12]

Unit III :Synchronous Motors
Synchronous Motor – Principle of operation, starting methods, phasor diagram torque-angle characteristics, V-curves hunting and damping, synchronous condenser, introduction to single phase synchronous motors: Reluctance and Hysteresis motors.

[T1,T2][No. of Hrs. : 10]

Unit IV: Fractional Horse Power Motors

[T1,T2][No. of Hrs. : 10]

Text Books:

Reference Books:
Objective: The objective of teaching this subject is to give students in depth knowledge of design and analysis of analog IC (OP-AMP, OTA). The internal details of OP-AMP and measurement of its parameters is elaborated. The linear and nonlinear applications, useful for practical circuits, are detailed. Some important and widely used ICs such as 555 timer IC, PLL & VCO, Voltage Regulator IC etc., are also included.

Unit – I

[T1,T2][No. of Hours: 11]

Unit – II
Linear & Non Linear Wave shaping: Inverting and non-inverting amplifiers, voltage follower, difference amp, adders, Voltage to current with floating & grounded load, current to voltage converter, practical integrator & differentiator, Clipping & Clamping circuits, Comparators, log/analog circuits using Op-Amps, precision rectifiers(half & full wave), peak detector, Inverting & non inverting Schmitt trigger circuit.

Waveform generations: Sine wave generator (Phase shift, Wein bridge, Hartley & Colpitts), Barkhausen criteria of oscillations, conditions for oscillation, crystal oscillator.

[T1,T2][No. of Hours: 11]

Unit – III
Waveform generators: Square and triangular waveform generators (determine period and frequency), saw tooth wave generator, Astable multi-vibrator, Monostable and Bistable Multivibrator.

Active RC Filters: Idealistic & Realistic response of filters (LPF, BPF, HPF, BRF), Butter worth & Chebyshev approximation filter functions All pass, Notch Filter.

[T1,T2][No. of Hours: 11]

Unit – IV
Introduction to 555 Timer IC: Functional and block diagram of 555 timer, Application of 555 timer as astable and monostable multivibrator. Operational transconductance amplifier (OTA)-C filters. OTA integrator & differentiator, Introduction to current conveyor. Applications of IC Analog Multiplier: IC phase locked loops, IC voltage regulators, IC VCO.

[T1,T2][No. of Hours: 11]

Text Books:
[T2] Op - Amps And Linear Integrated Circuits, Ramakant A Gayakwad PHI.

Reference Books:
[R4] David A Bell, “Operational Amplifiers and Linear IC’s”, PHI.
POWER SYSTEM-I

Paper Code: ETEE-206
Paper: Power System-I

INSTRUCTIONS TO PAPER SETTERS:

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.

MAXIMUM MARKS: 75

Objective: The objective of the paper is to enable the Electrical Engineering students to have knowledge of Power System-I, an important aspect of overall Electricity Supply System.

UNIT I
Power System Components: Block diagram of electric power system, Single line diagram of power system, brief description of power system elements such as, synchronous machine, transformer, transmission line, bus bar and circuit breaker.
Transmission line: Configurations, type of conductors, Mechanical Design of Transmission Line: catenary curve, calculation of sag and tension, effects of wind and ice loadings on sag, sag template, vibration dampers. Overhead Lines Insulators: Types of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential.

UNIT II

UNIT III
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. Fault Analysis: Per unit system, symmetrical component, calculation of symmetrical and unsymmetrical fault; use of current limiting reactors.

UNIT IV

Text Books:

Reference Books:
ELECTRICAL AND ELECTRONIC MEASURING INSTRUMENTS

Paper Code: ETEE-208
Paper: Electrical and Electronic Measuring Instruments

INSTRUCTIONS TO PAPER SETTERS:

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.

Objective: Electric and Electronic Instruments are being used in industries and in Labs. The Subject provides material for a first course on electric and electronic instruments. It details the basic working and use of different instruments. The knowledge of this subject will be helpful to students while working in industries.

UNIT I [Power and Energy Measurement]
Instrument transformers: CT and PT, Ratio and phase angle errors.
Measurement of Power: Single phase and three phase dynamometer wattmeter, LPF and UPF, expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers.
Type of P.F. Meters, dynamometer and moving iron type, Single phase and three phase meters. Frequency meters, Resonance type and Weston type, synchoroscopes.
Measurement of Energy: single phase and three phase induction type energy meter, driving and braking torques, errors and compensations, testing by phantom loading, trivector meter, maximum demand meters.

UNIT II [Potentiometers and Bridges]
Principle of operation and types of D. C. / A.C. potentiometers, application of DC/AC potentiometers. Bridges for measuring low, medium and high resistance, Carey Foster’s bridge, Kelvin’s double bridge, Megohm bridge, Megger.
A.C. Bridges: Measurement of inductance and capacitance, Maxwell’s bridge, Hay’s bridge, Anaderson’s bridge, Owen’s bridge, Heaviside Bridge and its modifications, Desauty bridge. Wien’s bridge, Schering Bridge.

UNIT III [Display Devices and Recorders]
Introduction of various display devices, LCD, LED and plasma display, resolution, sensitivity and accuracy specifications, CRO & its applications, triggered CRO, sampling oscilloscope. Recorders: requirement of recording data, selection of recorder for a particular application, analog, graphic, strip chart, galvanometric, circular chart, XY, digital recorders, single point and multipoint recorders.
Printers: Types of Printers, Drum type printer, dot matrix type printer, Ink-jet and Laser jet printers

UNIT IV [Electronic Measuring Instruments]
Function Generator: Sine, Square and Triangular wave generator.

Text Book:

Reference Books:
[R1] Buckingham and Price - Electrical Measurements, Prentice – Hall Harris - Electrical Measurements

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
### ELECTROMAGNETIC FIELD THEORY

**Paper Code:** ETEE-210  
**Paper:** Electromagnetic Field Theory  
<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**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.

**Objectives:** To list Maxwell’s equations and solve them for specific regular geometries, understand general electromagnetic wave propagation and its applications to engineering problems.

**UNIT I**

**Introduction:** Review of scalar and vector field, Dot and Cross products, Coordinate Systems-Cartesian, cylindrical and spherical. Vector representation of surface, Physical interpretation of gradient divergence and curl, Transformation of vectors in different co-ordinate systems, dirac-delta function.

**Electrostatics:** Electric field due to point-charges, line charges and surface charges, Electrostatic potential, Solution of Laplace and Poisson’s equation in one dimension, M-method of image applied to plain boundaries, field mapping and conformal transformation, Electric flux density, Boundary conditions. Capacitance: calculation of capacitance for simple rectangular, cylindrical and spherical geometries, Electrostatic energy.

**UNIT II**


**UNIT III**

**Electromagnetic Waves:** 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.

**UNIT IV**

**Transmission Lines:** Transmission line equations, Characteristic impedance, Distortion-less lines, Input impedance of a loss less line, computation of primary and secondary constants, Open and Short circuited lines, Standing wave and reflection losses, Impedance matching, Loading of lines, Input impedance of transmission lines, RF lines, Relation between reflection coefficient and voltage standing wave ratio (VSWR), Lines of different lengths – λ/2, λ/4, λ/8 lines, Losses in transmission lines, Smith chart and applications, impedance matching Single stub, Double stub.

**Text Books:**


**Reference Books:**

[R2] J.D. Kraus, “Electromagnetics”, TMH  

---

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) **w.e.f batch 2014-15** and (2nd, 3rd & 4th years) **w.e.f batch 2013-14** approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
CONTROL SYSTEMS

Paper Code: ETEE-212        L       T/P       C
Paper: Control Systems       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.

Objective: To teach the fundamental concepts of Control systems and mathematical modeling of the system. To study the concept of time response and frequency response of the system. To teach the basics of stability analysis of the system

UNIT I : Control Systems - Basics & Components

[T1,T2][No. of Hrs. : 11]

UNIT II : Time – Domain Analysis
Time domain performance specifications, transient response of first & second order systems, steady state errors and static error constants in unity feedback control systems, response with P, PI and PID controllers, limitations of time domain analysis.

[T1,T2][No. of Hrs. : 10]

UNIT III : Frequency Domain Analysis
Polar and inverse polar plots, frequency domain specifications and performance of LTI systems, Logarithmic plots (Bode plots), gain and phase margins, relative stability. Correlation with time domain performance closes loop frequency responses from open loop response. Limitations of frequency domain analysis, minimum/non-minimum phase systems.

[T1,T2][No. of Hrs. : 10]

UNIT IV : Stability & Compensation Techniques

[T1,T2][No. of Hrs. : 11]

Text Books:

Reference Books:
ELECTRICAL MACHINES–II LAB

Paper Code: ETEE-252
Paper: Electrical Machines–II Lab

List of Experiments

EXP. 1 To conduct no-load and blocked rotor test on three phase squirrel cage Induction motor and draw the equivalent circuit.

EXP: 2 To conduct the load test on three phase squirrel cage Induction motor
(a) Compute torque, output power, efficiency, input power factor and slip for various load settings.
(b) To plot the following curves on the same graph sheet from the data obtained in part (a)
   (1) Efficiency vs. output power.
   (2) Torque vs. output power.
   (3) Line current vs. output power.
   (4) Power factor vs. output power.
   (5) Slip vs. output power.
(c) Also plot Torque-slip characteristic.

EXP: 3 To conduct the load test on three phase slip ring Induction motor
(a) Compute torque, output power, efficiency, input power factor and slip for various load settings.
(b) To plot the following curves on the same graph sheet from the data obtained in part (a)
   (1) Efficiency vs. output power.
   (2) Torque vs. output power.
   (3) Line current vs. output power.
   (4) Power factor vs. output power.
   (5) Slip vs. output power.
(c) Also plot Torque-slip characteristic.

EXP: 4 To study the different methods available in laboratory for starting three-phase Induction motor and compare them.

EXP: 5 To find the effect of the variation of supply voltage on the performance of three-phase Induction motor at 120%, 100%, 80%, 60%, and 50% of rated voltage and plot the variation of power factor, speed, current and input power for different voltages.

EXP: 6
a) Perform no load and short circuit test on a three-phase synchronous generator.
b) Measure the resistance of the stator windings
c) Find the voltage regulation at full load at (i) Unity power factor (ii) 0.85 power factor leading (iii) 0.85 power factor lagging by synchronous impedance method.

EXP: 7 To synchronize a three-phase synchronous generator with the infinite bus bar. (main supply)

EXP: 8 To start a synchronous motor and study the effect of variation of field current upon the stator current and power factor, hence draw V and inverted V curves of the motor for ½ load, ¾ load and full load. Also draw the unity power factor curve.

EXP: 9 To perform slip test on a 3 phase synchronous machine and find direct axix and quadrature axix synchronous reactances (Xd, Xq).

EXP: 10 To study voltage build up in isolated Induction generator and find its load characteristics using suitable terminal capacitor.

EXP: 11 To conduct no-load and blocked rotor test on single phase squirrel cage Induction motor and draw the equivalent circuit.

Reference Books:
R1. Laboratory Operations for Rotating Electric Machinery and Transformer Technology, Donald V. Richardson, Prentice Hall, 1980

NOTE:- At least 8 Experiments out of the list must be done in the semester.
ANALOG ELECTRONICS-II LAB

Paper Code: ETEC-254  
Paper: Analog Electronics-II Lab  
L  T/P  C  
0  2  1

List of Experiments:

1. To study the op-amp (IC 741) as inverting and non-inverting amplifier and calculate its gain.
2. Observe and plot the output Wave shape of Op-Amp R-C differentiating circuits, R-C integrating circuits for square wave input.
3. To study the op-amp (IC 741) as adder, subtractor and voltage follower, calculate its output voltage.
4. Construct biased and unbiased series and shunt clipping circuits & combinational clipper circuit for positive and negative peak clipping of a sine wave.
5. To study RC phase shift/Wien Bridge oscillator measurement of frequency and amplitude of oscillations using Op-Amp.
6. To study the waveform of square wave generator using 741 Op-Amp IC.
7. To study the waveform of Schmitt Trigger circuit & Precision Rectifier using 741 OP-AMP IC.
8. To make and test the operations of Monostable Multivibrator circuits using 555 timer.
9. To make and test the operations of Astable Multivibrator circuits using 555 timer.
10. To study the Sallen Key Voltage controlled voltage source active filters.

NOTE: - At least 8 Experiments out of the list must be done in the semester
POWER SYSTEM-I LAB

Paper Code: ETEE-256
Paper: Power System-I Lab

L T/P C
0 2 1

LIST OF EXPERIMENTS

1. Study of constructional features, applications, power rating of LT and HT cables.
3. Study of different types of distribution systems by physical inspection of these systems.
6. Study of different types of insulators with rating. Enumerate the different application of the different types of insulators, with their properties.
7. Calculate the resistance of earth using earth electrodes and Megger.
8. Calculate the dielectric strength of the transformer oil.
9. Enumerate the different applications involved in the power generating station. Write a report on visit of Thermal/Hydro/Nuclear power station.
10. Estimation and Costing of over head lines/distribution lines of specified voltage level and length.
11. Estimation and Costing of service mains for single face, three face domestic/industrial consumers.
12. Estimation and Costing of pole mounted sub-station /indoor outdoor sub-station.
13. To locate fault in a cable by Murray loop test.

SIMULATIONS:

1. MATLAB Simulation of Transmission Line for Short Transmission Line for calculation of various parameters.
2. Explain why the guard ring is required for string insulators. Using MATLAB simulink calculate the potential distribution across different units of string insulator, with and without guard ring and also calculate the string efficiency.
3. MATLAB Simulation of Transmission Line for Medium Transmission Line for calculation of various parameters.
5. Study the typical application software for power system (ETAP), which not only handles large power system SLD, also handle fault analysis, load flow analysis, stability analysis etc.
6. Study of single line diagram of typical power system and enumerate the different components involved in the power system viz. Alternator Transformer, Busbar etc. and also write their application.
7. Write a programme in C/C++ to draw a single line diagram of a typical power system, keeping in view the number of generating units, Buses, lines etc with their rating.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
ELECTRICAL AND ELECTRONIC MEASURING INSTRUMENTS LAB

Paper Code: ETEE-258
Paper: Electrical and Electronic Measuring Instruments Lab

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Experiments:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Testing of single phase and three phase electromechanical and electronic energy meters.
3. Study and demonstration of Trivector Meter.
5. Measurement of low resistance using Kelvin’s double bridge.
8. Study and demonstration of universal / electronic counter and measurement of frequency and time period.
9. Measurement of inductance and capacitance using C.R.O.
10. Measurement of phase and frequency using C.R.O.
12. Study and use of different types of Recorders / Printers.

NOTE: At least 8 Experiments out of the list must be done in the semester.
CONTROL SYSTEMS LAB

Paper Code: ETEE-260
Paper: Control Systems Lab

List of Experiments:

1. Comparison of open loop & closed loop control in speed control of D.C. motor & to find the transfer function.
2. To study the characteristics of positional error detector by angular displacement of two servo potentiometers
   a. excited with dc
   b. excited with ac
3. To study synchro transmitter in terms of position v/s phase and voltage magnitude with respect to rotor voltage magnitude/phase.
4. To study remote position indicator systems using synchro transmitter/receiver.
5. To plot speed-torque curves for ac servomotor for different voltages.
6. To study/ac motor position control system & to plot the dynamic response & calculate peak time, settling time, peak overshoot, damping frequency, steady state error etc.
7. To study the time response of simulated linear systems.
8. To study the performance of PID Controller.
9. Plot impulse response, unit step response, unit ramp response of any 2nd order transfer function on same graph using MATLAB.
10. To draw the magnetization (Volt Amps) characteristics of the saturable core reactor used in the magnetic amplifier circuits.
11. Plot root locus for any 2nd order system (with complex poles). For Mp=30%, find the value of K using MATLAB.
12. To design lead-lag compensator for the given process using Bode plots in MATLAB.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
### COMMUNICATION SKILLS FOR PROFESSIONALS

**Paper Code:** ETHS-301  
**Paper:** Communication Skills for Professionals  

<table>
<thead>
<tr>
<th>INSTRUCTIONS TO PAPER SETTERS:</th>
<th>MAXIMUM MARKS: 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

**Objective:** To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision. This course will also equip them with the basic skills required for a variety of practical applications of communication such as applying for a job, writing reports and proposals. Further, it will make them aware of the new developments in communication that have become part of business organisations today.

**UNIT I**  
**Organizational Communication:** Meaning, importance and function of communication, Process of communication, Communication Cycle - message, sender, encoding, channel, receiver, decoding, feedback, Characteristics, Media and Types of communication, Formal and informal channels of communication, 7 C’s of communication, Barriers to communication, Ethics of communication (plagiarism, language sensitivity)  
**Soft Skills:** Personality Development, Self Analysis through SWOT, Johari Window, Interpersonal skills - Time management, Team building, Leadership skills, Emotional Intelligence. Self Development and Assessment - Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, Career planning, Self esteem.

**UNIT II**  
**Introduction to Phonetics:** IPA system (as in Oxford Advanced Learner’s Dictionary), Speech Mechanism, The Description of Speech Sounds, Phoneme, Diphthong, Syllable, Stress, Intonation, Prosodic Features; Pronunciation; Phonetic Transcription - Conversion of words to phonetic symbols and from phonetic symbols to words. British & American English (basic difference in vocabulary, spelling, pronunciation, structure)  
**Non-Verbal Language:** Importance, characteristics, types – Paralanguage (voice, tone, volume, speed, pitch, effective pause), Body Language (posture, gesture, eye contact, facial expressions), Proxemics, Chronemics, Appearance, Symbols.

**UNIT III**  
**Letters at the Workplace** – letter writing (hard copy and soft copy): request, sales, enquiry, order, complaint.  
**Job Application** -- resume and cover letter  
**Meeting Documentation** – notice, memo, circular, agenda and minutes of meeting.  

**UNIT IV**  
**Listening and Speaking Skills:** Importance, purpose and types of listening, process of listening, difference between hearing and listening, Barriers to effective listening, Traits of a good listener, Tips for effective listening, Analytical thinking; Speech, Rhetoric, Polemics; Audience analysis. Telephone Skills - making and receiving calls, leaving a message, asking and giving information, etiquettes.  
**Presentations:** Mode, mean and purpose of presentation, organizing the contents, nuances of delivery, voice and body language in effective presentation, time dimension.  
**Group Discussion:** Purpose, types of GDs, strategies for GDs, body language and guidelines for group discussion.  
**Interview Skills:** Purpose, types of interviews, preparing for the interview, attending the interview, interview process, employers expectations, general etiquettes.
Text Books:

References Books:
POWER ELECTRONICS

Paper Code: ETEE-303
Paper: Power Electronics

L T/P C

3 1 4

INSTRUCTIONS TO PAPER SETTERS:

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.

Objective: The objective of the paper is to facilitate the student with the basics of Power Electronics that are required for an engineering student.

UNIT- I
Introduction
Characteristics and switching behaviour of Power Diode, SCR, UJT, TRIAC, DIAC, GTO, MOSFET, IGBT, MCT and power BJT, two-transistor analogy of SCR, firing circuits of SCR and TRIAC, SCR gate characteristics, SCR ratings. Protection of SCR against over current, over voltage, high dV/dt, high dI/dt, thermal protection, Snubber circuits, Methods of commutation, series and parallel operation of SCR, Driver circuits for BJT/MOSFET.

[T1,T2] No. of hrs. 11

UNIT- II
A.C. to D.C. Converter:
Classification of rectifiers, phase controlled rectifiers, fully controlled and half controlled rectifiers and their performance parameters, three phase half wave, full wave and half controlled rectifiers and their performance parameters, effect of source impedance on the performance of single phase and three phase controlled rectifiers, single-phase and three phase dual converter.

[T1, T2, T3] No. of hrs. 11

UNIT- III
D.C. to D.C. Converter:
Classification of choppers as type A, B, C, D and E, principle of operation, switching mode regulators: Buck, Boost, Buck-Boost, Cuk regulators.

A.C. to A.C. Converter:
AC voltage Controllers, Cyclo-converters: single phase to single phase, three phase to single phase, three phase to three phase Cyclo-converter circuit and their operation, Matrix converter.

[T1, T2, T3] No. of hrs. 11

UNIT-IV
D.C. to A.C. Converter:
single phase single pulse inverter: Square wave, quasi square. Three phase single pulse inverters (120° and 180° conduction) Modulation Techniques and reduction of harmonics, PWM techniques, SPWM techniques, SVM, Carrier less modulation. , PWM Inverter, Bidirectional PWM converters, voltage source inverters and current source inverter, Multi level Inverter: cascaded and NPC Inverters.

[T1, T2, T3] No. of hrs. 11

Text Books:

References Books:
[R2] Ned Mohan, Tore M. Undeland and Robbins, “Power Electronics: Converters, Applications and Design” Wiley India Publication
[R5] M.S. Jamil Asghar, “Power Electronics” PHI Publication
SENSORS AND TRANSDUCERS

Paper Code: ETEE-305
Paper: Sensors and Transducers

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

**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.

**Objective:** To provide the basic understanding about operational characteristics and applications of various sensors and transducers.

**UNIT I [Introduction to Sensors]**

Definition and differences of sensors and transducers, Classification, static and dynamic characteristics, electrical characterization, mechanical and thermal characterization including bath-tub curve.

**Different Sensors:**


**UNIT-II**

**Thermal sensors:** Gas thermometric sensors, Dielectric constant, refractive index thermo-sensors, nuclear thermometers, resistance change type thermometric sensors, Thermoemf sensors.

**Magnetic sensors:** Basic working principles, Magnetostrictive, Hall effect, Eddy current type, SQUID sensors.

**Radiation sensors:** Photo-detectors, Photo-emissive, photomultiplier, scintillation detectors.

**UNIT-III**


**UNIT-IV**

**Different Transducers:** LVDT, RTD, Thermistor, Wire anemometer, piezoresistors, Variable diaphragm capacitance transducers, Angular movement transducers, seismic mass transducer, interferometer transducer. Feedback transducer system: Inverse transducer, Self-balancing transducer, Servo-operated manometer, Feedback pneumatic load cell, integrating servo.

**Text Books:**


**Reference Book:**


SWITCHING THEORY AND LOGIC DESIGN

Paper Code: ETEE-307  
L T/P C  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 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the knowledge of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Digital Systems and Computer Architecture.

UNIT- I
Number Systems and Codes: Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.
Switching Theory: Boolean Algebra- Postulates and Theorems, De’ Morgan’s Theorem, Switching Functions- Canonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine Mc-Clusky Methods.
Combinational Logic Circuits: Review of basic gates- Universal gates, Adder, Subtractor ,Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Look-ahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and De-multiplexer, ALU, PLA and PAL.

UNIT- II
Integrated circuits: TTL and CMOS logic families and their characteristics. Brief introduction to RAM and ROM.
Sequential Logic Circuits: Latches and Flip Flops- SR, , D, T and MS-JK Flip Flops, Asynchronous Inputs.
Counters and Shift Registers: Design of Synchronous and Asynchronous Counters:- Binary, BCD, Decade and Up/Down Counters, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.

UNIT- III
Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines. Partition techniques and merger chart methods-concept of minimal cover table.

UNIT- IV
Algorithmic State Machine: Representation of sequential circuits using ASM charts synthesis of output and next state functions. Data path control path partition-based design.
Fault Detection and Location: Fault models for combinational and sequential circuits, Fault detection in combinatorial circuits. homing experiments, distinguishing experiments, machine identification and fault detection experiments in sequential circuits.

Text Book:

Reference Books:
COMMUNICATION SYSTEMS

Paper Code: ETEE-309
Paper: Communication Systems

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

INSTRUCTIONS TO PAPER SETTERS:

Objective: The objective of the paper is to facilitate the students with the knowledge of electronic communication thereby enabling the student to obtain the platform for studying in communication system.

UNIT I

Introduction: Overview of Communication system, Communication channels, Mathematical Models for Communication Channels

Introduction of random Variables: Definition of random variables, PDF, CDF and its properties, joint PDF, CDF, Marginalized PDF, CDF, WSS wide stationery, strict sense stationery, non stationery signals, UDF, GDF, RDF, Binomial distribution, White process, Poisson process, Wiener process.

[TL, T2][No. of Hrs. 11]

UNIT II


Pulse Analog Modulation: Sampling-Natural and Flat top. reconstruction, TDM-Pulse Amplitude Modulation (TDM-PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), Generation and Recovery.

Pulse Digital Modulation: Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), ADPCM.

[TL, T2][No. of Hrs. 11]

UNIT III


Information and Coding Theory: Entropy, Information, Channel Capacity. Source Coding Theorem: Shannon Fano Coding, Huffman Coding.

[TL, T2][No. of Hrs. 11]

UNIT IV


[TL, T2][No. of Hrs. 11]

Text Books:


Reference Books:

INDUSTRIAL MANAGEMENT

Paper Code: ETMS-311
Paper: Industrial Management

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

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.

Objective: The course provides a broad introduction to some aspects of business management and running of business organization.

UNIT I
Industrial relations- Definition and main aspects. Industrial disputes and strikes. Collective bargaining.
Labour Legislation- Labour management cooperation/worker’s participation in management. Factory legislation. International Labour Organization. [T1,T2][No. of Hrs. 10]

UNIT II
Trade Unionism- Definition, Origin, Objectives of Trade Unions. Methods of Trade unions. Size and finance of Indian Trade unions-size, frequency distribution, factors responsible for the small size. Finance-sources of income, ways of improving finance. [T1,T2][No. of Hrs. 10]

UNIT III

UNIT IV
Quality Management- What is Quality? Control Charts. Quality is everybody’s job. Taguchi Philosophy. Service Quality. What is Total Quality Management (TQM)? Roadmap for TQM. Criticism of TQM. Six Sigma. [T1,T2][No. of Hrs. 10]

Text Books:

Reference Books:
SENSORS AND TRANSDUCERS LAB

Paper Code: ETEE-351  L  T/P  C
Paper: Sensors and Transducers Lab  0  2  1

List of Experiments:

1. Study of various sensors e.g., Thermocouple, RTD, Thermistor, Magnetic Sensors, Load Cells, Film Sensors.
2. Characteristics of (Resistive and Thermo emf) temperature sensor
3. Measurement of displacement using LVDT
4. Measurement of strain and torque using strain gauges
5. Measurement of speed using photoelectric sensors, tachogenerators and stroboscope.
6. Calibration and measurement of temperature using PRT.
7. Static and Dynamic Characteristics of sensors.
8. Liquid level measurement using capacitive measurement system.
9. Pressure measurement using load cell.
10. Study and operation of Electrochemical Cell.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
## POWER ELECTRONICS LAB

**Paper Code:** ETEE-353  
**Paper:** Power Electronics Lab  
<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### List of Experiments:
1. To study and analyze V-I characteristics of SCR and TRIAC.
2. To study the switching characteristics of MOSFET and IGBT.
3. To study R and RC and UJT based firing circuits using SCR.
4. To study single phase Semi-converter and Full converters feeding R and RL load.
5. To study A.C phase control using SCR (half and full wave) using DIAC and TRIAC for dimmer application.
6. To study single-phase cyclo-converter feeding R and RL loads.
7. To study the operation and duty cycle control of buck and boost converter feeding R loads.
8. To study the operation and duty cycle control of Type-C chopper.
9. To study the THD in operation of single phase Square wave and Quasi square wave Inverter.
10. To study the operation of SPWM Inverter.

**NOTE:-** At least 8 Experiments out of the list must be done in the semester.
SWITCHING THEORY AND LOGIC DESIGN LAB

Paper Code: ETEE-355
Paper: Switching Theory and Logic Design Lab

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

List of Experiments:

1. Realize all gates using NAND & NOR gates
2. Realize Half Adder, Full Adder, Half subtracter, Full subtracter
3. Realize a BCD adder
4. Realize a Serial Adder
5. Realize a four bit ALU
6. Realize Master-Save J K Flip-Flop, using NAND/NOR gates
7. Realize Universal Shift Register
8. Realize Self-Starting, Self Correcting Ring Counter
9. Realize Multiplexer and De-Multiplexer
10. Realize Carry Look ahead Adder / Priority Encoder
11. Simulation of PAL and PLA
12. Simulation Mealy and Moore State machines

NOTE: - At least 8 Experiments out of the list must be done in the semester
COMMUNICATION SYSTEMS LAB

Paper Code: ETEE-357
Paper: Communication Systems Lab

List of Experiments:

2. Practical study of amplitude demodulation by linear diode detector
4. Practical study of envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
5. To generate FM signal using voltage controlled oscillator.
6. To generate a FM Signal using Varactor & reactance modulation.
8. Practical study of Super heterodyne AM receiver and measurement of receiver parameters viz.sensitivity, selectivity & fidelity.
9. Practical study of Pre-emphasis and De-emphasis in FM.
10. Generation of Phase modulated and demodulated signal.

Simulations study of some of the above experiments using P-spice or Multisim softwares

NOTE: - At least 8 Experiments out of the list must be done in the semester
### ELECTRICAL & ELECTRONIC WORKSHOP

<table>
<thead>
<tr>
<th>Paper Code: ETEE-359</th>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper: Electrical &amp; Electronic Workshop</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**IN-HOUSE WORKSHOP FOR EE/EEE**

**Week – 1:** Identification of hand tools, their specifications and purpose, safety precautions, first aid for electric shock, identification, specification of various types of resistors, capacitors, inductors, diodes, zener diodes, transistors, thyristors, LDR, VDR, UJT. Soldering and desoldering practice on wire and PCB.

Design and fabricate dc power supply using single diode half wave rectifier, two diode full wave rectifier, 4 diode bridge rectifier, capacitor filter, without and with regulator.

**Week – 2:** Introduction to various electrical components and accessories used in wiring installation for example fuse, MCB, ELCB, switches etc. Introduction of different types of electrical wiring and wiring diagrams, selection (gauges, size etc.) and ratings of wires. Introduction to domestic and industrial wiring installations.

**Week – 3:** Fabrication of different types of extension board. Study and wiring of a tube light circuit. Connection of fan with regulator circuit. Demonstration of various types of illumination devices like lamp, tube light, CFL and LED lamps. Trouble shooting of various home appliances.

**Week - 4:** Study of various components of a small single phase step down transformer & its fabrication and testing. Safety measures regarding electric fire. Introduction to relays, contactors and starters, their specification and applications. Connecting a 3-phase induction motor through (a) D.O.L starter (b) Star/delta starter, running & reversing the direction of rotation of motor.
COMMUNICATION SKILLS FOR PROFESSIONALS LAB

Paper Code: ETHS-351                                                                                   L       T/P       C
Paper: Communication Skills for Professionals Lab                                                0       2        1

Objective: To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision. These activities will enhance students' communication skills with a focus on improving their oral communication both in formal and informal situations. They will develop confidence in facing interviews and participating in group discussions which have become an integral part of placement procedures of most business organisations today.

Lab Activities to be conducted:

1. **Listening and Comprehension Activities** – Listening to selected lectures, seminars, news (BBC, CNN, etc.). Writing a brief summary or answering questions on the material listened to.

2. **Reading Activities** – Reading different types of texts for different purposes with focus on the sound structure and intonation patterns of English. Emphasis on correct pronunciation.

3. **Conversation Activities** – Effective Conversation Skills; Formal/Informal Conversation; Addressing higher officials, colleagues, subordinates, a public gathering; Participating in a video conference.

4. **Making an Oral Presentation** – Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Connecting with the audience during presentation; Projecting a positive image while speaking; Emphasis on effective body language.

5. **Making a Power Point Presentation** – Structure and format; Covering elements of an effective presentation; Body language dynamics.

6. **Making a Speech** – Basics of public speaking; Preparing for a speech; Features of a good speech; Speaking with a microphone. Famous speeches may be played as model speeches for learning the art of public speaking. Some suggested speeches: Barack Obama, John F Kennedy, Nelson Mandela, Mahatma Gandhi, Jawahar Lal Nehru, Atal Bihari Vajpayee, Subhash Chandra Bose, Winston Churchill, Martin Luther King Jr.

7. **Participating in a Group Discussion** – Structure and dynamics of a GD; Techniques of effective participation in group discussion; Preparing for group discussion; Accepting others’ views / ideas; Arguing against others’ views or ideas, etc.

8. **Participating in Mock Interviews** – Job Interviews: purpose and process; How to prepare for an interview; Language and style to be used in an interview; Types of interview questions and how to answer them.

Suggested Lab Activities:

1. Interview through telephone/video-conferencing
2. Extempore, Story Telling, Poetry Recitation
3. Mock Situations and Role Play; Enacting a short skit
4. Debate (Developing an Argument), News Reading and Anchoring

Reference Books:


Note: The Communication Skills Lab should be equipped with computers, microphones, an internet connection, overhead projector, screen, sound system, audio/video recording facilities, and seating arrangement for GDs and mock interviews. The student activities may be recorded and students may replay them to analyse and improve their pronunciation, tone, expressions, body language, etc.

Traditional language lab softwares are not mandatory and may be used by students to practice and enhance their language competence. Such softwares are usually elementary in nature and are mostly based on British/American English (pronunciation, accent and expression). They should preferably be in Indian English.
# POWER SYSTEM-II

**Paper Code:** ETEE-302  
**Paper:** Power System-II  
**L T/P C** 3 1 4

<table>
<thead>
<tr>
<th>INSTRUCTIONS TO PAPER SETTERS:</th>
<th>MAXIMUM MARKS: 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

**Objective:** The objective of the paper is to enable the Electrical Engineering students to have knowledge of Power System-II, an important aspect of overall Electricity Supply System.

**Unit – I: Protective Relays, CTs and PTs.**

**Classification of Relays:** Electromechanical, static and numerical relays: Construction, operating characteristic and their applications, Constructions and Characteristic of CTs and PTs, capacitance voltage transformer.

**No. of Hrs.: 10**

**Unit – II: Protection of Generators and Transformers**

Differential Protection, protection of stator windings, rotor earth fault protection, protection against unbalanced loading, loss of excitation and prime mover failure; Protection of motors (induction and synchronous) and bus bars.

**No. of Hrs.: 10**

**Unit – III: Protection of Transmission lines**

Over current protection, Grading of over current relays, distance protection, types of distance relays and their characteristics, carrier current protection, protection against surges, surge diverters, surge absorbers, use of ground wires on transmission lines, methods of grounding.

**No. of Hrs.: 12**

**Unit – IV: Fuses and Circuit Breakers**

Types & Applications of Fuse and MCB, Current interruption theories, types of Circuit Breakers: Air, air-blast, Oil, SF6 and Vacuum circuit breakers-Principle, ratings and applications.

**No. of Hrs.: 10**

**Text Books:**


**Reference Books:**

UTILIZATION OF ELECTRICAL ENERGY & ELECTRIC TRACTION

Paper Code: ETee-304
Paper: Utilization of Electrical Energy & Electric Traction

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

**INSTRUCTIONS TO PAPER SETTERS:**

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.

**Objectives:** To clearly understand the basic concepts related to use of electric energy in various industrial, commercial and residential applications.

**UNIT I**  
**Illumination**
Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light, discharge lamps, Mercury Vapour and Sodium Vapour lamps- their characteristic and applications. Performance comparison between tungsten filament lamps, fluorescent tubes, CFL and LED Lights. Basic principles of light control, types and design of lighting schemes and flood lighting.

**UNIT II**  
**Electrical Heating:** Principle and application of resistance, induction and dielectric heating; Infrared or radiant heating. High frequency eddy current heating, arc furnaces, induction furnace, electric supply for high frequency heating applications.

**Welding:** Resistance welding; arc welding, welding generator and welding transformer, properties of arcing electrode, comparison between resistance and arc welding, comparison between A.C. and D.C. welding.

**UNIT III**  
**Electric Traction**
Advantages of electric traction, requirements of an ideal traction system, different system of electric traction; comparison between D.C. and A.C. systems of railway electrification; speed – time curves, different types of traction motors and their characteristics; parallel operation of traction motors. Starting and speed control of 3 phase induction motors, braking, advantages and disadvantages of regenerative braking. Calculation of energy returned during regeneration.

**UNIT IV**  
**Electroplating:** Principles and applications of electrolysis, Faraday’s law of electrolysis, electroplating; calculation of current required for depositing given amount of metal, current efficiency, voltage-energy efficiency, extraction of metals electro deposition, factors governing deposition process.

**Energy Storage Devices:** Constructional details, principle of operation of Rechargeable Alkaline, Nickel – Cadmium, Nickel-Metal Hydride, Lithium ion and Lead-acid batteries, their comparison and applications. Charging of batteries and rating. Fuel cell and use of electric double layer capacitor (super capacitor) as battery bank.

**Textbooks:**

**Reference Books:**

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
DIGITAL SIGNAL PROCESSING

Paper Code: ETEC-306
Paper: Digital Signal Processing

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.

Objectives: The aim of this course is to provide in depth knowledge of various digital signal processing techniques and design of digital filters, learn the concept of DFT FFT algorithms, and design of digital filters using different approximations, DSP processor and architecture. The prerequisites of this subject are basic knowledge of signal and systems.

UNIT–I:
Frequency Domain Sampling: The Discrete Fourier Transform, Properties of the DFT, Linear filtering methods based of the DFT.
Efficient computation of the DFT: Principal Of FFT, Fast Fourier Transform Algorithms, Applications of FFT Algorithms, A linear filtering approach to computation of the DFT.
Application of DFT, Design of Notch filter

[T2,T1] [No. of Hours: 11]

UNIT–II:
Design & Structure of IIR filters from analog filters: Impulse Invariance; Bilinear transformation and its use in design of Butterworth and Chebyshev IIR Filters; Frequency transformation in Digital Domain, Direct, Cascade, Parallel & transposed structure
Design & structure of FIR filters: Symmetric and anti-symmetric FIR filters; Design of Linear Phase FIR filters using windows, Frequency Sampling Method of FIR design, Direct, Cascade, Frequency Sampling, transposed structure

[T1,T2] [No. of Hours: 11]

UNIT–III:
Implementation of Discrete Time Systems:
Lattice structures, Lattice and Lattice-Ladder Structures, Schur - Cohn stability Test for IIR filters; Discrete Hilbert Transform.
Linear predictive Coding:
Lattice filter design, Levension Darwin Technique, Schur Algorithm

[T1,T2] [No. of Hours: 10]

UNIT–IV:
Quantization Errors in Digital Signal Processing: Representation of numbers, Quantization of filter coefficients, Round-off Effects in digital filters.
Multirate Digital Signal Processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Frequency domain characterization of Interpolator and Decimator; Polyphase decomposition.

[T1, T2][No. of Hours: 10]

Text Books:
[T2] Proakis and Manolakis, Digital Signal Processing, PHI Publication

Reference Books:
VLSI DESIGN

Paper Code: ETEC-308
Paper: VLSI Design

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

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 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 of 12.5 marks.

Objective: The prerequisite are analog devices, STLD, Digital system design and micro-electronics. The students are introducing to MOS technology, design rules and some applications.

UNIT I
Evolution of VLSI, MOS transistor theory, MOS structure, enhancement & depletion transistor, threshold voltage, MOS device design equations, MOSFET scaling and small geometry effects, MOSFET capacitances. NMOS inverter, CMOS inverter, DC characteristics, static load MOS inverter, pull up/pull down ratio, static & dynamic power dissipation, CMOS & NMOS process technology – explanation of different stages in fabrication, body effect, latch up in CMOS.

[T1,T2][No. of Hours: 11]

UNIT II
Stick diagram and design rules, lambda based design rules, switching characteristics & inter connection effects: rise time, fall time delays, noise margin. CMOS logic gate design: NAND, NOR, XOR and XNOR gates, Transistor sizing, combinational MOS logic circuits: pass transistor and transmission gate designs, Pseudo NMOS logic.

[T1,T2][No. of Hours: 11]

UNIT III
Sequential MOS logic circuits: SR latch, clocked latch and flip flop circuits, CMOS D latch and edge triggered flip flop, dynamic logic circuits; basic principle, non ideal effects, domino CMOS logic, high performance dynamic CMOS circuits, clocking issues, clock distribution.

[T1,T2][No. of Hours: 11]

UNIT IV
VLSI designing methodology, design flow, design Hierarchy, concept of regularity, modularity & locality, VLSI design style, Design quality, computer aided design technology, adder design and multiplier design examples, Low power design concepts using CMOS Technology.

[T1,T2][No. of Hours: 11]

Text Books:

Reference Book:

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
MICROPROCESSORS AND MICROCONTROLLERS

Paper Code: ETEE-310                           L  T/P  C
Paper: Microprocessors and Microcontrollers       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

Objective: The objective of the paper is to facilitate the student with the knowledge of microprocessor systems and microcontroller.

UNIT- I

UNIT- II
8086 Microprocessor: 8086 Architecture, difference between 8085 and 8086 architecture, generation of physical address, PIN diagram of 8086, Minimum Mode and Maximum mode, Bus cycle, Memory Organization, Memory Interfacing, Addressing Modes, Assembler Directives, Instruction set of 8086, Assembly Language Programming, Hardware and Software Interrupts.

UNIT- III
Interfacing of 8086 with 8255, 8253/8251, 8259: Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255, Sample-and-Hold Circuit and multiplexer, Keyboard and display interface, Keyboard and display controller (8279), Programmable Interval timers (Intel 8253/8254), USART (8251), PIC (8259), DAC, ADC, LCD, Stepper Motor.

UNIT- IV
Overview of Microcontroller 8051: Introduction to 8051 Microcontroller, Architecture, Memory organization, Special function registers, Port Operation, Memory Interfacing, I/O Interfacing, Programming 8051 resources, interrupts, Programmer’s model of 8051, Operand types, Operand addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions, Timer & Counter Programming, Interrupt Programming.

Text Books:
[T3] Ramesh Gaonkar, “MicroProcessor Architecture, Programming and Applications with the 8085”, PHI

References Books:

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
POWER STATION PRACTICE

Paper Code: ETEE-312
Paper: Power Station Practice

INSTRUCTIONS TO PAPER SETTERS:

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

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 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 of 12.5 marks.

Objective: The objective of the paper is to enable the Electrical Engineering students to have knowledge of Power Stations an important aspect of overall Electricity Supply System.

UNIT I
Different form energy sources: Fossils fuels, Nuclear energy and Hydro power.
-Thermal Power Plant: Location and Site selection, general layout and working of plant, boilers, economizers, super heaters, draft equipments, fuel and ash handling plants.

UNIT II
-Gas Turbine Power Plant: Lay out, Working and components of gas turbine power plant, combined gas and steam turbine plant.
-Hydro Electric Plant: Location and site selection, general layout and operation of plant, Types of Hydro Turbines and their characteristics – Impulse and reaction type (Pelton Wheel, Francis and Kaplan turbines,), speed governing system.
-Diesel Power Plant: Layout and components of plant auxiliary equipments.

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

UNIT IV
-Substation Layout: Types of substations, typical layout and constructional details of pole mounted, Indoor, Outdoor sub-stations, hybrid gas insulated sub stations, bus bar arrangements, application of substation equipment like transformer, circuit breaker, isolator, metering equipments and protecting equipment, substation grounding.

Text Books:

Reference Books:

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
POWER SYSTEM-II LAB

List of Experiments:

Exp-1. To study single line to Ground fault as practical application in transmission lines. (Using Experimental setup)

Exp-2. To study three phase fault as practical application in transmission lines. (Using Experimental setup)

Exp-3. To determine the characteristics of the given differential relay and to apply the relay for the protection of a transformer against internal faults. (Using Experimental setup)

Exp-4. To study instantaneous over current relay. (Using Experimental setup)
   (1) Study the construction of relay.
   (2) Study the operating and deoperating of relay.
   (3) Study the current vs. time characteristics.

Exp-5. To study over voltage relay static type and draw its characteristics. (Using Experimental setup)

Exp-6. To study the characteristics of miniature-circuit breaker. (Using Experimental setup)

Exp-7. To study the operating characteristics of HRC fuse. (Using Experimental setup)

Exp-8. To obtain the characteristics of thermal bimetallic relay. (Using Experimental setup)

Exp-9. To study the characteristics of IDMT Earth fault relay. (Using Experimental setup)

LIST OF ADVANCE EXPERIMENTS

Exp-1. Simulation based on Load flow analysis.

Exp-2. Simulation based on Short circuit analysis.


Exp-4. Simulation based on Relay co-ordination.

Exp-5. Simulation based on Voltage instability analysis.


Exp-7. Simulation based on Line and cable parameter.


Exp-10. Simulation based on Network Reduction.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
UTILIZATION OF ELECTRICAL ENERGY LAB

Paper Code: ETEE-354
Paper: Utilization of Electrical Energy Lab

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

List of Experiments:

1. Demonstration and calculation of current for electro-plating process used to different metals.
2. Demonstration of large-size cut model of different types of batteries.
3. Study of charging methods of batteries and calculation of their life cycle.
4. Charging and discharging of super capacitors.
5. To plot polar curves for various lamps.
6. Verification of illumination laws.
7. Performance comparison of MV lamps, SV lamps, filament lamps, CFL & LED lights.
10. Characteristics of welding transformer.
11. Speed control of various traction motors.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
DIGITAL SIGNAL PROCESSING LAB

Paper Code: ETEC-356
Paper: Digital Signal Processing Lab

List of Experiments:

Software Experiments:
1. Generation of basic signals sine, cosine, ramp, step, impulse and exponential in continuous and discrete domains using user defined functions.
2. Write a MATLAB program to find convolution (linear/circular) and correlation of two discrete signals.
3. Perform linear convolution using circular convolution and vice versa.
4. Write a MATLAB program to
   a. Find 8 point DFT, its magnitude and phase plot and inverse DFT.
   b. Find 16 point DFT, its magnitude and phase plot and inverse DFT.
5. Perform the following properties of DFT-
   a. Circular shift of a sequence.
   b. Circular fold of a sequence.
6. Write a MATLAB Program to design FIR Low pass filter using
   a. Rectangular window
   b. Hanning window
   c. Hamming window
   d. Bartlett window
7. Write a MATLAB program to
   b. Implement a Low pass / High pass / Band pass / Band stop IIR Filter using Chebyshev Approximation.

Hardware Experiments using Texas Instruments Kits-DSK 6713:
8. Introduction to Code composer Studio.
9. Write a program to generate a sine wave and see the output on CRO
10. Write a Program to Generate ECHO to give audio file.
11. Write a program to demonstrate Band Stop filter by FIR.

Additional Experiments:
12. Write a program to generate a cos wave and see the output on CRO
13. Write a program to blink the LED
14. Write a program to display a string on LCD.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
MICROPROCESSORS AND MICROCONTROLLERS LAB

Paper Code: ETEE-358
Paper: Microprocessors and Microcontrollers Lab

List of Experiments:

1. Write a program to add and subtract two 16-bit numbers with/without carry using 8086.
2. Write a program to multiply two 8-bit numbers by repetitive addition method using 8086.
3. Write a Program to generate Fibonacci series.
4. Write a Program to generate Factorial of a number.
5. Write a Program to read 16-bit Data from a port and display the same in another port.
6. Write a Program to generate a square wave using 8254.
7. Write a Program to generate a square wave of 10 kHz using Timer 1 in mode 1 (using 8051).
8. Write a Program to transfer data from external ROM to internal (using 8051).
9. Design a Minor project using 8086 Microprocessor (Ex: Traffic light controller/temperature controller etc)
10. Design a Minor project using 8051 Microcontroller

NOTE: - At least 8 Experiments out of the list must be done in the semester.
ELECTRICAL DRIVES

Paper Code: ETEE-401        L  T/P C
Paper: Electrical Drives

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 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 of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Electrical Drives that are required for an engineering student.

UNIT- I
Dynamics of Electric Drives: Types of loads, quadrant diagram of speed time characteristics, Basic and modified characteristics of dc and ac motors, equalization of load, steady state stability, calculation of time and energy loss, control of electric drives, modes of operation, speed control and drive classifications, closed loop control of drives, selection of motor power rating, class of duty, thermal considerations.

UNIT- II
DC Motor Drives: DC motor speed control, Methods of armature control, field weakening, semiconductor controlled drives, starting, braking, transient analysis, controlled rectifier fed dc drives, chopper controlled dc drives.

UNIT- III
Induction Motor Drives: Three phase induction motor starting, braking, transient analysis, speed control from stator and rotor sides, stator voltage control, variable frequency control from voltage sources and current sources, static rotor resistance control, slip power recovery, static Scherbius and static Kramer drive.

UNIT-IV Drives with Special Machine: Introduction to permanent magnet machines, thermal properties of PM, concept of BLDC motor, 120° and 180° operation, rotor position detection, open loop voltage control, closed loop current control, high speed single pulse operation, permanent magnet synchronous machines, rotor position detection and synchronization, sinusoidal PWM excitation, closed and open loop control, PMSG and its application to wind energy, stepper motor, current and voltage control, drive circuits, SRM drive, modeling and analysis of SRM, different configurations of converters, closed and open loop operation, high speed operation with angle of advance.

Text Books:

References Books:
[R2] Ned Mohan, “Electrical Machines And Drives” Wiley India Publication
[R5] Bimal K Bose, “Power Electronics and Variable Frequency Drives”, Wiley India Publication
ADVANCED CONTROL SYSTEMS

Paper Code: ETEE-403
Paper: Advanced Control Systems

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 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 of 12.5 marks.

Objective: To impart knowledge of state space, discrete systems, non-linear systems and adaptive control.

UNIT – I: State Space Analysis
Introduction, state space representation of continuous LTI systems, transfer function and state variables, transfer matrix, EIGEN values and EIGEN vectors, Solution of State equations, controllability and observability, canonical forms (CCF, OCF, DCF, JCF).

UNIT – II: Discrete System
Introduction to discrete time systems, sampling process, Z-transform and inverse Z-transforms and hold circuits, presentation by difference equation and its solution, pulse transfer function, transient and steady state responses, Dead beat response, steady state error, Representation of discrete systems in state variable form and its solution, stability of digital control system, digital equivalent of conventional controller/compensator.

UNIT – III: Non-Linear System
Introduction, Non-linear system behavior and different types of non-linearities, Describing function analysis, assumptions and definitions, DF of common non-linearities, Phase Plane Analysis, singular points, construction of phase portrait, phase plane analysis of linear/non-linear systems, existence of limit cycles, jump phenomenon, stability analysis:

UNIT – IV: Lyapunov Theory and Adaptive Control
Lyapunov direct method, positive definite functions and Lyapunov functions, existence of Lyapunov functions, Lyapunov analysis of LTI systems, variable gradient method, Krasvoskii method, performance analysis, Popov’s stability criteria.
Introduction to basic approaches to adaptive control - Model reference adaptive control systems, self tuning regulators, Applications of adaptive control.

Text Books:

Reference Books:
[R2] Brian D.O.Adnerson & John B. Moore, Optimal Control
[R4] Shastri & Badson, Adaptive Control, PHI
EHV & HVDC TRANSMISSION

Paper Code: ETEE-405  
Paper: EHV AC & HVDC Transmission  

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

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 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 of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of EHV AC and HVDC Transmission that are required for an engineering student.

UNIT-I  
EHV AC Transmission System: Fundamental design aspects of EHV AC transmission lines and their power carrying capabilities; EHV AC Transmission lines analysis – nominal and equivalent circuits; Problems related with long lines: corona loss, audible noise generation and characteristic corona pulses, RI effect, ferro-resonance, principle of half wave transmission.  

UNIT-II  
Reactive Power Management in EHV AC System: Reactive power management of power system, reactive power problems associated with EHV AC systems; Reactive power devices – their operation and control, series and shunt compensation of EHV AC system, different equipment and scheme details with analysis, application of FACTS Technology. Extra High Voltage Testing: Characteristics and generation of impulse voltage, generation of high AC and DC voltages, measurement of high voltage by sphere gaps and potential dividers.

UNIT-III  
HVDC Transmission: Fundamental aspects of HVDC systems and their comparison with EHV AC Systems; Different types of HVDC Schemes with their basic details, HVDC Equipment and their ratings, construction and characteristics; Power Converter circuits associated with HVDC systems, design aspects of 12- pulse converters, simple design problems of HVDC Systems.

UNIT-IV  
HVDC System Control: Types of DC link, principle of dc link control, converter controls characteristics, firing angle control, current and excitation angle control, power control, starting and stopping of dc link, Harmonic Filters – HVDC current and voltage filters, different types of filters, Fundamental aspects of HVDC circuit breaking, MTDC systems: types, control and application.

Text:  

References:  

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
# RENEWABLE ENERGY RESOURCES

**Paper Code:** ETEE-419  
**Paper:** Renewable Energy Resources

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**INSTRUCTIONS TO PAPER SETTERS:**

<table>
<thead>
<tr>
<th>MAXIMUM MARKS: 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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 of 12.5 marks.</td>
</tr>
</tbody>
</table>

**Objective:** The objective of the paper is to introduce the knowledge of upcoming and future promising area of renewable energy resources to the students, which is developing rapidly.

**UNIT- I**  
Solar Energy: radiation – extra terrestrial, spectral distribution, solar constant, solar radiation on earth; measurements; solar thermal system – solar thermal power and its conversion, solar collectors, flat plate, solar concentrating collectors, - types and applications; photovoltaic (PV) technology - photovoltaic effect, efficiency of solar cells, semi-conductor materials, solar PV system, standards and applications, tracking.

**UNIT- II**  
Wind and Small Hydropower Energy: wind data, properties, speed and power relation, power extracted, wind distribution and speed prediction, wind map of India; wind turbines and electric generators. fundamentals – types of machines and their characteristics, horizontal and vertical wind mills, elementary design principle, wind energy farms, off-shore plants; small, mini and micro hydro power plants and their resource assessment, plant layout with major components shown.

**UNIT- III**  
Other Non-conventional Energy Sources: biomass – photosynthesis and origin of biomass energy, resources, cultivated resources, waste to biomass, terms and definitions – incineration, wood and wood waste, harvesting super tree, energy forest, phrylysis, thermo-chemical biomass conversion to energy, gasification, anaerobic digester, fermentation, gaseous fuel; geothermal – resources, hot spring, steam system, principle of working, site selection, associated problems in development; ocean and tidal energy – principle of ocean thermal energy conversion, wave energy conversion machines, problems and limitations, fundamentals of tidal power, conversion systems and limitations; hydrogen energy – properties of hydrogen, sources, production and storage, transportation, problems for use as fuel; fuel cells – introduction with types, principle of operation and advantages.

**UNIT-IV**  
Grid Connectivity: wind power interconnection requirement - low-voltage ride through (LVRT), ramp-rate limitations, supply of ancillary services for frequency and voltage control, load following, reserve requirement, impact of connection on steady-state and dynamic performance of power system; interfacing dispersed generation of solar energy with the grid, protective relaying, islanding, voltage flicker and other power quality issues; role of non-conventional energy system in smart grid.

**Text Books:**


**References Books:**

| [R6] D P kothari ;”Wind energy System and applications” Narosa Pub 2014 |

---

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
POWER DISTRIBUTION SYSTEM

Paper Code: ETEE-409
Paper: Power Distribution System

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

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 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 of 12.5 marks.

Objective: The objective of the paper is to enable the Electrical Engineering students to have knowledge of Power Distribution System, an important aspect of overall Electricity Supply System.

UNIT- I
Introduction to sub-transmission and distribution system; classification of loads – residential, commercial, agricultural, industrial and their characteristics; distribution system planning – short-term, mid-term, long-term, load modeling and characteristics; definition of demand factor, utilization factor, load factor, plant factor, diversity factor, loss factor; computer applications to distribution system automation; tariff.

UNIT- II
Distribution feeders, transformers and sub-stations; primary feeders – voltage level, radial and loop types, uniformly distributed and non-uniformly distributed load; design considerations for secondary system – voltage level, location of substation, rating, service area with primary feeders, optimal location; existing system improvement.

UNIT- III
System analysis – voltage drop and power loss calculation; methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines; loss reduction, voltage regulation, voltage control and improvement, issues in quality of service – voltage sag, swell and flicker; application of capacitors to distribution system – effect of series and shunt capacitors, power factor correction, economic justification for capacitor with cost-benefit analysis aiming at most economic power factor, optimum location of capacitor.

UNIT- IV
Distribution sub-station bus schemes, description and comparison of switching schemes; types of common faults and procedure for system fault calculation; protection – objectives, over current protection devices – fuses, automatic circuit re-closers, automatic line sectionalizing, coordination of protective devices – fuse to fuse, fuse to circuit breaker, re-closer to circuit breaker.

Text:

References:

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 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 of 12.5 marks.

Objective: The objective of the paper is to enable the Electrical Engineering students to have knowledge of Power Distribution System, an important aspect of overall Electricity Supply System.

UNIT- I
Introduction to sub-transmission and distribution system; classification of loads – residential, commercial, agricultural, industrial and their characteristics; distribution system planning – short-term, mid-term, long-term, load modeling and characteristics; definition of demand factor, utilization factor, load factor, plant factor, diversity factor, loss factor; computer applications to distribution system automation; tariff.

UNIT- II
Distribution feeders, transformers and sub-stations; primary feeders – voltage level, radial and loop types, uniformly distributed and non-uniformly distributed load; design considerations for secondary system – voltage level, location of substation, rating, service area with primary feeders, optimal location; existing system improvement.

UNIT- III
System analysis – voltage drop and power loss calculation; methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines; loss reduction, voltage regulation, voltage control and improvement, issues in quality of service – voltage sag, swell and flicker; application of capacitors to distribution system – effect of series and shunt capacitors, power factor correction, economic justification for capacitor with cost-benefit analysis aiming at most economic power factor, optimum location of capacitor.

UNIT- IV
Distribution sub-station bus schemes, description and comparison of switching schemes; types of common faults and procedure for system fault calculation; protection – objectives, over current protection devices – fuses, automatic circuit re-closers, automatic line sectionalizing, coordination of protective devices – fuse to fuse, fuse to circuit breaker, re-closer to circuit breaker.

Text:

References:
TELEMETRY & DATA ACQUISITION SYSTEM

Paper Code: ETEE-411
Paper: Telemetry & Data Acquisition System

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.

Objective: Telemetry is the study of data communication between a numbers of locations. Data Acquisition system deals with acquiring the data from different sources, processing the data so that it can be made compatible to be used with the controlling systems. So, the study of this subject is very useful for the students who are to work in automation industries.

UNIT – I
Telemetry Concepts
Introduction: Methods of data transmission, general telemetry system, types of telemetry systems, voltage, current, position, landline, radio frequency telemetry systems.
Sampling fundamentals: Introduction to sampling theorem and sampling process, convolution, computing minimum sampling rate, Aliasing Errors.

[T1 T2][No. of Hrs. 12]

UNIT – II
Data Communication Systems
Data Transmission system: Methods of binary data transmission, data formats, 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, power line carrier communication.
Data reception systems: Bit Synchronizers, Frame Synchronizers, Sub frame Synchronizers, PLL, Display System.

[T1 T2][No. of Hrs. 10]

UNIT – III
Remote Control: Communication Based Processing Control Systems, Pipelines, Operational security system components, Pipeline control, Power system control, Programmable controllers for factory automation.
Command: Tone Command system, Tone Digital Command system, ON/OFF command and Data commands.

[T1 T2][No. of Hrs. 10]

UNIT – IV
Data Acquisition System (DAS)
Introduction, Analog and digital data acquisition system, Importance of DAS, building blocks of DAS, sample and hold circuits, A/D, D/A, multiplexer . Microprocessor based DAS.

[T1 T2][No. of Hrs. 10]

Text Books:
[T1] Patranabis, “Telemetry Principles”, TMH.

Reference Books:

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
PLC & SCADA SYSTEMS

Paper Code: ETEE-413
Paper: PLC & SCADA Systems

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.

Objective: The objective of this paper is to introduce the students about the knowledge of programmable logic controller, principles of PLC and functions and SCADA and its elements and functions.

UNIT-I
Programmable Logic Controller (PLC) Basics: Introduction, Parts of PLC, Principles of operation, PLC size and applications, PLC Advantages and Disadvantages, PLC Manufacturers, PLC hardware components, I/O section, Analog I/O modules, Digital I/O modules, CPU- Processor memory module, Programming devices, Devices which can be connected to I/O modules, Relay, Contactor, SPST, Push Buttons, NO/NC Concept

UNIT-II
Programming of Programmable Logic Controller: General PLC Programming Procedures, Contacts and Coils, Program SCAN, Programming Languages, Ladder Programming, Relay Instructions, Instruction Addressing, Concept of Latching, Branch Instructions, Contact and Coil I/O Programming Examples, Relation of Digital Gate Logic to Contact/Coil Logic.

UNIT-III
Programmable Logic controller Functions: Timer Instructions: ON DELAY Timer and OFF DELAY timer, Counter Instructions: UP/DOWN Counters, Timer and Counter Applications, Program Control Instructions: Master Control Reset, Jump and Subroutine, Math Instructions- ADD, SUB. Data Handling: Data Move, Data Compare, Data Selection, Electro-pneumatic Sequential Circuits and Applications.

UNIT-IV

Text Books:

Reference Books:
[R1] Stuart A.Boyer “Supervisors Control and Data Acquisition”, ISA
[R6] Programmable Logic Controllers, W.Bolton, Elsevier
MECHATRONICS

Paper Code: ETAT-403
Paper: Mechatronics

INSTRUCTIONS TO PAPER SETTERS:

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

MAXIMUM MARKS: 75

Objective: Mechatronics is the combination of mechanical and electronics automation and computers. Nowadays all the mechanical machines have been made computer-controlled. The Subject details the basic hardware and software elements used for proper and successful operation of various equipments. The knowledge of this subject will be helpful to students while working in industries.

UNIT - I
Mechanical Actuating Systems: Types of motion, Degrees of freedom, constraints, Kinematic Chains, Cam, Gear and gear trains, Ratchet and pawl Belt drive, chain drive, Bearing, pre loading.

Hydraulic & Pneumatic Actuation Systems: Fluid power systems, hydraulic systems, Pneumatic systems, system structure and signal flow, hydraulic pumps and Pressure Control Valves and regulation, air compressors and treatment, Cylinders, Direction Control Valves, Process control valves, Rotary Actuators, Accumulators, Amplifiers, and Pneumatic Sequencing Problems.

[T1] [T2] [No. of Hrs: 11]

UNIT - II
Electrical Actuation Systems: Switching Devices, Mechanical Switches – SPST, SPDT, DPDT, keypads; Relays, Electronic sensors, Diodes, Thyristors, Transistor, solenoid operating Valve, Solenoid Operated Hydraulic and Pneumatic Valves, Electro-Pneumatic Sequencing Problems. Control of DC Motors, Permanent Magnet DC Motors, Brush less Permanent Magnet DC Motors, AC Motors and speed controls, Stepper Motors and Controls, Servo Motors.

Digital Electronics and systems:
Number Systems, Binary Mathematics, Boolean Algebra, Gates and Integrated Circuits Like 7408, 7402, Karnaugh Maps, Application of Logic Gates as: Parity Generators, Digital Comparators, BCD to Decimal Decoders, Flip Flops and applications, sequential logic, Microprocessor and microcontrollers, programming, instruction set, assembly language, C programming for Intel 8051 / 8082 micro-controller.

[T1] [T2] [No. of Hrs: 11]

UNIT - III

System Interfacing and data acquisition:
Data acquisition systems, Data loggers, SCADA, Interfacing requirements, Buffers, Darlington Pair, Handshaking, Serial and Parallel Port Interfacing, Peripheral Interface Adapters, Analog to Digital Conversion, Digital To Analog Conversion, Sample and Hold Amplifiers, Multiplexers, Time Division Multiplexing, Digital Signal Processing, Pulse Modulation, Component Interconnection and Impedance Matching, Interfacing Motor drives. Electrical power supply and protection.


[T1] [T2] [No. of Hrs: 11]

UNIT - IV
Programmable logic controllers:
Programmable logic controllers (PLC) Structure, Input / Output Processing, principles of operation, PLC versus computer, Programming Languages, programming using Ladder Diagrams, Logic Functions, Latching, Sequencing, Timers, Internal Relays And Counters, Shift Registers, Master and Jump Controls, Jumps, Data Movement, Code Conversion, Data handling and manipulation, selecting a PLC.
Case studies: Mechatronic approach to design, Boat Auto pilot, high speed tilting train, automatic car park system, coin counter, engine management system, autonomous mobile system, antilock brake system control, Auto-Focus Camera, Printer, Domestic Washing Machine, Optical Mark Reader, Bar Code Reader and Pick and Place robot Arm. Using PLC for extending and retracting a pneumatic piston and two pneumatic pistons in different combinations, control of vibrating machine, control of process tank, control of conveyor motor, detecting, sorting and packaging unit.

Text Book:

Reference Books:
[R2] Dan Necsulescu, Mechatronics, Pearson
HIGH VOLTAGE ENGINEERING

Paper Code: ETEE-417
Paper: High Voltage Engineering

L T/P C
3 0 3

INSTRUCTIONS TO PAPER SETTERS:

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.

MAXIMUM MARKS: 75

Objectives: To understand the various types of over voltages in power system, protection methods, measurement of over voltages, nature of Breakdown mechanism in solid, liquid and gaseous dielectrics and Testing of power apparatus and insulation coordination.

UNIT I
High Voltage and Breakdown Phenomenon
Electric field stress due to high voltage, gas, vacuum, liquid, solids and composites as dielectrics and insulator, estimation and control of electric stress and numerical methods for its computation, surge voltages and their distribution and control, application of insulating materials in transformer, rotating machines, circuit breakers, cable, power capacitors, bushings; breakdown in gaseous and liquid dielectrics, collision process, ionization process, Townsend’s Criteria of breakdown in gases, Paschen’s law, breakdown in pure and commercial liquids as insulator; intrinsic, electromechanical and thermal breakdown of solid dielectrics, breakdown in composite dielectrics.

UNIT II
Generation of High Voltages and Currents
Generation of high direct current voltages and high alternating current voltages, generation of impulse voltages and impulse currents, tripping and control of impulse generators.

UNIT III
Measurement of High Voltages and Currents
Measurements of high voltages - direct, alternating and impulse, measurements of high currents—direct, alternating and impulse, Oscilloscope for impulse voltage and current measurements.

UNIT IV
Over Voltage, Insulation Coordination and Testing
Causes of over voltage – lightning, switching, faults and other abnormal conditions, principles of insulation coordination in high voltage, extra high voltage and ultra high voltage power systems, measurement of DC resistivity, dielectric constant, loss factor and partial discharge, testing of insulators and bushings, isolators and circuit breakers, cables, transformers, surge arresters, measurement of Radio Interference.

Text Books:

Reference Books:
SELECTED TOPICS IN EEE

Paper Code: ETEE-421  
Paper: Selected Topics in EEE  

L  T/P  C
3   0    3

INSTRUCTIONS TO PAPER SETTERS:

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.

MAXIMUM MARKS: 75

Objective: The objective of this paper is to introduce the student about induction Generator, Harmonics in Electrical Machine, Solar photovoltaic system and other related functions

UNIT I
Induction Generator: Torque-speed characteristics of an induction machine under generation mode, Line/grid Connected Induction Generator : Operation and limitations; Self Excited Induction Generator (SEIG) : Process of self excitation, conditions of self excitation, critical capacitance curve, no load characteristics (terminal capacitance vs induced voltage at constant speed), load characteristics (terminal voltage vs load current at fixed terminal capacitance & constant speed), frequency characteristics (frequency of generated voltage vs resistive load current) and voltage characteristic improvement using additional capacitor (capacitance vs resistive load current keeping terminal voltage and speed constant).

UNIT II
Harmonics in Electrical Machines: Harmonics in 3-phase transformers, Space distribution of magnetic field produced by direct current in stator field coils of a D.C. machine, Space distribution of magnetic field produced by current in armature windings of a D.C. machine, Effect of armature MMF on main field of a D.C. machine, Space distribution of magnetic field produced by 3-phase distributed stator winding of a 3-phase induction machine, Space harmonics and their effects in a 3-phase induction machine, Operation of 3-phase induction motor on unbalanced supply.

UNIT III

UNIT IV
Electrical Energy Conservation: Modern compact fluorescent lamps, energy audit methods of saving electricity in drives, lighting, air conditioning, pumps and distributions systems metering, KW, KWh and KVAR meters, Standby power generation: DG sets, UPS, online Inverters and their maintenance.

Text Books:

References:
OPTOELECTRONICS AND OPTICAL COMMUNICATIONS

Paper Code: ETEC-403
Paper: Optoelectronics and Optical Communications

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

INSTRUCTIONS TO PAPER SETTERS:

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 12.5 marks

OBJECTIVE: The objective of this paper is to introduce the student about Optical Fiber, Wave propagation, Detectors and its structures and functions.

UNIT I

UNIT II
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.

UNIT III

UNIT IV

Text Books:

Reference Books:
DATABASE MANAGEMENT SYSTEMS

Paper Code: ETCS-425
L T/P C
Paper: Database Management Systems 3 0 3

INSTRUCTIONS TO PAPER SETTERS:

<table>
<thead>
<tr>
<th>Maximum Marks: 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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 12.5 marks.</td>
</tr>
</tbody>
</table>

Objective: The concepts related to database, database techniques, SQL and database operations are introduced in this subject. This creates strong foundation for application data design.


UNIT-IV: Transaction Management: ACID properties, serializability of Transaction, Testing for Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, Database recovery management.

Implementation Techniques: Overview of Physical Storage Media, File Organization, Indexing and Hashing, B+ tree Index Files, Query Processing Overview, Catalog Information for Cost Estimation, Selection Operation, Sorting, Join Operation, Materialized views, Database Tuning.

Text Books:

References Books:
Objective: The objective of teaching this subject is to make students understand the applications of electronics in diagnostic and therapeutic area. Further the methods of recording various bio potentials; measurement of biochemical and physiological information are explained. The topics such as Patient Monitoring systems, Audiometers, imaging systems, Patients safety are also included. The emerging Computer Applications in Biomedical field are also dealt with.

UNIT I

UNIT II
Patient Monitoring systems & Audiometers: Cardiac monitor, Bedside patient monitor, measurement of heart rate, blood pressure, temperature, respiration rate, Arrhythmia monitor, Methods of monitoring fatal heart rate, Monitoring labor activity, Audiometers: Audiometers, Blood cell counters, Oximeter, Blood flow meter, cardiac output measurement, Blood gas analyzers.

UNIT III
Modern Imaging systems: Introduction, Basic principle & Block diagram of x-ray machine, x-ray Computed Tomography (CT), Magnetic resonance imaging system (NMR), ultrasonic imaging system. Eco-Cardiograph, Eco Encephalography, Ophthalmic scans, MRI. Therapeutic Equipments: Cardiac pacemakers, cardiac defibrillators, Hemodialysis machine, Surgical diathermy machine.

UNIT III
Patients safety & Computer Applications in Biomedical field: Precaution, safety codes for electro medical equipment, Electric safety analyzer, Testing of biomedical equipment, Use of microprocessors in medical instruments, Microcontrollers, PC based medical instruments, Computerized Critical care units, Planning & designing a computerized critical care unit. Physiotherapy; Software Diathermy, microwave diathermy, Ultrasound therapy unit, Electotherapy Equipments, Ventilators.

Text Books:

Reference Books:
[R3] Leslie Cromwell, Fred J. Weibell & Erich A. Pfeiffer, “Biomedical Instrumentation & Measurements”, PHI
DIGITAL SYSTEM DESIGN

Paper Code: ETEC-427
Paper: Digital System Design

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

INSTRUCTIONS TO PAPER SETTERS:

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.

Objective: To enhance the knowledge and skill of the students in digital system design with emphasis on Hardware Description Language (VHDL HDL)

UNIT I
Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements. Subprograms – Functions, Procedures, attributes, generic, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

UNIT II
Combinational logic circuit design and VHDL implementation of following circuits – first adder, Subtracter, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.

UNIT III
Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC).

UNIT IV
Asynchronous sequential circuit design – primitive flow table, concept of race, critical race and hazards, design issues like metastability, synchronizers, clock skew and timing considerations. Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of CPLD (Xilinx/Altera).

Text Books:

Reference Books:
Objective: The objective of the paper is to facilitate the student with the knowledge of communication through power lines.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
Systems and Implementations: PLC smart grid systems, PLC broadband Access systems, Multimedia PLC systems, DC-PLC systems, PLC in emerging countries

Text:

References:
ELECTRICAL MACHINES DESIGN

Paper Code: ETEL-405
Paper: Electrical Machines Design

L T/P C
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.

Objective: Providing sound knowledge about the principles of operation of various electrical machines, their constructional features, and their behavior and Design concepts of various components of each electrical machine so that machines after manufacturing operate at optimum efficiency and economy under various condition of operation.

UNIT I
DC Machines: Output Equations, Main Dimensions, Magnetic circuit calculations, Carter’s Coefficient, Net length of Iron, Real & Apparent flux densities, Selection of number of poles, Design of Armature, Design of commutated and brushes, performance prediction using design values.

UNIT II
Transformers: Output Equations, Main Dimensions, KVA output for single and three phase transformers, Window space factor, Overall dimensions, Operating characteristics, Regulation, No load current, Temperature rise in Transformers, Design of Tank, Methods of cooling of Transformers.

UNIT III
Induction Motors: Output equation of Induction motor, Main dimensions, Length of air gap, Rules for selecting rotor slots of squirrel cage machines, Design of rotor bars & slots, Design of end rings, Design of wound rotor, Magnetic leakage calculations, leakage reactance of poly phase machines, Magnetizing current, Short circuit current, Circle diagram, Operating characteristics.

UNIT IV
Synchronous Machines: Output equations, choice of loadings, Design of salient pole machines, Short circuit ratio, shape of pole face, Armature design, Armature parameters, Estimation of air gap length, Design of rotor, Design of damper winding, Determination of full load field mmf, Design of field winding, Design of turbo alternators, Rotor design.

Text Books:

Reference
**SOCIOLOGY AND ELEMENTS OF INDIAN HISTORY FOR ENGINEERS**

**Paper Code:** ETHS-419

**Paper:** Sociology and Elements of Indian History for Engineers

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**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.

**Objective:** The objective of this course is to familiarize the prospective engineers with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society. The course would enable them to analyze critically the social processes of globalization, modernization and social change. All of this is a part of the quest to help the students imbibe such skills that will enhance them to be better citizens and human beings at their workplace or in the family or in other social institutions.

**UNIT I**

**Module 1A:** Introduction to Elements of Indian History: What is History? History Sources—Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography.

**Module 1B:** Introduction to sociological concepts—structure, system, organization, social institution, Culture social stratification (caste, class, gender, power). State & civil society.

**UNIT II**

**Module 2A:** Indian history & periodization; evolution of urbanization process: first, second & third phase of urbanization; Evolution of polity; early states of empires; Understanding social structures—feudalism debate.

**Module 2B:** Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim.

**UNIT III**

**Module 3A:** From Feudalism to colonialism—the coming of British; Modernity & struggle for independence.

**Module 3B:** Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim.

**UNIT IV**

**Module 4A:** Issues & concerns in post-colonial India (upto 1991); Issues & concerns in post-colonial India 2nd phase (LPG decade post 1991).

**Module 4B:** Social change in contemporary India: Modernization and globalization, Secularism and communalism, Nature of development. Processes of social exclusion and inclusion. Changing nature of work and organization.

**Text Books:**


**Reference Books:**

[R1] Guha, Ramachandra (2007), India After Gandhi, Pan Macmillan

ELECTRICAL DRIVES LAB

Paper Code: ETEE-451
Paper: Electrical Drives Lab

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

List of Experiments:

1. Load equalization by flywheel for intermittent duty loads.
2. Comparison of various braking methods and their range of braking for induction motor.
3. Open loop AC voltage Control of single phase capacitor run induction motor.
4. Verification of linear relationship between duty cycle vs speed in open loop step down chopper controlled DC motor drive.
5. Single phase thyristorised full converter fed closed loop speed control of DC motor drive.
6. Closed loop speed control of 4 quadrant DC motor drive.
7. Closed Loop constant V/F speed control of Induction motor drive.
8. Closed Loop speed control through static rotor resistance controlled slip ring Induction motor.
10. Closed Loop speed control of SRM drive.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
ADVANCED CONTROL SYSTEMS LAB

Paper Code: ETEE-453
L T/P C
0 2 1

Paper: Advanced Control Systems Lab

List of Experiments:

1. Study of open loop and closed loop time/frequency responses of first/second order LTI system
2. Conversion of transfer functions to state model of LTI system and vice versa
3. Determine State Space Model of a given system and determine its controllability and observability.
4. Analysis of Zero order hold and first order hold circuits.
5. Conversion of transfer functions to state model of discrete time system.
6. To determine state transition matrix of a given system.
7. Study of saturation and dead zone non-linearity using describing function technique of a relay control system.
8. To draw phase trajectory of a given non-linear system.
9. Experiments based on PLC applications e.g. Lift control models, pick and place module etc.
10. Study of operation of a stepper motor interface with microprocessor.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
ELECTRICAL MACHINES DESIGN LAB

Paper Code: ETEE-455(ELECTIVE)  
Paper: Electrical Machines Design Lab  
L T C  
3 0 3

List of Experiments:

To design the following parts of the electrical machines by using C++/MATLAB or any other related software.

1. Design of Armature
2. Design of Commutator
3. Design of Armature winding
4. Design of Magnetic Core of Transformer
5. Design of rotor bars and slots of squirrel cage induction motor
6. Design of rotor core of slip ring induction motor
7. Design of salient pole rotor of synchronous machine
8. Design of stator core and winding for synchronous machine
9. Design of rotor for turbo alternators
10. Design of damper winding

Reference:

NOTE:- At least 8 Experiments out of the list must be done in the semester.
DIGITAL SYSTEM DESIGN LAB

Paper Code: ETEE-455(ELECTIVE)                                      L  T/P  C
Paper: Digital System Design Lab                                      0  2   1

List of Experiments:

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. half adder
   b. full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   c. multiplexer
   d. demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. decoder
   b. encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6. Write a VHDL program for a code converter and check the wave forms and the hardware generated
7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
8. Write a VHDL program for a counter and check the wave forms and the hardware generated
9. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. register
   b. shift register

NOTE:- At least 8 Experiments out of the list must be done in the semester.
DATABASE MANAGEMENT SYSTEMS LAB

Paper Code: ETEE-455(ELECTIVE)  
Paper: Database Management Systems Lab  

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**LAB BASED ON DBMS**

Lab includes implementation of DDL, DCL, DML i.e SQL in Oracle.

**List of Experiments:**

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE, and DELETE
4. Write the queries to implement the joins
5. Write the queries for implementing the following functions: MAX (), MIN (), AVG (), COUNT ()
6. Write the queries to implement the concept of Integrity constrains
7. Write the queries to create the views
8. Perform the queries for triggers
9. Perform the following operation for demonstrating the insertion, updation and deletion using the referential integrity constraints

**TEXT BOOK:**


**NOTE:** At least 8 Experiments out of the list must be done in the semester.
INSTRUCTIONS TO PAPER SETTERS:  

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.
3. Two internal sessional test of 10 marks each and one project report* carrying 5 marks.

MAXIMUM MARKS: 75

INSTRUCTIONS TO PAPER SETTERS:

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.
3. Two internal sessional test of 10 marks each and one project report* carrying 5 marks.

OBJECTIVES:

1. The main object of this paper is to inculcate the skills of ethical decision making and then to apply these skills to the real and current challenges of the engineering profession.
2. To enable student to understand the need and importance of value-education and education for Human Rights.
3. To acquaint students to the National and International values for Global development.

UNIT I - Appraisal of Human Values and Professional Ethics:
Review of Universal Human Values:
- Indian pluralism - the way of life of Islam, Buddhism, Christianity, Jainism, Sikhism and Hinduism, Greek - Roman and Chinese cultural values.
Sensitization of Impact of Modern Education and Media on Values:
- a) Impact of Science and Technology
- b) Effects of Printed Media and Television on Values
- c) Effects of computer aided media on Values (Internet, e-mail, Chat etc.)
- d) Role of teacher in the preservation of tradition and culture.
- e) Role of family, tradition & community prayers in value development.
Review of Professional Ethics:
- Accountability, Collegiality, Royalty, Responsibility and Ethics Living.
- Engineer as a role model for civil society, Living in harmony with ‘NATURE’.
- Four orders of living, their inter -correctness, Holistic technology (eco-friendly and sustainable technology).

UNIT II – Engineers responsibility for safety:
Some Case Studies:
- Case Studies, BHOPAL Gas Tragedy, Nuclear Power Plant Disasters, Space Shuttle Challenger, Three Mile Island Accident, etc.

UNIT III – Global Issues:
Globalization and MNCs: International Trade, Issues,
Case Studies: Kelleg’s, Satyam, Infosys Foundation, TATA Group of Companies
Business Ethics: Corporate Governance, Finance and Accounting, IPR.
Corporate Social Responsibility (CSR): Definition, Concept, ISO, CSR.
Environmental Ethics: Sustainable Development, Eco-System, Ozone depletion, Pollution.
Computer Ethics: Cyber Crimes, Data Stealing, Hacking, Embezzlement.

UNIT IV - Engineers Responsibilities and Rights and Ethical Codes:
Collegiality and loyalty, Conflict of interests, confidentiality, occupational crimes, professional rights, responsibilities. To boost industrial production with excellent quality and efficiency, To enhance national economy, To boost team spirit, Work Culture and feeling of job satisfaction, National integration, Examples of some illustrious professionals.
Need for Ethical Codes, Study of some sample codes such as institution of Electrical and Electronics Engineers, Computer Society of India etc., Ethical Audit.
Development and implementation of Codes: Oath to be taken by Engineering graduates and its importance**.

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
Text Books:
[T1] Professional Ethics, R. Subramanian, Oxford University Press.

References Books:
[R8] Charles E Harris, Micheal J Rabins, "Engineering Ethics, Cengage Learning
[R9] PSR Murthy,”Indian Culture Values and Professional Ethics”, BS Publications
[R10] Caroline Whitback< Ethics in Engineering Practice and Research, Cambrdges University Press
[R13] C, Sheshadri; The Source book of Value Education, NCERT
[R14] M. Shery; Bhartiya Sanskriti, Agra (Dayalbagh)

*Any topic related to the experience of the B.Tech student in the assimilation and implementation of human values and professional ethics during the past three years of his/her studies in the institute OR A rigorous ethical analysis of a recent case of violation of professional ethics particularly related to engineering profession.

**All students are required to take OATH in writing prior to submission of major project and the record of the same is to be maintained at the college level and/or, this oath may be administered by the head of the institutions during the graduation ceremonies. The draft for the same is available alongwith the scheme and syllabus.
OATH TO BE TAKEN BY ENGINEERING GRADUATES

In a manner similar to the Hippocratic Oath taken by the medical graduates, Oath to be taken by the engineering graduates is as given below.

1. I solemnly pledge myself to consecrate my life to the service of humanity.
2. I will give my teacher the respect and gratitude, which is their due.
3. I will be loyal to the profession of engineering and be just and generous to its members.
4. Whatever project I undertake, it will be for the good of mankind.
5. I will exercise my profession solely for the benefit of humanity and perform no act for criminal purpose and not contrary to the laws of humanity.
6. I will keep away from wrong, corruption and avoid tempting others to vicious practices.
7. I will endeavor to avoid waste and consumption of non-renewable resources.
8. I will speak out against evil and unjust practices whenever and wherever I encounter them.
9. I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my work, even under threat.
10. I will practice my profession with conscience, dignity and uprightness.
11. I will respect the secrets, which are confided to me.

I make these promises solemnly, freely and upon my honor.

(Name of the Student)

Correspondence Address:

________________________________________
________________________________________

Email: ________________________________________
NEURO & FUZZY SYSTEMS

Paper Code: ETEE-404

L       T/P       C
3       1         4

Objective: To impart knowledge of soft computing techniques and applications in engineering systems.

UNIT -I

[T1, T2][No. of Hrs. 11]

UNIT-II

UNIT-III


[T1, T2][No. of Hrs. 11]

UNIT-IV

[T1, T2][No. of Hrs. 10]

Text Books:

References Books:
[R5] S N Sivanandam, “Neural Network using Matlab” TMH 2013
POWER SYSTEM OPERATION & CONTROL

Paper Code: ETEE-406
Paper: Power System Operation & Control

INSTRUCTIONS TO PAPER SETTERS:

<table>
<thead>
<tr>
<th>MAXIMUM MARKS: 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

Objective: The objective of the paper is to facilitate the student with the importance of Optimal Control and Stability Concerns in Power Systems.

UNIT-I
AUTOMATIC GENERATION CONTROL:
Introduction: Load frequency control (single area case), load frequency (Two Area Case) control, load frequency control with GRC, Speed Governor Dead Band and its effects.

UNIT-II
ECONOMIC LOAD DESPATCH:

UNIT-III
RESTRUCTURING OF POWER SYSTEM:
Introduction: Reason for restructuring or deregulation of power industry, Understanding the restructuring process, introduction to issues involved in deregulation, reasons and objectives of deregulation of various power system across the world, Transmission Congestion management.

UNIT-IV
REACTIVE POWER AND VOLTAGE CONTROL:
Bases of reactive power control, Excitation System, Modeling, Generation and Absorption of Reactive Power, Relation between voltage, power and reactive power at node, methods of voltage control.

Text Books:

Reference Books:
APPLICATION OF POWER ELECTRONICS TO POWER SYSTEMS

Paper Code: ETEE-408
Paper: Application of Power Electronics to Power Systems

L T/P C

INSTRUCTIONS TO PAPER SETTERS:

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

MAXIMUM MARKS: 75

Objective: The objective of the paper is to facilitate the student with the basics of Application of Power Electronic to Power Systems that are required for an engineering student.

UNIT- I
Overview of Power Quality:
Classification of power quality issues, characterization of electric power quality, power acceptability curves, power quality problems, poor load power factor, nonlinear and unbalanced loads, transients, voltage sags and swells, over voltages and under voltages, outage, harmonic distortion, voltage notching, flicker, electrical noise, power quality indices, distortion index, IEEE guidelines and recommendations, harmonics creating loads, characterization of nonlinear loads, modelling of nonlinear loads, harmonic propagation series and parallel resonances, harmonic power flow.

UNIT- II
Compensation of Power Quality Problems:
Passive Filters, various types, analysis and design, basics of P-Q theory, Clarke’s and Park transformations (abc-dq), Synchronous Reference Frame theory (SRF), comparison between SRF and pq theory, application to 3 ph-3 wire and 3ph-4wire system, harmonic, reactive power and current unbalance compensation by DSTATCOM, voltage regulation, distortion and voltage unbalance compensation by DVR, Hybrid power filters and Unified Power Quality Conditioner.

UNIT-III
Compensation with FACTS Controllers:
Reactive power control in power systems, static series and shunt compensators, objectives of shunt and series compensation, methods of controllable VAR generation, Voltage sourced converters and current source converters, SVC and STATCOM for transmission lines, comparison between SVC and STATCOM, principles of TCSC and SSSC, basic operating principles of UPFC, applications for power flow control.

UNIT- IV
DC Power Transmission and System Control:
Introduction, comparison of AC and DC transmission, application of DC transmission. General principles of DC link control, converter control characteristics, combined rectifier and inverter characteristics, alternative inverter control modes, mode stabilization, system control hierarchy, harmonics and filters.

Text:

References:
[R3] Lecture Series on Power Quality- NPTEL
DIGITAL IMAGE PROCESSING

Paper Code: ETIT-418
Paper: Digital Image Processing

L T/P C
3 0 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.

Objectives: The aim of this course is to provide digital image processing fundamentals, hardware and software, digitization, encoding, segmentation, feature extraction etc. It will enhance the ability of students to apply tools in image restoration, enhancement and compression and to apply the techniques in both the spatial and frequency domains. It will enhance the ability of students to identify the quality characteristics of medical images, differences between computer vision and image processing and help in studying the remote sensing images of the environmental studies.

UNIT- I:


UNIT- II:
Filtering in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothening and Sharpening Frequency Domain Filters.


UNIT- III:
Image Compression: fundamentals of compression, coding redundancy, Lossy and lossless compression, Spatial and temporal redundancy, Image compression models. Some basic compression methods

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Region Oriented Segmentation, Motion based segmentation.

UNIT- IV:
Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

Object Recognition: Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

Text Books:

Reference Books:
RELIABILITY ENGINEERING & APPLICATION TO POWER SYSTEMS

Paper Code: ETEE-412                                                                                           L T/P C
Paper: Reliability Engineering & Application to Power Systems              3 0 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.

Objective: The objective of the paper is to facilitate the student with the concept of probability theory and Reliability modelling of a generation system.

UNIT- I
Basic probability theory & Distribution:

UNIT- II
Network Modelling and Reliability Analysis:
Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method. Reliability functions f(t), F(t), R(t), h(t) and their relationships – exponential distribution – 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.

UNIT- III
Markov Modelling:

UNIT- IV
Generation System Reliability Analysis:

Text Books:

Reference Books:
ELECTRICAL MACHINES—III

Paper Code: ETEE-414
Paper: Electrical Machines—III

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.

Objective: Providing sound knowledge about the principles of operation of various electrical machines, their constructional features, and their behavior and characteristics under various conditions of operation.

UNIT I:
Induction Generator: Torque-speed characteristics of an Induction machine under generation mode, Line/grid Connected Induction Generator: Operation and Limitations, Self-Excited Induction Generator: Process of self-excitation, conditions of self-excitation, critical capacitance curve, No load characteristics, load characteristics, frequency characteristics, Voltage characteristics improvement using additional terminal capacitors, Doubly fed Induction generator, Induction voltage regulator.

UNIT II:
Stepper Motors: Principle of operation, characteristics and analysis of variable reluctance, permanent magnet and hybrid stepper motors, torque equation, drive circuits and switching diagrams, Open-Loop Control of Stepper Motor, Microprocessor-Based Control of Stepper Motor.
Switched Reluctance Motors: Construction, principle of operation, torque production, modes of operation, drive circuits, microprocessor based control of SRM and sensor less control.

UNIT III:
Permanent Magnet Machines: Construction, working principle, torque equation, equivalent circuit, performance characteristics and applications of permanent magnet brushed DC motors (PMBDC), PMBLDC Motors, permanent magnet synchronous motors, reluctance motors, synchronous reluctance motors. DC and AC tacho generators.

UNIT IV:
Special Electrical Machines: Construction, principle of operation, characteristics and analysis of fractional horse power universal motor, hysteresis motor. Construction, principle of operation of Linear Induction Motors and applications.

Text Books:
[T2] Special Electrical Machines by K Venkatratnam, Universities Press 2014

Reference Books:
[R6] Special Electrical Machines by K Venkatratnam, Universities Press 2014

Scheme and Syllabi for B. Tech-EEE, 1st year (Common to all branches) w.e.f batch 2014-15 and (2nd, 3rd & 4th years) w.e.f batch 2013-14 approved in the 22nd BOS of USET on 30th June, 2014 and approved in the 37th AC Sub Committee Meeting held on 10th July, 2014.
ELECTRICAL ENERGY CONSERVATION

Paper Code: ETEE-416
Paper: Electrical Energy Conservation

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

Objectives: To impart knowledge on Electrical energy conservation, energy auditing and power quality, Principle and design of illumination systems and methods of heating and their performance.

UNIT I
Energy Conservation and Energy Policies

UNIT II
Energy Conservation in Electrical Installations

UNIT III
Energy Efficient Motors
Types and operating characteristics of electric motors, Energy efficient control and starting – Load matching, Selection of motors, Efficiency and load analysis, Energy efficiency, High efficiency motors, Industrial drives, Control schemes, Variable speed drives and Energy conservation schemes, Pumps and fans, Efficient control strategies, Over-sizing Case studies.

UNIT IV
Energy Efficient Building / Green Building
Energy Conservation in Buildings Air conditioning, monitoring and control systems of energy efficient buildings, Principle of Energy efficient building design water heating system, photovoltaic systems and Energy conservation in lighting schemes, Energy efficient light sources, Domestic, commercial and industrial lighting, Lighting controls, Luminaries.

Text Books:-

Reference Books:
[R1] Bureau of Energy efficiency of India.
### POWER SYSTEM ANALYSIS & STABILITY

**Paper Code:** ETEL-402  
**Paper:** Power System Analysis & Stability  

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

**INSTRUCTIONS TO PAPER SETTERS:**

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.

**Objective:** The objective of the paper is to facilitate the student with detailed study of flow of power in the network, subsequent faults and the stability limits in the system.

**UNIT-I**  
**LOAD FLOW STUDIES**  
Type of buses, bus admittance method, load flow equation, GS method, NR method, Fast decoupled load flow.

**UNIT-II**  
**FAULT CALCULATIONS**  
Symmetrical Components, symmetrical faults, unsymmetrical faults, Sequence networks for synchronous Machines, Transformers and Transmission Line, Sequence impedance.

**UNIT-III**  
**POWER SYSTEM STABILITY**  
Introduction, swing equation, steady state stability, equal area criteria, critical clearing angle, point by point method, factors affecting Steady State and Transient Stability and Methods of Improvements.

**UNIT-IV**  
**OPTIMAL POWER FLOW**  
Problem statement, solution of optimal power flow, gradient method, Newton method, Linear sensitivity analysis, LP methods- with real power variables only, LP method with ac power flow variable and detailed cost functions, security constraint optimal power flow

**Text Books:**

**Reference Books:**
- [R4] L.P. Singh, Advanced power system analysis and dynamics, New age International Ltd.
ELECTRICAL SYSTEM DESIGN

Paper Code: ETEE-418
Paper: Electrical System Design

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.

Objective: The objective of the paper is to facilitate the student with detailed Design aspects of Electrical Systems.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
Estimate the quantity of materials required and draw the electrical wiring layout of (a) residential building (b) Multi-storied building using rising mains (c) factory with one number of small and high rating motor at LT or HT supply and many number of connected loads with suitable starters/switches and control panels (d) Cinema hall design, layout and estimation of power supply arrangement for (1), A bulk Industrial consumer (2) An underground power supply (3) An Over head line to a rural consumer. Estimate and draw the layout of (1) indoor (2) outdoor 11KV transformer station with all accessories – single line diagram and physical layout Design and draw the typical earthing installation like (1) pipe earthing (2) Plate earthing (3) earth mat/grid.

Text Books:

Reference Books:
[R1] Performance and Design of D.C Machine: Clayton
[R2] Design of Electrical Machines: V. N Mittal
EMBEDDED SYSTEMS

Paper Code: ETIC-410

Paper: Embedded Systems

L  T/P  C
3   0   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

Objective: The objective of the paper is to enable a student to design an embedded system for specific tasks.

UNIT- I

PIC Microcontrollers: Architecture, Registers, memory interfacing, interrupts, instructions, programming and peripherals.

UNIT- II
ARM Processors: Comparison of ARM architecture with PIC micro controller, ARM 7 Data Path, Registers, Memory Organization, Instruction set, Programming, Exception programming, Interrupt Handling, Thumb mode Architecture.

UNIT- III
Embedded Software, Concept of Real Time Systems, Software Quality Measurement, Compilers for Embedded System

UNIT-IV

Text book:
[T1] Design with PIC Microcontrollers, John B. Peatman, Pearson Education Asia, 2002

References Books:
[R1] The Design of Small-Scale embedded systems, Tim Wilmhurst, Palgrave2003
DATA COMMUNICATION & NETWORKS

Paper Code: ETEC-420
Paper: Data Communication & Networks

INSTRUCTIONS TO PAPER SETTERS:

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 12.5 marks.

MAXIMUM MARKS: 75

OBJECTIVES:
The objective of the paper is to provide an introduction to the fundamental concepts on data communication and the design, deployment, and management of computer networks.

UNIT- I

Switching: Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and Datagram approach), message switching.

UNIT- II

Medium Access Sublayer: Channel allocation problem, Controlled Access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Token ring, Token Bus, FDDI based LAN, Network Devices-repeaters, hubs, switches bridges.

UNIT- III

UNIT- IV
Transport Layer: Process to Process Delivery: UDP, TCP, congestion control and Quality of service.

Application Layer: Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP), file transfer (FTP), HTTP and WWW.

Text Books:

Reference Books:
OBJECT ORIENTED PROGRAMMING USING C++

Paper Code: ETCS-430
Paper: Object Oriented Programming Using C++

L T/P C
3 0 3

OBJECTIVE ORIENTED PROGRAMMING USING C++

INSTRUCTIONS TO PAPER SETTERS:

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

MAXIMUM MARKS: 75

Objective: The objective of the paper is to facilitate the student with the basics of Object Oriented Programming that are required for an engineering student.

UNIT- I

[T1], [T2] [No. of hrs. 12]

UNIT- II
Array of objects, pointers to objects, this pointer, Dynamic allocation operators, Dynamic objects, Constructors, default constructor, Parameterized constructors, Constructor with dynamic allocation, copy constructor, destructors, operator overloading, friend functions, overloaded through friend functions, overloaded assignment operator, static members Objects, pointers and objects, constant objects, nested classes, local classes

[T1], [T2] [No. of hrs. 11]

UNIT- III
Inheritance, Defining derived classes, Single inheritance, protected data with private inheritance, multiple inheritance, multi level inheritance, hierarchical inheritance, hybrid inheritance, multipath inheritance, Constructors in derived and base class, Abstract classes, virtual function and dynamic polymorphism, pure virtual functions, virtual destructor, Exception Handling, principle of Exception handling, Exception handling mechanism, multiple catch, Nested try, Rethrowing the exception.

[T1], [T2] [No. of hrs. 12]

UNIT- IV
Streams in C++, Stream classes, Formatted and Unformatted data, manipulators, User defined manipulators, file streams, file pointer manipulation, file open and close, Templates, Template functions and Template classes.

[T1], [T2] [No. of hrs. 10]

Text Books:

References:
POWER PLANT INSTRUMENTATION

Paper Code: ETEE-426
Paper: Power Plant Instrumentation

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

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.

Objective: The objective of the paper is to facilitate the student with detailed survey of methods of power generation, monitoring and control.

UNIT I
Power plant: Unit, overview, Types of boiler, Exhaust Gas Boilers and Incinerators, turbine generators, condensers, material handling systems. Comparison of thermal power plant, hydroelectric power plant, Nuclear power plant, solar power plant, Wind power plant.

UNIT II
Boiler Instrumentation: Control and optimization, Combustion control, air to fuel ratio control, 3-element drum level control, steam temperature and pressure control, oxygen/CO2 in flue gases, furnace draft, boiler interlocks, sequence event recorder, supervisor control, data acquisition controls, burner management systems and controllers. Start-up and shut-down procedures, Boiler safety standard, Boiler inspection procedures. Boiler load calculation, boiler efficiency calculation.

UNIT III
Turbine instrumentation and control, start-up and shut-down, thermal stress control, condition monitoring & power distribution instrumentation. Synchronous, Induction generators.

UNIT IV

Text Books:
[T2] Krishnaswamy/Ponni Bala, Power Plant Instrumentation, PHI Learning

Reference Books:
INTELLIGENT AND SMART INSTRUMENTATION

Paper Code ETEE-428
Paper: Intelligent and Smart Instrumentation

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.

Objective:- To introduce modern devices and techniques used in instrumentations, especially in automation and critical applications.

UNIT-I

UNIT-II
Sensors: Primary sensors; Excitation; Amplification; Filters; Converters; Compensation (Nonlinearity: look up table method, polygon interpolation, polynomial interpolation, cubic spline interpolation, Approximation & regression; Noise & interference; Response time; Drift; Cross-sensitivity); Information Coding/ Processing; Data Communication; Standards for smart sensor interface.

UNIT-III
VI and Data Acquisition: Introduction to virtual Instrumentation, VI programming using LabVIEW, Signal Conditioning, DAQ Hardware Configuration, DAQ Hardware, DAQ Software Architecture, DAQ Assistant, Channel and Task configuration, Selecting and Configuring a DAQ device, Serial interfacing - RS 232C, RS 422, RS 423, RS 485.

UNIT IV
Instrumentation Systems:- Types of Instrumentation systems, Intelligent Instrumentation. Component of Intelligent Instrumentation System, Concept of real time system and its industrial application, realization of real time system using microcontroller and typical applications.

Text Books:

Reference Books:
[R2] P.Rai Choudhury, MEMS and MOEMS Technology and Application, PHI
[R3] Barney, “ Intelligent Instrumentation, Microprocessor Applications in measurement and Control”, PHI
### Digital Communication

**Paper Code:** ETEC-430  
**Paper:** Digital Communication  

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**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.

**Objective:** To enable the students
- 1. To distinguish between analog and digital communication.
- 2. To understand the concept of digital communication system.
- 3. To understand the concept of random variables and random process.
- 4. To learn the digital modulation techniques.

**UNIT-I**
Introduction to Digital Communication:

- **Line coding:** NRZ, RZ, Manchester encoding, differential Manchester encoding, AMI coding, high density bipolar code, binary with n-zero substitution codes.
- Review of sampling theorem, uniform and non-uniform quantization, companding, \( \mu \)-Law and A-law compressors. Concept and Analysis of PCM, DPCM, DM and ADM modulators and demodulators, M-ary waveforms, S/N ratio for all modulation, probability of error for PCM in AWGN Channel and other modulation techniques, Duo Binary pulse.

**[T1, R2]** [No. of Hours: 11]

**UNIT-II**
Random Signal Theory:

- Probability, Concept of Random variable (Stationary, Non stationary, WSS, SSS), Random process, CDF, PDF, Joint CDF, Joint PDF, marginal PDF, Mean, Moments, Central Moment Auto-correlation & Cross-correlation, covariance functions, ergodicity, power spectral density, Gaussian distribution, Uniform distribution, Rayleigh distribution, Binomial distribution, Poisson’s distribution, Weiner distribution, Wiener-khinchin theorem, Central limit Theorem.

**[T1, T2, R2]** [No. of Hours: 11]

**UNIT-III**
Designing of Receiver:


**[T1, T2, R1, R2]** [No. of Hours: 11]

**UNIT-IV**
Digital modulation schemes:


**[T1, T2, R2]** [No. of Hours: 11]

**Text Books:**

**Reference Books:**
Objective: The objective of the paper is to facilitate the student with the importance of Power Quality and methods to improve it that are required in the power industry.

UNIT I

UNIT II
Voltage Sag Analysis: Voltage sag characteristics – Methodology for computation of voltage sag magnitude and occurrence — Accuracy of sag analysis — Duration & frequency of sags — Faults behind transformers — Effect of pre-fault voltage — Simple examples — Voltage dip problems, fast assessment methods for voltage sags in distribution systems.

UNIT III
PQ Consideration in Industrial Power Systems: Adjustable speed drive (ASD) systems and applications — Sources of power system harmonics — Mitigation of harmonics — Characterization of voltage sags experienced by three-phase ASD systems — Types of sags and phase angle jumps — Effects of momentary voltage dips on the operation of induction and synchronous motors.

UNIT IV
Harmonics: Harmonic distortion, Voltage versus current distortion, Harmonics versus Transients, Harmonic Indices, Harmonic sources from commercial loads, Harmonic sources from industrial loads, Locating Harmonic sources, System response characteristics, Effects of Harmonic distortion, Inter harmonics, Devices for controlling harmonic distortion.

Text Books:

References Books:
NEURO & FUZZY SYSTEMS LAB

Paper Code: ETEE-452
Paper: Neuro & Fuzzy System Lab

List of Experiments:

1. Design a neural network using neural network toolbox, which identify the given data set.
   \[ P = [0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10]; \] (Given input data)
   \[ T = [0 \ 1 \ 2 \ 3 \ 4 \ 3 \ 2 \ 1 \ 2 \ 3 \ 4]; \] (Given output data)
2. Write a program to implement AND function using perception networks with bipolar inputs and outputs.
3. Write a program to implement AND function using ADALINE with bipolar inputs and outputs.
4. Implement a Back Propagation network for a given input pattern by a suitable MATLAB program. Perform 3 epochs of operation.
5. Write a program to construct and test auto-associative network for input vector using HEBB/Outer Product Rule.
6. Write a program to construct and test hetero-associative network for binary inputs and targets using HEBB/Outer Product Rule.
7. Consider the following fuzzy sets
   \[ A = \left\{ \frac{1}{2} + \frac{0.4}{3} + \frac{0.6}{4} + \frac{0.3}{5} \right\} \]
   \[ B = \left\{ \frac{0.3}{2} + \frac{0.2}{3} + \frac{0.6}{4} + \frac{0.5}{5} \right\} \]
   Calculate \( A \cup B, A \cap B, A, B \), by using a MATLAB program.
8. Find the fuzzy relation using fuzzy max-min method for the following
   Using MATLAB program
   \[
   \begin{bmatrix}
   0.2 & 0.3 & 0.4 \\
   0.3 & 0.5 & 0.7 \\
   1 & 0.8 & 0.6
   \end{bmatrix}
   \]
   \[
   \begin{bmatrix}
   0.1 & 1 \\
   0.4 & 0.2 \\
   0.3 & 0.7
   \end{bmatrix}
   \]
9. Using MATLAB programming to draw triangular and Gaussian membership function. Given \( x = 0 \) to \( 10 \) with increment of \( 0.1 \). Triangular membership function is defined between \([5 \ 6 \ 7]\) and Gaussian membership is defined between \([2 \ 4]\).
10. Using MATLAB program find the crisp lambda cut set relation for lambda=0.6.
    The fuzzy matrix is given by:
    \[
    \begin{bmatrix}
    0.1 & 0.6 & 0.8 & 1 \\
    1 & 0.7 & 0.4 & 0.2 \\
    0 & 0.6 & 1 & 0.5 \\
    0.1 & 0.5 & 1 & 0.9
    \end{bmatrix}
    \]
11. Write a Matlab program/GATOOL for maximizing/minimizing a function.
12. Design a Controller using Fuzzy/Neural Network/ANFIS Editor

NOTE:- At least 8 Experiments out of the list must be done in the semester.
### ELECTRICAL ENERGY CONSERVATION LAB

**Paper Code:** ETEE-454 (ELECTIVE)  
**Paper:** Electrical Energy Conservation  

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**List of Experiments:**

1. Experimental study of solar PV pumping system.
2. Experimental study of solar lighting systems.
3. Efficiency evaluation of pumps/fans/compressors.
5. Design of measurement and control systems using virtual instrumentation software for motors, PV and lighting systems.
7. Building energy analysis using software.

**NOTE:** At least 8 Experiments from the syllabus must be done in the semester.
ELECTRICAL MACHINES-III LAB

Paper Code: ETEE-454 (ELECTIVE) L T/P C
Paper: Electrical Machines–III Lab 0  2  1

List of Experiments:

EXP. 1 To plot following characteristics of self-excited Induction generator.
   a) No load characteristics ( terminal capacitance vs. induced voltage at no load and constant speed)
   b) Load characteristics (terminal voltage vs. load current at fixed terminal capacitance & constant speed).
   c) Frequency characteristics (frequency of generated voltage vs. resistive load current at constant speed)

EXP. 2 To plot load-voltage characteristics of doubly fed Induction generator.
EXP. 3 To Study Induction voltage regulator.
EXP. 4 To draw torque speed characteristic of variable reluctance motor.
EXP. 5 To control the Speed of stepper motor.
EXP. 6 To draw the torque speed characteristic of hysteresis motor.
EXP. 7 To draw the torque speed characteristic of universal motor.
EXP. 8 To draw the torque speed characteristic of repulsion motor.
EXP. 9 To draw the torque speed characteristic of linear induction motor.
EXP. 10 To draw the Torque speed characteristic of doubly fed induction motor.

Reference Books:
R1. Laboratory Operations for Rotating Electric Machinery and Transformer Technology, Donald V. Richardson, Prentice Hall, 1980

NOTE:- At least 8 Experiments out of the list must be done in the semester.
EMBEDDED SYSTEMS LAB

Paper Code: ETEE-454 (ELECTIVE)  
Paper: Embedded Systems Lab

<table>
<thead>
<tr>
<th>L</th>
<th>T/P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

List of Experiments:

1. Introduction to microcontroller and interfacing modules.
2. To interface the seven segment display with microcontroller 8051
3. To create a series of moving lights using PIC on LEDs.
4. To interface the stepper motor with microcontroller.
5. To display character ‘A’ on 8*8 LED Matrix.
6. Write an ALP to add 16 bits using ARM 7 Processor.
7. Write an ALP for multiplying two 32 bit numbers using ARM Processor
8. Write an ALP to multiply two matrices using ARM processor

NOTE:- At least 8 Experiments out of the list must be done in the semester.