SCHEME OF INSTRUCTION AND SYLLABUS

(2nd YEAR TO 4th YEAR)

B.E. (CIVIL ENGINEERING)

&

B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)

Department of Civil Engineering
Andhra University College of Engineering (Autonomous)
Visakhapatnam-530 003
Andhra Pradesh, India
I/IV B.E/B.TECH (FOUR YEAR COURSE) - SEMESTER SYSTEM
(With effect from 2006-2007 admitted batch onwards)

I & II SEMESTERS

<table>
<thead>
<tr>
<th>CODE NO.</th>
<th>COURSE</th>
<th>Credits</th>
<th>Periods L/T/Lab</th>
<th>Exam Hours</th>
<th>Sessional Marks</th>
<th>Exam Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 1001</td>
<td>English</td>
<td>2</td>
<td>2+1</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1002</td>
<td>Mathematics – I</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1003</td>
<td>Mathematics – II</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1004</td>
<td>Physics Theory</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1005</td>
<td>Chemistry Theory</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1006</td>
<td>History of Science And Technology</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1007</td>
<td>Comp. Prog. And Num. Methd</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1008</td>
<td>Engineering Graphics</td>
<td>5</td>
<td>2+4</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1009</td>
<td>Physics Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1010</td>
<td>Chemistry Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1011</td>
<td>Workshop</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1012</td>
<td>Programming Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>37</td>
<td><strong>39</strong></td>
<td><strong>440</strong></td>
<td></td>
<td><strong>760</strong></td>
<td><strong>1200</strong></td>
</tr>
</tbody>
</table>
II / IV B.E. (CIVIL ENGINEERING) & II / IV B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)

SCHEME OF INSTRUCTION

1st Semester:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam.</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hrs</td>
<td>Marks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE211</td>
<td>Engineering Mathematics – III</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE212</td>
<td>Engineering Mechanics</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE213</td>
<td>Mechanics of Solids</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE214</td>
<td>Building Materials and Building Construction</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE215</td>
<td>Surveying – I</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE216</td>
<td>Engineering Geology</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE217</td>
<td>Strength of Materials Laboratory</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CE218</td>
<td>Survey Field Work-I</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>4</td>
<td>8</td>
<td>36</td>
<td>520</td>
<td>280</td>
<td>800</td>
<td>28</td>
</tr>
</tbody>
</table>

2nd Semester:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam.</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hrs</td>
<td>Marks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE221</td>
<td>Engineering Mathematics- IV</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE222</td>
<td>Structural Analysis-I</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE223</td>
<td>Fluid Mechanics-I</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE224</td>
<td>Surveying-II</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE225</td>
<td>Building Planning &amp; Design</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE226</td>
<td>Environmental Studies</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CE229</td>
<td>Human Values &amp; Professional Ethics</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td>100</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CE227</td>
<td>Survey Field Work-II</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CE228</td>
<td>Fluid Mechanics Lab. – I</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>5</td>
<td>9</td>
<td>37</td>
<td>520</td>
<td>280</td>
<td>800</td>
<td>26</td>
</tr>
</tbody>
</table>
### III / IV B.E. (CIVIL ENGINEERING) & III / IV B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)

#### SCHEME OF INSTRUCTION

**1st Semester:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE311</td>
<td>Reinforced Concrete Structures – I</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE312</td>
<td>Steel Structures – I</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE313</td>
<td>Fluid Mechanics – II</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE314</td>
<td>Geotechnical Engineering- I</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE315</td>
<td>Environmental Engineering- I</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE316</td>
<td>Estimating and Quantity Surveying</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE317</td>
<td>Environmental Engg. Lab</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE318</td>
<td>Geotechnical Engg. Lab-I</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE319</td>
<td>Soft Skills</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>FE 01</td>
<td>Free Elective -I</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>28</td>
<td>6</td>
<td>8</td>
<td>42</td>
<td>590</td>
<td>410</td>
<td>1000</td>
<td>33</td>
</tr>
</tbody>
</table>

**2nd Semester:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE321</td>
<td>Structural analysis – II</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE322</td>
<td>Reinforced Concrete Structures – II</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE323</td>
<td>Steel Structures – II</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE324</td>
<td>Geotechnical Engineering-II</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE325</td>
<td>Fluid Mechanics – III</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE326</td>
<td>Elective -I</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE327</td>
<td>Geotechnical Engg. Lab. II</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE328</td>
<td>Concrete Laboratory</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Industrial Training</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>24</td>
<td>11</td>
<td>6</td>
<td>41</td>
<td>520</td>
<td>280</td>
<td>800</td>
<td>28</td>
</tr>
</tbody>
</table>

@ Assessment as indicated along with the requirements given in the syllabus part.

**ELECTIVE – I (COURSE NO. CE 326)**

- CE326 A  Repair and Rehabilitation of structures

**FREE ELECTIVE – I**
### IV / IV B. E. (CIVIL ENGINEERING)

#### SCHEME OF INSTRUCTIONS

**1st Semester:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ.Exam</th>
<th>Sels. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE411</td>
<td>Water Resource Engineering – I</td>
<td>3</td>
<td>2</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE412</td>
<td>Transportation Engineering – I</td>
<td>3</td>
<td>1</td>
<td></td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE413</td>
<td>Project Planning and Management</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE414</td>
<td>Environmental Engineering – II</td>
<td>4</td>
<td></td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE415</td>
<td>Elective – II</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE416</td>
<td>Computer applications in Civil Engineering (Lab)</td>
<td>3</td>
<td>3</td>
<td></td>
<td>6</td>
<td>3</td>
<td>50</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE417</td>
<td>Transportation Engineering Lab.</td>
<td>3</td>
<td>3</td>
<td></td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE418</td>
<td>Fluid Mechanics Lab. – II</td>
<td>3</td>
<td>3</td>
<td></td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE419</td>
<td>Industrial Training</td>
<td></td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

@ held during summer vacation after III year 2nd semester. Assessment as indicated along with the requirements given in the syllabus part.

**2nd Semester**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ.Exam</th>
<th>Sels. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE421</td>
<td>Transportation Engineering II</td>
<td>3</td>
<td>1</td>
<td></td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE422</td>
<td>Water Resources Engineering II</td>
<td>3</td>
<td>2</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE423</td>
<td>Elective – III</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE424</td>
<td>Elective – IV</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE425</td>
<td>Project Work</td>
<td>6</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td>FE 02</td>
<td>Free Elective-II</td>
<td>4</td>
<td></td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ELECTIVE – II (COURSE NO. CE 415)**
- CE415 A Environmental Impact Analysis
- CE415 B Structural Dynamics
- CE415 C River Engineering

**ELECTIVE – III (COURSE NO. CE 423)**
- CE423 A Finite Element Methods of Analysis
- CE423 B Solid Waste management
- CE423 C Soil Dynamics & Machine Foundation
- CE423 D Principles of Water Quality Management

**ELECTIVE – IV (COURSE NO. CE 424)**
- CE424 A Air Pollution Control
- CE424 B Ground Improvement Techniques
- CE424 C Prestressed Concrete
- CE424 D Coastal Engineering
- CE424 E Hydraulic Structures
## I/IV B.E/B.TECH (FOUR YEAR COURSE) - SEMESTER SYSTEM
(With effect from 2006-2007 admitted batch onwards)

### I & II SEMESTERS

<table>
<thead>
<tr>
<th>CODE NO.</th>
<th>COURSE</th>
<th>Credits</th>
<th>Periods</th>
<th>Exam</th>
<th>Sessional Marks</th>
<th>Exam Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 1001</td>
<td>English</td>
<td>2</td>
<td>2+1</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1002</td>
<td>Mathematics – I</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1003</td>
<td>Mathematics – II</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1004</td>
<td>Physics Theory</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1005</td>
<td>Chemistry Theory</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1006</td>
<td>History of Science And Technology</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1007</td>
<td>Comp. Prog. And Num. Met4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1008</td>
<td>Engineering Graphics</td>
<td>5</td>
<td>2+4</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1009</td>
<td>Physics Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1010</td>
<td>Chemistry Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1011</td>
<td>Workshop</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1012</td>
<td>Programming Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

**Total** 37 39 440 760 1200
ENGLISH
(Common to all the Branches – B.E./B.Tech/ Dual degree ME/ M. Tech Courses and Architecture)

<table>
<thead>
<tr>
<th>Theory Hours</th>
<th>Sessional Marks</th>
<th>External exam marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
</tbody>
</table>

**Vocabulary:** Word Search, Discuss and Note – Word Quiz – A List of 100 Basic Words – One Word Substitutes – 100 Difficult Words, Synonyms, Antonyms, Idioms, Technical terms

**2) Grammar:** Types of Sentences, Verbs, Adverbs, Pronouns, Adjectives, Gerunds & Infinitives, Articles, Quantifier, Punctuation, Prepositions, Conjunctions, Exclamation.


**4) Listening:** Life in a Hostel – Eating Away those Blues!, Meeting Carl Jung – A Documentary on the Big Cat – A Consultant Interviewing Employees – A Conversation about a Business Idea – An Interview with a Woman Engineer

**5) Speaking:** Your favourite Holiday Destination – Describe yourself – Why we need to Save OurTigers-a Dialogue – Your First Interview – Pair Work: Setting up a New Business – Great Engineering Achievements.


**Text Book:**

**Reference Books:**
ENG 1002 Mathematics-I

Lectures/week = 3          Sessional Marks = 30
Exam=3 Hrs,                 Exam. Marks = 70

I Partial Differentiation and its applications:
Functions of Two or More Variables, Partial Derivatives, Homogeneous Functions- Euler’s Theorem, Total Derivative, Differentiation of Implicit Functions, Geometrical Interpretation- Tangent Plane and Normal to a surface. Change of Variables, Jacobians, Taylor’s Theorem for functions of two variables, Errors and approximations. Total Differential, Maxima and Minima of functions of two variables. Lagrange’s method of undetermined multipliers, Differentiation under the integral sign – Leibnitz Rule.

II Solid geometry:

III Multiple integrals and their applications:

IV Infinite series:

V Fourier series:
Euler’s formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Odd and even periodic functions – Expansions of odd and even periodic functions. Half range series. Parseval’s formula, Practical Harmonic analysis.

Text Books:

Reference Books:
ENG 1003 Mathematics-II

Lectures/week = 3
Exam=3 Hrs,  
Sessional Marks =30
Exam. Marks = 70

I Linear Algebra:


II Ordinary Differential Equations Of First Order And Its Applications:


III Linear Differential Equations:

Higher order linear differential equations with constant coefficients. Cauchy’s and Legendre’s linear equations, Simultaneous linear equations with constant coefficients.

IV Series solutions of differential equations:

Series Solutions of ODE-Frobenius method ( when x=0 is a regular singularity),Bessel’s equation, equations reducible to Bessel’s equations. Legendre Polynomials, Rodrigue’s formula, Generating function. Recurrence relations. Orthogonality relation for Bessel’s functions and Legendre Polynomials.

V Laplace transforms:


Text Books:


Reference Books:

ENG. 1004  
Physics

Lectures/week = 3  
Exam=3 Hrs,  
Sessional Marks =30  
Exam. Marks = 70

**Thermodynamics**

**Electromagnetism**
Concept of electric field – Point charge in electric field, dipole in an electric field. Gauss law, some applications, electric potential and field strength, potential due to a point charge and dipole.


**Optics**

Diffraction – Single slit (Qualitative and quantitative treatment).

Polarisation – Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization and detection.

**Lasers and Fibre Optics**
Spontaneous and stimulated emissions, population inversions, Ruby laser, Gas laser, Semiconductor laser, Applications of lasers.

Fibre Optics, Optical Fibre and Total Internal Reflection, Acceptance Angle and cone of a fibre, Fibre optics in communications, Optical parts in Fibre. Fibre Optic Sensors.

**Ultrasonics**
Production of Ultrasonics by Magnetostriction and Piezoelectric effects – Ultrasonics and diffraction pattern, Applications of Ultrasonics.
Modern Physics
The quantization of energy, Photoelectric effect, De Broglie concept of matter waves, uncertainty principle, Schrodinger wave equation, application to a particle in a box.

Elementary concepts of Maxwell-Boltzman, Bose-Einstein’s and Fermi Dirac Statistics. Fermi Dirac Distribution function (no derivations).

Free electron theory of metals, Band theory of solids, Kronig Penny Model, Metals, Insulators and Semiconductors. Ferroelectrics and their applications

Super conductivity, Meisner Effect, Types of Superconductors and Applications of Superconductors.

Nanophase materials – Synthesis, characterization of nanostructured materials, properties and applications.

Renewable energies – Solar, wind and tidal – Applications

Books Recommended
2. Physics by David Halliday and Robert Resnick – Part I and Part II
3. Modern Engineering Physics by A.S. Vadudeva
4. University Physics by Young and Freedman
5. Materials Science by V. Rajendra and A. Marikani
6. Nonconventional Energy by Ashoke V. Desai
ENG 1005 Chemistry

Lectures/week = 3
Exam=3 Hrs.

Sessional Marks =30
Exam. Marks = 70

1. Water Chemistry and pollution:


Water pollution: Source – BOD – COD – Sewage treatment - preliminary, primary, secondary and tertiary.

Air Pollution: Source – Air pollutants – CO , SOx , NOx , Hydrocarbons and particulates. Acid rain – Green House effect – control of Air pollution (General).

2. Solid State Chemistry:


3. Energy Sources:


Nuclear Energy : Fission and fusion – power rectors – Atomic pile applications .


4. Corrosion Chemistry :


5. Fuels and Lubricants:


Lubricants: Classification - mechanism - properties of lubricating oils - Selection of lubricants for Engineering applications.

6. Polymers and Plastics:


7. Building Materials:
Refractories: Classifications - properties - Engineering applications.
Ceramics: Classification - Properties - uses.

Prescribed Text Books
5. Material Science and Engineering V. Raghavan - Prentice-Hall India Ltd.,
ENG 1006 History of Science and Technology

Lectures/week = 3  Sessional Marks = 30
Exam=3 Hrs,  Exam. Marks = 70

1. Historical Perspective :

2. Policies and Plans After Independence :
Nehru’s vision of Science for Independent India, Science and Technology Developments in the New Era Science and Technology Developments during the Five Year Plan Periods and Science and Technology Policy Resolutions.

3. Research and Development (R&D) in India :

4. Science and Technological Developments in Major Areas :
Space – Objectives of Space Programms, Geostationary Satellite Services – INSAT System and INSAT Services Remote Sensing Applications, Launch Vehicle Technology
Defense Research --- Spin –off Technologies for Civilian Use;
Biotechnology --Applications of Biotechnology in – Medicine, Biocatalysts, Agriculture, Food, Fuel and Fodder, Development of Biosensors and Animal Husbandry;

5. Nexus Between Technology Transfer and Development :
Transfer of Technology—Types, Methods, Mechanisms, Process, Channels and Techniques: Appropriate Technology, Technology Assessment, Technological Forecasting, Technological Innovations and Barriers of Technological Change.

Test Books :
1. Kalpana Rajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi-58.

Reference Books :
ENG 1007 Computer Programming and Numerical Methods

Lectures/week = 3
Exam=3 Hrs,
Sessional Marks =30
Exam. Marks = 70

Objectives:
To make the student familiar with programming in C and enable the student to implement the numerical methods described in this course using C as Programming Language

Section A

Computer Programming in C

Functions: Concept of a function – Parameters and how they are passed – Automatic Variables – Recursion – Scope and extent of variables. Writing programs using recursive and non-recursive functions.

Arrays and Strings: Single and multidimensional arrays-Character array as a string- Functions on strings. Writing C Programmes using arrays and for string manipulation.

Structures: Declaring and using structures-Operations on structures – Arrays of structures-User defined data types-Pointers to using files.


Section B

Computer Oriented Numerical Methods

2. Representation for Characters and Numbers: Representation for integer and real numbers. Effect of finite representation on arithmatic operations for example overflow, underflow, associativity and normalization. Some elementary methods for overcoming these limitations.
4. Solutions of simultaneous Algebraic Equations; Gauss elimination method and Gauss Seidal methods.
5. Interpolation: Lagrange’s Interpolation and difference table methods.

Books:
1. Section A: Programming with C by K.R.Venugopal & Sudeep R Prasad
2. Section B: Introduction to Numerical Methods by S.S Sastry
3. Elementary Numerical Methods by S.D.Conte

Reference:
1. C Programming Language by Kerningham & Ritchie
ENG 1008 Engineering Graphics

Lectures/week = 2+4
Exam=3 Hrs,
Sessional Marks =30
Exam. Marks = 70

Introduction:
Drawing Instruments and uses. Lettering scales in common use.

Curves:
Curves used in Engineering Practice, conic sections, construction of conics by different methods, rectangular-hyperbola, cycloidal curves, trochoids, epi and hypo-cycloids. involutes and Archimedian spiral.

Orthographic Projections:
Projection of points, projection of straight lines, traces of a line, projection of planes and projection on auxiliary planes.

Solids and Developments:
Projection of solids in simple positions, projection of solids with axis inclined to one of the reference planes and parallel to the other, projection of solids with axis inclined to both the reference planes. Projection of spheres. Development of surfaces of solids. Development of transition piece connecting a square and circular pipe. Helices and screw threads.

Sections and Intersections:
Sections of different solids and true shape of sections. Intersection of surfaces-simple problems with cylinders, prisms and cones.

Isometric and Perspective Projections:

Textbook:
1. Elements of Engineering Drawing by N.D. Bhatt

Reference:
12 of the following experiments must be completed:

1. Lee’s method - determination of coefficient of thermal conductivity of a bad conductor
2. Melde’s experiment - determination of the frequency of an electrically maintained tuning fork.
4. Diffraction grating – determination of wavelengths in mercury line spectrum using spectrometer
5. Determination of Cauchy’s constants using Spectrometer and mercury light.
7. Michelson’s interferometer - a) determination of wavelength of light b) Resolution of spectral lines.
8. Det. of \( \square \) using calcite crystal.
9. Optical Bench – a) Young’s double slit b) Lloyd’s mirror c) biprism d) diffraction at an edge e) Thickness of wire
11. Variation of magnetic field along the axis of current carrying circular coil – Stewart and Gee’s apparatus
12. Calibration of voltmeter using potentiometer
13. Carey Foster’s bridge a) laws of resistance b) temperature coefficient of resistance
15. Calendar and Barnes method – determination of specific heat of water
16. Hall effect – a) Determination of hall coefficient B) determination of charge density
17. Photoelectric effect – a) characteristics of photoelectric cell b) det. of Planck’s const.
18. Determination of Rydberg constant using hydrogen discharge tube
19. Determination of e/m of an electron – Thomson’s method
ENG 1010 Chemistry Laboratory

Practicals/week = 3  
Exam=3 Hrs.  
Sessional Marks =50  
Exam. Marks = 50

**List of Experiments:**

01. Determination of Sodium Carbonate.
02. Determination of Sulfuric acid using a strong base.
03. Estimation of Iron (II) using Potassium Permanganate.
05. Determination of volume strength of Hydrogen Peroxide.
06. Estimation of Calcium in a sample of Portland cement.
07. Estimation of Chromium (VI) using Ferrous Ammonium Sulphate.
08. Estimation of Copper (II) using Sodium thiosulphate.
09. Analysis of Bleaching powder for Chlorine content.
11. Determination of hardness of a water sample (EDTA Method).
12. Determination of alkalinity of a water sample.

**Demonstration Experiments:**

14. Preparation of Copper pigment.
15. Preparation of Phenol-Formaldehyde resin.
17. Digital potentiometer.
ENG 1011 Workshop

Practicals/week = 3
Exam=3 Hrs,
Sessional Marks =50
Exam. Marks = 50

1. Carpentry:
   Bench work, tools used in carpentry.
   Jobs for class work – half lap joint, mortise and tenon joint, half –lap dovetail joint, corner dovetail joint, bridle joint.

2. Sheet Metal:
   Tools used in sheet metal work. Laying developments of sheet metal jobs, soldering.
   Jobs for class work – square tray, taper side tray, funnel, elbow pipe.

3. Fitting:
   Tools used in fitting work. Different files, chisels, hammers and bench vice.
   Jobs for class work – hexagon, rectangular, circular and triangular fits. External and internal threads with dies and taps.

Reference
1. Elements of Workshop technology, Vol.1 by S.K. and H.K. Hajra Choudary
ENG 1012 Programming Laboratory

Practicals/week = 3
Exam=3 Hrs,
Sessional Marks =50
Exam. Marks = 50

1. Write a program to read x,y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?

2. Write a program, which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (e.g. for, while, and do while)

3. Write a set of string manipulation functions e.g. for getting a sub-string from a given position, Copying one string to another, Reversing a string, adding one string to another.

4. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?

5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order.

6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).

7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.

8. Given two points on the surface of the sphere, Write a program to determine the smallest arc length between them.

9. Implement bisection method to find the square root of a given number to a given accuracy.

10. Implement Newton Raphson method to det. a root of polynomial equation.

11. Given a table of x and corresponding f(x) values, write a program which will determine f(x) value at an intermediate x value using Lagrange’s interpolation.

12. Write a function which will invert a matrix.

13. Implement Simpson’s rule for numerical integration.


15. Write a program to solve a set of linear algebraic equations.
**II / IV B.E. (CIVIL ENGINEERING)**

**&**

**II / IV B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)**

**SCHEME OF INSTRUCTION**

1st Semester:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam.</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE211</td>
<td>Engineering Mathematics – III</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE212</td>
<td>Engineering Mechanics</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE213</td>
<td>Mechanics of Solids</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE214</td>
<td>Building Materials and Building Construction</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE215</td>
<td>Surveying – I</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CE216</td>
<td>Engineering Geology</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE217</td>
<td>Strength of Materials Laboratory</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CE218</td>
<td>Survey Field Work-I</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam.</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
<td>4</td>
<td>8</td>
<td>36</td>
<td>520</td>
<td>280</td>
<td>800</td>
<td>28</td>
</tr>
</tbody>
</table>
Vector Calculus: Differentiation of Vectors, Curves in Space, Velocity and acceleration, relative velocity and acceleration, scalar and vector point functions, vector operator. $\vec{V}$, $\vec{V}$ applied to scalar point functions, gradient, V applied to vector point functions, divergence and curl. Physical interpretations of $\vec{V} \cdot F$ and $\vec{V} \times F$, $\vec{V}$ applied twice to point functions, $\vec{V}$ applied to products of point functions, integration of vector, line integral, circulation, work surface integral-flux, Green’s theorem in the plane, Stoke’s theorem, volume integral, divergence theorem, irrotational and solenoidal fields, Green’s theorem, Introduction of orthogonal curvilinear coordinates: Cylindrical, spherical and polar coordinates.

Introduction of Partial Differential Equations: Formation of partial differential equations, solutions of PDEs, equations solvable by direct integration, linear equations of first order, homogeneous linear equations with constant coefficients, rules for finding the complimentary function, rules of finding the particular integral, working procedure to solve homogeneous linear equations of any order, non homogeneous linear equations.

Applications of Partial Differential Equations: Method of separation of variables, Vibrations of a stretched string-wave equations, one-dimensional and two-dimensional heat flow equations, solution of Laplace equation, Laplace equation in polar co-ordinates.


TEXT BOOK:


References:

CE212 ENGINEERING MECHANICS


Equilibrium: Free body diagrams – Equations of equilibrium for a concurrent coplanar force system – Equilibrium of Bodies acted on by two or three forces – Equilibrium of bodies acted on by non-concurrent coplanar force system – Equilibrium of bodies acted on by parallel, non-coplanar force system – Equilibrium of non-concurrent, non-coplanar non-parallel force system.

Centroids and Centres of Gravity: Centre of gravity of parallel forces in a plane – Centre of gravity of parallel forces in space – centroids and centres of gravity of composite bodies – Theorems of Pappus – Distributed Loads on Beams.

Moments of Inertia, Definition – Parallel axis theorem for areas – Second moments of areas by integration – Radius of gyration of areas – Moments of inertia of composite areas – Parallel axis and parallel plane theorems for masses – Moments of inertia of masses by integration – Radius of gyration of mass – Moments of inertia of composite masses.


References:
(2) Engineering Mechanics by Timoshenko and D.H. Young.
(3) Engineering Mechanics by J.L. Meriam
(4) Mechanics for Engineers Statics and Dynamics by F.B. Beer and E.R. Johnston
Duties / obligations Accountability of structural engineer for the design of a structure: a) economy b) safety: (i) strength consideration (ii) stiffness consideration. Need for assessment of strength of a material – analysis for strength requirement for design purposes – Review of IS code provisions.


Effect of transverse force, Shear force, Bending moment and Axial thrust diagrams for a) Cantilever b) Simply supported and c) Over hanging beams for various patterns of loading. Relation between (i) intensity of loading (ii) Shear force and (iii) Bending moment at a section. Theory of simple bending: flexural normal stress distribution. Flexural shear stress distribution for various shapes of cross section.

(a) Stresses on oblique plane – Resultant stress – Principle stress and maximum shear stress and location of their planes. Mohr’s circle for various cases of stresses;
(b) Theory of pure torsion for solid and hollow circular sections – torsional shear stress distribution, effect of combined torsion, bending and axial thrust – equivalent B.M and T.M.
(c) Longitudinal and Hoop stresses in thin cylinders subjected to internal pressure. Wire wound thin cylinders.

(b) Open and closed coiled helical springs subjected to axial load. Thick cylinders – Lammé’s theory, Compound tubes – Theory of failure (i) Principal Stress theory, (ii) Principal Strain theory, (iii) Maximum Shear Stress theory and (iv) Maximum strain energy theory.

Graphic Statics a) Determination of Resultants of Systems of Coplanar Forces; b) Locating Centroids of Sections of various Shapes; c) S.F. & B.M. Diagrams for (i) Cantilever, (ii) Simple Supports, (iii) Over – hanging Beams; d) Determination of Forces in Members of Trusses (having 9 members or less) by Maxwell Diagram

References:
1. Elements of strength of materials by Timoshenko and Young.
2. Introduction to mechanics of solids by Popov.
3. Structural Analysis by Pundit & Gupta
5. Elementary mechanics of solids by P.N. Singer and P.K. Jha.
7. Strength of materials by Vazirani and Ratwani.
BUILDING STONES
Stones: Classification of rocks basing on geological, physical and chemical etc. composition, characteristics and use of various stones available in India. Stone quarrying Methods, precautions to be taken in various explosives uses, Methods of dressing and Polishing of stones. Various tests on stones as per I.S. code, Natural Bed of stone and its importance in construction. Artificial stones – Varieties.

BRICKS AND CLAY PRODUCTS
Bricks: Sources and qualities of Brick Earth, Classification of Bricks, Manufacture of Bricks, including burning types, general qualities of Bricks as per IS code, tests for good bricks as per IS code, including field tests, special forms of Bricks and their uses.
Clay Products: Various types of tile manufacturing and their uses, Earth-wares, Terra-cotta, stone ware, porcelain, glazing of tiles etc.

WOOD, WOOD BASED PRODUCTS:
Wood: Classification of various trees, cross section details of trees, their general properties, various types of defects in wood and timber, Methods of seasonizing and their importance, felling and conversion, various Mechanical Properties of timber, Decay of timber, preservation methods, common Indian trees and their uses.
Wood based Products: Veneers, Plywood and its types, Manufacturing of Plywood, plywood grades as per IS code, Laminated wood, merits of plywood and laminated wood, Lamin Boards, Block Boards, Batten board, Hard board, Particle boards and Composite boards.

PAINTS, VARNISHES, ASBESTOS, ASPHALT, BITUMEN, TAR:
Paints and Varnishes: Constituents and characteristics of paints, types of paint, their uses and preparation on different surfaces, painting defects, causes and remedies. Constituents of varnishes, uses of varnishes, different kinds of varnish, polishes, Lacquer etc.,
Painting of interior walls, exterior walls, wooden doors and windows – steel windows – various types of paints (chemistry of paints not included) including distempers; emulsion paints etc., Varnishes wood work finishing types.

ASBESTOS & ASPHALT BITUMEN & TAR
Availability and uses of asbestos, properties of asbestos, various types of asbestos, difference between asphalt & bitumen, Types, uses and properties of Asphalt & Bitumen, composition of coal tar, wood tar, mineral tar and Naphtha.

Foundations: Different types of soils, Types of Foundations : Strip, Isolated, Strap, Combined Footings, Raft – Mat – Slab and Beam Raft, Box Type Raft, inverted arch foundations, SHELL foundations, Grillage foundations, Different type of pile foundations and their brief description with usual dimensions. Under reamed piles – Minimum depth of Foundation – Bearing capacity of soils


CEMENTS, MODERN RENOVATION MATERIALS:
Cements: Natural and artificial cements, types of various artificial cements and their uses. Wet and dry process of manufacturing ordinary Portland cement (OPC), Chemical and Physical analysis of OPC, various field and Lab. Tests on OPC as per IS code. Storing of cement in the field and godowns
Modern renovation materials: Cement bound, polymer cement bound and pure polymer bound materials, their properties & uses.

CONCRETE TECHNOLOGY AND MIX DESIGN,
Polymer Concrete, Types of cement concretes, ingredients and their characteristics, Cement concrete properties and relevant tests, storage, batching, mixing & Transporting, placing & vibrating and curing. Concrete grades & mix designs upto M 20 as per IS code. Introduction to polymer concrete and its uses.
Roofing: Mangalore tiled Roof, RCC roof, Madras Terrace, Hollow Tiled Roof, Asbestos Cement, Fibre glass, Aluminium G.I. Sheet roofings.

Trusses: King Post & Queen Post Trusses – Steel roof Truss for 12m Span with details.

Wooden Doors and Windows: – Parallel – Glazed – Flush shutters, Plywood, Particle Board Shutters – Aluminium, PVC, Steel doors, windows and ventilators, various types of windows, Glazing – different varieties.

Stair Cases: Stair cases or Stairway design (Architectural design or planning only) various types such as, straight flight – dog legged, quarter landing, open spiral, spiral stairs etc.

References:

7. “Concrete Technology Theory & Practice” by M.S. Shetty, ‘S. Chand & Company Ltd.’
CE215  SURVEYING – I

Introduction: Classification and principles of surveying. Triangulation and Trilateration Earth as spheroid, datum, geoid, Azimuth, latitude, longitude, Map projections, scales, plans, & Maps.

Chain surveying: Instrumentation for chaining – Errors due to incorrect chain-Chaining on uneven and sloping ground-Errors in chaining-Tape corrections – Problems: Base line measurement-chain Triangulation-Check lines, Tie lines, Offsets. Basic problems in chaining-obstacles in chaining-Problems-Conventional signs.


(b) Traverse Surveying: Chain and compass traversing-Free or loose needle method – Fast needle method-Checks in closed and open traverse-Plotting methods of traverse Survey-Closing error-Balancing the traverse-Bowditch’s method-Transit method, gale’s Traverse table.

Plane table surveying: Introduction-Advantages, Accessories-Working operations such as fixing the table to tripod, leveling-centering-orientation by back-sighting. Methods of plane tabling-Plane table traversing-Three point problem-Mechanical method – Graphical method- Two point problem-Errors in plane tabling.


Minor instruments: Uses and adjustments of the following minor instruments: Line Ranger, Optical Square, Abney level, and Clinometer, Ceylon Ghat tracer, Pentagraph, Sextant and Planimeter.

Contouring: Definitions-Interval, Characteristics of contours-methods of locating contours-Direct and indirect methods-interpolation of contours-Contour gradient-Uses of contour maps. Contours mapping using computer techniques (surfer, CAD)

References:

2. Surveying Vol. 1, 2 and 3 – By Punmia, Standard Book House.
4. Surveying: Theory & Practices by James M. Anderson and Edward M. Mikhail

Petrology & Mineralogy

Mineralogy: physical properties: form, color, luster, cleavage, fracture, hardness and specific gravity. Study of important rock forming minerals: Silicate structures, Quartz, feldspars, pyroxenes, amphiboles, micas and clays.

Statigraphy & Structural geology
Statigraphy: Time scale, Major geological formations of India. Achaeans, Cuddapahs, Vindyans, Gondwanas and Deccan Traps. Mineral resources of Andhra Pradesh.


Remote sensing and Geophysical methods


References:
2. Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd. 2005
4. Engineering and general geology by Parbin Singh – Katson Publishing house
6. Engineering Geology by K.M.Bangaru
CE217  STRENGTH OF MATERIALS LABORATORY

(1) Tension test on Mild/HYSD bars
(2) Compression test on wood (parallel and perpendicular to grains)
(3) Tests on springs for the determination of rigidity modulus and spring constant
(4) Brinell’s and Rockwell hardness tests.
(5) Charpy and Izod impact tests.
(6) Double shear test on mild steel specimen.
(7) Bending test: Load deflection test for the determination of young’s modulus on simply supported and cantilever beam for wood and steel.
(8) Study of forces in coplanar force system.
CE218  SURVEYING FIELD WORK – I

Chain Surveying: Introduction of instruments used for chain survey. Folding and unfolding of chain-Line ranging (direct method)-Pacing. Chain traversing – Preparation of plan of a residential building by making use of chain, ranging rods, by oblique off-set method, introduction of check line. Preparation of residential building by perpendicular offset, introduction of tie lines. Finding the distance between inaccessible points by making use of chain, cross staff, tape, ranging rods; Arrows and field problems of obstacles to chaining.


Plane Table Survey: Introduction to plane table-Use of its accessories: Two & Three Point Problem. Finding the distance between inaccessible points by making use of plane table, its accessories-Ranging rods and tape.

Levelling: Introduction to dumpy level, levelling staff. Reading of level staff, temporary adjustments of dumpy level. Introduction to fly levelling-Booking the readings by height of collimation method. Introduction to fly levelling-Booking the readings by rise and fall method-To find closing error. Check levelling.- L.S. & C.S. of a road profile.

Preparation of contour plan for an open area by taking level of the site. Field work examination, for sessional marks.
II / IV B.E. (CIVIL ENGINEERING) & II / IV B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)

SCHEME OF INSTRUCTION

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam.</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE221</td>
<td>Engineering Mathematics-IV</td>
<td>4</td>
<td>4</td>
<td></td>
<td>8</td>
<td>3 70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE222</td>
<td>Structural Analysis-I</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>12</td>
<td>3 70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE223</td>
<td>Fluid Mechanics-I</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>12</td>
<td>3 70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE224</td>
<td>Surveying-II</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>3 70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE225</td>
<td>Building Planning &amp; Design</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>3 70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE226</td>
<td>Environmental Studies</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>3 70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE227</td>
<td>Human Values &amp; Professional Ethics</td>
<td>2</td>
<td>2</td>
<td></td>
<td>4</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE228</td>
<td>Survey Field Work-II</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>3 50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE285</td>
<td>Fluid Mechanics Lab. – I</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>3 50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
</tbody>
</table>

|         |                                         | 23 | 5 | 9 | 37   | 520         | 280        | 800         | 26      |

For Admitted Batch 2014-2015
FUNCTIONS OF A COMPLEX VARIABLE: Continuity concept of \( f(z) \), derivative of \( f(z) \), Cauchy-Riemann Equations, Analytic functions, Harmonic Functions, Orthogonal System, applications to flow problems, integration of complex functions, Cauchy’s theorem, Cauchy’s integral formula, statements of Taylor’s and Laurent’s series without proofs, singular points, residues and residue theorem, calculation of residues, evaluation of real definite integrals, geometric representation of \( f(z) \), conformal transformation, some standard transformations: (1) \( w = z+c \), (2) \( w = 1/z \), \( w = (az+b)/(cz+d) \), \( w = z^2 \), and \( w = e^z \).

STATISTICS: Review of probability distributions (not to be examined). Sampling Theory: Sampling distribution, standard error, Testing of hypothesis, Level of significance, Confidence limits, Simple sampling of attributes, sampling of variables - large samples, and small samples, Student’s t-distribution, \( \chi^2 \)-distribution, F-distribution, Fisher’s Z-distribution.

DIFFERENCE EQUATIONS AND Z-TRANSFORMS: Z-transforms, definition, some standard Z-transforms, Linear property, Sampling rule, some standard results, shifting rules, initial and final value theorems, Convolution theorem, Evaluation of inverse transforms, definition, order and solution of a difference equation, Formation of difference equations, Linear difference equations, Formation of difference equations, Linear difference equations, Rules for finding inverse transforms, definition, order and solution of a difference equation, Application to deflection of a loaded string, Application of Z-transform to difference equations.

TEXT BOOK:

References:
3. Advanced Mathematics for Engineering Students Vol-2 and Vol-3 by Narayanan et al.
CE222  STRUCTURAL ANALYSIS – I

Deflections of Beams : (i) Cantilever (ii) simply supported and (iii) over hanging beams, using (a) double integration and (b) Macaulay’s method. Analysis for forces in members of a truss (having 9 members or less) by tension coefficient method only

Deflections of Statically Determinate Structures: (a)Single storey, single bay rectangular portal frames using (i) Unit load method, (ii) Castigliano’s theorem – 1. (b) Trusses (having 9 members or less) using (i) Unit load method, (ii) Castigliano’s theorem-1. (iii) Williat Mohr Diagram.

Strain – energy due to (i) Axial load, (ii) Shear force, (iii) Bending Moment and (iv) Torque;

Analysis of (a) fixed beams, (b) three span continuous beams using (i) Theorm of three moments, (ii) Slope deflection method and (iii) Moment distribution method.

Moving loads: Maximum Shear force and Bending moment diagrams for different types of loads. Maximum Bending moment at a section under a wheel load and absolute maximum Bending moment in the case of several wheel loads. Equivalent uniformly distributed live load for Shear force and Bending moment. Reversal of nature of Shear force, focal length, counter bracing for truss panels, Influence lines for (i) Beams and (ii) members of Warren and Pratt trusses.

References:
(1) Structural Analysis By Pundit & Gupta.
(2) Strength of Materials – Ramamrutham.
(3) Elementary strength of materials – Timoshenko and Young.
(4) Strength of materials – Singer.
(5) Strength of materials – Jain and Arya.
(6) Analysis and Design of structures – Vazirani and Ratwani
CE223 FLUID MECHANICS – I


Fluid Statics. Pressure and its measurement – Forces Acting on a Fluid Element – Pascal’s law; Variation of Pressure in Static Fluid; Absolute, Gauge and Total Pressure; Pressure Measurement – Piezometers, Manometers, Micro-manometers, Mechanical Gauges and Pressure Transducers.

Forces on Immersed Bodies in Static Fluids – Force on a Plane Surface – Centre of Pressure; Pressure Diagram; Forces on Curved Surfaces; Forces on radial Crest Gates and Lock Gates. Buoyancy & Floatation – Archimedes Principle; Stability of Floating Bodies – Centre of Buoyancy, Metacentric Height and its Determination.

Liquids in Relative Motion – Pressure of Liquids in a Container Subjected to Linear Acceleration and Rotation.


Fluid Kinematics – Translation, Deformation and Rotation of a Fluid Element in Motion; Local, Convective and Total Accelerations; One, Two & Three Dimensional Analysis of Flows.


Principle of Conservation of Mass – Concepts of System and Control Volume; Continuity Equation in three dimensional Cartesian coordinates; Continuity Equation for flow through a Stream tube.


Flow through Tanks and Reservoirs – Measurement of Discharge from Tanks and Reservoirs – Steady and Unsteady Flow through Orifices and Mouthpieces – Small & Large Orifices – Different types of Mouthpieces; Discharge from tanks through Drowned Orifices, Time of Emptying Tanks, Discharge from a Tank with Inflow.


Flow through Pipes: Introduction to Pipe Flow and Laws of Friction – Reynolds Experiment; Steady Turbulent Flow through Pipes; Laws of Friction; Darcy-Weisbach Equation.


Flow between Two reservoirs; Three Reservoir Problems; Distribution Mains; Working Pressures, Design Pressure and Test Procedures; Choice of Pipe Material; Siphon; Pipe Network Analysis by Hardy-Cross Method; Hydraulic Power Transmission through Pipes and Nozzles, Water hammer (only concept).

Laminar flow: Equation of Motion for Real Fluids – Modifications in Equation of Motion, Stress Strain Relationships, Tangential Stress Terms.


References:

3. Engineering Fluid Mechanics Kumar, K.L., S. Chand & Co. Ltd.
CE224 SURVEYING – II


Total Station Surveying: Electronic Theodolite, Electronic Distance Measurements, Total Station, Errors in measurements, Advantages, Disadvantages, Applications; Contour mapping, determination of height of remote point, position of hidden point, free station, Area measurement, volume measurement.


References:
2. Surveying Vol. 1,2 and 3 – By Punmia, Standard Book House.
5. Surveying: Theory & Practices by James M. Anderson and Edward M. Mikhail
CE225  BUILDING PLANNING AND DESIGN


Preliminary Drawings: (a) Conventional signs of materials various equipment used in a Residential Building (copying exercise) (b) Plan section and Elevation of a small House (one room and varandah) (copying exercise) (c) Plan section and Elevation of Two Bed Room House (copying exercise) (d) (e) (f) Plan section and Elevation of three bed room house in Hot and Humid zone, Hot and Arid zone, cold zone (copying exercises)

(a) Design of Individual rooms with particular attention to functional and furniture requirements. Building regulations and Byelaws of Residential Buildings;
(b) Auto Cad drawing of residential building (only for internal assessment)

Drawing the Plan Section and Elevation of Houses with given Functional requirements and climatic data. (Emphasis may be given to Hot and Humid zones.)

References:
CE226 ENVIRONMENTAL STUDIES (COMMON TO ALL BRANCHES)

Introduction: Definition, scope and importance. Measuring and defining environmental development; indicators.

Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems like Forest, Grass Land, Desert, Aquatic (Lake, rivers and estuaries)

Environmental and Natural Resources Management.
Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems.
Forest resources: Use and over-exploitation, Mining and dams – their effects on forest and tribal people.
Energy resources
Energy resources: Energy needs. Renewable and non-renewable energy sources. Use of alternative energy sources. Impact of energy use on environment

Value of bio-diversity - consumptive and productive use, social, ethical, aesthetic and option values.
Bio-geographical classification of India – India as a mega diversity habitat.
Threats to bio-diversity – Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity – In-situ and Ex-situ conservation.


Case Studies: Chipko movement, Narmada Bachav Andolan, Silent Valley Project, Madhura Refinery and Taj Mahal, Industrialisation of Patancheru, Nuclear reactor at Nagarjuna Sagar, Tehri dam, Ralegaon Siddhi (Anna Hazare), Kolleru lake – aquaculture, Florosis in Andhra Pradesh.

Field work: Visit to a local area to document and mapping environmental assets – river / forest / grass land / hill / mountain. Study of local environment- common plants, insects, birds. Study of simple ecosystems – pond, river, hill, slopes etc. Visits to industries, water treatment plants, affluent treatment plants.
CE229 HUMAN VALUES & PROFESSIONAL ETHICS

No of Periods per Week : 2 L+ 0 T  Credits: 2  Sessional Marks:100

UNIT-I: Ethical Theories
- Basic Moral Theories:
  i) Beneficence: doing good to others
  ii) Non-violence or peace
  iii) Justice

UNIT-II
- Classification of Ethical Theories:
  i) Consequentialism-Mill’s utilitarianism-
greatest happiness to greatest number of people.
  ii) Deontology-Kantianism-Actions must satisfy the
categorical imperative.
  iii) Virtue theory-Aristotelianism virtue is a mean
  between two extremes of action or passion.

UNIT-III
- Rights & Responsibilities of a citizen:
  i) Fundamental duties as stipulated in the
  constitution of India.
  ii) The rights to individuals guaranteed by Indian
  constitution.
  iii) (a) Rights of a professional
      (b) Professional responsibilities.

UNIT-IV
- Human Values & Attitudes:
  i) Classification of Values
  ii) Analysis of desirable values
  iii) The importance of attitudes in personal &
  Professional lives.

UNIT-V
- Ethical Living:
  i) Maslow’s theory of Hierarchy of needs.
  ii) Clayton Alderfer’s ERG (Existence, Relatedness
      and
      Growth) theory.
  iii) Concept of harmony in life.

CE227  SURVEYING FIELD WORK – II

1.  Measurement of Horizontal Angles by Repetition & Reiteration, Measurement of Vertical Angles, Heights & Distances
2.  Distance between two in-accessible points by theodolite
3.  Tachometry
4.  Setting out curve by deflection angle method by two theodolites
5.  Point positioning using GPS
6.  Contour mapping using total station
7.  Height of remote point using total station
8.  Position of hidden point using total station
9.  Area & volume measurement using total station
1. Study of Small orifice, by constant head method and Time of emptying a tank through a small orifice.
2. Study of Cylindrical mouthpiece by constant head method and Time of emptying a tank through a cylindrical mouthpiece.
3. Study of floating body and determination of Metacentic Height.
5. Study of Venturimeter.
7. Study of Flow nozzle meter.
8. Study of Sharp – crested full width and contracted weirs.
10. Study of Broad-crested weir.
### III / IV B.E. (CIVIL ENGINEERING) & III / IV B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)

#### SCHEME OF INSTRUCTION

**1st Semester:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ. Exam</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE311</td>
<td>Reinforced Concrete Structures – I</td>
<td>4</td>
<td>1</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE312</td>
<td>Steel Structures – I</td>
<td>4</td>
<td>1</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE313</td>
<td>Fluid Mechanics – II</td>
<td>4</td>
<td>1</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE314</td>
<td>Geotechnical Engineering- I</td>
<td>4</td>
<td>1</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE315</td>
<td>Environmental Engineering- I</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE316</td>
<td>Estimating and Quantity Surveying</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE317</td>
<td>Environmental Engg. Lab</td>
<td>3</td>
<td>3</td>
<td></td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE318</td>
<td>Geotechnical Engg. Lab-I</td>
<td>3</td>
<td>3</td>
<td></td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE319</td>
<td>Soft Skills</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>FE 01</td>
<td>Free Elective -I</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

**FREE ELECTIVE – I.**
III / IV B.E. (CIVIL ENGINEERING) & III / IV B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)

1st SEMESTER

CE311 REINFORCED CONCRETE STRUCTURES – I


Analysis and design of singly reinforced rectangular beams and doubly reinforced beams, design by using SP 16 (Sessional Work Only).

Design of flanged beams (T and L), Effective flange width, Basis of analysis and design, Minimum and Maximum steel in flanged beams, SP 24 in design of beams.

Design of one way and two way slab: Simply supported slabs on all four sides, Moment in two way slabs with corners held down. Choosing slab thickness. Design of restrained slabs (with torsion at corners) I.S. code provisions. Detailing of reinforcement. Load from slabs on supporting beams. Different kinds of loads on slabs including partition walls, Shear in slabs.


Columns: Short and Long columns, Minimum eccentricity, short column under axial compression, column with helical and tie reinforcement. Short columns subjected to uniaxial and biaxial moments.

Footings: Analysis and design of isolated Square and rectangular footings. Design of stair case.

TEXT BOOKS:
1. Limit State of Design of Reinforced Concrete – P. C. Vergheese

References:
Reinforced Concrete Limit state Design, P. Dayaratnam
Reinforecened Concrete Structures by R Park and Paulay
CE 312     STEEL STRUCTURES – I

Note: All the designs should be taught in the limit state design method as per IS 800-2007

Fundamental Concepts of limit state design of structures, Different types of rolled steel sections available to be used in steel structures. Stress – Strain relationship for mild steel.
Bolted connections: Behavior of bolted joints, Design strength of ordinary black bolts, high strength friction grip bolts, Simple connections, Moment resistant connections.

Welded Connections: Advantages of welding, Types and prosperities of welds, Types of joints, weld specifications Design of welded joints subjected to axial load, Eccentric welded connections.

(a) Tension members: Types of tension members, Design of strands, slenderness ratio, displacement of tension members, behavior of tension members, modes of failure, factors affecting strength of tension members, angles under tension, design of tension members, Lug angles, splices.
(b) Compression members: Possible failure modes, classification of cross-section, behavior of compression members, Effective length, radius of gyration and slenderness of compression members, Allowable stresses in compression, Design of axially loaded compression members, built up compression members, Laced and Battened columns, eccentrically loaded columns, Column splices.

(a) Beams: Beam types, section classifications, lateral stability of beams, Allowable stress in bending, Shear and Bearing stresses, Effective length of compression flange, Laterally supported and unsupported beams, Design of built up beams.
(b) Roof trusses: Types of trusses, Economical spacing of roof trusses, loads on roof trusses, Estimation of wind load on roof trusses as per IS : 875. Design of members of roof truss and joints, Design of purlins.

(a): Column bases and Foundations: Allowable stress in bearing, Slab base, Gusset base and Grillage foundations.
(b) Introduction to pre-engineered structures, concepts and advantages, disadvantages.

References:
1. Design of Steel structures by N. Subramanian, Oxford University Press.
CE313 - FLUID MECHANICS – II

Viscous Effects on Fluid Motion: Navier-Stokes Equations (No Derivation) – N.S. equations for standard cases of Plane two Dimensional and Axisymmetric Flows.

Boundary Layer Theory: Theory of Boundary Layer – Characteristics of Laminar Boundary Layer – Boundary Layer growth over a Flat Plate (without pressure gradient) – Boundary Layer Thickness and its Characteristics – Displacement, Momentum and Energy Thicknesses; Stability Parameter; Laminar and Turbulent boundary layers.

Boundary Layer Separation – Mechanism of Separation, Control of B.L. Separation; Boundary Layer on rough surfaces - Laminar Sublayer, Shear friction velocity; Friction Drag.


Analysis of Turbulent Flows – Shear Stress due to turbulence – Semi-empirical Theories, Boussinesq Eddy Viscosity Model, Prandtl Mixing Length Concept; Velocity distribution for hydrodynamically smooth and rough pipes; Variation of Friction Factor in turbulent flow; Friction Factor for commercial pipes – Moody diagram.


Distribution of Fluid Pressure on immersed bodies – Pressure Distribution for flow past a circular disk, sphere; Effects of eddy pattern in two dimensional flow –Distribution of pressure for two dimensional flow past a cylinder – von Kármán vortex trail, Eddy shedding; Drag of immersed bodies – Variation of Drag Coefficient with Reynolds Number – Drag on Cylinder –Resistance diagram for bodies of revolution; Drag Coefficient of Practical Bodies.


Open Channel Flows: Basic Concepts – Introduction, Classification of Open Channels – Classification of Flow; Channel Geometry – Geometric Elements of a Channel Section; Velocity Distribution in a Channel Section; Wide Open Channel; Measurement of Velocity; Velocity Distribution Coefficients; Pressure Distribution in a Channel Section – Effect of Slope on Pressure Distribution; Basic Equations – Chezy’s Equation, Manning’s Equation.

Uniform Flow Computation; Conveyance of a Channel Section – Section Factor and Hydraulic Exponent. Flow Characteristics in a Closed Conduit with Open Channel Flow; Determination of Normal Depth and Velocity; Design of Channels for Uniform Flow; Design of Non-erodible Channels; Best Hydraulic Section; Determination of Section Dimensions for Uniform Flow; Most Economical Channel Sections – Rectangular, Trapezoidal, Circular and Triangular Channel Sections; Critical Flow – Computation of Critical Flow, Section Factor for Critical Flow.

Application of Energy Principle in Open channels – Definition of Specific Energy, Specific Energy Diagram, Critical depth, Critical Velocity, Conjugate or Alternate Depths, Sub-critical, Critical and Super-critical Flows, Froude Number, Relationship between Critical depth and Specific Energy for Rectangular, Trapezoidal Sections; Application of Momentum Principle in Open channels – Specific Force; Canal Transitions – Change of Depth in Channels with Change in Cross-section and Hump in the Bed; Control Sections; Venturi Flume and Parshall Flume.


Rapidly Varied Flow – Hydraulic jump, Types of jump, Hydraulic jump in horizontal rectangular Channels; Surges.

References:

3. Engineering Fluid Mechanics, Kumar, K.L., S. Chand & Co. Ltd.
CE314  GEOTECHNICAL ENGINEERING – I

Classifications: Mechanical analysis – Sieve analysis, stoke’s law, hydrometer and Pipette Analysis Textural Classification, Structural Classification based on size – unified soil classification and modification by Bureau of Indian Standard.

B). Soil Hydraulics – Types of soil water capillary rise and surface tension, Darcy’s law and its limitations constant head and variable head permeameters pumping tests, Factors effecting coefficient of permeability, permeability of stratified soils. Total, neutral and effective stresses, No flow downward flow and upward flow conditions, quick sand conditions, critical hydraulics gradient.
Stress distribution : Boussinesq’s theory for determination of vertical stress, assumptions and validity, extension to rectangular and circular loaded areas, 2 : 1 approximate method, westergard’s theory Newmarks influence chart. Construction and use, contact pressure distribution beneath footings.
Consolidation : Oedometer Test, e-p and e-log p curves – compression index, coefficient of compressibility and coefficient of volume decrease. Terzaghi’s one dimensional consolidation theory assumption, derivation and application, coefficient of consolidation time curve fitting methods, initial compression, primary compression and secondary compression determination of preconsolidation pressure. Normally consolidated, over consolidated and under consolidated clays.

Compaction : Mechanism of compaction Factors effecting compaction – water content, compactive effort, Nature of soil. B.S., Modified AASHO and IS compaction tests. Effect of compaction on physical and engineering properties of soils, Field compaction – Equipment and Quality Control proctors penetrometer.
Subsoil Exploration : Methods of subsoil exploration Direct, semi direct and indirect methods, Soundings by Standard, Dynamic cone and static cone penetration tests, Types of Boring, Types of samples, Criteria for undisturbed samples, Transport and preservation of samples, Borelogs, planning of exploration programmes, report writing.
Shear Strength of Soils : Stress at a point, Mohr circle of stress, Mohr coulomb failure theory shear tests – shear box, unconfined compression, and triaxial compression tests, fieldvane shear tests, shear parameters, types of shear tests in the laboratory based on drainage conditions, shear strength of sands, critical void ratio and dilatancy, shear strength of clays, total stress analysis and effective stress analysis, skemptons pore pressure coefficients, stress paths.

References :
2. Soil Mechanics, Foundation Engineering by V.N.S. Murthy.
CE315  ENVIRONMENTAL ENGINEERING – I

Introduction: Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities.

Water Demand and Quantity studies: Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.


References:
1. Environmental Engineering – Peavy, Rowe, Tchenobolus
2. Elements of Environmental Engineering – K.N. Duggal
4. Water Supply Engineering – Dr. P.N.Modi
5. Water Supply and Wastewater Engineering – Dr. B.S.N.Raju
7. Water Supply Engineering – Hussain
8. Water Supply Engineering – Chatterjee
CE316 ESTIMATING AND QUANTITY SURVEYING

Introduction: Standard units, Units of measurement of different items of work. Meaning of estimating. Errors in estimation, Different types of estimates. Contingencies and related terms in the estimate, different types of approvals. Plinth area and related terms used in the estimation of various structures, rules and methods of measurements of different works.

Specialisations: Meaning, purpose, types of specialisations, Method of preparation of specification, general specification, detailed specifications of different items of buildings and other structures – Race analysis – Data sheet for materials and various items of work in buildings and other structures, schedule of rates, abstract estimate of buildings.

Detailed estimate of buildings. Different items of work in building; Principles of taking out quantities, detailed measurement form; long walls and shortwalls method of building estimate, Centre line method of building estimate. Estimate of RCC building, slope roof buildings; G.I. and A.C. Sheet, Detailed estimate of different types of doors and windows, electricity and water supply. Sanitation works etc.

Estimate of earth work; different formulae for calculations, estimate of metalled road, Tar road, concrete road, Railway tract, Estimate of culverts and bridges etc. Valuation of buildings; purpose, different method of building valuation; different terms used in valuation and their meaning.

References:
1. Estimation, Costing, Specifications and Valuation in civil Engineering by M. Chakrabarti.
3. Textbook of estimating and costing by G.S. Birdie.
CE317  ENVIRONMENTAL ENGINEERING LABORATORY-1

1. (a) pH
   (b) Conductivity.
2. (a) Turbidity.
   (b) Jar Test.
3. Hardness.
5. Alkalinity estimation.
7. Fluorides.
10. D.O.
11. B. O. D.
12. C. O. D.
13. Chlorides.
CE318  GEOTECHNICAL ENGINEERING LABORATORY – I

1. Atterberg limits
2. Field density by Core Cutter and Sand replacement method.
3. Grain size analysis
4. Hydrometer/pipette analysis.
5. Specific gravity by pycnometer/density bottle method.
6. Permeability of soil – Constant and variable head tests.
7. IS light compaction.

DEMONSTRATION EXPERIMENTS:

1. Consolidation test.
2. Quick sand model and others if any.
CE319 SOFT SKILLS
(COMMON WITH OTHER BRANCHES)

Communication:
- Importance of communication
- Non verbal communication
- Personal appearance Gestures
- Facial expressions
- Eye contact
- Space distancing

Goal setting:
- Immediate, short term, long term
- Smart goals, strategies to achieve goals

Time management:
- Types of time
- Identifying time wasters
- Time management skills

Leadership and team management:
- Qualities of a good leader
- Leadership styles
- Decision making
- Problem solving
- Negotiation skills

Group discussions:
- Purpose (Intellectual ability, creativity, approach to a problem, solving, tolerance, qualities of a leader)
- Group behaviour, analysing performance

Job interviews:
- Identifying job openings
- Preparing resumes & CV
- Covering letter
- Interview (Opening, body-answer Q, close-ask Q), Types of questions

Reference books:
1. ‘Effective Technical Communications’ by Rizvi M. Ashraf, McGraw–Hill Publication
2. ‘Developing Communication Skills’ by Mohan Krishna & Meera Banerji, Macmillan
3. ‘Creative English for Communication’ by N.Krishnaswami & T.Sriraman, Macmillan
### SCHEME OF INSTRUCTION

#### 2nd Semester:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total</th>
<th>Univ.Exam</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE321</td>
<td>Structural analysis – II</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE322</td>
<td>Reinforced Concrete Structures – II</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE323</td>
<td>Steel Structures – II</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE324</td>
<td>Geotechnical Engineering-II</td>
<td>4</td>
<td>1</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE325</td>
<td>Fluid Mechanics – III</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE326</td>
<td>Elective -I</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE327</td>
<td>Geotechnical Engg. Lab. II</td>
<td>3</td>
<td>3</td>
<td></td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>CE328</td>
<td>Concrete Laboratory</td>
<td>3</td>
<td>3</td>
<td></td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Industrial Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>To be held during summer vacation and evaluated in the 1st Semester of IV year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>11</td>
<td>6</td>
<td>41</td>
<td>520</td>
<td>280</td>
<td>800</td>
<td>28</td>
</tr>
</tbody>
</table>

@ Assessment as indicated along with the requirements given in the syllabus part.

#### ELECTIVE – I (COURSE NO. CE 326)

- CE326 A  Repair and Rehabilitation of structures
III/ IV B.E. (CIVIL ENGINEERING) & III / IV B.E. (CIVIL ENGINEERING with ENVIRONMENTAL ENGINEERING Elective)

2nd SEMESTER

CE321 STRUCTURAL ANALYSIS – II

Analysis of statically indeterminate trusses (having not more than 7 members and 3 supports) containing (a) external redundant supports (b) internal redundant members using (i) method of consistent deformation of unit load method (ii) Castigliano’s theorem – II.

Analysis of statically indeterminate frames (single storey, single bay portal frames only) using (i) slope-deflection method (ii) moment distribution method (iii) Kani’s method, (iv) Column Analogy.

Arches: Normal thrust, radial shear and bending moment in three hinged and two hinged parabolic and segmental arches. Effects of rib-shortening and temperature change.

Suspension bridges: Stresses in loaded cables with supports at the same and different levels. Length of cable; Two and Three hinged stiffening girders.
(a) Analysis of Multistoreyed frames by substitute frame method, Analysis of Multistoreyed frames for wind loads by portal, cantilever and Girder Factor methods.
(b) Introduction to matrix methods of structural analysis (Very elementary treatment only) Static indeterminacy, Kinematic indeterminacy, Stiffness and flexibility method for two span continuous beams only. – Truss with 3 supports and 7 members.

References
1. Statically indeterminate structures – C.K. Wang
3. Indeterminate Structures by R.I. Jindal
CE322  REINFORCED CONCRETE STRUCTURES – II


Water Tanks : Stress in concrete and steel in water tanks, Modular ratio, Impermeability requirements, Under ground rectangular tanks, Elevated rectangular and circular tanks, Design of these tanks for strength and cracking. Design of staging of rectangular tanks.


Piles and Pile caps : Design of bored cast in situ piles (bearing and friction types), under reamed piles. Pile Caps design; bending and truss methods.

Prestressed Concrete – Reinforced Concrete Versus Prestressed Concrete. – Prestressing Systems (Fressinet, Gifford Udal, Magnel Blatten) – Prestressing Losses – Steel and Concrete for Prestressing – Homogeneous Beam Concept, limiting eccentricities, Pressure line, Elastic Stress distribution across the depth due to D.L. eccentric prestress and L.L.

References:
1.  Limit State of Design of Reinforced Concrete – P.C. Vergheese
3.  Design of reinforced Concrete Structures – P. Dayaratnam
CE323  STEEL STRUCTURES – II

Note: All the designs should be taught in the limit state design method as per IS 800-2007”.

Plate Girders (Bolted and Welded): Components of a plate girder, Economical depth, proportioning of web and flanges, shear buckling resistance of web (simple post critical and tension field methods), curtailment of flange plates, connection of flange angles to web and flange angles to flange plates.

Web stiffeners: Design of bearing stiffeners, End panel design, design of intermediate stiffeners, connections. Web splices (Rational splices), Splices of flange angles and flange plates.

Bridges: Classification, Loadings, Deck type and through type bridges. Plate girder bridges, design of stringers, cross girders, wind bracings.
Bearings: Types of bearings, plate bearing, Rocker bearing, Roller bearing, Knuckle pin bearing.

Water tanks, Introduction, Design of elevated circular and rectangular water tanks, Design of pressed steel tanks.

Plastic analysis: Introduction, Upper and Lower bound theorems, Uniqueness theorem, Shape factor, Load factor
Beams: Collapse load for fixed and continuous beams, Design of beams
Frames: Collapse load for a frame of single bay single storey frame.

References:
1. Design of Steel structures by N. Subramanian, Oxford University Press.
CE324 GEOTECHNICAL ENGINEERING – II

Bearing Capacity: Safe bearing capacity and allowable bearing pressure, Terzaghi’s bearing capacity equations its modifications for square, rectangular and circular foundation, General and local shear failure conditions. Factors affecting bearing capacity of Soil. Allowable bearing pressure based on N-values. Bearing capacity from plate load tests.


Pile Foundations: Types, Construction, load carrying capacity of single pile – Dynamic Formula, Static formula, Pile load tests, Load carrying capacity of pile groups, settlement of pile groups, Negative skin friction.

Caissons: Types of caissons, pneumatic caissons, Different shapes of well foundations. Relative advantages and disadvantages. Different Components of well and their function. Grip length, problems in well sinking and remedial measures.


NOTE: This course does not cover structural design of foundations.

References:
1. Analysis, Design of foundations and Earth retaining structures by Shamsher Prakash, Gopal Ranjan and Swami Saran.
CE325 - FLUID MECHANICS - III

Dimensional Analysis and Similitude:
Fundamental Concepts of Dimensional Analysis – Importance of Dimensional Analysis & Model Study; Units and Dimensional Formulae for Various Engineering Quantities; Fourier Concept of Dimensional Homogeneity.

Methods of Arriving at Dimensionless Groups – Non-dimensional Parameters; Rayleigh’s Method; Buckingham $\pi$ method – Buckingham modified method; Omitted and Superfluous variables.

Examples in Dimensional Analysis – Capillary Rise, Drag on Cylinder, Resistance of a Ship, Discharge over a Sharp Crested Weir, Fall Velocity of a Sphere, Head Characteristics of a Pump, Thrust on a Propeller,

Similarity and Similarity Laws – Concepts of Similarity – Geometric, Kinematic and Dynamic Similarities; Modeling Criteria; Similarity Laws – Important Dimensionless Numbers – Reynolds Number, Froude Number, Mach Number, Euler Number, Weber Number.

Application of Similarity Laws to Practical Problems – Bodies Completely Submerged in Fluids, Bodies subjected to Gravity and Viscous Forces, River Models – Manning’s Law; Distorted Models – Depth distortion and slope distortion; Problems related to Modeling of Spillways, Ships and Pumps & Turbines.

Impact of jets:
Force exerted by fluid jet on stationary and moving flat and curved vanes, Torque and Work done by series of Moving Vanes.

Hydraulic Machines– Turbines:
Introduction and Classification of Turbines – Function of Prime movers and Pumps, Hydraulic Turbines, Classification Based on Head, Discharge, Hydraulic Action – Impulse and Reaction Turbines, Differences between Impulse and Reaction Turbines; Choice of Type of Turbine – Specific Speed.


Performance & characteristics of Turbines: Unit Quantities, Specific Speed and its importance; Model Relationships; Operating Characteristic Curves; Cavitation problem in Turbines – Thoma’s Cavitation Factor.

Hydraulic Machines – Centrifugal Pumps
Functions of a Pump – Types of Pumps – Selection Criterion – Rotodynamic and Positive Displacement Pumps – Comparison between Centrifugal & Reciprocating Pumps.


Hydraulic Machines – Reciprocating Pump & Hydraulic Ram:
Reciprocating Pumps – Fundamental concepts, Component Parts and Working principle of Single Acting and Double Acting Reciprocating Pumps – Discharge Coefficient, Volumetric Efficiency and Slip; Work done by
Reciprocating pumps – Work Done and Power Input – Indicator Diagram – Effect of Acceleration and Friction on Indicator Diagram – Maximum Speed of Rotation of Crank; Air Vessels and their principles – Modified Indicator Diagram in the presence of Air Vessels, Work Saved due to Presence of Air Vessel, Flow into and from Air Vessel.


References:
3. Engineering Fluid Mechanics Kumar, K.L., S. Chand & Co. Ltd.
CE 326 ELECTIVE – I

CE 326A REPAIR AND REHABILITATION OF STRUCTURES


Techniques to test the existing strengths: Destructive and non destructive tests on concrete.

Repairs of Multistory structures: Cracks in concrete, possible damages to the structural element–beams, slab, Column, Footings, etc., Repairing techniques like Jacketing, Grouting, External prestressing, Use of chemical admixtures, Repairs to the fire damaged structures.


Reference:
CE326 B  REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS

REMOTE SENSING: Introduction, Basic components of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces.

SENSORS AND PLATFORMS: introduction, passive sensor, active sensor, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential. Spatial, spectral, radiometric and temporal resolution.

IMAGE ANALYSIS: introduction, elements of visual interpretations, digital image processing- image preprocessing, colour systems, band selection image enhancement, image classification, supervised classification, unsupervised classification. Introduction to feature extraction (band arithmetic, NDVI)

GEOGRAPHIC INFORMATION SYSTEM: Introduction, key components, application areas of GIS and spatial referencing (coordinate systems and map projections).

DATA ENTRY AND PREPARATION: spatial data input, raster data models, vector data models, raster versus vector. Errors in data entry and topology.

SPATIAL DATA ANALYSIS: introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing. ILWIS 52N GIS-software tools

RS AND GIS APPLICATIONS in Civil Engineering:
Land cover and land use Mapping, Urban applications.
Hydrology-flood zone delineation and mapping, drought monitoring, groundwater studies and other watershed studies.

TEXT BOOKS :
2. Remote sensing and image interpretation by Thomas M. Lillesand and Ralph W. Kiefer, John Wiley and Sons
1. Field identification & classification of soils
2. Unconfined compression test
3. CBR test/plate bearing test
4. Triaxial compression test
5. Direct sheartest
6. Vane sheartest
7. Relative density
8. Triaxial test
10. Consolidated drained
11. Demonstration experiments (subject to availability)
12. S.P.T.
13. Consolidated undrained Foundation models
14. Plate load test
15. Pressuremeter test
16. Field vane shear.
1. Specific gravity and unit weight of cement
2. Specific gravity and unit weight of coarse and fine aggregates.
3. Determination of normal consistency of cement
4. Determination of initial and final setting time
5. Fineness of cement.
6. Determination of compressive strength of cement (for different grades of cement).
7. Bulk characteristics of sand.
8. Sieve analysis of coarse and fine aggregates and classification as per IS 383.
11. Compressive Strength
12. Split tensile strength
13. Modulus of rupture
14. Design of concrete mix by using IS code method (for class work only)
15. Case studies on a) framed structures and b) plate girder bridge

INDUSTRIAL TRAINING
To be held during summer vacation at the end of second semester of III year and evaluated in the 1st Semester of IV year
## IV / IV B. E. (CIVIL ENGINEERING)

### SCHEME OF INSTRUCTIONS

**1st Semester:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total Hrs</th>
<th>Univ. Exam Marks</th>
<th>Sels. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE411</td>
<td>Water Resource Engineering – I</td>
<td>3</td>
<td>2</td>
<td></td>
<td>5</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE412</td>
<td>Transportation Engineering – I</td>
<td>3</td>
<td>1</td>
<td></td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE413</td>
<td>Project Planning and Management</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE414</td>
<td>Environmental Engineering – II</td>
<td>4</td>
<td></td>
<td></td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE415</td>
<td>Elective - II</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>70</td>
<td>30</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE416</td>
<td>Computer applications in Civil Engineering (Lab)</td>
<td>3</td>
<td></td>
<td>3</td>
<td>6</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>CE417</td>
<td>Transportation Engineering Lab.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE418</td>
<td>Fluid Mechanics Lab. – II</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>CE419</td>
<td>Industrial Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 21   | 9   | 9   | 39  | 500  | 400  | 900  | 30   |

@ held during summer vacation after III year 2nd semester. Assessment as indicated along with the requirements given in the syllabus part.

### ELECTIVE – II (COURSE NO. CE 415)

- CE415 A  Environmental Impact Analysis.
- CE415 B  Structural Dynamics
- CE415 C  River Engineering
IV / IV B. E. (CIVIL ENGINEERING)

1st SEMESTER

CE411 WATER RESOURCES ENGINEERING – I

INTRODUCTION AND HYDROLOGICAL ASPECTS: Water Resources in India, Hydrology in water Resources Planning – Hydrologic Planning – Water budget equation; Climate and Weather – Importance of monsoon rains, clouds, storms and precipitation - Precipitation – Types, Measurement of rainfall; Influence and feedbacks of hydrological changes due to climate change; Average depth of rainfall over an area, Mean annual rainfall; Analysis of Rainfall Data – Consistency of rainfall record, Double mass curve, Depth –Intensity, Depth-Area-Duration curves, frequency of point rainfall – Intensity-Duration-Frequency (IDF) curves, Probable Maximum Precipitation (PMP) curves; Infiltration – Factors affecting and its determination, Infiltrometers; Evaporation and Evapotranspiration – Pan Evaporation; Runoff – Factors affecting Runoff, Methods of determination of Runoff, Hydrograph Analysis, Base flow separation, Unit Hydrographs, Hydrograph of different durations, Applications of Unit Hydrograph; S-hydrograph, Synthetic Unit Hydrograph; Stream flow measurement – Gauge discharge curves.

GROUND WATER FLOW: Mechanics of interstitial flow, definitions, subsurface distribution of water, ground water movement; Darcy’s law; Permeability – Intrinsic permeability; Well hydraulics – Steady flow in different types of aquifers and wells; Determination of hydraulic properties of aquifer; Well losses; Specific capacity of well; Well efficiency – Pumping tests – Recuperation test method for determination of well yield.
Rain water Harvesting & Recharging of underground storage – Methods of recharging – Infiltration galleries, Infiltration wells, Springs.

Methods of construction of open well yield of an open well – Methods of construction of Tube Wells, Well shrouding and Well development, Spacing of tube wells, Design of tube well; Pumping requirements, Centrifugal and bore hole type pumps; Collector wells.

RESERVOIR PLANNING AND FLOOD ROUTING: Types of reservoir – Investigations for reservoir planning, Selection of site for a reservoir, Zones of storage in a reservoir; Purpose of reservoir, Design studies, Reservoir regulation, Reservoir yield, Mass curve and Demand curve, Determination of reservoir capacity, Yield from a reservoir of given capacity; Operating schedules – Rule Curve for reservoir operation; Economics of Water resources Projects – Apportionment of total cost of a Multi Purpose project, Benefit - Cost Ratio; Reservoir Losses – Measures to reduce evaporation loss in reservoirs sedimentation, Control of reservoir sedimentation.

Flood Routing – Hydrologic reservoir routing by Puls method of routing, Channel routing by Muskingum method.


References:
6. Impacts of climate change and climate variability on hydrological regimes, Jan C. van Dam, Cambridge University Press.
CE 412 TRANSPORTATION ENGINEERING – I


Airport Engineering: Layout of Airports – Components functions – Aircraft characteristics – Airport site selection – Airport obstructions – Runway design – Visual aids – Air traffic control.

References:
1) Highway Engineering by Khanna & Justo.
2) Highway Engineering by Sharma & Sharma.
3) Airport planning and Design by Khanna & Arora.
CE413 PROJECT PLANNING AND MANAGEMENT

PERT and CPM : Introduction : Origin of PERT and CPM, Planning, Scheduling and controlling Bar charts, Milestone charts, weaknesses in Barcharts, PERT and CPM networks – Comparison, Event, Activity, Rules for drawing networks, Numbering the events (Fulkerson’s law : Dummy activities, Time estimate-Expected time, Earliest allowable occurrence time, Latest allowable occurrence time, slack, project duration, probability of completion, Start and Finish time estimates, Floats, Project scheduling, Critical and sub-critical path.


Management – Scope of the Construction Management, Significance of Construction management, Concept of Scientific Management, Qualities of Manager, Organisation – Authority, Policy, Recruitment process and Training Development of Personnel Department.


References:
1) PERT and CPM – L. S. Srinath.
2) PERT and CPM – Punmia.
4) Construction Management and Planning – Guna and Sen Gupta, B.


Anaerobic Processes; Septic Tanks and Imhoff tanks-Principles and Design-sludge treatment and disposal-Fundamentals of UASB. Biosolids (Sludge): Characteristics- thickening – digestion,drying and sludge disposal.

References:
4. Sewage treatment and disposal by Dr. P.N. Modi.
5. Water supply and Waste Water Engineering by Dr. B.S.N. Raju
CE415 ELECTIVE – II

CE415 A ENVIRONMENTAL IMPACT ANALYSIS

Introduction to EIA. Definition of EIA and EIS. Guidelines in USA, preparation of EIS, Elements of EIA (1 question either/or).

Agency Activities, Environmental setting, Environmental attributes, air, water, soil, ecology, noise Socio-Economic aspects, Culture and human aspects (Human settlements – rehabilitations) (1 question either/or).

Environmental impacts, Identification measurement, Aggregation, Secondary and Cumulative Impacts (1 question either/or).

Criteria for selection of methodology, impact assessment methodologies, procedure for reviewing environment impact statement (1 question either/or).

Case studies, Economic impact analysis energy production impact analysis, cost benefit analysis, Environmental impact mitigation and control measures. (1 question either/or).

References:
CE415 B  STRUCTURAL DYNAMICS


Text Book:

1) Structural Dynamics by Mario Paz

References:

2) Dynamics of Structures by R.W. Clough & J. Penzien
3) Dynamics of Structures by Anil . K. Chopra
4) Earth quake engineering by A.R. Chandrasekhar & Jaikrishna.
CE415 C  RIVER ENGINEERING

Incipient Motion of Sediment Particles. Critical tractive force.

Bed Level Variation in Alluvial Streams: Continuity equation for sediment, equilibrium depth of scour in long channel contractions, general mathematical models, silting of reservoirs, local scour.
Variation in Plan form of Streams: Secondary currents, flow in rigid boundary open channel bends, scour and deposition at Alluvial Bends, sediment distribution at channel bifurcations, meandering, lateral migration of Alluvial Streams cutoffs, delta formation.

Sediment control in Canals: Methods of sediment control.
River Training: Objective of river training, river training for flood control, navigation, guiding the flow, sediment control, stabilization of rivers.
Alluvial River Models, Debris Flows, Density Currents.


References:
CE416  COMPUTER APPLICATIONS IN CIVIL ENGINEERING (C A C E)

Determination of Bending moment, deflection for different loading conditions for a simply supported beam and cantilever beam. Determination of fixed end moments for different loading conditions of a fixed beam.

Estimation of Run off for a catchment. Estimation of friction factor for laminar and turbulent flows, minor losses in pipe flow. Conversion of angles from WCB to RB. Classification of soils, determination of coefficient of permeability, degree of consolidation and shear strength.


Basic AUTO CAD commands, application of drafting tools and modifying tools, creation of 3 Dimensional solids.

Application of STAAD Pro for the analysis and design of various structural components of Civil Engineering and Building Frames.

Text Book:

Reference:
CE417  TRANSPORTATION ENGINEERING LABORATORY


Testing of bituminous material: Specific gravity – Penetration value – Viscosity value – Softening point – Ductility value – Flash and Fire point.


Testing on Bituminous Mixes: Bitumen Extraction Test, Marshal Stability Test (Demonstration)

References:
1) Highway material testing by Khanna & Justo.
1) Study of Characteristics of a hydraulic jump – To measure and draw \((E_1-E_2)/E_1\) vs \(F_1\) and \(L_j/y_2\) vs \(F_1\), and compare with theoretical results wherever possible.

2) Study of Rugosity coefficients in an open channel flow.

3) Study of major losses in pipes – Pipe friction – To compute Darcy-Weisbach friction factor.

4) Study of Drag characteristics of a circular cylinder with its axis normal to the direction of flow.
   (a) To measure the pressure distribution on the surface of a cylinder and plot the dimensionless pressure variation around the cylinder and compute the pressure drag.
   (b) To measure the velocity variation in the wake of the cylinder, velocity of approach, and compute the total drag by momentum principle.

5) Study of performance characteristics of a centrifugal pump – To measure the discharge, head developed, and power input at various discharges for centrifugal pump and draw the performance characteristics.

6) Study of performance characteristics of a reciprocating pump – To measure the discharge, head developed, and power input at various discharges for reciprocating pump and calculate percentage slip and efficiency.

7) Study of performance characteristics of a Pelton turbine – To measure the discharge, head difference across the turbine, the brake load, speed of turbine for various discharges and draw the performance characteristics.

8) Study of performance characteristics of a Francis turbine – To measure the discharge, head difference across the turbine, the brake load, speed of turbine for various discharges and draw the performance characteristics.

9) Study of impact of a jet on flat and curved vanes.
CE419  INDUSTRIAL TRAINING

The students are supposed to submit a detailed report covering the following aspects related to civil engineering projects that are relevant to the industry in which they received training:

- Project Planning, Design, Scheduling,
- Specifications,
- Tender Document Preparation, Calling of Tenders,
- Material Procurement Methods / Practices,
- Inventory, Stores Maintenance and Material Issue Norms,
- PERT / CPM Details,
- Project Execution,
- Check Measurement,
- Project Management,
- Quality Control,
- Safety and Risk Analysis and
- Maintenance, Repairs and Operation.

The report will be evaluated for 100 marks by a viva-voce committee comprising of the following members:

Head of the Department, Two internal Examiners, One external examiner and Chairman Board of studies.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title of Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Total Hrs</th>
<th>Univ.Exam Marks</th>
<th>Ses. Marks</th>
<th>Total Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE421</td>
<td>Transportation Engineering II</td>
<td>3</td>
<td>1</td>
<td></td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE422</td>
<td>Water Resources Engineering II</td>
<td>3</td>
<td>2</td>
<td></td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE423</td>
<td>Elective – III</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE424</td>
<td>Elective – IV</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>CE425</td>
<td>Project Work</td>
<td>--</td>
<td>6</td>
<td></td>
<td>6</td>
<td>--</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>FE 02</td>
<td>Free Elective-II</td>
<td>4</td>
<td></td>
<td></td>
<td>4</td>
<td>3</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Total: 18 7 6 31 400 200 600 28

**ELECTIVE – III (COURSE NO. CE 423)**
- CE423 A Finite Element Methods of Analysis
- CE423 B Solid Waste management
- CE423 C Soil Dynamics & Machine Foundation
- CE423 D Principles of Water Quality Management

**ELECTIVE – IV (COURSE NO. CE 424)**
- CE424 A Air Pollution Control
- CE424 B Ground Improvement Techniques
- CE424 C Prestressed Concrete
- CE424 D Coastal Engineering
- CE424 E Hydraulic Structures
IV / IV B. E. (CIVIL ENGINEERING)

2nd SEMESTER

CE421 TRANSPORTATION ENGINEERING – II

RAILWAY ENGINEERING – 1 : Historical development of railways in India – Advantages of Railways – Classification of Indian Railways – Permanent way – Components and their functions – Rail joints – Welding of Rails – Creep of Rails – Rail fixtures & Fastenings.


References:
2) Railway Engineering by Rangwala.
3) Dock & Harbour by Birdie.
4) Tunnelling by Rangwala.
CE422  WATER RESOURCES ENGINEERING – II

Storage Works: Classification of dams, Factors governing selection of types of dam, Selection of site, Preliminary investigation.


Earth Dams: Types, Foundation for earth dams, design of earth dams, Causes for failure of earth dams, Criteria for safe design, Phreatic line, Seepage analysis – Seepage control through body and foundation.

Spillways: Essential requirements, Spillway capacity, Components, Types of spillways and their working, Design of ogee spillway, Energy dissipation below spill way, Scour protection, Use of hydraulic jump as energy dissipater – Design of stilling basins – USBR and IS standard basins; Spillway crest gates – Different types.

Diversion Head Works: Types, Location and components, effects of construction of weirs on permeable foundation, Bligh’s, Lanes and Khosla’s theories, Method of independent variables, Design principles of weirs and barrages, Design of weirs on permeable foundations, Design of vertical drop weir, Silt control devices.

Regulation Works: Canal falls – Definition, Necessity and location, Classification of falls, Design principles of syphon well drop, Notch fall, Sarada fall, Straight glacis fall; Oftake alignment; Cross regulator and Distributary head regulator – Design of cross regulator and Distributor head regulator.

Cross Drainage Works: Types, Factors affecting the suitability of each types, Classification of aqueducts, Design principles of different types of aqueducts.

River Training Works: River Training and its objectives, Classification of river training works, Marginal embankment, Guide banks, Groynes, cutoffs, Bank pitching, Launching aprons, Miscellaneous types of river training works.

Water Power engineering: Development of hydro power in India, Assessment of available power, Utilisation factor, Load factor, Diversity factor, Storage and Pondage; Types of hydro power schemes; Components of hydel schemes – Fore bay, Intake structure, Trash racks, Surge tanks; Water hammer pressure, Substructure and Superstructure of power house.

References:
Matrix methods of Analysis - Introduction, Analysis of beams and Portal Frames (One bay, one storey Two bay, two storey) by stiffness method.

Matrix methods of Analysis - Introduction, Analysis of beams and Portal Frames (One bay, one storey Two bay, two storey) by flexibility method.


Basic theory relating to the formulation of the finite element method, element shapes, nodes, nodal degree of freedom, node numbering. Coordinate system (local and global), Convergence requirements, Compatibility requirement, Geometric Invariance.

Finite element analysis of - single bar element (One –Dimensional problem) – Shape functions, derivation of stiffness matrix, stress-strain relations – All with reference to bar element and trusses under axial forces.

Text Books:

References:
CE423B   SOLID WASTE MANAGEMENT

Introduction: Definition of solid waste, garbage, rubbish- Sources and Types of solid wastes. Characteristics of Solid Wastes: Physical, chemical and biological characteristics- Problems due to improper disposal of solid waste.

Solid Waste Management: Definition- Reduction, reuse, recycling and recovery principles of waste management- Functional elements of Solid Waste management- Waste generation and handling at source- Collection of solid wastes- Collection methods and services- guidelines for collection route layout.

Transfer and Transport of Wastes: Transfer station- Processing and segregation of the solid waste- various methods of material segregation.


References:
1. Integrated Solid Waste Management by Tchobanognous
2. Environmental Engineering by Howard S. Peavy, Donald R. Rowe and George Tchobanognous
CE423 C  SOIL DYNAMICS AND MACHINE FOUNDATIONS

Types of machine foundations – General requirements, Design criteria for machine foundations, Permissible amplitudes and bearing pressures.
Resonance and its effect – free and forced Vibrations with and without damping – Constant force and rotating mass type excitation – Magnification factor – Phase difference between forces and displacement for steady state vibrations – Logarithmic decrement.

Natural frequency of foundation – soil system – Barkan’s and I.S. methods of determining natural frequency. Tachehotarioff’s reduced natural frequency.
Elastic properties of soil for dynamical purpose and their experimental determination of shear modulus from wave theory.

Apparent soil mass – bulb of pressure concept – Pauw’s analogy of foundation – soil system (charts to be supplied for solving problems).

Principles of design of foundations for reciprocating and impact type of machine – as per I.S. codes.- Vibration isolation – types and methods of isolation – isolating materials and their properties.

References:
2) I.S. Codes.
4) Analysis and design of Foundations and Retaining Structure by Shamsher prakash, Gopal Ranjan and Swamisaran – M/s Saritha Prakashan, Meerut.
CE 423 D: PRINCIPLES OF WATER QUALITY MANAGEMENT


Modeling the fate of pollutant in natural water: Fundamentals of process and mechanisms-Conventional Streeter-Phelps BOD-DO models, Critical deficit and time required to reach the critical deficit.

Fundamentals of ground water flow – variations of ground water levels, fluctuations due to Evapotranspiration, Meteorological phenomena

Groundwater pollution and management – Sources of ground water pollution and their effects – municipal, industrial, agricultural and miscellaneous, ground water basin investigations. Groundwater modeling techniques.


Reference Books:
1. Ground Water Technology by B. K. Todd.
2. An introduction to Water quality modelling. James, A.
3. Surface water quality modeling by Chopra, S.C
CE 424 ELECTIVE – IV

CE424 A  AIR POLLUTION CONTROL

Air Pollution and its definition – Factors influencing air pollution – Classification of pollutants particulates – Gases-Sources of pollution – Air qualities standards – effects – Location of Industries.


Air Pollution effects on human beings, animals, plants and materials – Air Pollution Episodes in India and abroad.

Ambient air quality monitoring and stack monitoring.

Control of air pollution – Removal of pollutants – particulate and gaseous – Air pollution control equipments (units) such as setting chamber, cyclones, wet scrubbers/collectors, scrubbers, centrifugal scrubbers spary towers, packed beds, electrostatic precipitators, after burners-absorption – adsorption – Diffusion.

References:
1) Air Pollution Control Technology by T. Painter.
2) Elements of Air Pollution Control by Prof. T. Shivaji Rao.
3) Air Pollution Control by K.V.S.G. Murali Krishna.
4) Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H.
CE424 B  GROUND IMPROVEMENT TECHNIQUES

In-situ densification Methods in granular soils – Introduction of Vibration at the ground surface, Impact at the Ground surface, Vibration at depth, Impact at depth.
In-situ Densification methods in cohesive soils, introduction, preloading or dewatering, drainwalls, sand drains, sand wicks, geodrains/banddrains, stone and lime columns, forced vacuum preconsolidation, thermal methods.

Grout injections, suspension and solution grouts, grouting equipment and methods, Applications.

Geotextiles: Introduction, types of geotextiles; Functions and their application, tests for geotextile materials, geogrids, functions.
Mechanical stabilization: Soil aggregate mixture, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control. Cement stabilization, Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.

Lime and Bituminous Stabilization: Types of admixtures, mechanism, factors affecting, design of mixtures, construction methods.
Stone columns, introduction, construction practice, design principles, vibrofloatation techniques and other techniques like dynamic replacement etc.

References:
2) Principles of pavement design, E. J. Yoder: John Wiley and sons.
3) Foundation Engineering, Leonards, G.A.
CE 424 C  PRESTRESSED CONCRETE

Introduction, Basic concepts of prestressing, need for high strength steel and concrete, advantages of prestressed concrete. Materials for prestressed concrete, high strength concrete and high strength steel.

Prestressing systems (1) Fressinet System (2) Gifford Udall (3) Magnel Blatan System, Tensioning devices, anchoring devices. (d) Pretensioning and Post tensioning.

Prestressing losses, Elastic shortening, loss due to shrinkage, loss due to creep, loss due to friction, loss due to curvature etc. I.S. code provisions.

Analysis of prestress members, assumptions, pressure, or thrust line concept of load balancing, cable profile, kern distance, stress in tendons as per IS 1343, cracking moment.

Limit state design of flexural members, stress, I.S. code provisions, design of symmetrical beams, design of prestressed concrete poles, design for shear, I.S. code provisions.

(b) Anchorage zone in post tensioned members, stress distribution in end block, Guyon’s method of approach of analysis of end block (Not more than 2 cables).

References:
1) Prestressed Concrete by P. Dayaratnam.
CE424 D  COASTAL ENGINEERING

Mechanics of Wave Motion: Wave fundamentals and classification of waves, small amplitude wave theory, wave celerity, length, and period, orbital motions, pressure distribution, wave trains and wave energy, transformation of waves, higher order wave theories, stokes higher order wave theories, cnoidal wave theory, wave refraction, wave diffraction, wave reflection, wave breaking.

Tides, Storm surges, Tsunamis - Wave Prediction: Wave height variability, energy spectra of waves, directional spectra of waves, wind information needed for wave prediction, estimating the wind characteristics, delineating a fetch, forecasts for lakes, bays, and estuaries, significant wave method, wave spectrum method, forecasting wind waves in shallow water, deep water relation for wave decay, hurricane waves.

Littoral Processes: Ocean currents, long shore currents and setup due to ocean waves, sediment transport in the offshore zone, surf zone, bar-berm prediction and budget of the littoral zone.

Wave runup, overtopping and transmission - Wave Forces: Wave forces on cylinders and walls.

REFERENCES:
CE424 E HYDRAULIC STRUCTURES

Straight Gravity concrete Dams : Single-step design, multiple-step design, Internal stresses in gravity dams, stress distribution around openings, stress distribution around a circular hole in an infinite plate due to a normal stress on the plate, stress distribution around a horse shoe shaped gallery using phillips and zanger’s tables, design of reinforcement around galleries in dams.

Arch Dams: Economic central angle of an arch dam, constant radius method, constant angle method, and variable radius and variable angle design of arch dams, trial load method of analysis of arch dams.


Spillways: Hydraulic design of ogee spillways, comprehensive discharge characteristics of ogee spillways, design of reinforcement in the crest region of an ogee spillway, hydraulic design of chute spillways, morning glory spillways, side channel spillways.

Stilling basins and energy dissipaters: Intake Structure:

Water Conductor System: Selection of type of water conductors, economic analysis for determination of sizes of water conductors, analysis and design of lined pressure tunnels, water hammer analysis, analysis and design of surge tanks of various types, design of anchor blocks for penstocks, design of penstock junctions, design of scroll cases and draft tubes.

Gates and Valves : Vertical lift gates, tainter gates, cylindrical gates, butterfly valves, Howell – Bunger valves, needle valves, flow induced forces on vertical lift gates, flow induced vibration of vertical lift gates.

Layout of Power Houses.

References:
4) Handbook of applied hydraulics, Davis and Sorensen.
5) Soil Mechanics , Lambe and Whitman,

CE425 PROJECT WORK