Minutes

of the special meeting of the Board of Studies (BOS) of the Civil Engineering Section (CES), University Polytechnic, was held on 28.03.2019 at 3:30 P.M. in the conference room, University Polytechnic, AMU, Aligarh. The following were present:

1. Prof. Arshad Umar
2. Prof. Amjad Massod (Assigned member)
3. Dr. Mohd. Mohsin
4. Mr. M. Rizwan R. Khan
5. Mr. Mohd Kafi
6. Mr. Mazhar Ali
7. Dr. S. Kaleem A. Zaidi
8. Dr. Ahmad Ashfaq
9. Mr. Mohd. Idris
10. Mr. Jan Nisar Akhtar
11. Ms. Sadaf Ahmad
12. Mr. Mohd. Danish
13. Dr. Md. Ayaz
14. Mr. Ahmed Bilal
15. Mr. Md. Shaheer Ali
16. Mr. Syed Mohd. Talha

Principal (in the chair)
Professor, Dept. of Civil Engineering AMU, Aligarh
Associate Professor & Incharge, CES
Associate Professor
Associate Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor
Assistant Professor

The members of the board of studies warmly welcomed the new Principal, University Polytechnic.

Item No. 01.

(a) As per clause 10.2 of academic ordinance CHAPTER XXXVII (D) 2013-2014, CHAPTER XXXVIII(E) 2013-14 and CHAPTER XXXVIII(F) 2013-14, duration of end semester examination of each theory as well as practical courses shall be of 02 (Two) hours instead of 03(Three) hours w.e.f 2019-20 which will be incorporated in study/teaching and evaluation/ examination (Curriculum) scheme of Diploma in Engineering (Civil), ADFT and ADEE, as given in Annexure I.
(b) The change in the ordinance is given in Annexure II. Further, this change will be applicable w.e.f. 2018-2019.

(c) Introduction of provision of Internship Training is given in Annexure II. Some other minor amendments are also given in Annexure II.

Item No. 02.

Re-organized /modified syllabi of Diploma in Engineering (Civil), ADFT and ADEE course are given in Annexure III.

The BOS authorizes the Principal to make minor changes in consultation with the Incharge, Civil Engineering Section.

The meeting, then, came to an end after a vote of thanks from the chair.

(Dr. Mohd Mohsin)
Assoc. Prof. & Incharge
Civil Engineering Section
University Polytechnic
AMU, Aligarh

(Prof. Arshad Umar)
Principal
University Polytechnic
AMU, Aligarh
### Course Structure and Evaluation Scheme

**Diploma Engineering Programme**

**University Polytechnic**

**Faculty of Engineering and Technology, AMU, Aligarh**

#### Branch: Civil Engineering

**I-Semester**

<table>
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<td>Pds/week</td>
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* Course Common with other Diploma Programmes.
### COURSE STRUCTURE AND EVALUATION SCHEME

**DIPLOMA ENGINEERING PROGRAMME**

**UNIVERSITY POLYTECHNIC**

**FACULTY OF ENGINEERING AND TECHNOLOGY, AMU, ALIGARH**

#### III-Semester

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G. **TOTAL=** 16 18 800

Total Pds/Week= 34
### IV-Semester

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**Practical Courses:**

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**G. TOTAL= 24 09 850**

Total Pds/Week= 33

Total Marks of II-Yr= 1650

*Course Common with other Diploma Programmes.*
### COURSE STRUCTURE AND EVALUATION SCHEME
#### DIPLOMA ENGINEERING PROGRAMME
##### UNIVERSITY POLYTECHNIC
###### FACULTY OF ENGINEERING AND TECHNOLOGY, AMU, ALIGARH

#### V-Semester

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Total Pds/Week= 32
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* In continuation to Project initiated under course no. BCE-593

$ Subject allocation on the basis of preference based on I-year marks.

# Courses bearing code other than BCE shall be approved by BOS of concerned Section

Total Marks of I-Yr= 1600

Total Marks of II-Yr= 1650

Total Marks of III-Yr= 1750

Grand Total Marks= 5000
# I-Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>Duration of Exam</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>ADFT-5101</td>
<td>Food Microbiology</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>ADFT-5102</td>
<td>Food Chemistry and Nutrition</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>ADFT-5103</td>
<td>Food Refrigeration and Cold Storage</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>ADFT-5104</td>
<td>Basic Chemical Engineering</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong>= 12</td>
<td></td>
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</tr>
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</table>

# Practical Courses:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>Duration of Exam</td>
</tr>
<tr>
<td>1</td>
<td>ADFT-5191</td>
<td>Food Microbiology and Analysis Lab</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>ADFT-5192</td>
<td>Unit Operations Lab</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong>= 12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# II-Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>Duration of Exam</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>ADFT-5201</td>
<td>Food Preservation Technology</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>ADFT-5202</td>
<td>Technology of Fermented and Baked foods</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>ADFT-5203</td>
<td>Process Technology of Dairy Products</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>ADFT-5204</td>
<td>Technology of Plantation crops and spices</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>ADFT-5205</td>
<td>Fruits and vegetable Processing Technology</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong>= 15</td>
<td></td>
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</table>

# Practical Courses:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>Duration of Exam</td>
</tr>
<tr>
<td>1</td>
<td>ADFT-5291</td>
<td>Bakery and Dairy Technology Lab</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>ADFT-5292</td>
<td>Computer Lab</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong>= 09</td>
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</tbody>
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# Total Marks of I-Yr= 1800
### III-Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>Duration of Exam</td>
</tr>
<tr>
<td>1</td>
<td>ADFT-5301</td>
<td>Food Packaging, Handling and Transportation</td>
<td>3 - 2</td>
<td>10 15</td>
</tr>
<tr>
<td>2</td>
<td>ADFT-5302</td>
<td>Food Quality Standards and Regulations</td>
<td>3 - 2</td>
<td>10 15</td>
</tr>
<tr>
<td>3</td>
<td>ADFT-5303</td>
<td>Livestock and Marine Products Processing</td>
<td>3 - 2</td>
<td>10 15</td>
</tr>
<tr>
<td>4</td>
<td>ADFT-5304</td>
<td>Environmental Pollution and Management</td>
<td>3 - 2</td>
<td>10 15</td>
</tr>
<tr>
<td>5</td>
<td>ADFT-5305</td>
<td>Entrepreneurship Development</td>
<td>3 - 2</td>
<td>10 15</td>
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<tr>
<td></td>
<td></td>
<td><strong>TOTAL=</strong> 15</td>
<td><strong>500</strong></td>
<td></td>
</tr>
</tbody>
</table>

**G. TOTAL= 15 06 750**

**Total Pds/Week= 21**

### IV-Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>Duration of Exam</td>
</tr>
<tr>
<td>1</td>
<td>ADFT-5491</td>
<td>Seminar</td>
<td>- 6 2</td>
<td>200 -</td>
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<tr>
<td>2</td>
<td>ADFT-5492</td>
<td>Project</td>
<td>- 6 2</td>
<td>200 -</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total=</strong> 12</td>
<td><strong>700</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>G. TOTAL= 00 12</strong></td>
<td><strong>700</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total Pds/Week= 12</strong></td>
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</tr>
</tbody>
</table>

**Total Marks of II-Yr= 1450**

**Grand Total Marks= 3250**
# Advance Diploma in Environmental Engineering (ADEE)

## Civil Engineering Section, University Polytechnic

### Faculty of Engineering and Technology

**AMU, ALIGARH**

## Annexure-I

### Course Structure and Evaluation Scheme

#### COURSE STRUCTURE AND EVALUATION SCHEME

**ADVANCE DIPLOMA IN ENVIRONMENTAL ENGINEERING (ADEE)**

**CIVIL ENGINEERING SECTION, UNIVERSITY POLYTECHNIC**

**FACULTY OF ENGINEERING AND TECHNOLOGY**

**AMU, ALIGARH**

### I-Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Duration of Exam</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>L P Hrs</td>
<td>Max Marks</td>
</tr>
<tr>
<td>Theory Courses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ADEE-4101</td>
<td>Applied Statistics</td>
<td>3 - 2 2</td>
<td>10 15 75 100</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ADEE-4102</td>
<td>Environmental Hydraulics</td>
<td>4 - 2 10</td>
<td>15 75 100</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ADEE-4103</td>
<td>Municipal and Industrial Water Treatment</td>
<td>4 - 2 10</td>
<td>15 75 100</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ADEE-4104</td>
<td>Environmental Chemistry and Microbiology</td>
<td>4 - 2 10</td>
<td>15 75 100</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ADEE-4105</td>
<td>Environmental Impact Assessment and Auditing</td>
<td>3 - 2 10</td>
<td>15 75 100</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL= 18</strong></td>
<td></td>
<td></td>
<td><strong>500</strong></td>
</tr>
<tr>
<td>Practical Courses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ADEE-4191</td>
<td>Environmental Engineering Lab-I</td>
<td>- 6 2 100</td>
<td>- 50 150</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ADEE-4192</td>
<td>Computer Applications Lab</td>
<td>- 2 2 100</td>
<td>- 50 150</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL= 8</strong></td>
<td></td>
<td></td>
<td><strong>300</strong></td>
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<tr>
<td></td>
<td></td>
<td><strong>G. TOTAL= 18</strong></td>
<td></td>
<td></td>
<td><strong>800</strong></td>
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<td></td>
<td><strong>Total Pds/Week= 26</strong></td>
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### II-Semester

<table>
<thead>
<tr>
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<th>Course No.</th>
<th>Course Title</th>
<th>Study Scheme</th>
<th>Duration of Exam</th>
<th>Evaluation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pds/week</td>
<td>L P Hrs</td>
<td>Max Marks</td>
</tr>
<tr>
<td>Theory Courses:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ADEE-4201</td>
<td>Water Quality Management</td>
<td>3 - 2 2</td>
<td>10 15 75 100</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ADEE-4202</td>
<td>Municipal and Industrial Wastewater Treatment</td>
<td>4 - 2 10</td>
<td>15 75 100</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ADEE-4203</td>
<td>Air Pollution and Control</td>
<td>4 - 2 10</td>
<td>15 75 100</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ADEE-4204</td>
<td>Solid and Hazardous Waste Management</td>
<td>4 - 2 10</td>
<td>15 75 100</td>
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</tr>
<tr>
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<td></td>
<td><strong>TOTAL= 15</strong></td>
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<td></td>
<td><strong>400</strong></td>
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</tr>
<tr>
<td>1</td>
<td>ADEE-4291</td>
<td>Environmental Engineering Lab-II</td>
<td>- 6 2 100</td>
<td>- 50 150</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ADEE-4292</td>
<td>Project/Industrial Study and Seminar</td>
<td>- 4 2 200</td>
<td>- 50 250</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total= 10</strong></td>
<td></td>
<td></td>
<td><strong>400</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>G. TOTAL= 15</strong></td>
<td></td>
<td></td>
<td><strong>800</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total Pds/Week= 25</strong></td>
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</table>

**Total Pds/Week= 25**

**Total Marks of I-Yr= 1600**

**Grand Total Marks= 1600**
## Annexure II

### Minor Amendments in Ordinances (Academic) in Chapter XXXVII (D) Relating to Diploma in Engineering Courses

<table>
<thead>
<tr>
<th>Clause No.</th>
<th>Existing Ordinance</th>
<th>Deleted</th>
<th>Added</th>
<th>Proposed Ordinance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2</td>
<td>The maximum duration of the program shall be ten (10) semester after admission.</td>
<td></td>
<td></td>
<td>The maximum duration of the program shall be ten (10) <strong>consecutive</strong> semester after admission.</td>
</tr>
<tr>
<td>6.3 (a)</td>
<td>The curriculum of each branch shall contain a list of courses having a course number, course title, number of contact periods, maximum marks assigned to various component of evaluation.</td>
<td></td>
<td></td>
<td>The curriculum of each branch shall contain a list of courses having a course number, course title, number of contact periods, maximum marks assigned to various component of evaluation <strong>and duration of end semester examination.</strong></td>
</tr>
</tbody>
</table>
| 10.4       | (a)
            | (b)             | Nil    | Nil               | (a)
            | (b)             | (c)***          | (c)***          |
(i) Supplementary examination shall be held only for those who have cleared all the theory as well as practical courses up to fourth semester and have no more than four courses of theory and practical's combined to clear **fifth and sixth semester**.

(ii) Supplementary examination shall be held only after the final semester (sixth semester).

<table>
<thead>
<tr>
<th></th>
<th>Nil</th>
<th>Nil</th>
<th>Nil</th>
<th>Deleted</th>
<th>Deleted</th>
<th>Deleted</th>
</tr>
</thead>
</table>

(a) (b) (c) (d) (e) (f)

(g) Candidate who obtains 75% or more marks in the subject of final semester shall be marked distinction in that respective subject(s) of all semesters marks sheets.
(c)***

- The students of Diploma in Engineering will have to undergo 04 (Four) weeks summer internship training comprising of industrial hands on experience for fulfilling AICTE requirement at the end of 4th Semester.

- The Committee/TPO, University Polytechnic will issue the list of students who have completed the training and each student would be required to submit a brief report with the certificate of completion of training by the respective industry.

- The evaluation will be done and grades would be awarded as per AICTE norms and marked in the marks sheet of Final Semester.

- It was recommended that the internship training will be introduced from the academic session 2019-20. However, the training would be introduced on experimental basis from the current academic session 2018-19.
Minor Amendments in Ordinances (Academic) in Chapter XXXVIII (E) Relating to Advance Diploma in Food Technology Programme University Polytechnic (Boys)

<table>
<thead>
<tr>
<th>Clause No.</th>
<th>Existing Ordinance</th>
<th>Deleted</th>
<th>Added</th>
<th>Proposed Ordinance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2</td>
<td>The maximum duration of the program shall be six (6) semester after admission.</td>
<td></td>
<td></td>
<td>The maximum duration of the program shall be six (6) <strong>consecutive</strong> semester after admission.</td>
</tr>
<tr>
<td>6.3 (a)</td>
<td>The curriculum of each branch shall contain a list of courses having a course number, course title, number of contact periods, maximum marks assigned to various component of evaluation.</td>
<td></td>
<td></td>
<td>The curriculum of each branch shall contain a list of courses having a course number, course title, number of contact periods, maximum marks assigned to various component of evaluation and <strong>duration of end semester examination.</strong></td>
</tr>
<tr>
<td>10.4</td>
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<td>Nil</td>
<td>(a)</td>
</tr>
<tr>
<td></td>
<td>(b)</td>
<td>Nil</td>
<td>Nil</td>
<td>(b)</td>
</tr>
<tr>
<td></td>
<td>(c)***</td>
<td></td>
<td></td>
<td>(c)***</td>
</tr>
<tr>
<td>15</td>
<td>(a)</td>
<td>Nil</td>
<td>Nil</td>
<td>(a)</td>
</tr>
<tr>
<td></td>
<td>(b)</td>
<td>Nil</td>
<td>Nil</td>
<td>(b)</td>
</tr>
<tr>
<td></td>
<td>(c)</td>
<td>Nil</td>
<td>Nil</td>
<td>(c)</td>
</tr>
<tr>
<td></td>
<td>(d)</td>
<td>Nil</td>
<td>Nil</td>
<td>(d)</td>
</tr>
<tr>
<td></td>
<td>(e)</td>
<td>Nil</td>
<td>Nil</td>
<td>(e)</td>
</tr>
<tr>
<td></td>
<td>(f)</td>
<td>Nil</td>
<td>Nil</td>
<td>(f)</td>
</tr>
</tbody>
</table>
(g) Candidate who obtains 75% or more marks in the subject of final semester shall be marked distinction in that respective subject(s) of all semesters marks sheets.

(c)**

- The students of Diploma in Engineering will have to undergo 04 (Four) weeks summer internship training comprising of industrial hands on experience for fulfilling AICTE requirement at the end of 2nd Semester.

- The Committee/TPO, University Polytechnic will issue the list of students who have completed the training and each student would be required to submit a brief report with the certificate of completion of training by the respective industry.

- The evaluation will be done and grades would be awarded as per AICTE norms and marked in the marks sheet of Final Semester.

- It was recommended that the internship training will be introduced from the academic session 2019-20. However, the training would be introduced on experimental basis from the current academic session 2018-19.
Annexure: II

Minor Amendments in Ordinances (Academic) in Chapter XXXVIII (F) Relating to Advance Diploma in Environmental Engineering Programme University Polytechnic (Boys)

<table>
<thead>
<tr>
<th>Clause No.</th>
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<th>Added</th>
<th>Proposed Ordinance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2</td>
<td>The maximum duration of the program shall be four (4) semester after admission.</td>
<td></td>
<td></td>
<td>The maximum duration of the program shall be four (4) <strong>consecutive</strong> semester after admission.</td>
</tr>
<tr>
<td>6.3 (a)</td>
<td>The curriculum of each branch shall contain a list of courses having a course number, course title, number of contact periods, maximum marks assigned to various components of evaluation.</td>
<td></td>
<td></td>
<td>The curriculum of each branch shall contain a list of courses having a course number, course title, number of contact periods, maximum marks assigned to various components of evaluation <strong>and duration of end semester examination.</strong></td>
</tr>
<tr>
<td>10.4 (a)</td>
<td>Nil</td>
<td></td>
<td>Nil</td>
<td>(a)</td>
</tr>
<tr>
<td>15 (a)</td>
<td>Nil</td>
<td></td>
<td>Nil</td>
<td>(a)</td>
</tr>
</tbody>
</table>
(g) Candidate who obtains 75% or more marks in the subject of final semester shall be marked distinction in that respective subject(s) of all semesters marks sheets.

(c)***

- The students of Diploma in Engineering will have to undergo 04 (Four) weeks summer internship training comprising of industrial hands on experience for fulfilling AICTE requirement at the end of 4th Semester.

- The Committee/TPO, University Polytechnic will issue the list of students who have completed the training and each student would be required to submit a brief report with the certificate of completion of training by the respective industry.

- The evaluation will be done and grades would be awarded as per AICTE norms and marked in the marks sheet of Final Semester.

- It was recommended that the internship training will be introduced from the academic session 2019-20. However, the training would be introduced on experimental basis from the current academic session 2018-19.
### Course Assessment Method

1. Class Work (50 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (35 Marks) – 2 Hours

### Course Objectives

1. To improve the imagination power so that students can imagine about the details before the existence of the objects.
2. The main purpose of engineering drawing is to communicate the details of objects to other engineers.
3. To understand the basic principles of Technical/Engineering Drawing.
4. To understand the drawing standards as per BIS.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Sketch engineering objects in the free hand mode.
2. Read and interpret drawings of simple objects and building components and sectional views in first and third angle of projection systems.
3. To apply engineering drawing standards and developing new ideas and products.
4. Apply various engineering scales such as plane, diagonal in engineering drawing.

### Topics Covered

#### Unit-I  PRINTING

- Introduction: Need and importance of drawing as the language of Engineers, Selection and handling of the drawing instruments and equipments, Single stroke printing: Capitals, Sub-capitals, Small, Vertical and Italics, with and without serif, Block printing in 5:7 type.

#### Unit-II  SCALES

- Need of a scale, Representative Fraction (R.F.) and types of Scales according to R.F., Construction of Plain, Diagonal and Vernier Scales.

#### Unit-III  ORTHOGRAPHIC PROJECTIONS


### Text Books and/or Reference Books

2. Gill, P.S.; Engineering Drawing, S.K. Kataria & Sons
3. Dhawan, R.K.; Engineering Drawing, S. Chand & Company Ltd.
4. Gupta, R.B.; Engineering Drawing, SatyaPrakashan

### Additional Learning Source

1. https://nptel.ac.in/courses/112103019/
<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/ Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>I-Year (II-Semester)</td>
<td>BCE201</td>
<td>Engineering Drawing - II</td>
<td>Theory</td>
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</tbody>
</table>

**Course Assessment Method**

1. Class Work (50 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (35Marks) – 2 Hours

**Course Objectives**

1. To understand the pictorial projection of objects.
2. To learn the detail of isometric and perspective view.
3. To understand the basics of building drawings and important building components.
4. To learn the development of plan, elevation and sections of small residential building.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:
1. Draw different views of simple three dimensional objects.
2. Sketch some basic components of building drawing.
3. Interpret plan, elevation and sanction of building drawing.
4. Read the details of building drawings in various building drawings.
5. Read the information from building drawing and apply them in the field as per the drawing details.

**Topics Covered**

Unit- I  NSOMETRIC AND PERSPECTIVE PROJECTIONS

**Isometric Projection:** Simple Right Solids, English Alphabets, 3 Steps Stair Block and Model of Simple Machine Parts.

**Perspective Projection:** Two Point Perspective of Plane Laminae, Right Solids and Simple Blocks.

Unit- II BUILDING COMPONENTS

**Basic idea of different types of foundations such as Wall Footing including Spread, Eccentric and Dwarf wall, Isolated Column and Combined footing.**

**Types of Floors:** Brick, Cement Concrete, Stone, Mosaic, Marble and Vitrified Tile Flooring, Roof terracing.

**Wall Section:** Wall sections through doors, windows and arch openings.

Unit- III RESIDENTIAL BUILDINGS


**Text Books and/or Reference Books**

2. Chakraborti M; Calcutta.

**Additional Learning Source**

<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Weak</th>
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<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>First Year (II-Semester)</td>
<td>BCE202</td>
<td>Surveying-I</td>
<td>Theory</td>
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</table>

Course Assessment Method

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

Course Objectives

1. To be able to do the chain and plane table surveying.
2. To be able to do the compass surveying.
3. To be able to do the profile levelling and cross-sectioning.
4. To be able to do the surveying using theodolite.

Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Measure and correct the measured distances and areas using tapes and chains.
2. Plot the area to the scale using plane table surveying.
3. Make the traverse using compass surveying.
4. Make profile and cross-sections
5. Measure horizontal and vertical angles using theodolite.

Topics Covered

Unit-I  CHAIN SURVEYING
I Definition of surveying, principles of surveying. Brief description of different types of chains and tapes, tape corrections. Corrections of erroneous distances and areas, ranging of survey lines. Obstacles in chaining and ranging.

PLANE TABLE SURVEYING:
Accessories and methods of plane table surveying, advantages and disadvantages of plane table surveying. Three point problem (Mechanical and Lehman’s method). Two point problem.

Unit-I  COMPASS SURVEYING:

Unit-I  LEVELLING:
III Definition of terms related to levelling. Brief description of dumpy, tilting and IOP levels. Temporary and permanent adjustment of dumpy level. Sensitiveness of bubble tube, Curvature and refraction, reciprocal levelling, Methods of calculation of reduce levels. Profile levelling, L-section, cross-section and formation lines. Precautions and errors in levelling, balancing back sight and fore sight distances. Levelling difficulties.

Unit-I  THEODOLITE SURVEYING:
IV Description of a transit theodolite. Definition of terms. Fundamental lines and desired relations, temporary adjustment of theodolite. Method of reading horizontal and vertical angles. Miscellaneous operations with theodolite. Determination of heights and distances with theodolite when base of the object is accessible.

Text Books and/or Reference Books

Table:

<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
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<tbody>
<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil</td>
<td>First Year (II-)</td>
<td>BCE203</td>
<td>Construction Materials</td>
<td>Theory</td>
<td>100</td>
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</table>

Course Assessment Method
1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

Course Objectives
1. To understand about stones, bricks and building tiles (their properties, types and uses).
2. To understand about lime, aggregates, mortar and cement (their classification, properties and uses).
3. To understand about timber, wood based products, paints, varnishes, distempers, asphalts, tar, bitumen and insulating materials (their characteristics and uses).
4. To understand about metals, concrete, admixtures and asbestos (their properties, types and uses).

Course Outcomes
Upon successful completion of this course, it is expected that the students will be able to develop understanding of:
1. Requirements of good building stones, composition of good brick earth and uses of stones, bricks and tiles.
2. Classification and uses of lime, aggregates, mortar and cement.
3. Properties and preservation of timber, uses of paints, varnishes, distemper, asphalt, tar and bitumen.
4. Various types of insulating materials.
5. Properties and uses of cast iron, wrought iron and mild steel.
6. Qualities of good concrete, function and utility of admixtures and uses of asbestos in civil engineering work.

Topics Covered

**Unit-I**
- **STONES**: Introduction, requirement of good building stones, uses of stones, classification of stones, common building stones of India and their uses. Stone cladding, artificial or cast stones.
- **BRICKS**: Definition, composition of good brick earth, functions of the constituents of good brick earth, characteristics and uses of first class, second class and third class bricks. Tests for bricks, special bricks.
- **BUILDING TILES**: Introduction, types of building tiles.

**Unit-II**
- **LIME**: Introduction, classification of lime, calcinations and slaking of lime, uses of lime.
- **AGGREGATES**: Introduction, types of aggregates, uses of aggregates
- **MORTAR**: Introduction, types of mortar, uses of mortar
- **CEMENT**: Introduction, Portland cement, composition of Portland cement, physical properties of cement, types of Portland cement and their uses.

**Unit-III**
- **TIMBER**: Introduction, properties of good timber, preservation of timber, some common Indian timbers and their uses in civil engineering works.
- **WOOD BASED PRODUCTS**: Introduction, veneers, plywood, hard board, block board, lamin board, batten board and particle board.
- **PAINTS, VARNISHES AND DISTEMPERS**: Definitions, characteristics of good paint, desirable properties paint, common constituents of paints, types of paint.
- **ASPHALT, TAR AND BITUMEN**: Description, uses of asphalt, tar and bitumen.
- **INSULATING MATERIALS**: Introduction, types of heat and sound insulating materials.

**Unit-IV**
- **METALS**: Definition, properties and uses of pig iron, cast iron, wrought iron and mild steel.
- **CONCRETE**: Introduction, qualities of good concrete, plain cement concrete, lean concrete, reinforced cement concrete.
- **ADMIIXTURES**: Introduction, qualities of good concrete, plain cement concrete, lean concrete, reinforced cement concrete.
- **ASBESTOS**: Definition, Uses of Asbestos in civil engineering works.

Text Books and/or Reference Books

Additional Learning Source
1. [https://onlinecourses.nptel.ac.in/noc15_ce05/preview](https://onlinecourses.nptel.ac.in/noc15_ce05/preview)
**Course Assessment Method**

1. Class Work (30 Marks)
2. End-Semester Examination (20 Marks) – 2 Hours

**Course Objectives**

To impart knowledge and hands-on experience of basic computer applications to the students which will be a prerequisite for any profession.

**Course Outcomes**

At the end of the course, the students will be able to use basic computer applications for writing of project reports, official letters and applications, preparation of graphs, solving design problems, preparation of presentations and other professional works.

**Topics Covered**

1. Introduction to basics of computer application (Hardware/software/folder/file/etc.) with typing practice on Notepad and WordPad
2. Writing of specimen application using MS Word with formatting and page setup commands
3. Preparation of Curriculum Vitae (CV) using MS Word with Indentation and Tab commands
4. Preparation of class time table in MS Word using Table Command
5. Application of Equation Editor for writing mathematical equations
6. Practice of advanced MS Word commands (Header/Footer/Drop Cap/Change Case/Styles/etc.)
7. Introduction to MS Excel (Components of Excel User Interface/Page Setup/Formatting/Cell Reference etc).
8. Plotting of graphs in MS Excel
9. Introduction to Functions and Formulas in MS Excel
   - Program to solve quadratic Equation
   - Program to solve a design Problem
10. Introduction to MS PowerPoint for developing presentations

**Text Books and/or Reference Books**

1. C. S. Changeriya, Basic Computer Course, ChetanPrakashan Publisher, 2014

**Additional Learning Source**

1. [https://swayam.gov.in](https://swayam.gov.in)
### Course Assessment Method

1. Course Work – 70 Marks
2. Mid-Semester Examination (Camp) – 40 Marks
3. End-Semester Examination – 40 Marks (Duration: 2 Hours)

### Course Objectives

1. To be able to measure the distances.
2. To be able to measure the angles.
3. To be able to map and calculate the area.
4. To be able to draw profile and cross-sections.
5. To be able to measure the angles precisely.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to perform the following field work:

1. Measuring the distances, ranging, offsetting and traversing using tapes and chains.
2. Making and adjusting the traverse using compass.
3. Plotting the area to the scale using plane table surveying.
4. Making profile and cross-sections of roads and other related Civil Engineering structures.
5. Measuring horizontal and vertical angles using theodolite.

### Topics Covered

1. **CHAIN SURVEY:** Folding & unfolding of chains, Ranging of Lines, Offsetting, Offsetting with 90 turn, Offsetting with tie line turn, Traversing with Chain.

2. **COMPASS SURVEY:** Measurements of Bearing, Measurements of included angles from bearings, Traversing with Compass, Graphical Adjustments.

3. **PLAIN TABLE SURVEY:** Radiation Method, Intersection Method, Traversing, Two - Point problems, Three – Point problem.

4. **LEVELING:** Rise & Fall method, Height of Instrument method, Profile Leveling, Cross Sectioning.

5. **THEODOLITE SURVEY:** Measurements of horizontal angles, Measurements of vertical angles.

### Text Books and/or Reference Books

### Course Information

**Section**

<table>
<thead>
<tr>
<th>Civil Engineering</th>
<th>Diploma in Civil Engineering</th>
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<table>
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<th>Year/Semester</th>
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<th>Course Title</th>
<th>Course Type</th>
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<th>Contact Hours/Week</th>
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<td>II-Year (III-Semester)</td>
<td>BCE301</td>
<td>Environmental Studies Water Quality</td>
<td>Theory</td>
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</table>

#### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid Semester Examination (15 Marks) - 1 Hour
3. End Semester Examination (75 Marks) - 2 Hours

#### Course Objectives

1. To have the awareness, knowledge and appreciation of the intrinsic values of ecological processes & communities.
2. To identify the various sources, adverse effects and remedial measures adopted for pollution.
3. To have an approach and awareness to environmental issues, including global warming acid rain, ozone layer depletion.
4. To have a concept of sustainability through sustainable development.
5. To have a basic background of key current environmental problems including deforestation & desertification.
6. To plan strategies before the implementation of a project, without disturbing the environment, through Environmental impact assessment (EIA).
7. To be conversant with the role of non-conventional sources of energy for the control of pollution.
8. To study various types of intake works, pumps used distribution systems for the supply of water.
9. To study the different treatment techniques for the treatment of water to apply the most appropriate one.

#### Course Outcomes:

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the awareness, knowledge and appreciation of the intrinsic values of ecological processes & communities.
2. Identify the various sources, adverse effects and remedial measures adopted for pollution.
3. Understand the approach and awareness to environmental issues, including global warming acid rain, ozone layer depletion.
4. Develop a concept of sustainability through sustainable development.
5. Understand the background of key current environmental problems including deforestation & desertification.
6. To develop strategies before the implementation of a project, without disturbing the environment, through Environmental impact assessment (EIA).
7. Converseant with the role of non-conventional sources of energy for the control of pollution.
8. Understand various types of intake works, pumps used distribution systems for the supply of water.
9. Understand the different treatment techniques for the treatment of water to apply the most appropriate one.

#### Topics Covered

- **Unit-I**
  - Definition of Environmental Science, Environmental engineering and Environmental Management, Concept of Ecology, Food Chain, Food Web, Types of Pollutants; Classification, Sources, Effects and Control Measures, Air Pollution, Water Pollution, Land Pollution, Noise Pollution, Odor pollution, Thermal Pollution
  - Marks: 15

- **Unit-II**
  - Global Warming, Acid Rain, Ozone Depletion, Deforestation and Desertification, Role of Non-Conventional Sources of Energy for Environmental Pollution Control, Environmental Impact Assessment (EIA); Basic Concepts, Objectives, Operating and Guiding Principles, Environmental Awareness, Public Participation.
  - Marks: 20

- **Unit-III**
  - Marks: 20

- **Unit-IV**
  - Water Treatment Processes: Flowsheets, Screening, Aeration, Sedimentation, Coagulation, Flocculation, Filtration, Softening and Disinfection, Bacterial & Microscopical Characteristic: MPN, Plate Count.
  - Marks: 20

#### Reference Books


#### Additional Learning Source

1. [www.vssut.ac.in/lecture_notes/lecture1424353637.pdf](http://www.vssut.ac.in/lecture_notes/lecture1424353637.pdf)
2. [https://www.alljntuw.org](https://www.alljntuw.org)
3. [https://lecturenotes.in/subject/91/environmental-engineering-ee](https://lecturenotes.in/subject/91/environmental-engineering-ee)
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<th>Section</th>
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<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Week</th>
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<td>II Year (III-Semester)</td>
<td>BCE302</td>
<td>Surveying-II Theory</td>
<td>Theory</td>
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</tbody>
</table>

**Course Assessment Method**
1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**
1. To learn the different techniques of measurements of distances, directions and elevations.
2. To learn about the procedures of preparations of topographical maps of the areas.
3. To learn about the process of establishment of horizontal control points necessary for carrying out survey of the area.
4. To learn about the advanced surveying techniques.
5. To learn about the techniques of layout of curves

**Course Outcomes**
Upon successful completion of this course, it is expected that students will be able to:
1. Determine the elevation and distances of various points using various surveying techniques
2. Plan different engineering projects of importance.
3. Layout Curves for roads and railway projects
4. Understand the importance of GPS and remote sensing in the present times.

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit-</th>
<th>TRIGONOMETRIC LEVELLING</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Introduction of trigonometric levelling, different cases of trigonometric levelling for measurement of heights and distances.</td>
<td></td>
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</table>

**TACHEOMETRIC SURVEYING**
Introduction, principle, determination of tacheometric constants, specifications of a tacheometer and a stadia rod, fixed hair system of tacheometric surveying with line of sight (i) horizontal and (ii) inclined with staff held vertical, anallactic lens.

<table>
<thead>
<tr>
<th>Unit-</th>
<th>CONTOURING</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>II</td>
<td>Definition, contour interval, characteristics of contours, methods of locating contours interpolation of contours, contour gradient, applications of contour maps.</td>
<td></td>
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</tbody>
</table>

**TRAVERSING**
Methods of traversing, Independent and consecutive coordinates, Adjustment of traverse by transit and Bowditch’s rules, various cases of omitted measurements.

<table>
<thead>
<tr>
<th>Unit-</th>
<th>CURVES</th>
<th>Marks</th>
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<tbody>
<tr>
<td>III</td>
<td>Necessity, sketches of various types of curves in horizontal and vertical plane, elements of a simple circular curve, degree of curve, necessary calculations and methods of layout of simple circular curve by linear and angular methods, method of lay out of a compound curve by deflection angles. Transition curves: Introduction, functions, conditions to be fulfilled by a transition curve, equilibrium and deficient cant, centrifugal ratio, length of transition curve by arbitrary gradient, time rate, and rate of change of radial acceleration, necessary calculations and methods of lay out.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit-</th>
<th>GPS SURVEYING</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>Introduction and components of GPS and their advantages over conventional methods.</td>
<td></td>
</tr>
</tbody>
</table>

**REMOTE SENSING AND GIS**
Definition, terminology, applications, advantages and disadvantages of remote sensing. Introduction of GIS, applications of GIS, advantages and disadvantages of GIS.

**Text Books and/or Reference Books**
2. Surveying vol. I & II by B. C. Punmia
Section | Course Designation | Year/Semester | Course No. | Course Title | Course Type | Total Marks | Contact Hours/Week
--- | --- | --- | --- | --- | --- | --- | ---
Civil Engineering | Diploma in Civil Engineering | Final Year (III-Semester) | BCE303 | Hydraulics | Theory | 100 | 3 1 0

**Course Assessment Method**
1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**
1. To understand the basics of hydraulics.
2. To be able to design the water supply main pipes.
3. To be able to design open channels.
4. To measure the discharge of water in open channels through notches, weirs and in pipes through Venturimeter.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Know the basics of hydraulics and various fluid properties of water.
2. Design the main water supply pipelines and calculate the head losses.
3. Design the open channels including the sewers.
4. Measure the discharge of water in open channels through notches, weirs and in pipes through Venturimeter.

**Topics Covered**

**Unit-I**
- **FLUIDS STATICS**: Fluid pressure, Pascal’s Law, pressure intensity and pressure Head. Derivation and Application of Basic Formula for pressure intensity. Vacuum and Atmospheric Pressure, Absolute and Gauge Pressure Measurement of fluid pressure by piezometers and U-tube Manometers.
- **HYDROSTATIC FORCE ON SURFACES**: Total Hydrostatic Force on a plane immersed Surface and Centre of Pressure. Simple Applications.

**Unit-II**
- **FLOW OF WATER**: Types of flow, Reynolds and Froude numbers: Discharge and Equation of Continuity. Pressure, Velocity, datum and Total Heads, Bernoulli’s Theorem. Venturimeter.
- **ORIFICES**: Definition and Types of Orifices Hydraulic Coefficients. Large Vertical Rectangular Orifice Free, Drowned and partially drowned orifices Time of emptying tanks of uniform cross section by a single orifice, without inflow.

**Unit-III**
- **MOUTHPIECES**: Definition and Types of Mouthpiece. Discharge through an external cylindrical mouthpiece.

**Unit-IV**
- **FLOW THROUGH PIPES**: Friction in pipes. Definition of HGL and TEL, Loss of Head due to friction, Sudden Expansion, sudden Contraction, Entrance, Exit. Obstruction and change of direction. Flow through parallel (forked) pipes. Flow from one reservoir to another through a long pipe of uniform and composite section.
- **OPEN CHANNEL FLOW**: Geometry of Channel and Geometric Elements. Types of flow in open channels. Flow Formulæ for Open Channels: Chezy’s, Manning’s and Kutter’s. Depth of maximum discharge. Most economical section for rectangular, triangular and trapezoidal channels.

**Text Books and/or Reference Books**
### Course Assessment Method

1. Assignments, Quizzes and Class Work (50 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (35 Marks) – 2 Hours

### Course Objectives

The main objective of the course is to develop basic understanding of civil engineering construction drawings, so that the students get a better insight into the subject, which can subsequently be used in the professional practice.

### Course Outcomes

Upon successful completion of this course, it is expected that students will be able to Understand, interpret and draw civil engineering construction drawings.

### Topics Covered

#### Unit-I

**BUILDING DRAWING AND SERVICES**

- Working drawing of the following including the limitations regarding building heights, built-up area and open space requirements according to local bye-laws:
  - Double storeyed residential buildings with load bearing walls
  - Double storeyed framed structured residential buildings
  - Public buildings
- General idea about site, key and terrace plan
- Provisions of the following building services
  - Structural drawing and detailing of the following
    - Beams, Lintels and Slabs
    - Columns and footings
    - Staircase

#### Unit-II

**IRRIGATION DRAWINGS**

- Plan and sectional elevation of the following
  - Sarda type fall
  - Slab culvert, Pipe culvert slab and box culvert
  - Typical cross section of canal
  - Schematic layout plan of head work
  - Various types of bridges
  - Steel roof truss and different steel sections
  - Detailed of septic tank and soak pit
  - Water harvesting systems

#### Unit-III

**IRRIGATION DRAWINGS**

- Plan and sectional elevation of the following
  - Sarda type fall
  - Slab culvert, Pipe culvert slab and box culvert
  - Typical cross section of canal
  - Schematic layout plan of head work
  - Various types of bridges

---

### Table

<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
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<th>Total Marks</th>
<th>Contact Hours/Week</th>
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<td>II Year (III-Semester)</td>
<td>BCE304</td>
<td>Civil Engineering Drawing</td>
<td>Theory</td>
<td>100</td>
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</tbody>
</table>

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### Course Assessment Method
1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

### Course Objectives
1. To be able to use Transit theodolite, Auto Level and Digital Theodolite.
2. To be able to observe the horizontal and vertical angles of the object
3. To be able to determine the height of an object by transit and digital theodolite
4. To be able to determine the height and R.L of an inaccessible object by digital theodolite
5. To be able to determine the vertical and horizontal distance by tachometry
6. To be able to plot the contour maps of a given area (App100m x 150m).

### Course Outcomes
Upon successful completion of this course, it is expected that the students will be able to:
1. Use the Digital Theodolite & Auto Level for survey work.
2. Observe the horizontal & vertical angles of the object
3. Determine the height & R.L of an object
4. Determine the height & R.L of an inaccessible object
5. Plot the contour maps of an area.

### Topics Covered/ List of Experiments
<table>
<thead>
<tr>
<th>No.</th>
<th>Experiment Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Observe the horizontal angles between the given sides by Transit theodolite</td>
</tr>
<tr>
<td>02</td>
<td>Observe the horizontal angles between the given sides by Digital theodolite</td>
</tr>
<tr>
<td>03</td>
<td>Observe the vertical angles between the given sides by Transit theodolite</td>
</tr>
<tr>
<td>04</td>
<td>Observe the vertical angles between the given sides by Digital theodolite</td>
</tr>
<tr>
<td>05</td>
<td>To determine the height of an object by keeping the instrument at a known distance by (a) Transit theodolite (b) Digital theodolite</td>
</tr>
<tr>
<td>06</td>
<td>To determine the reduce level (Top and Bottom) of an object by keeping the instrument at a known distance from the object. Take R.L of the B.M as (100+Roll No) m.</td>
</tr>
<tr>
<td>07</td>
<td>To determine the reduce level (Top) of an inaccessible object, if the instrument station and object are in the same vertical plane. Take R.L of the B.M as (100+Roll No) m.</td>
</tr>
<tr>
<td>08</td>
<td>To determine the reduce level (Top) of an inaccessible object, if the instrument station and object are not in the same vertical plane. Take R.L of the B.M as (100+Roll No) m.</td>
</tr>
<tr>
<td>09</td>
<td>To determine the sensitiveness and radius of curvature of the bubble tube of a Dumpy level.</td>
</tr>
<tr>
<td>10</td>
<td>To determine the true difference in elevation between two points P &amp; Q by the Reciprocal levelling.</td>
</tr>
<tr>
<td>11</td>
<td>To determine the multiplying and additive constant of a transit theodolite having internal focusing telescope.</td>
</tr>
<tr>
<td>12</td>
<td>To determine the horizontal and vertical distances between two points A&amp;B by tacheometry. Also determine the reduce level of B, if R.L of B.M is (100+Roll No) m. Assume K &amp; C as 100 &amp; 0.2m.</td>
</tr>
<tr>
<td>13</td>
<td>To plot the contour maps of a given area (App100m x 150m in size).</td>
</tr>
</tbody>
</table>

### Text Books and/or Reference Books
Section | Course Designation | Year/Semester | Course No. | Course Title | Course Type | Total Marks | Contact Hours/Week | L | T | P
---|---|---|---|---|---|---|---|---|---|---
Civil Engineering | Diploma in Civil Engineering | II-Year (III-Semester) | BCE392 | Environmental Engineering Lab | Lab | 100 | | 0 | 0 | 4

**Course Assessment Method**
1. Assignments, Oral Quizzes and Class Work (60 Marks)
2. End Semester Examination (40 Marks) - 3 Hours

**Course Objectives**
1. To develop an appreciation for the importance of Environmental Engineering as a major factor in preserving and protecting human health and the environment.
2. To organize their learning about environmental engineering along lines of chemical, physical and biological processes.
3. To describe principal chemicals of concern, the units of measurement, and possible reactions and transformations. These concepts are applied to descriptions of water and wastewater treatment systems.
4. To understand and use the water and wastewater sampling procedures and sample preservations.
5. To carry out experiments and verify theories relating to water and wastewater quality analysis and treatment.
6. To perform common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems.
7. To apply the laboratorial results to problem identification, quantification, and basic environmental and technical solutions.
8. To understand the impact of water and wastewater treatment on people and the environment.
9. To demonstrate the ability to write clear technical laboratorial reports.
10. To understand and apply ethical issues associated with decision making and professional conduct in the laboratorial and field environment.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Students will develop an appreciation for the importance of Environmental Engineering as a major factor in preserving and protecting human health and the environment.
2. Students will organize their learning about environmental engineering along lines of chemical, physical and biological processes.
3. The principal chemicals of concern, the units of measurement, and possible reactions and transformations would be achieved and the concepts would be applied to descriptions of water and wastewater treatment systems.
4. Water and wastewater sampling procedures and sample preservations would be understood.
5. The experiments and verifying theories relating to water and wastewater quality analysis and treatment would be carried out.
6. Common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems would be performed.
7. The laboratorial results to problem identification, quantification, and basic environmental and technical solutions would be applied.
8. The impact of water and wastewater treatment on people and the environment would be understood.
9. The ability to write clear technical laboratorial reports would be demonstrated.
10. To understand and apply ethical issues associated with decision making and professional conduct in the laboratorial and field environment.

**Topics Covered**
1. To collect water samples and wastewater samples for laboratory analysis.
2. To prepare standard solution of the following regents and calculate their actual Normality/Molarity using primary standards.
4. To determine total and calcium hardness in water samples.
5. To determine total acidity in water and wastewater samples.
6. To determine total phenolphthalein and methyl orange alkalinity in water and waste water samples.
7. To determine chloride content in water and waste water samples.
8. To evaluate percentage available chlorine in bleaching powder.
9. To determine dissolved oxygen in water and wastewater samples.
10. To determine Biochemical oxygen demand (BOD) of wastewater samples.
11. To determine Chemical oxygen demand (COD) of wastewater samples.
12. To determine total solids, total dissolved solids (TDS), total suspended solids (TSS) and total volatile solids in water and wastewater samples.
**Reference Books**


**Additional Learning Source**

1. www.vssut.ac.in/lecture_notes/lecture1424353637.pdf
2. https://www.alljntuworld.in
3. https://lecturenotes.in/subject/91/environmental-engineering-ee
### Course Assessment Method
1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

### Course Objectives
1. To understand the different types of energy associated with fluid flow through Bernoulli’s experiment.
2. To be able to determine the coefficient of discharge of Venturimeter to be used for the discharge measurement in a pipeline and coefficient of discharge of triangular/rectangular notch to be used for discharge measurement in an open channel.
3. To be able to determine the coefficient of discharge of a mouthpiece/orifice to be used for the discharge measurement from a tank.
4. To be able to calculate major head loss (due to friction) and minor head loss (due to sudden expansion and sudden contraction).

### Course Outcomes
Upon successful completion of this course, it is expected that students will be able to:
1. Understand the different types of energy associated with fluid flow and verify the Bernoulli’s Theorem.
2. Determine the coefficient of discharge of Venturimeter to be used for the discharge measurement in a pipeline and coefficient of discharge of triangular/rectangular notch to be used for discharge measurement in an open channel.
3. Determine the coefficient of discharge of a mouthpiece/orifice to be used for the discharge measurement from a tank.
4. Calculate major head loss (due to friction) and minor head loss (due to sudden expansion and sudden contraction).

### Topics Covered/List of Experiments
1. Verification of Bernoulli’s Theorem
2. Determination of Coefficient of discharge ($C_d$) of the given external cylindrical mouthpiece.
3. Determination of Coefficient of discharge ($C_d$) of the given triangular/rectangular notch.
4. Determination of loss coefficient due to sudden expansion ($K_e$) and sudden contraction ($K_c$) for the given pipe arrangement.
5. Determination of coefficient of friction ($f$) for the given pipe.
6. Determination of meter coefficient ($C_d$) for the given Venturimeter/Orifice meter.
7. Determination of Viscosity ($\mu$) by falling sphere viscometer.
8. Study of the type of the flow by Reynolds apparatus.

### Text Books and/or Reference Books
1. Hydraulics Lab Manual prepared by M R R Khan, Dr. Mubeen Beg and Dr. Mohd. Mohsin.
### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

1. To be able to understand the nature of shear force and bending moment in different types of beams.
2. To be able to understand the different types of stresses and strains and their relationships.
3. To be able to learn how to determine the centroid and Moment of inertia of different beams, also understand the theory of simple bending including calculation of section modulus.
4. To be able to learn how to calculate the forces in simple truss by different methods.
5. To be able to, understand the basic design of riveted and welded joints.
6. To be able to understand the theory involved in long and short column failure.

### Course Outcomes

As this is the first course leading to structure design of various civil engineering works, it is expected that the students will be able to:

1. Find out the shear force and bending moment in different types of beams with different types of loading.
2. Determine types of stresses and strains and their relationships.
3. Find out the centroid, moment of inertia of different types of beam sections, application of theorem of parallel and perpendicular axis, theory of simple bending and application.
4. Determine the forces in simple truss by different methods of analysis, understand the steps involved in the design of riveted and welded connections.
5. Design long and short columns with different end conditions.

### Topics Covered

#### Unit-I

**Shear Force and Bending Moment:**
Types of Support, Types of beams, Types of Load. Shear Force and Bending Moment, SFD and BMD for Cantilevers, Simply Supported and overhanging beam for concentrated and uniformly distributed load and combination of loads, Relationship between S.F and B.M.

#### Unit-II

**Simple Stresses and Strains:**
Introduction, Types of stresses and strains (Tensile, Compressive and Shear), Hooke’s law, Permissible Stresses, Principle of Superposition, Composite Sections, Thermal Stresses, Poisson’s ratio, Volumetric Strain, Elastic modulus with their relationship.

#### Unit-III

**Geometrical Properties of Area:**
Centre of area or Centroids, Moment of Inertia and second moment of area, Theorem of Parallel and Perpendicular axes, Second moment of area of rectangular, Circular, T, I, L and Built up Sections.

**Theory of Bending:**
Bending Stress: Assumptions, moment of resistance, bending equation, sectional modulus.

#### Unit-IV

**Frames:**

**Structural Steel Connection:**
Description of riveted and welded joints. Design of riveted and welded connections.

**Columns:**
Long and Short columns (Failure of columns), effective length and slenderness ratio. Use of simple column formulae for long and short column with different end conditions.

### Text Books and/or Reference Books

1. Strength of Materials by S. Ramamurtham
4. Strength of Materials by Rajput
5. Strength of Materials by W. A. Nash
### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

The objective of BCE-402 is to introduce the theory and application of analysis and design of reinforced concrete elements. The course focuses on the understanding the behaviour of reinforced concrete components and systems subjected to gravity loads.

After taking this course the students will be able to classify and identify structures based on their behaviour and further analyse, design and detail the various components of structure subjected to gravity loads. They will also be able to interpret and understand the relevant BIS codes and Special publications of BIS.

### Course Outcomes

Upon successful completion of this course, it is expected that students will be able to:

1. Recognise the basic properties of concrete in fresh and hardened states
2. Design concrete mix by IS code method which is required in the most of the civil engineering construction works.
3. Understand the recent advances in different types of concrete.
4. Recognize the design philosophy of the reinforced concrete structures.
5. Understand the difference between the structural behaviour of different reinforced concrete structural elements through demonstration experiments and analysis.
6. Analyse and design different elements of reinforced concrete structural elements under gravity loads
7. Follow relevant and upcoming BIS standards and design philosophies prevalent in the world.

### Topics Covered

#### Unit-I FRESH CONCRETE:
- Concrete Mix Proportioning: Nominal concrete mix, Design concrete mix (IS code method).

#### Unit-II HARDENED CONCRETE:

#### Unit-III ANALYSE AND DESIGN OF BEAMS INFLEXURE:
- Using Limit State Method analyse and design the Rectangular and T-beams in flexure

#### Unit-IV ANALYSE AND DESIGN OF FOR SHEAR AND BOND:
- Shear: Behaviour of Reinforced Concrete beam under Shear. Critical sections for shear design. Types of shear reinforcement. Design of shear reinforcement with vertical stirrups and bent-up bars with vertical stirrups.
- Bond and development length: Introduction to Bond stress, flexural bond, anchorage (or development) bond, development length in compression and tension, bends and hooks, splicing reinforcement. Check in deflection. Design examples.

### Text Books and/or Reference Books

1. Reinforced Concrete - Limit State Design by A. K. Jain
2. Reinforced Concrete Design by S. U. Pillai and D. Menon
3. IS: 456-2000, Plain and Reinforced Concrete - Code of Practice
4. Concrete Technology by M. L. Gambhir
ANNEXURE-III: SPL. BOS, CES: 28-3-2019

<table>
<thead>
<tr>
<th>Section</th>
<th>Designation</th>
<th>Year/ Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Week</th>
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<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>Second Year (IVth – Semester)</td>
<td>BCE403</td>
<td>Building Construction &amp; Services</td>
<td>Theory</td>
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</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To be able to understand the different types of foundation i/c design of wall and column footing.
2. To be able to understand the peculiarity of orientation of building, understand the importance of sound absorption and noise reduction in a room.
3. To be able to learn how to have the surface finishing of a building i/c the removal of defects.
4. To be able to understand the necessity of good building drainage system i/c water supply. A brief knowledge of electrification, lightening conductor, fire resisting materials and Earthquake has also given.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the selection of proper type of foundation for building as per the requirement at site i/c its design. Understand the design criteria for reciprocating and impact type machine foundations.
2. Place the building as per the best orientation requirements. Understand how to design halls/studios acoustically, common acoustical defects and sound insulation.
3. Understand how to carry out the surface finishing of a building i/c the removal of defects in finishing items in an old building. Understand the necessity of construction machinery and its handling.
4. Understand how to plan a good drainage system for a new building. Understand the layout of building water supply.
5. Understand the necessity of lightening conductor in a building. Understand the causes, magnitude and methods of minimising the effect of earthquake on high rise structures.

**Topics Covered**

**Unit-I**

**FOUNDATIONS:**
Definitions, classification of foundations, shallow and deep foundations, strap & combined footings, mat or raft foundations, design of wall footing, pile foundations, pier foundation and well foundation, Introduction to the mass-spring system, free and forced vibration with and without damping, reciprocating and impact type machines.

**Unit-II**

**ARCHITECTURAL DESIGN OR PLANNING, ACOUSTICS AND SOUND INSULATION**
Orientation and area requirement for various components of a residential building, functional planning of residential, primary school, a small hospital (with an emergency, OT and 6 bed wards), and a small factory building. Transmission of sound in rooms, coefficient of sound absorption and noise reduction, classification of acoustical materials, acoustic of palatable building (auditorium, school, theatre, religious building), sound insulation.

**Unit-III**

**SURFACE FINISHING AND CONSTRUCTION MACHINERY**
Plastering: preparation of surface and application of various types of cement plastering on new and old brick masonry, requirements of good plastering, defects in cement plastering and their removal; Pointing: preparation of surface and application of cement pointing on brick work; White/colour washing/distempering: preparation of white/colour washing, various types of distempers, preparation of surfaces, application and defects in distempering; Brief description with necessary sketches of concrete mixers, various types of concrete vibrators and floor grinders.

**Unit-IV**

**BUILDING DRAINAGE**
Aims of building drainage, different types of sanitary fittings and their applications, layout plan of sanitary fittings and building drainage, testing of building drainage, Building water supply: types of water supply fixtures and their applications, layout of building water supply: types of water supply arrangement, arrangement of house connection from supply mains; Electrification: electrification plan of single storey residential building, Lightening conductor; brief description with necessary sketches; Fire: causes, fire resisting materials, fire tests, escape means, firefighting equipments, firefighting system in a multistoried building, protection; Earthquake: causes, magnitude, methods of minimizing the effect of earthquake on high rise structures.
### Text Books and/or Reference Books

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<table>
<thead>
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<tbody>
<tr>
<td>Section</td>
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<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
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</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To learn highway geometric design such as horizontal and vertical alignments and cross section elements of roads.
2. Understand the various techniques for the construction of flexible & rigid pavement.
3. Understand the working principles of points & crossings and techniques of laying railway tracks.
4. Understand Airport Zoning & Runway orientation.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Design Camber, Stopping Sight distance & Overtaking Sight distance.
2. Do the Horizontal & vertical alignment of roads.
3. To be able to analyse traffic data for improvement of traffic on roads.
4. To have a better understanding of various materials to be used in road construction work.
5. To have a better understanding of various types of railway gauges, sleepers & stations in Indian Railways.
6. To have a better understanding of standard planning of airports as per ICAO regulations.

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit-I</th>
<th>Highway development and planning in India, Highway Geometric design, Cross section elements, Camber, Sight distance, Superelevation, Horizontal Alignment Design, Types of horizontal curves Simple circular curve, Transition curve, Vertical Alignment Design, Types of vertical curves</th>
<th>15 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit-III</td>
<td>Types of railways, Types of railway gauges, Creep of rail, Wear of rail, Rail fixtures, Rail fastenings, Types of sleepers, Points and crossings, Laying of rail tracks, Stations and Yards</td>
<td>20 Marks</td>
</tr>
<tr>
<td>Unit-IV</td>
<td>Importance of Airports, Airport planning Standards for planning of Airports as per ICAO, Site selection survey, Airport Zoning, Runway Orientation, Windrose diagram, Taxiways &amp; Aprons, Planning &amp; layout of terminal buildings, Hangars, Parking area</td>
<td>20 Marks</td>
</tr>
</tbody>
</table>

**Text Books and/or Reference Books**


**Additional Learning Source**

1. www.iitk.ac.in/ce/transportation-engineering
2. https://graduatedegrees.online.njit.edu
### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid Semester Examination (15 Marks) - 1 Hour
3. End Semester Examination (75 Marks) - 2 Hours

### Course Objectives

1. To study the different treatment techniques for the treatment of wastewater to apply the most appropriate one.
2. To study various types of intake works, pumps used distribution systems for the supply of water.
3. To have basic background of wastewater collection system (sewers), their maintenance, cleaning & ventilation.
4. To plan strategies for the monitoring reduction and control of emissions through Air pollution, by applying appropriate methods.
5. To be conversant with the classification & characterization of solid waste and its management processing & disposal.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the different treatment techniques for the treatment of wastewater to apply the most appropriate one.
2. Converse with various types of intake works, pumps used distribution systems for the supply of water.
3. Understand the basic background of wastewater collection system (sewers), their maintenance, cleaning & ventilation.
4. Develop strategies for monitoring, reduction and control of emissions through Air pollution, by applying appropriate methods.
5. Converse with the classification & characterization of solid waste and its management processing & disposal.

### Topics Covered

#### Unit: I
Wastewater Characteristics, BOD Kinetics, Wastewater Treatment Flow sheets, Screening, Grit Removal, Sedimentation, Activated Sludge Process (ASP), Stabilization Ponds, Trickling filters, Wastewater Irrigation and Reuse, Wastewater Effluent Standards

15 Marks

#### Unit: II
Wastewater Collection Systems, Classification, Types of Sewers and Drains. Sewer Materials, Sewer appurtenances; Manholes, Street Inlets, Catch basins, Grease & Oil traps Maintenance, Cleaning and Ventilation of Sewers, Anaerobic Treatment, Sludge treatment and Disposal

20 Marks

#### Unit: III
Air Pollution, Air Quality Monitoring, Standards, Meteorology, Stack Height, Air pollution Control Methods: Gravitational Settling Chambers, Centrifugal Collector, Wet Scrubbers, Electrostatic Precipitators (ESP), and Fabric Filters.

20 Marks

#### Unit: IV
Solid Waste, Classification, Sources and Characteristics, Waste Management, Generation, Collection, Storage & Transfer, Processing and Disposal, Biological and Thermal Conversion Process

20 Marks

### Reference Books


### Additional Learning Source

1. www.vssut.ac.in/lecture_notes/lecture1424353637.pdf
2. https://www.alljntuworld.in
3. https://lecturenotes.in/subject/91/environmental-engineering-ee
## Course Assessment Method

1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

## Course Objectives

1. To be able to use Transit theodolite, Digital Theodolite, Prismatic compass
2. To be able to observe the length and bearing of one side of the closed traverse
3. To be able to observe the length and bearing of two consecutive side of the closed traverse
4. To be able to observe the length and bearing of two non-adjacent sides of the closed traverse
5. To be able to set out a simple circular curve by methods of ordinates from long chord, radial offset from the tangent & perpendicular offset from the tangent.
6. To be able to set out a simple circular curve by the Rankine’s method of tangential angles & the Rankine’s two theodolite method.
7. To be able to set out a compound curve by the method of Rankines’s deflection angles.

## Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:
1. Use of Transit theodolite, Digital Theodolite, Prismatic compass for survey work.
2. Observe the length & bearing of two consecutive sides
3. Observe the length & bearing of two non-adjacent sides
4. Set out a simple circular curve by ordinates from the long chord, radial offset from the tangent & perpendicular offset from the tangent.
5. Set out a simple circular curve by Rankine’s one theodolite and two theodolite method.
6. Set out a compound curve by Rankine’s deflection angles

## Topics Covered/ List of Experiments

01 To determine the length and bearing of one side of a closed traverse
02 To determine the length of one side and bearing of another side of a closed traverse
03 To determine the lengths of two consecutive sides of a closed traverse
04 To determine the bearings of two consecutive sides of a closed traverse
05 To determine the lengths of two non-adjacent sides of a closed traverse
06 To determine the bearings of two non-adjacent sides of a closed traverse
07 To set out a simple circular curve by the method of ordinates from the long chord
08 To set out a simple circular curve by the method of radial offset from the tangent
09 To set out a simple circular curve by the method of perpendicular offset from the tangent
10 To set out a simple circular curve by the Rankine’s method of tangential angles
11 To set out a simple circular curve by the Rankine’s two theodolite method
12 To set out a compound curve by the method of Rankines’s deflection angles

## Text Books and/or Reference Books

<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/semester</th>
<th>Course No</th>
<th>Course title</th>
<th>Course type</th>
<th>Total Marks</th>
<th>Contact Hours/Week</th>
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<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>II- year (IV Semester)</td>
<td>BCE492</td>
<td>Construction Technology Lab</td>
<td>Practical</td>
<td>100</td>
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**Course Assessment Method**
1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

**Course Objectives**
1. To identify different types of building materials used in civil construction works.
2. To recognise the different types of tools used in masonry work/building construction works.
3. To recognise different types of bonds used in brick masonry work.
4. To recognise different types of water supply fixtures, plumbing tools and sanitary fittings used in buildings.
5. To know the removal periods of form work and shuttering used for different structural members in a building construction work.
6. To recognise the various types of equipments used in the civil construction works e.g. concrete mixer, internal, external and form vibrators and transporter cum mixer machines.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Identify the different types of building materials used in civil construction works.
2. Recognise the different types of tools used in masonry work and civil construction works.
3. Recognise different types of bonds used in brick masonry work.
4. Recognise different types of water supply fixtures, plumbing tools and sanitary fittings used in buildings.
5. Know the removal periods of form work and shuttering used for different structural members in a building construction work.
6. Recognise the various types of equipments used in the civil construction works e.g. concrete mixer, internal, external and form vibrators and transporter cum mixer machines.

**Topics Covered/ List of Experiments**
1. Identification & demonstration of building materials and tools used in the construction work.
2. Construction of L-Junction with stretcher and header bonds.
3. Construction of L-Junction with one brick thick wall in English and Flemish bonds.
4. Construction of L-Junction with 1½ brick thick wall in English and Flemish bonds.
5. Construction of L-Junction with 2 bricks thick wall in English and Flemish bonds.
7. Demonstration of various mortars and cement concrete mixes, mixing, transportation, placement, compaction and curing and their methods.
8. Form work, centering & shuttering and their removal.
9. Demonstration of water supply fixtures and sanitary fittings.
10. Site Visits.
### Course Assessment Method
1. Class Work (30 Marks)
2. End-Semester Examination (20 Marks) – 2 Hours

### Course Objectives
1. To be able to use impact and compressive testing machines,
2. To be able to observe the Toughness & compressive strength of aggregate
3. To be able to observe the specific gravity, water observation & resistance value of aggregate
4. To be able to observe shape and angularity of the aggregate
5. To be able to observe the consistency of bitumen
6. To be able to observe the safe temperature value & softening point of bitumen sample
7. To be able to observe the deformation, elongation and resistance to flow of bitumen sample

### Course Outcomes
Upon successful completion of this course, it is expected that the students will be able to:
1. Use of different types of testing machines for road works
2. Determine the Impact & crushing value of aggregates
3. Determine the water content, specific gravity, abrasion value flakiness index & elongation of aggregates
4. Determine the penetration value, Flash & Fire point of bitumen
5. Determine the softening point & ductility of the bitumen sample

### Topics Covered/ List of Experiments

#### Part A – Test on Aggregates
1. To determine the Impact value of stone aggregate by impact testing machine I.S:2386 Part –IV
2. To determine the aggregate crushing value by compressive testing machine I.S:2386 Part –IV
3. To determine the specific Gravity and water absorption test on aggregates I.S:2386 Part –III
4. To determine the abrasion value of a given aggregate sample by Los Angeles abrasion test I.S:2386 Part –IV
5. To determine of abrasion value of a given aggregate sample by conducting Deval abrasion Test I.S:2386 Part –IV
6. To determine the Flakiness Index of a given aggregate sample I.S:2386 Part -I
7. To determine the Elongation Index of the given aggregate sample I.S:2386 Part -I

#### Part B – Test on Bitumen
8. To determine the hardness or softness of a give binder (Penetration Test) I.S:1203-1978
9. To determine the Flash and Fire point of a given bituminous material I.S:1209-1978
10. To determine the softening point of a given bitumen sample I.S:1205-1978
11. To determine the ductility value of a given sample of bitumen I.S:1202-1978
12. To determine the viscosity of a given bituminous binder I.S:1208-1978

### Text Books and/or Reference Books
1. A. Text book of transportation Engineering by S. P. Chandra S. Chand
2. Highway Engineering by Paul H. Wright & Karen K. Dixon
3. Highway Engineering by S.K. Khanna & C.E.G Justo
4. Principles practice & Design of highway Engineering by Dr. S.K. Sharma
5. Text book of highway Engineering by R. Srinivasa Kumar
### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

1. To be able to understand the steps involved in the design of one way and two way slabs.
2. To be able to understand the design of axially loaded column with lateral ties and helical reinforcement.
3. To be able to understand the different types of footings used for residential buildings including the design of isolated column footings for square, rectangular and circular columns.
4. To be able to understand the different types of staircases including the design of stairs spanning horizontally and doglegged stairs with their sketches showing placement of reinforcement.
5. To have the basic knowledge of pre-stressed concrete, pre-tensioned and post-tensioned system, loss of pre-stress.
6. To be able to understand the basic members of steel structures such as design of tension and compression members for single and built-up sections, design steps involved in lacings and battens.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Design the one way and two way slab for rectangular, square and circular shapes with corners free and held down cases including the placement of reinforcement.
2. Design the axially loaded column with lateral ties and helical reinforcement.
3. Design the isolated column footing for square, rectangular and circular columns.
4. Design of stairs spanning horizontally and doglegged stairs with their reinforcement sketches showing the placement.
5. Design of tension and compression members for structural steel single and built-up sections, design of lacings and battens.

### Topics Covered

#### Unit-I

**SLABS:** One-way and two way slab. Design of rectangular, square and circular slabs with corners free and held down. Provision of reinforcement in slabs. 15 Marks

#### Unit-II

**COLUMNS:** Column and its types. Design of axially loaded short column with lateral ties and helical reinforcements. 20 Marks

**FOOTINGS:** Footing and its types. Footings used for residential buildings. Design of isolated column footings for square, rectangular and circular column footings

#### Unit-III

**STAIRCASE:** Types of staircase. Design of stairs spanning horizontally and doglegged stairs. Reinforcement sketches. 20 Marks

**Pre-stressed Concrete:** Assumptions and general principles of design. Pre-tension and post tension system. Analysis of beams with tendons placed at longitudinal centroidal axis and at an eccentricity, tendons with parabolic profile. Load balancing method. Losses of pre-stress.

#### Unit-IV

**TENSION MEMBERS: (STEEL STRUCTURES)** Common types of tension members. Net sectional area for angles and tees. Design of tension members single and built-up sections. 20 Marks

**COMPRESSION MEMBERS:** Common types of compression member – column and structural design of compression members. single and built-up sections. Design of lacings and battens

### Text Books and/or Reference Books

3. Timoshenko, “Strength of Material”.
7. IS 800-1984, IS Code
<table>
<thead>
<tr>
<th>Section</th>
<th>Course designation</th>
<th>Year/semester</th>
<th>Course No.</th>
<th>Course title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Week</th>
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<td>Civil Engineering</td>
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<td>Final Year (V Semester)</td>
<td>BCE502</td>
<td>Theory of Structures</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and class work (10 Marks)
2. Mid Semester Examination (15 Marks) - 1 Hour
3. End Semester Examination (75 Marks) - 2 Hours

**Course Objectives**

1. To be able to understand the concept of stress.
2. To be able to understand the concept of deflection.
3. To be able to understand the shear force and bending moment.
4. To be able to understand the utility of different beams in building.

**Course Outcomes**

Upon successful completion of this course, it is expected that the student will be able to:

1. Calculate Shear Force and Bending Moment in different type of beams.
2. Calculate deflection to design beams.
3. Calculate stresses in beams.
4. Understand the behaviour of Arch.
5. Understand the difference in beams and bridges.

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit</th>
<th>(A) Stresses (Compound Stress)</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Introduction, Principal Stresses, Graphical Method: Mohr’s Circle Method</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td><strong>(B) Slope &amp; Deflection</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction, Computation of Slope and Deflection for simple cases of Cantilevers and Simply Supported Beams for Concentrated and Uniformly Distributed Loads for: Double Integration Method Macaulay’s Method Area Moment Method</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>(A) Shear stresses in Beams</strong></td>
<td>20</td>
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<tr>
<td>II</td>
<td>Introduction, Distribution of Shear Stress in Rectangular, Circular, I &amp; T section</td>
<td></td>
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<tr>
<td></td>
<td><strong>(B) Propped Beams</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction, Prop Reactions, Shear Force &amp; Bending Moment diagram for Simple loadings</td>
<td></td>
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<tr>
<td></td>
<td><strong>(C) Fixed Beams</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction, Analysis of Fixed Beams, Shear Force &amp; Bending Moment diagram for Symmetrical Concentrated &amp; Uniformly Distributed Loads</td>
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<table>
<thead>
<tr>
<th>Unit</th>
<th>(A) Continuous Beams</th>
<th>Marks</th>
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<tbody>
<tr>
<td>III</td>
<td>Introduction, Analysis by Three Moment Theorem Method, Shear Force &amp; Bending Moment diagram for Symmetrical Concentrated &amp; Uniformly Distributed Loads</td>
<td>20</td>
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<tr>
<td></td>
<td><strong>(B) Combined Direct and Bending Stresses</strong></td>
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<tr>
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<td>Introduction, Stresses due to Eccentric Loads, Law of Middle Third</td>
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<tr>
<th>Unit</th>
<th>(A) Portal Frames</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>Introduction, Shear Force, Bending Moment diagram and Thrust Diagram for static Loadings</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>(B) Three Hinged Arches</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Introduction, Linear arch &amp; Eddy’s Theorem, Bending Moment Diagram for Parabolic &amp; Circular Arches for Static Loadings</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>(C) Influence Lines</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction, Influence Lines Diagram (ILD) for Shear Force &amp; Bending Moment for Beams Application of Influence lines Diagram for determining SF &amp; BM due to moving loads</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Course Designation</td>
<td>Year/Semester</td>
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<tr>
<td>Civil Engineering Section</td>
<td>Diploma in Civil Engineering</td>
<td>Final Year (V-Semester)</td>
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</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

The student should set the idea of
2. Methods of irrigation. Design of canal
3. Headworks, river training works, cross drainage works
4. Dams, wells and tube wells. Falls, types and design.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:
1. Understand the concept of hydrology. Calculate the water requirement of different crops in different seasons. Fix the capacity of canal/reservoir.
2. Know the different practices followed in field to supply water to the crops for their growth. Design the canal on the basis of Lacey’s and Kennedy’s theory.
3. Understand the functions of various components of diversion headworks. Understand the purpose of river training. Various types of river training structures. Cross drainage works and its types. The conditions in which they have to be used.
4. Understand the purpose, design and construction of various kinds of dams. Differentiate between wells and tube wells and their types. The necessity of falls, types of falls and design of Sarda type fall.

**Topics Covered**

**Unit-I**

**HYDROLOGY:** Hydrological cycle, precipitation, types of precipitation. Runoff, surface runoff, infiltration, percolation, evaporation and transpiration. Measurement of rainfall. Symons rain gauge, watershed and drainage, catchments area. Estimation of discharge by Dicken’s formula.

**WATER REQUIREMENTS OF CROPS:** Crops and crops seasons. Sowing time, harvesting time, Command of canal, gross command area, culturable command area, intensity of Irrigation, base period, duty, delta, relation between duty and delta, kor period, kor depth, outlet discharge factor, problems.

**Unit-II**

**METHODS OF IRRIGATION:** Natural, artificial, perennial and non-perennial Irrigation. Lift and flow irrigation, surface irrigation, sub-surface irrigation and sprinkler Irrigation.


**Unit-III**

**HEAD WORKS:** Selection of the site, types of head works, schematic layout of head works, part of head works.

**RIVER TRAINING WORKS:** Problems of alluvial rivers, purpose of river training. Types of river training works. Marginal embankment, guide banks, spur and cut off.

**CROSS DRAINAGE WORKS:** Necessity, selection of site. Types of cross drainage works. Aqueduct, siphon aqueduct, super passage, siphon, and level crossing.

**Unit-IV**

**DAMS:** Purpose, selection of site, type and typical section of gravity dam, buttress, arch and earthen dams. Causes of failure of gravity dams.

**WELLS AND TUB-WELLS:** Advantages and disadvantages of well irrigation over canal irrigation. Bore and open wells. Types of wells-shallow and deep wells, strata chart, aquifers. Types of tube-wells

**CANAL MASONRY WORKS:** Necessity of fall description of various types of falls, Design of Sarda type fall on Bligh’s Theory.
<table>
<thead>
<tr>
<th><strong>Text Books and/or Reference Books</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dr. B.C. Punmia, Pandey B.B. Lal - Irrigation Engineering.</td>
</tr>
<tr>
<td>2. S. K. Garg - Irrigation Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Additional Learning Source</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. <a href="https://lecturenotes.in/subject/159/irrigation-engineering-ie">https://lecturenotes.in/subject/159/irrigation-engineering-ie</a></td>
</tr>
</tbody>
</table>
### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

1. To understand the importance of quantitative assessment in the field of construction industry.
2. To be able to calculate the quantity of items used in a civil construction project.
3. To be able to prepare the material statement.
4. To be able to analyse the rates of items of work on the basis of market survey and to prepare the schedule of rates.
5. To be able to calculate the abstract of cost.
6. To be able to prepare the detailed estimate of a civil construction project.
7. To be able to prepare the tender documents for a civil construction project.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. To understand the importance and use of quantity surveying.
2. To understand the stages of a detailed estimate.
3. To understand the units of measurement and payment and rules of measurement of the items used in civil construction works as per BS: 1200.
4. To use the two methods (Long wall & Short wall method, Centre line method) of calculation of quantity of items of a building having a continuous wall footing.
5. To calculate the quantity of items of a RCC building and a single span RCC slab culvert.
6. To calculate quantity of items of a steel roof truss, a septic tank with a soak pit, WBM road, and RCC/CC road.
7. To calculate the quantity of item for arches.
8. To carry out the market survey for the rates of various materials and labours.
9. To analyse the rates for various items of work on the basis of market survey.
10. To prepare the schedule of rates of various items of work.
11. To use DSR prepared by CPWD.
12. To prepare the abstract of cost for a civil project.
13. To prepare the material statement for a civil construction project.

### Topics Covered

#### Unit-I

**Introduction:** Definition, Importance. Duties of quantity surveyor. 15 Marks

**Types of estimates:** Preliminary estimates, Plinth area estimate, Cubic rate estimate, Estimate per unit base.

**Detailed estimates:** Definition, Stages of preparation.

**Measurement:** Units of measurement for various items of work as per BS: 1200, Rules for measurements.

#### Unit-II & III

**Calculation of quantities of items from drawings:**

Methods of calculation of quantities of items:
1. Long wall and short wall method
2. Centre line method 40 Marks

**Details of measurements & calculation of quantities of various items of work for:**

1. A small residential building with continuous wall footings
2. RCC work in beams, slabs, columns and lintels (including bar bending schedule)
3. A small RCC framed building
4. A steel roof truss
5. A septic tank with a soak pit
6. A single span RCC slab culvert
7. WBM road
8. RCC/CC road
9. Arches

#### Unit-IV

**Analysis of rates and material statement:**

Definition, market survey, analysis of rates for various items of work involved in the above solved problems. Schedule of rates, DSR and CPWD schedule of rates. Abstract of cost. Material statements for the above solved problems. 20 Marks
<table>
<thead>
<tr>
<th>Text Books and/or Reference Books</th>
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| 8. BS: 1200. (Year….)

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<td>Course</td>
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<tr>
<td>Civil Engineering</td>
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</table>

**Course Assessment Method**

1. Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To Study about the effective management of maintenance to keep a building in its serviceable condition for its life span.
2. To study about premature decay of structure its remedial measure.
3. To study abt building and its components for proper use during their estimated life cycle
4. To save properties valued crores of rupees of the country by increasing the life of buildings by rehabilitation and retrofitting
5. To save buildings of historical importance

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand importance of maintenance of old buildings specially heritage buildings or buildings of historical importance.
2. Understand condition assessment of existing old buildings for repair, rehabilitation and retrofitting.
3. Understand systematic approach of investigation of defects in buildings and suitable materials for repairs
4. Understand various supplementary strengthening techniques for masonry and RC elements in building
5. Understand local and global deficiencies in RC buildings and also prepare flow chart programme for effective and economical maintenance.
6. Understand retrofit of foundations and techniques for steel and concrete jacketing in RC building members.

**Topics Covered**

**Unit-I**

**PRINCIPLE OF MAINTENANCE:**

Introduction, types of Maintenance, causes which necessitate the maintenance, inspection of building, routine building maintenance, maintenance items for up keeping the building, determination of approximate strength of structural members of old building and age of old building.

SAFETY IN MAINTENANCE:

Safety precaution prior to and during dismantling, dismantling sequence, dismantling of wall and floor.

**Marks:** 15

**Unit-II**

**STONE AND BRICKS MASONRY MAINTENANCE:**

Causes and remedial measures of dampness and efflorescence. Investigation causes, remedial measures of structural cracks in load bearing walls including infill wall, small and Large Cracks.

**Marks:** 20

**Unit-III**

**REPAIR AND RETROFIT:**

Introduction, repair, rehabilitation and retrofit, condition assessment of existing buildings, Local and global retrofit strategies, flow chart of a retrofit programme, repair materials.

RETROFIT OF REINFORCED CEMENT CONCRETE BUILDING:

Local and Global deficiencies, strengthening a wall using concrete, retrofit of foundation, techniques for steel and concrete jacketing of columns and beams.

**Marks:** 20

**Unit-IV**

**RETROFIT OF NON ENGINEERED AND MASONRY BUILDING:**

General defects strengthening of foundation, wall and pillars.

GENERAL REPAIR CASES IN A BUILDING:

Replacement of broken W.C. Seat and P-trap, leakage through the roof, maintenance of house pipe line and drainage system, sewer maintenance.

**Marks:** 20

**Text Books and/or Reference Books**

5. A manual on maintenance engineering: B.S. Nayak Khanna Publisher.
### Course Assessment Method

1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

### Course Objectives

1. To learn how to find the tensile strength of different materials.
2. To learn how to find the compressive strength of materials.
3. To learn about the material property hardness of different materials.
4. To learn about the material property toughness or the energy absorbing capacity before failure.
5. To learn to verify bending moments experimentally.
6. To learn to verify deflection in simply supported and fixed beams.
7. To learn how to determine the horizontal thrust in three hinge arch and portal frame.
8. To learn how to plot influence line diagram for any beam.

### Course Outcomes

Upon successful completion of this course, it is expected from students that they will be able to:

1. Determine the tensile strength of different materials.
2. Determine the compressive strength and different materials.
3. Determine the material property hardness of different materials.
4. Determine the material property toughness or the energy absorbing capacity of different materials.
5. Verify bending moments experimentally.
6. Verify deflection in simply supported and fixed beams.
7. Determine the horizontal thrust in three hinge arch and portal frame.
8. Plot influence line diagram for any beam.

### List of experiments

1. To determine the tensile strength of mild steel bar.
2. To determine the compressive strength of brick.
3. To determine hardness of given specimens: Brass, Aluminium.
5. To verify bending moment in a simply supported beam subjected to concentrated load.
6. To verify deflection in simply supported beam subjected to point load at centre.
7. To verify deflection in fixed beam subjected to point load at centre.
8. To determine the horizontal thrust in three hinged arch.
9. To determine the horizontal thrust in a portal frame.
10. To plot the influence line diagram for the given simply supported beam.
## Course Assessment Method
1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

## Course Objectives
1. To be able to perform the different tests on cement.
2. To be able to perform the different tests on aggregates.
3. To be able to perform the different tests on fresh concrete.
4. To be able to perform the different tests on hardened concrete.

## Course Outcomes
Upon successful completion of this course, it is expected that the students will be able to:
1. To perform the different tests on cement to ascertain the quality of cement and its suitability for civil engineering works.
2. To perform the different tests on aggregate to ascertain the quality of aggregate fit for civil works.
3. To perform the different tests on fresh concrete for to ascertain the quality of concrete used in the works.
4. To perform the different tests on hardened concrete to ascertain the quality of works.

## Topics Covered/ List of Experiments
- **Experiment No.1:** To determine the amount of water required to make a cement paste of standard or normal consistency using Vicat’s apparatus.
- **Experiment No.2:** To determine the (A) Initial setting time and (B) Final setting time of given sample of cement using Vicat’s apparatus.
- **Experiment No.3:** To find out the compressive strength of cement sand mortar after (i) 3 days and (ii) 7 days.
- **Experiment No.4:** To find out the tensile strength of cement sand mortar after (i) 3 days and (ii) 7 days.
- **Experiment No.5:** To determine the soundness of cement by Le Chatlier’s method.
- **Experiment No.6:** To find out the fineness of cement by sieving.
- **Experiment No.7:** To determine the slump value of M20 grade (1:1.5:3) concrete with varying w/c 0.5, 0.6, 0.7 and 0.8 percent by weight.
- **Experiment No.8:** To determine the Compaction Factor of M20 grade (1:1.5:3) concrete with varying w/c 0.5, 0.6, 0.7 and 0.8 percent by weight.
- **Experiment No.9:** To determine the Workability of M20 grade (1:1.5:3) concrete with varying w/c 0.35, 0.4, 0.5 and 0.6 percent by weight using Vee Bee Consistometer.
- **Experiment No.10:** To find out the fineness modulus of given samples of (i) fine and (ii) course aggregates by sieve analysis and find out the zonal classification of fine aggregate.
- **Experiment No.11:** To find out the silt content in given sample of fine sand.
- **Experiment No.12:** To find out the bulking of given sample of sand.
- **Experiment No.13:** To find out the compressive strength of M20 grade (as per mix design) cement concrete after (i) 7 days and (ii) 28 days.
- **Experiment No.14:** To study the effect of w/c ratio on the compressive strength of concrete.

## Text Books and/or Reference Books
1. Dr. Azhar Jameel, “Concrete Lab (Working Manual)”. Academic Book, Aligarh
2. IS 456-2000 Indian standard, Plain and Reinforced Concrete- Code of Practice.
<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
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<td>Final Year (V-Semester)</td>
<td>BCE593</td>
<td>Project and Seminar</td>
<td>Practical</td>
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</table>

**Course Assessment Method**
1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

**Course Objectives**
1. To develop an appreciation of problems in the Design and Analysis of Buildings and roads
2. To impart training for handling such design projects
3. To have feel of real life situations in planning of such projects

**Course Outcomes**
1. Build the necessary theoretical background for planning, estimation, and design of civil engineering structures
2. Understand the behaviour of simple (selected) structural elements under applied forces.
3. Recognize and be able to apply fundamental principles to check the stability of structural components
4. Understanding the Specifications like CPWD specifications and Schedule of Rates
5. Preparation of Bill of Quantities and Materials and Labour statements strictly adhering to the specifications and the construction drawing

**Topics Covered**

1. PROJECT PROBLEM
   2. Selection of project problem on different type of Civil Engineering Work, preliminary site visit, planning, feasibility studies.
ANNEXURE-III: SPL. BOS, CES: 28-3-2019

<table>
<thead>
<tr>
<th>Section</th>
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<th>Year/Semester</th>
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<th>Course Title</th>
<th>Course Type</th>
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<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>Final Year (V-Semester)</td>
<td>BCE594</td>
<td>Cad lab - I</td>
<td>Practical</td>
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</tbody>
</table>

**Course Assessment Method**

1. Class Work (30Marks)
2. End-Semester Examination (20 Marks) – 2 Hours

**Course Objectives**

1. The main objective of the course is to make the students aware of the basic AutoCAD commands and prepare them to make basic drawings of Civil Engineering works in AUTOCAD.

2. Course Outcomes

3. Upon successful completion of this course, the students will be able to prepare and interpret basic civil engineering construction drawings using AutoCAD software.

**Topics Covered/List of experiments**

1. Learning of AUTOCAD commands
2. General idea about double line plan of a single storeyed residential masonry building with load bearing walls
3. Terrace plan of a single storeyed residential masonry building with load bearing walls
4. Site plan of a single storeyed residential masonry building with load bearing walls
5. Key plan of a single storeyed residential masonry building with load bearing walls
6. Front elevation of a single storeyed residential masonry building with load bearing walls
7. Sectional elevation of a single storeyed residential masonry building with load bearing walls
8. Foundation details of a single storeyed residential masonry building with load bearing walls
9. General idea about double line plan of a double storeyed residential masonry building with load bearing walls
10. Terrace plan of a double storeyed residential masonry building with load bearing walls
11. Site plan of a double storeyed residential masonry building with load bearing walls
12. Key plan of a double storeyed residential masonry building with load bearing walls
13. Front elevation of a double storeyed residential masonry building with load bearing walls
14. Sectional elevation of a double storeyed residential masonry building with load bearing walls
15. Foundation details of a double storeyed residential masonry building with load bearing walls

**Additional Learning Source**

1. https://knowledge.autodesk.com/support/autocad/learn
Section | Course Designation | Year/Semester | Course No. | Course Title | Course Type | Total Marks | Contact Hours/Weak | L | T | P
---|---|---|---|---|---|---|---|---|---|---
Civil Engineering | Diploma in Civil Engineering | III Year (VI-Semester) | BCE601 | Soil Mechanics | Theory | 100 | 3 | 1 | 0

**Course Assessment Method**
1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**
1. To provide basic understanding of index properties of soil.
2. To acquire basic knowledge in engineering design of geotechnical systems.
3. To learn soil classification, identification and effect of presence of water in soil.
4. To understand compaction process in soil and introduction of consolidation.
5. To provide understanding of shear strength, bearing capacity of soil and ground improvement techniques.

**Course Outcomes**
Upon successful completion of this course the students will be able to:
1. Apply principles of phase diagram for soil properties and perform basic weight-volume calculations.
2. Determine consistency of soil and identify the characteristics of fine grained soil.
3. Determine shear strength and bearing capacity of soil using standard field test
4. Apply the knowledge of compaction and consolidation to use soil as building material.
5. Apply the knowledge of soil properties, field test and apply ground improvement techniques to design the foundation.

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit-</th>
<th>Introduction: Soil, Soil Mechanics and Geo-technical Engineering, Soil Formation, Soil types and soil deposits in India. Applications of soil Mechanics</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Physical Properties of Soil: Soil as Phase diagram, Physical properties of soils, their determinations and their functional relationship.</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit-</th>
<th>Classification, Identification &amp; Plasticity characteristics of Soils: Particle size Classification, IS soil Classification, Grain size Analysis of Soil, Sedimentation analysis. Consistency of soil &amp; its uses, Atterberg’s Limits (Liquid limit, plastic limit &amp; shrinkage limit), Index properties of soil and classification based on it. Soil Water: Broad classification of soil water. Permeability, Factors effecting permeability Darcy’s law, laboratory determination of coefficient of permeability.</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Stress due to self-weight of soil: Effective stress, Pore water pressure and total Stress.</td>
<td>20</td>
</tr>
<tr>
<td>III</td>
<td>Compaction and Consolidation: Principle of compaction, Factors effecting compaction, Laboratory and field compaction tests, Effect of compaction on engineering properties of soil. Consolidation, its types and difference with compaction.</td>
<td>20</td>
</tr>
<tr>
<td>IV</td>
<td>Shear Strength: Coulomb’s equation and Mohr-Coulomb failure theory. Determination of shear stress: Direct shear, Tri-axial, Vane shear &amp; Unconfined compression tests. Bearing Capacity of Shallow Foundation: Bearing capacity and factors effecting, Terzaghi’s theory of bearing capacity. Plate load test &amp; Standard Penetration test. Ground Improvement Techniques: Objectives, classification and types of ground improvement techniques.</td>
<td>20</td>
</tr>
</tbody>
</table>

**Text Books and/or Reference Books**
1. Soil Mechanics & Foundation By Dr. B. S. Pumia, Ashok Kumar Jain Arun Kumar Jain.

**Additional Learning Source**
1. https://nptel.ac.in/courses/105103097/
### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

1. To understand the significance of construction planning and management in construction industry.
2. To evaluate the project time and cost through Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) analysis.
3. To understand the importance of mechanization in construction industry.
4. To understand the role of material management, store keeping and purchase department in a civil construction project.
5. To understand the importance of safety management in construction industry.

### Course Outcomes

Upon successful completion of this course the students will be able to:

1. Understand the importance and objectives of construction planning and management.
2. Learn about the different resources required for construction planning and the different stages of construction management.
3. Solve CPM and PERT network diagrams for calculating the estimated time and cost of a construction project.
4. Understand the importance of machines in construction industry and evaluating different kinds of machinery based on their initial cost, salvage value and depreciation.
5. Learn the importance of the different departments (Store, Purchase, etc.) in a construction project.
6. Analyse the causes, effects and control measures for preventing accidents on construction sites.

### Topics Covered

<table>
<thead>
<tr>
<th>Unit-</th>
<th>INTRODUCTION: Significance, objectives and functions of construction management, Classification and stages in construction. The construction team: Owner, Engineer and Contractor: Resources for construction: Men, Machine, Materials, Money and Management. CONSTRUCTION PLANNING: Objectives, principles, advantages, analysis, limitation and stages of planning for construction projects. CONSTRUCTION SCHEDULING: Preparation of construction schedules for labour, material, machine and finance.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>15 Marks</td>
</tr>
<tr>
<td>II</td>
<td>20 Marks</td>
</tr>
<tr>
<td>III</td>
<td>20 Marks</td>
</tr>
<tr>
<td>Unit-</td>
<td>TIME COST OPTIMIZATION: Direct, indirect and total project cost. Normal and crash cost and time. Cost time optimization through CPM techniques for simple jobs.</td>
</tr>
<tr>
<td>IV</td>
<td>20 Marks</td>
</tr>
</tbody>
</table>
ACCIDENT AND SAFETY IN CONSTRUCTION: Definition of accidental terms: partial and total disablement, Injury frequency rate, Injury severity rate. Causes of accidents, remedies to avoid accidents, accident prevention, and importance of safety. Safety measures for storage and handling of building materials, construction elements of a building, excavation, drilling and blasting, hot bituminous work, scaffolding ladders, formwork, and demolition.

CONSTRUCTION DISPUTES AND THEIR SETTLEMENT: Introduction, categories of disputes, modes of settlement of disputes.

Text Books and/or Reference Books

Additional Learning Source
1. https://onlinecourses.nptel.ac.in
ANNEXURE-III: SPL, BOS, CES: 28-3-2019

<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>Final Year (VI-Semester)</td>
<td>BCE603</td>
<td>Earthquake Engineering</td>
<td>Theory</td>
<td>100</td>
<td>3 0</td>
</tr>
</tbody>
</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To gain knowledge on basic seismology like the causes of occurrence of earthquake and its characterization hazards and its consequences, earthquake measurement and instrumentation.
2. To develop an understanding of structural dynamics of simple systems.
3. To impart knowledge on different types of damages caused due to earthquake.
4. To impart knowledge of analysis for lateral loads and codal provisions for earthquake resistant design of structures as per Indian Standards.

**Course Outcomes**

Upon successful completion of this course, it is expected that students will be able to:

1. Suggest possible causes for the movements of the plates and different types of plate boundaries.
2. Describe elastic rebound theory as it is related to seismic activity.
3. Distinguish between earthquake magnitude and earthquake damage (intensity).
4. Understand why earthquakes occur, how they are measured and categorized and the effect they may have on engineering structures.
5. Understand the concepts of seismic and wind forces and how they relate to structures.
6. Develop an understanding of structural dynamics of simple systems and know the different types of damages caused due to earthquake.
7. Apply the basic codal provisions for earthquake resistant design of structures as per Indian standards.

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Interior of Earth, Plate tectonics, Faults, consequences of earthquake, Basic parameters of earthquake, Magnitude &amp; intensity, Scales, Measuring instruments. Seismic zones of India, Difference between wind and earthquake forces.</th>
<th>15 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>Major past earthquakes occurred inside and outside India, Lesson learnt from past earthquakes. General consideration of shape of the building, Weak and Soft storey, Storey drift .Preventive measures before, during and after earthquake. Soil liquefaction. New technique in seismic resistance design of structure.</td>
<td>20 Marks</td>
</tr>
<tr>
<td>Unit</td>
<td>Ductile Detailing: Concepts of Detailing of various structural components as per IS: 13920 provisions .Hoop, crosstie, lap, splices in beams, anchorage of beam bars in an external joints, beam-web reinforcement, transverse reinforcement in columns, special confining reinforcement in beams, columns, footing and columns under discontinued wall ., Portal frames, Space frames.</td>
<td>20 Marks</td>
</tr>
</tbody>
</table>

**Text Books and/or Reference Books**

2. Dynamics of Structures - Application to Earthquake Engineering by A. K. Chopra
5. David Key, 'Earthquake Design Practice for Buildings', Thomas Telford, London,
7. Pankaj Agarwal and Manish Shrikhande, 'Earthquake Resistant Design of Structures', PHI, 8. I.S. Codes No. 1893, 4326, 13920 etc.

**Additional Learning Source**

1. Web links related to Earthquake and Wind Engineering
Civil Engineering
Diploma in Civil Engineering
Final Year (VI-Semester)
BCE604
Quantity Survey & Valuation-II
Theory
100
100
3
1
0

Course Assessment Method
1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

Course Objectives
1. To understand the method of calculation of earth work (E/E) for canals, roads and railway embankments.
2. Learn the concept of valuation of the buildings.
3. Understand the contract system, type of contracts, billing process and type of bills.
4. Understand the tendering process, preparation of the detailed estimate and tender documents.
5. Study the specifications for different items used in civil construction works.

Course Outcomes
Upon successful completion of this course, it is expected that the students will be able to:
1. Calculate the quantity of earth work (E/W) for canals, roads and railway embankments.
2. Do the valuation of buildings.
3. Prepare the detailed estimate of a civil construction project.
4. Prepare the tender documents for a civil construction project.

Topics Covered

Unit-I & II Calculation of quantities of earth work using different methods (Mean area, Mid area & Prismatic formula) for:
- Road
- Railway embankments
- Irrigation Canals

Unit-III Valuations:
- Introduction. Purpose of valuation, Principles of valuation. Definition of various terms related to valuation like Gross Income, Net Income, Outgoings, scrap, salvage market and Book values, depreciation, sinking fund, year’s purchase (Y.P.) etc.
- Methods of valuation:
  1. Replacement cost method
  2. Rental return method

Unit-IV Contract System & Mode of Payments/Bills
- Introduction, Contract, Contractor, Qualities of a good contractor. Types of contracts, their advantages, disadvantages and suitability, earnest money, security deposit, Mode of Payments.
- Types of contracting firms/construction companies.
- Types of Bills

Text Books and/or Reference Books
8. BS: 1200. (Year.…)

<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>Final Year (VI-Semester)</td>
<td>BCE604</td>
<td>Quantity Survey &amp; Valuation-II</td>
<td>Theory</td>
<td>100</td>
<td>3 1 0</td>
</tr>
</tbody>
</table>
## Additional Learning Source

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><a href="http://www.scquantitysurveyors.com">http://www.scquantitysurveyors.com</a></td>
</tr>
</tbody>
</table>
## Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

## Course Objectives

This course is aimed to develop the understanding of basic principles and concepts of analysis and design of hydraulic structures on permeable foundation such as weirs and barrages along with the detailed insight in to the theories of subsurface flow. The course also intends to learn the detailed design principles of gravity dam, reservoirs, cross drainage works and canal transitions.

## Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the design aspects of various hydraulic structures on permeable foundation and their causes of failure.
2. Design the gravity dam and understand the methods of foundation treatment, mass concreting in dam construction and provisions for providing keys, water seals, drainage galleries, various instrumentation and outlets works.
3. Plan and design reservoir capacity and understand the IS code provisions for reservoir sediment control.
4. Plan and design of cross drainage works.

## Topics Covered

### Unit-I
**THEORIES OF SEEPAGE**
- Bligh’s theory, Lane’s theory and Khosla’s solution: Analytical and graphical solutions
- Problems on pressure calculations, various corrections, Determination of thickness of floor and Exit Gradient.

### Unit-II
**GRAVITY DAMS**
- Forces acting on a gravity dam, Causes of failure of a gravity dam, Stability analysis of a gravity dam, Elementary profile of a gravity dam, Low and High gravity dam, Foundation treatment, Mass concrete for dams, Structural joints, Keys and water seals, Galleries, Instrumentation, Outlets.

### Unit-III
**RESERVOIR**
- Introduction, Types of reservoirs, Storage zones of a reservoir, Designing reservoir capacity, Reservoir sedimentation, Trap efficiency, Density Current, Reservoir sediment control, Determination of life of reservoir, Reservoir losses, Reservoir clearance.

### Unit-IV
**CROSS DRAINAGE WORKS**
- Introduction, Various types of cross drainage works, Selection of the suitable type of cross drainage work, Hydraulic design of aqueduct and siphon aqueduct, Design of canal transition by UPIRI method, IS code recommendations for clearance and freeboard.

## Text Books and/or Reference Books


## Additional Learning Source

1. https://amututorials.blogspot.com/
2. https://nptel.ac.in/courses/105105110/#
3. https://www.amu.ac.in/polyshowstudym.jsp?did=103&eid=10060879
<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>Final Year (VI-Semester)</td>
<td>BCE605B</td>
<td>Architecture and Town Planning</td>
<td>Theory (Elective)</td>
<td>100</td>
<td>3 1 0</td>
</tr>
</tbody>
</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To study about the old art and science of building including various elements of architecture to improve human life.
2. To study about building about bye-laws, ensuring safety of the public through open spaces and other areas limits with better standards.
3. To study about best utilization of spaces with their functions, structural utility and aesthetics.
4. To study about proper site selection to get maximum benefits from nature.
5. To study the needs of modern challenges of city planning, roads and developments.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Improve environmental understanding background and importance of architecture necessary for modern age.
2. Secure knowledge of bye-laws and various standards to ensure safety of building and public.
3. Develop skills of best planning of building cities and roads.
4. Conditions, public health, safety and energy efficiency in building.

**Topics Covered**

- **Unit-I Architecture**
  - General background, evolution of architecture, definition of architecture, elements affecting the architecture, aims of architecture, principles of architecture. 15 Marks
- **Unit-II Functional Planning of Buildings**
  - Definition, objects of functional planning, procedure of functional planning for different uses with flow chart diagrams and single line plans, necessity of building by-laws, building by-laws for residential area of a typical town planning scheme, yards and set back limit, site coverage, Floor Area Ratio (FAR) and Floor Space Index (FSI). 20 Marks
- **Unit-III Architectural Composition**
  - Relationship of duty with utility aesthetic, elements of architectural composition, theory of colours, colours schemes for various parts of buildings. Idea of Green Building. 20 Marks
  - **Site Selection and Orientation of Buildings**
  - Aims and procedure of orientation, sun shading, ventilation and minimum area required for ventilation, wind control and general principle of air flow. 20 Marks
- **Unit-IV Town Planning**
  - Definition, necessity of town planning, objects of town planning, principle of town planning, site for an ideal town, requirement of a new town, master plan, necessity of master plan, objects of master plan, slum, causes of slum, slum clearance. 20 Marks
## Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

## Course Objectives

1. OBJECTIVES: To train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management. To prepare the students to be industry leaders who implement the best engineering and management practices and technologies in the construction industry. To continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry. To study and understand the overall and detailed planning of formwork, plant and site equipment. To understand the Design and erection of forms for various elements such as slabs, beams, columns, walls, shells and tunnels.

## Course Outcomes

1. OUTCOMES: On successful completion of this course, the students will be able to apply theoretical and practical aspects of project management techniques to achieve project goals. Possess organizational and leadership capabilities for effective management of construction projects. Be able to apply knowledge and skills of modern construction practices and techniques. Have necessary knowledge and skills in accounting, financing, risk analysis and contracting. Be capable of using relevant software packages for planning, scheduling, executing and controlling of construction projects. At the end of this course students will be able to know various types of equipments to be used in the constructions projects.

## Topics Covered

<table>
<thead>
<tr>
<th>Unit</th>
<th>Construction equipments: Selection of construction equipment, excavation and transportation</th>
<th>15 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>equipment, hoisting equipment, conveying and hauling equipment. Soil stabilization and compilation equipments; Mixers, dewatering equipment; Economic life of construction equipment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drilling blasting &amp; tunnelling equipments: Explosives: Types, storage, transportation, handing &amp; precautions of explosives, Drilling operation, stemming of bore holes, Detonators, firing the holes. Tunnelling: Types, location; alignment and grade of tunnels; Placing of concrete in hot and cold weather. Concerting under water. Advantages, preparation &amp; transportation of ready mix concrete.</td>
<td>20 Marks</td>
</tr>
<tr>
<td>II</td>
<td>High rise buildings: Constructions techniques for high rise building Special problems of high rise constructions. Advantages and disadvantages of high rise buildings. Rain water harvesting: Importance &amp; methodology of rain water harvesting. Concrete under special conditions: Environmental issues in construction: Pollution due to thermal &amp; nuclear power plants.</td>
<td>20 Marks</td>
</tr>
<tr>
<td>III</td>
<td>Prefabrications: Introduction, advantages and disadvantages, classification and planning</td>
<td>20 Marks</td>
</tr>
</tbody>
</table>

## Text Books and/or Reference Books


## Additional Learning Source

1. Teacher concern study material at www.amu.ac.in  2. Web links to e-learning nptel
<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/ Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Diploma in Civil Engineering</td>
<td>Final Year (VI-Semester)</td>
<td>BCE691</td>
<td>Soil Mechanics Lab</td>
<td>Practical</td>
<td>100</td>
<td>0 0 4</td>
</tr>
</tbody>
</table>

**Course Assessment Method**

1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

**Course Objectives**

1. Learn to classify the given sample of soil.
2. To learn standard test procedures for finding different parameters of soil.
3. To learn the methods to find out density, optimum moisture content, liquid limit, plastic limit and shrinkage limit of a given sample of soil.
4. To understand the importance of above parameters for defining the characteristics of different type of soil

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:
1. Classify the soil on the bases of grain size distribution.
2. Find out density and optimum moisture content of soil sample.
3. Find out consistency of soil.
4. Find out shrinkage limit of soil sample.
5. Carry out in-situ determination of soil density.

**Topics Covered/ List of Experiments**

**LIST OF EXPERIMENT**

1. To classify the given sample of course grained soil.
2. To determine the in-situ density of soil by core cutter method.
3. To determine the specific gravity of the given soil particles, using pycnometer /Density bottle.
4. To determine the optimum Moisture content (OMC) and maximum dry density of a given soil sample.
5. To determine the liquid limit of a given soil by Casagrande’s liquid limit apparatus.
6. To determine the plastic limit of a given soil sample.
7. To determine the shrinkage limit of a given soil sample.

**FOR DEMONSTRATION ONLY**

1. Coefficient of Permeability using (a) Constant head Permeability Test (b) Falling head permeability Test.
2. Standard Penetration Test (STP)

**Text Books and/or Reference Books**
### Course Assessment Method

1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

### Course Objectives

Learn the procedure to:
1. Operate the Total Station, Auto Level and Digital Theodolite.
2. Plot the X-section and L-section of the roads, canals etc.
3. Calculate the earth work for roads, canals etc.
4. Plot the Topographical Map of a site.
5. Plot the contour maps of an area.
6. Use the Pythagoras software.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:
1. Use the Total Station, Auto Level and Digital Theodolite for survey work.
2. Calculate the earth work for roads, canals etc.
3. Plot a closed traverse and to determine its area.
4. Determine the length and slope of a given line.
5. Plot the Topographical Map of a given site.
6. Plot the contour maps of an area.
7. Use the Pythagoras software.

### Topics Covered/ List of Experiments

Experiment No.1 To determine the height of the given object using tangential method (base accessible/base not accessible) using digital theodolite.

Experiment No.2 To determine the height of the given object (same as in Experiment No.1) using Total Station.

Experiment No.3 To determine the slope of the given line AB by stadia/Tangential method using digital theodolite.

Experiment No.4 To determine of the slope of the given line AB (same as in Experiment No.1) by Total Station.

Experiment No.5 To determine the area of the given closed traverse using digital theodolite & tape and plotting of the traverse by latitude & departure method.

Experiment No.6 To determine the area of the given closed traverse using Total Station.

Experiment No.7 To determine the omitted portion of a base line using digital theodolite.

Experiment No.8 To solve the three point problem in Hydrographic survey using digital theodolite.

Experiment No.9 To perform the layout of simple circular/transition/reverse curve.

Experiment No.10 To plot the X-sections & L-sections of the given existing road by performing levelling with auto level & calculation of materials for the proposed road using MS Excel/Pythagoras software.

Experiment No.11 To prepare the Topographical Map of the given area by taking the co-ordinates by Total Station.

Experiment No.12 To prepare the contour map of the given area using Auto level/Total Station and Pythagoras software.

### Text Books and/or Reference Books

## Civil Engineering

### Course Designation
Diploma in Civil Engineering

### Year/Semester
Final Year (VI-Semester)

### Course No.
BCE693

### Course Title
Project and Camp

### Course Type
Practical

### Total Marks
150

### Contact Hours/Weak
0 0 3

### Course Assessment Method
1. Class Work (80 Marks)
2. Camp (20 Marks)
3. End-Semester Examination (50 Marks) – 2 Hours

### Course Objectives
1. To develop an appreciation of problems in the Design and Analysis of Buildings and roads
2. To impart training for handling such design projects
3. To have feel of real life situations in planning of such projects

### Course Outcomes
1. Build the necessary theoretical background for planning, estimation, and design of civil engineering structures
2. Understand the behavior of simple (selected) structural elements under applied forces.
3. Recognize and be able to apply fundamental principles to check the stability of structural components
4. Understanding the Specifications like CPWD specifications and Schedule of Rates
5. Preparation of Bill of Quantities and Materials and Labour statements strictly adhering to the specifications and the construction drawing

### Topics Covered
**PROJECT WORK AND DETAILED REPORT**

1. Development of a detailed project document including data collection, planning, design, estimation, analysis of rates, drawings and detailing etc. whichever applicable.
2. Extensive field work as per requirement.
3. Submission of detailed project report.

### Text Books and/or Reference Books
1. 
### Course Assessment Method

1. Class Work (60 Marks)
2. End-Semester Examination (40 Marks) – 2 Hours

### Course Objectives

The main objective of the course is to prepare the complete drawings using AutoCAD for civil engineering structures and get hands-on experience of preparing the drawings which can subsequently be used in the professional practice.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to prepare and interpret complete civil engineering construction drawings using AutoCAD software.

### Topics Covered

1. Plan and reinforcement detailing of RC buildings
2. RC beams and slabs
3. RC columns and foundations
4. RC staircase
5. Overhead water tanks: Intze tank
6. Slab culvert
7. Cross-Section of Road

### Text Books and/or Reference Books

1.
COURSES TAUGHT
IN
OTHER BRANCHES
### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

1. To determine the relative position of any objects or points of the earth.
2. To determine the distance and angle between different objects.
3. To prepare a map or plan to represent an area on a horizontal plan.
4. To develop methods through the knowledge of modern science and the technology and use them in the field.
5. To solve measurement problems in an optimal way.

### Course Outcomes

1. To understand the Basic concepts of surveying and able to solve problem associated with linear measurements and error corrections
2. To understand the basics of Compass surveying
3. To understand the system of coordinates and angular measurements for the purpose of traversing
4. To learn various methods of taking levels and reducing levels and about different types of levelling methods.
5. To learn about the different methods of measuring areas and volumes of irregular figures.

### Topics Covered

**Unit-I  CHAIN SURVEYING**

- Definition of surveying, principles of surveying. Brief description of different types of chains and tapes, tape corrections. Corrections of erroneous distances and areas, ranging of survey lines. Obstacles in chaining and ranging.

**PLANE TABLE SURVEYING**

- Accessories and methods of plane table surveying, advantages and disadvantages of plane table surveying. Three point problem (Mechanical and Lehman’s method). Two point problem.

**Unit-II  COMPASS SURVEYING**


**Unit-III  LEVELLING**

- Definition of terms related to levelling. Brief description of dumpy, tilting and IOP levels. Temporary and permanent adjustment of dumpy level. Sensitiveness of bubble tube, Curvature and refraction, reciprocal levelling. Methods of calculation of reduce levels. Profile levelling, L-section, cross-section and formation lines. Precautions and errors in levelling, balancing back sight and foresight distances. Levelling difficulties.

**Unit-IV  THEODOLITE SURVEYING**

- Description of a transit theodolite. Definition of terms. Fundamental lines and desired relations, temporary adjustment of theodolite. Method of reading horizontal and vertical angles. Miscellaneous operations with theodolite. Determination of heights and distances with theodolite when base of the object is accessible.

### Text Books and/or Reference Books


### Additional Learning Source: www.nptel.com
<table>
<thead>
<tr>
<th>Section</th>
<th>Course Designation</th>
<th>Year/Semester</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
<th>Contact Hours/Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>Diploma in Mechanical Engineering</td>
<td>II Year</td>
<td>BCE306</td>
<td>Environmental Studies</td>
<td>Theory</td>
<td>50</td>
<td>2 0 0</td>
</tr>
</tbody>
</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (5 Marks)
2. Mid-Semester Examination (10 Marks) – 1 Hour
3. End-Semester Examination (35 Marks) – 2 Hours

**Course Objectives**

1. To understand the different components of the environment and their inter-relationships.
2. To learn about the sources, effects and control measures for different types of pollution occurring in India.
3. To understand the importance of earth’s atmosphere and the different cycles prevailing in it.
4. To learn about the different conventional and non-conventional energy sources.
5. To understand the importance of Environmental Impact Assessment for industries and organizations.

**Course Outcomes**

Upon successful completion of this course the students will be able to:

1. Understand the importance of environmental studies.
2. Analyse the impact of different types of pollution on the environment and its components.
3. Analyse the importance of the different non-conventional sources of energy in controlling pollution.
4. Understand the importance of Environmental Impact Assessment, its components, methods of analysis and stages for different types of industries and organizations.

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Definitions of Environmental Science, Environmental Engineering and Environmental Management, Concepts of Ecology, Food Chain, Food Web</td>
<td>5</td>
</tr>
<tr>
<td>II</td>
<td>Types of pollutants, Air Pollution, Water Pollution, Land Pollution, Noise Pollution: Sources, effects and control measures. Water Conservation and Reuse. Concept of waste reduction, recycling and reuse</td>
<td>10</td>
</tr>
<tr>
<td>III</td>
<td>Composition of atmosphere, Hydrological cycle, Greenhouse Effect, Global Warming, Acid Rain, Ozone depletion, deforestation and desertification. Role of Non- Conventional sources of energy for environmental pollution control</td>
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<td>IV</td>
<td>Basic concepts of Environmental Impact Assessment (EIA). EIA objectives. Environmental Awareness, public participation, Environmental case studies, Environmental Audit, Concept of Sustainable development</td>
<td>10</td>
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</tbody>
</table>

**Text Books and/or Reference Books**

1. Erach Bharucha, 2018, Textbook of Environmental Studies for Undergraduate Courses, University Press (India) Private Ltd.

**Additional Learning Source**

1. [http://envfor.nic.in/divisions/iass/eia/Chapter1.htm](http://envfor.nic.in/divisions/iass/eia/Chapter1.htm)
2. [https://www.cseindia.org/understanding-eia-383](https://www.cseindia.org/understanding-eia-383)
3. [https://nptel.ac.in/courses/120108004/module3/lecture3.pdf](https://nptel.ac.in/courses/120108004/module3/lecture3.pdf)
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<th>Course No</th>
<th>Course title</th>
<th>Course type</th>
<th>Total Marks</th>
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<tr>
<td>Civil Engineering</td>
<td>Diploma in Arch Engineering</td>
<td>II-year (III Semester)</td>
<td>BCE305</td>
<td>Strength of material</td>
<td>Theory</td>
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</table>

**Course Assessment Method**

1. Assignments, Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) - 1 Hour
3. End-Semester Examination (75 Marks) - 2 Hours

**Course Objectives**

1. To understand the concept of different types of stresses and strain in the member
2. To learn the method of calculation the shear force and bending moment of different types of beams
3. Calculate Moment of Inertia of T, I & L sections
4. To learn the method determining the forces in the members of simple truss

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:
1. Calculate the simple stresses and strain in composite section
2. Determine the Shear force and Bending moment of beams
3. Find out the relationship between SF & BM
4. Find out Geometrical Properties of Area
5. Observe different types of frame
6. Determine forces in simple truss by the method of joint and method of section

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Marks</th>
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<tr>
<td>Unit 1</td>
<td>Simple Stresses and Strain:</td>
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</tr>
<tr>
<td>Unit 2</td>
<td>Shear Force and Bending Moment:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type of Support. Type of beams. Type of Load. Shear Force and Bending Moment. SFD and BMD for Cantilevers, Simply Supported and Overhanging beam for Concentrated and Uniformly distributed load. Relationship between S.F and B.M</td>
<td>20 Marks</td>
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<tr>
<td>Unit 3</td>
<td>Geometrical Properties of Area:</td>
<td></td>
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<tr>
<td></td>
<td>Centre of area or Centroids. Moment of Inertia and second moment of area. Theorem of Parallel and Perpendicular axes. Second moment of area of rectangular, Circular, T, I, L and Built up Section.</td>
<td>20 Marks</td>
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<tr>
<td>Unit 4</td>
<td>Frames:</td>
<td></td>
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<tr>
<td></td>
<td>Introduction: Types of Frame. Determination of Forces in Simple trusses by the method of joint and method of section.</td>
<td>15 Marks</td>
</tr>
</tbody>
</table>

**Text Books and/or Reference Books**

1. Strength of Material S. Ramamuthan
4. Strength of Material Rajput
Architecture Diploma in Architecture Assistantship III Year (V-Semester) BCE506 Structural Design Theory 100 3 1 0

Course Assessment Method
1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

Course Objectives
The objective of BCE-506 is to introduce the theory and application of analysis and design of reinforced concrete elements. The course focuses on the understanding of the behaviour of reinforced concrete components and systems subjected to gravity loads.

After taking this course the students will be able to classify and identify structures based on their behaviour and further analyse, design and detail the various components of structure subjected to gravity loads. They will also be able to interpret and understand the relevant BIS codes and Special publications of BIS.

Course Outcomes
Upon successful completion of this course, it is expected that students will be able to:
1. Recognise the basic properties of concrete in fresh and hardened states
2. Recognize the design philosophy of the reinforced concrete structures.
3. Understand the difference between the structural behaviour of different reinforced concrete structural elements through demonstration experiments and analysis.
4. Analyse and design different elements of reinforced concrete structural elements under gravity loads
5. Follow relevant and upcoming BIS standards and design philosophies prevalent in the world.

Topics Covered
Unit-I
- Using Limit State Method analyse and design the Rectangular beams in flexure.

Unit-II
- Using Limit State Method analyse and design the T-beams in flexure
- Shear: Behaviour of Reinforced Concrete beam under Shear. Critical sections for shear design. Types of shear reinforcement. Design of shear reinforcement with vertical stirrups and bent-up bars with vertical stirrups.
- Bond and Development length: Introduction to Bond stress, flexural bond, anchorage (or development) bond, development length in compression and tension, bends and hooks, splicing reinforcement. Design examples.

Unit-III
- SLABS: One-way and two way slab. Design of rectangular, square and circular slabs with corners free and held down. Provision of reinforcement in slabs.

Unit-IV
- COLUMNS: Column and its types. Design of axially loaded column with lateral ties and helical reinforcements.
- FOOTINGS: Footing and its types. Footings used for residential buildings. Design of isolated column footings for square, rectangular and circular column footings
  - Introduction to Pre stressing

Text Books and/or Reference Books
1. Reinforced Concrete - Limit State Design by A. K. Jain
2. Reinforced Concrete Design by S. U. Pillai and D. Menon
3. IS: 456-2000, Plain and Reinforced Concrete - Code of Practice

Additional Learning Source
<table>
<thead>
<tr>
<th>Section</th>
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<th>Year/Semester</th>
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<td>Architecture</td>
<td>Diploma in Architectural Assistantship/ Interior Design</td>
<td>II-Year (IV-Semester)</td>
<td>BCE406</td>
<td>Environmental Studies</td>
<td>Theory</td>
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</table>

**Course Assessment Method**
1. Assignments, Oral Quizzes and Class Work (5 Marks)
2. Mid-Semester Examination (10 Marks) – 1 Hour
3. End-Semester Examination (35 Marks) – 2 Hours

**Course Objectives**
1. To understand the different components of the environment and their inter-relationships.
2. To learn about the sources, effects and control measures for different types of pollution occurring in India.
3. To understand the importance of earth’s atmosphere and the different cycles prevailing in it.
4. To learn about the different conventional and non-conventional energy sources
5. To understand the importance of Environmental Impact Assessment for industries and organizations.

**Course Outcomes**
Upon successful completion of this course the students will be able to:
1. Understand the importance of environmental studies.
2. Analyse the impact of different types of pollution on the environment and its components.
3. Analyse the importance of the different non-conventional sources of energy in controlling pollution.
4. Understand the importance of Environmental Impact Assessment, its components, methods of analysis and stages for different types of industries and organizations

**Topics Covered**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Marks</th>
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<tbody>
<tr>
<td>Unit-I</td>
<td>Definitions of Environmental Science, Environmental Engineering and Environmental Management, Concepts of Ecology, Food Chain, Food Web</td>
<td>5 Marks</td>
</tr>
<tr>
<td>Unit-II</td>
<td>Types of pollutants, Air Pollution, Water Pollution, Land Pollution, Noise Pollution: Sources, effects and control measures. Water Conservation and Reuse. Concept of waste reduction, recycling and reuse</td>
<td>10 Marks</td>
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<tr>
<td>Unit-III</td>
<td>Composition of atmosphere, Hydrological cycle, Greenhouse Effect, Global Warming, Acid Rain, Ozone depletion, deforestation and desertification. Role of Non-Conventional sources of energy for environmental pollution control.</td>
<td>10 Marks</td>
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<tr>
<td>Unit-IV</td>
<td>Basic concepts of Environmental Impact Assessment (EIA). EIA objectives. Environmental Awareness, public participation, Environmental case studies, Environmental Audit, Concept of Sustainable development</td>
<td>10 Marks</td>
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</table>

**Text Books and/or Reference Books**
1. Erach Bharucha, 2018, Textbook of Environmental Studies for Undergraduate Courses, University Press (India) Private Ltd.

**Additional Learning Source**
1. [http://envfor.nic.in/divisions/iass/eia/Chapter1.htm](http://envfor.nic.in/divisions/iass/eia/Chapter1.htm)
2. [https://www.cseindia.org/understanding-eia-383](https://www.cseindia.org/understanding-eia-383)
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<th>Total Marks</th>
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<td>Civil Engineering</td>
<td>Diploma in Electrical/Instrumentation Engineering</td>
<td>Final Year (V-Semester)</td>
<td>BCE507</td>
<td>Environmental Studies and Pollution Control in Power Plant</td>
<td>Theory</td>
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</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To make awareness about the adverse effects on the environment from human activities.
2. To identify the various sources, adverse effects and remedial measures adopted for pollution.
3. To describe the complex environmental problems and global issues.
4. To promote public participation in pollution control.
5. To be conversant with the role of non-conventional sources of energy for the control of pollution.
6. To be conversant with the pollution control in Thermal power plants and Nuclear power plants.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the natural phenomenon and cycling processes for sustaining life on earth.
2. Develop and identify the awareness, knowledge and appreciation of the intrinsic values of ecological processes & communities.
3. Understand different types of pollutant and their harmful effects on the environment.
4. Develop an approach and awareness to environmental issues, including global warming acid rain, ozone layer depletion, and sustainable development.
5. Know the importance of natural resources and measures to be taken for its conservation for future use.
6. Understand the pollution control in Thermal power plants and Nuclear power plants.

**Topics Covered**

Unit-I Definitions of Environmental Science, Environmental Engineering and Environmental Management, Concepts of Ecology, Food chain, Food Web. Types of Pollutants, Air Pollution, Water Pollution, Land Pollution: Classification, sources, effects and control measures, Noise Pollution, Odour Pollution. Water conservation and reuse.

Unit-II Composition of atmosphere, Hydrological cycle, Green House Effect, Global Warming, Acid Rain, Ozone depletion, deforestation and desertification. Concept of waste reduction, recycling and reuse.

Unit-III Basic concepts of Environmental Impact Assessment (EIA), EIA Objectives. Environmental awareness, public participation, Environmental case studies. Environmental Audit, Concept of sustainable development.

Unit-IV Role of Non-Conventional sources of energy for environmental pollution control. Environmental Control in Thermal power plants, Environmental Control in Nuclear power plants.

**Text Books and/or Reference Books**

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### Additional Learning Source

2. [www.vssut.ac.in/lecture_notes/lecture1424353637.pdf](http://www.vssut.ac.in/lecture_notes/lecture1424353637.pdf)
4. [http://www.eolss.net/ebooks/sample%20Chapters/C09/E4-23-03-03.pdf](http://www.eolss.net/ebooks/sample%20Chapters/C09/E4-23-03-03.pdf)
6. [https://www.alljntuworld.in](https://www.alljntuworld.in)
7. [https://lecturenotes.in/subject/91/environmental-engineering-ee](https://lecturenotes.in/subject/91/environmental-engineering-ee)
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## Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid Semester Examination (15 Marks) - 1 Hour
3. End Semester Examination (75 Marks) - 2 Hours

## Course Objectives

1. To have the awareness, knowledge and appreciation of the intrinsic values of ecological processes & communities.
2. To identify the various sources, adverse effects and remedial measures adopted for pollution.
3. To have an approach and awareness to environmental issues, including global warming and ozone layer depletion, and sustainable development.
4. To plan strategies before the implementation of a project, without disturbing the environment, through Environmental Impact Assessment (EIA).
5. To be conversant with the role of non-conventional sources of energy for the control of pollution.
6. To analyse the industrial activity of tannery, through its characterization, material balance & segregation, and reclamation/reuse of processing waste.
7. To study the different principles for the treatment of the wastewater generated for tannery.
8. To plan strategies of implant management, for the reduction of pollution including housekeeping segregation of waste streams and solid waste treatment in tannery industry.
9. To identify the importance of water and plan strategies to monitor, control & reduce, through its conservation & reuse.

## Course Outcomes:

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the awareness, knowledge and appreciation of the intrinsic values of ecological processes & communities.
2. Identify the various sources, adverse effects and remedial measures adopted for pollution.
3. Be conversant with an approach and awareness to environmental issues, including global warming acid rain, ozone layer depletion, and sustainable development.
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<td>I</td>
<td>Definition of Environmental Science, Environmental engineering and Environmental Management, Concept of Ecology, Food Chain, Food Web, Types of Pollutants; Classification, Sources, Effects and Control Measures, Air Pollution, Water Pollution, Land Pollution, Noise Pollution, Odor pollution, Thermal Pollution</td>
</tr>
<tr>
<td>II</td>
<td>Global Warming, Acid Rain, Ozone Depletion, Deforestation and Desertification, Role of Non-Conventional Sources of Energy for Environmental Pollution Control, Environmental Impact Assessment (EIA); Basic Concepts, Objectives, Operating and Guiding Principles, Environmental Awareness, Public Participation.</td>
</tr>
<tr>
<td>III</td>
<td>Sources of generation of waste streams in tanneries. Characterization of liquid waste, sampling and material balance, segregation and equalization; Disposal of waste, Adverse effects on land and receiving waters, disposal standards. Wastewater treatment, physical, chemical, and biological processes. Reclamation/Recovery and reuse of waste.</td>
</tr>
</tbody>
</table>
### Reference Books

1. Thomas, C. Thortensen, “Fundamentals of Pollution Control for the leather Industry”.

### Additional Learning Source

1. [www.vssut.ac.in/lecture_notes/lecture1424353637.pdf](http://www.vssut.ac.in/lecture_notes/lecture1424353637.pdf)
2. [https://www.alljntuworld.in](https://www.alljntuworld.in)
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<td>Civil Engineering Section</td>
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<td>BCE204</td>
<td>Theory</td>
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**Course Assessment method**
1. Course Work (50 %)
2. Mid-Semester Exam (15%) 1 Hour
3. End-Semester Exam (35%) 2 Hours

**Course Objectives**
1. To introduce the students to the “universal language of Engineers” for effective communication through drafting exercises of geometrical solids.
2. To enable students to acquire requisite knowledge, techniques, and attitude required for the advanced study of engineering drawing.
3. To introduce the elements of engineering communications; including a graphical representation of basic drawing and its elements and materials.
4. To provide knowledge of types of lines, dimensioning, and printing of letter in engineering drawing.
5. To provide basic knowledge engineering materials symbols.
6. Impart knowledge of engineering curves and there different types of methods of construction.
7. Providing knowledge of different types of quadrant in orthographic projection.
8. Providing basic knowledge of projection of points, line and planes in the first quadrant.

**Course Outcomes**
1. Understand and apply basic knowledge of lines, dimensioning, lettering and scales.
2. Graphically construct and understand the importance of mathematical curves in engineering applications.
3. Understand and construct Orthographic projection of points, Lines and Plane.

**Syllabus**

**Unit-I**
**PRINTING**

**Unit-II**
**SCALES**
- Need of a scale, Representative fraction (R.F.) and types of Scales according to the R.F. construction of plain and Diagonal.

**Unit-III**
**ORTHOGRAPHIC PROJECTIONS**

**Unit-IV**
**Isometric Projection:** Simple right Solids.

**Text Books and Reference materials**
3. Engineering Drawing: By P.S. Gill

**Additional Learning Sources**
Teacher concern study material at [www.amu.ac.in](http://www.amu.ac.in)
Web links to e-learning nptel
## Course Assessment method

1. Course Work (50 %)
2. Mid-Semester Exam (15%) 1 Hour
3. End-Semester Exam (35%) 2 Hours

## Course Objectives

1. To introduce the students to the “universal language of Engineers” for effective communication through drafting exercises of geometrical solids.
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## Syllabus

### Unit-I PRINTING
- Marks: 7

### Unit-II SCALES
- Need of a scale, Representative fraction (R.F.) and types of Scales according to the R.F. construction of plain and Diagonal.
- Marks: 7

### Unit-III ORTHOGRAPHIC PROJECTIONS
- Marks: 14

### Unit-IV Isometric Projection: Simple right Solids.
- Marks: 7

## Text Books and Reference materials

3. Engineering Drawing: By P.S. Gill

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<th>Contact Hours/Week</th>
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<td>Civil</td>
<td>Diploma in Architecture Assistanship / Interior Design</td>
<td>I-Year (II-Semester)</td>
<td>BCE191</td>
<td>Survey Lab</td>
<td>Practical</td>
<td>50</td>
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</table>

**Course Assessment Method**

1. Course Work – 30 Marks
2. End-Semester Examination – 20 Marks (Duration: 2 Hours)

**Course Objectives**

The students should learn the:

1. Method of measurement of distances.
2. Method to measure the angles.
3. Procedure of drawing map and calculating the area.
4. Method to draw profile and cross-sections.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to perform the following field work:

1. Measuring the distances, ranging, offsetting and traversing using tapes and chains.
2. Plotting the area to the scale using plane table surveying.
3. Making profile and cross-sections of roads and other Civil Engineering related structures.

**Topics Covered**

**CHAIN SURVEY**

- Folding & unfolding of chains, Ranging Of Lines, Offsetting, Offsetting with 90 turn, Offsetting with tie line turn, Traversing with Chain

**PLAIN TABLE SURVEY**

- Radiation Method
- Intersection Method
- Traversing
- Two – Point problems
- Three – Point problem

**LEVELING**

- Rise & Fall method
- Height of Instrument method
- Profile Leveling
- Cross Sectioning

**THEODOLITE SURVEY**

- Measurements of horizontal angles
- Measurements of vertical angles

**Text Books and/or Reference Books**

<table>
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<td>Civil Engineering</td>
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<td>II- year</td>
<td>BCE- 492</td>
<td>Construction Technology Lab</td>
<td>Practical</td>
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**Course Assessment Method**
1. Class Work (75 Marks)
2. End-Semester Examination (50 Marks) – 2 Hours

**Course Objectives**
1. To identify different types of building materials used in civil construction works.
2. To recognise the different types of tools used in masonry work/building construction works.
3. To recognise different types of bonds used in brick masonry works.
4. To recognise different types of water supply fixtures, plumbing tools and sanitary fittings used in buildings.
5. To know the removal periods of form work and shuttering used for different structural members in a building construction work.
6. To recognise the various types of equipment used in the civil construction works e.g. concrete mixer, internal, external and form vibrators and transporter cum mixer machines.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Identify the different types of building materials used in civil construction works.
2. Recognise the different types of tools used in masonry work and civil construction works.
3. Recognise different types of bonds used in brick masonry works.
4. Recognise different types of water supply fixtures, plumbing tools and sanitary fittings used in buildings.
5. Know the removal periods of form work and shuttering used for different structural members in a building construction work.
6. Recognise the various types of equipment used in the civil construction works e.g. concrete mixer, internal, external and form vibrators and transporter cum mixer machines.

**Topics Covered/ List of Experiments**
1. Identification & demonstration of building materials and tools used in the construction work.
2. Construction of L-Junction with stretcher and header bonds.
3. Construction of L-Junction with one brick thick wall in English and Flemish bonds.
4. Construction of L-Junction with 1½ brick thick wall in English and Flemish bonds.
5. Construction of L-Junction with 2 bricks thick wall in English and Flemish bonds.
7. Demonstration of various mortars and cement concrete mixes, mixing, transportation, placement, compaction and curing and their methods.
8. Form work, centering & shuttering and their removal.
9. Demonstration of water supply fixtures and sanitary fittings.
10. Site Visits.
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<th>Course No.</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Total Marks</th>
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<td>Advance Diploma in Food Technology</td>
<td>First Year (I-Semester)</td>
<td>ADFT-5101</td>
<td>Food Microbiology</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To introduce the basic concepts of microbiology and its brief history.
2. To impart the knowledge of working of various types of microscopes.
3. To impart knowledge about growth and culturing of microbes.
4. To teach about interaction of microbes with food products.
5. To impart knowledge about the effect of various food-borne microbes on human health.
6. To teach about various methods for controlling the growth of microbes.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Apply fundamental knowledge of microbiology for detection and identification of microorganisms.
2. Use the techniques and tools for culturing of microbes.
3. Understand and evaluate the role of environmental factors in the growth of microorganisms.
4. Evaluate and prevent the contamination of various types of food products by different microbes.
5. Diagnose and prevent food infections caused due to various microorganisms.
6. Diagnose and prevent food poisonings caused due to natural toxins present in various food products.
7. Understand and apply the concepts of D-value, F-value and z-value in destruction of microbes and preservation of food products.
8. Evaluate and apply various physical and chemical agents for controlling the growth of microorganisms.

**Topics Covered**

Unit-I Introduction to microbiology, Cell theory, difference between prokaryotic and eukaryotic cells, Haeckel’s Kingdom Protista, Whittaker five kingdom classification, Germ theory and Koch’s postulates, Classification of microbes (bacteria, yeast and mold). Microbial Growth, Growth curve and its different phases, Factors affecting microbial growth, Generation time, Culture maintenance and preservation.

Unit-II Working principle of light microscopes (Dark-field, Bright-field, Fluorescence and Phase contrast microscopes) and electron microscopes, Simple and differential staining techniques. Microbial spoilage of milk & milk products, meat, fish, poultry & egg products, fruits & vegetable products, Cereal grains, bakery products, fermented and canned foods.

Unit-III Food borne diseases, Food intoxications (Botulism, Staphylococcal Gastroenteritis) and infections (Salmonella, Clostridium perfringenes, Bacillus cereus and E.coli infections), Mycotoxins (Aflatoxin, Patulin, Ochratoxin) and their causative agents

Unit-IV Control of micro-organisms, Concept of TDT, F, z and D-value, Microbial spores, Physical & chemical anti-microbial agents - Temperature, Osmotic pressure, Radiations, Surface tension, Filtration, Phenols, Alcohols, Halogens (iodine and chlorine), Heavy metals, Detergents, Quaternary Ammonium compounds, Aldehydes, Ethylene oxide.

**Text Books and/or Reference Books**


**Additional Learning Source**

1. https://nptel.ac.in/courses/102103015/36
### Course Assessment Method

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

1. To discuss the scope and importance of food chemistry.
2. To introduce various food groups and their nutritive values.
3. To explain the roles and importance of different food constituents in our body.
4. To explain the functions and effects of different food constituents during processing and storage.
5. To impart knowledge about the chemistry of water and carbohydrates.
6. To explain the chemistry of proteins and fats.
7. To discuss the chemistry of minerals and vitamins.
8. To describe about colour pigments and enzymes.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Identify various food groups and their chemical constituents.
2. Estimate the nutritive importance of various food products.
3. Understand the significance of various chemical constituents during processing and storage.
4. Apply the fundamental knowledge of food chemistry in enhancing, improving and retaining the nutritive value and quality of the food products.
5. Use analytical and chemical techniques for determination of nutrients in foods.
6. Understand and evaluate the effects of processing techniques on the chemical constituents of foods.

### Topics Covered

**Unit-I**

Introduction to food chemistry, scope of food chemistry, introduction to different food groups: their classification and importance. Importance of nutrition and determination of nutritional value. Water-Structure, types and properties of water, water activity and its importance, water activity.

**Unit-II**

Carbohydrates- Definition, classification, sources, chemical make-up, biological functions, nutritional and industrial importance. Pigments- Types & sources, changes during processing & storage.

**Unit-III**

Proteins- Sources, chemical make-up, biological functions, nutritional aspects, industrial importance, essential amino acids, biological values, PER (Protein Efficiency Ratio). Enzymes- Nomenclature, classification, enzyme kinetics, enzyme inhibitions, application of enzymes in food processing.

**Unit-IV**

Fats- Sources, chemical make-up, biological functions, nutritional aspects, essential fatty acids, hydrogenation, rancidity and industrial importance. Minerals and Vitamins: Importance and sources of minerals & vitamins with special emphasis on calcium, iodine, zinc, iron, fluorine. Fat and water-soluble vitamins, effect of processing and storage on vitamins. Deficiency disorders and requirements of different vitamins and minerals.

### Text Books and/or Reference Books

2. Food Chemistry by Lilian Hoagland Meyer; Avi. Publishing Company
3. Food Chemistry by Owen Fennema; Marcel Dekker Inc.
4. Food Chemistry by Hemant Panwar, RBS Publishers

### Additional Learning Source

1. [https://nptel.ac.in/courses/102105034/](https://nptel.ac.in/courses/102105034/)
2. [https://swayam.gov.in/courses/5066-food-nutrition-for-healthy-living](https://swayam.gov.in/courses/5066-food-nutrition-for-healthy-living)
ANNEXURE-III: SPL BOS, CES: 28.3.2019

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<td>Civil Engineering</td>
<td>Advance Diploma in Food Technology</td>
<td>First Year (I-Semester)</td>
<td>ADFT-5103</td>
<td>Food Refrigeration and Cold Storage</td>
<td>Theory</td>
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</table>

**Course Assessment Method**

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To impart fundamental knowledge of refrigeration cycles, refrigeration systems and psychometrics.
2. To explain the designing of cold storages and freezers for various food commodities.
3. To teach about various aspects of operation and maintenance of cold storages.
4. To provide technical knowledge about different systems such as Controlled Atmosphere Storage and Modified Atmosphere Storage.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Identify different components of refrigeration cycle and their working.
2. Select and design cold storages and freezing systems for various food commodities.
3. Troubleshoot food refrigeration systems whenever problems occur.
4. Decide optimum conditions for cold storage and frozen storage of different foods.
5. Calculate cooling load for cold storages and frozen storages.

**Topics Covered**

- **Unit-I** Principles of Refrigeration, Refrigeration cycles, Vapour compression and vapour absorption cycles, refrigerants, characteristics of different refrigeration’s, ozone-depletion potentials, green house potential refrigerants, use of non-polluting refrigerants, net refrigerating effect, ton of refrigeration - Components of a Refrigeration system: compressor, condenser, evaporator, expansion valves piping and different controls. Atmospheric air and its properties, Psychometrics.
- **Unit-II** Cold Storage Design and Construction, Small and large commercial storages, Cold Room temperatures, Insulation, Properties of insulating materials, Air diffusion equipment, Doors and other openings. Cold load estimation; prefabricated systems, walk-in coolers and refrigerated container truck: Freezer Storages, Freezer room temperatures, insulation of freezer rooms: Pre-cooling and pre-freezing. Cold storage practice, Stacking and handling of material in and around cold rooms, Optimum temperatures of storage for different food materials.
- **Unit-III** Controlled atmosphere and modified atmosphere storages: Principles and basics of their construction, Operation and maintenance, cleanliness, defrosting practices, preventive maintenance and safety measures.

**Text Books and/or Reference Books**

2. Clive D.J. Dellino: Cold and Chilled Storage Technology Publisher: Kluwer Academic Publisher (1997)
4. Andrew D Althouse and others: Refrigeration and Air Conditioning Goodheart – Willcox Company Inc. 1982

**Additional Learning Source**

1. [https://nptel.ac.in/courses/103107088/module11/lecture2/lecture2.pdf](https://nptel.ac.in/courses/103107088/module11/lecture2/lecture2.pdf)
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<td>ADFT-5104</td>
<td>Basic Chemical Engineering</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

Providing students with advanced technical skills in Chemical Engineering that will enable them to
1. Translate fundamental discoveries in Food Sciences, materials and other high technology areas to commercial exploitation.
2. Adapt readily to the challenges presented in a diverse range of industrial sectors that can benefit from process engineering approaches.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:
1. Calculate the mass & energy balance for process industries.
2. Using the appropriate unit operation for size reduction.
3. Understand the basics of heat transfer, types & descriptions of heat exchanger.
4. Understand the unit processes such as drying.

**Topics Covered**

Unit-I Introduction, Classification of Unit Operations, Examples and applications of key unit operations. Working principles of centrifugal and screw pumps. Description of conveyors and belts.


Unit-III Law of Conservation of Mass - fundamentals of material balance, material balance in batch and continuous process without chemical reactions. Evaporation and– single effect and multiple effect evaporators


**Text Books and/or Reference Books**

1. Introduction to Food Process Engineering by Peter G Smith

**Additional Learning Source**

1. [https://nptel.ac.in/courses/103107082/](https://nptel.ac.in/courses/103107082/)
Civil Engineering  
Advance Diploma in Food Technology  
First Year (I-Semester)  
ADFT-5191  
Food Microbiology and Analysis Lab  
Practical  
250  
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6

### Course Assessment Method

1. Class Work (150 Marks)
2. End-Semester Examination (100 Marks) – 2 Hours

### Course Objectives

The specific objectives of food microbiology and analysis lab are as follows:

1. **Food microbiology testing:** The study of the microorganisms that inhabit or contaminate food to help manufacturers assess the safety of raw materials, components, ingredients and final products.

2. **Food nutrition analysis:** An analysis of value and the nutritional content in foods and food products. It provides information for nutrition labelling on food packaging that manufacturers are required to comply with the labelling regulations of destination countries.

3. **Sensory testing:** Sensory testing is identification of food product properties by using the human senses (sight, smell, taste, touch and hearing) for the purposes of evaluating consumer products.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Determine the proximate composition of food.
2. Understand the techniques for microbial analysis of food.

### Topics Covered/ List of Experiments

- **Experiment No.1** Culture media preparation for different types of microorganisms
- **Experiment No.2** Sterilization of media and glassware’s using autoclave apparatus
- **Experiment No.3** Counting of microbial colonies using digital colony counter
- **Experiment No.4** Identification of bacteria using gram staining technique.
- **Experiment No.5** Study of microbial growth curves.
- **Experiment No.6** Yeast and mould count for a given sample of food
- **Experiment No.7** Preparation of standard solutions
- **Experiment No.8** Determination of moisture in a given food sample
- **Experiment No.9** Determination of protein and ash contents in a given food sample
- **Experiment No.10** Determination of sugars (reducing, non-reducing and total sugars) in a given food sample by Lane-Eynon method
- **Experiment No.11** Determination of crude fat in a given food sample
- **Experiment No.12** Determination of pH and titratable acidity of a given food sample
- **Experiment No.13** Determination of ascorbic acid in a given food sample

### Text Books and/or Reference Books


### Additional Learning Source
Section Course Designation Year/Semester Course No. Course Title Course Type Total Marks Contact Hours per Week
Civil Engineering Advance Diploma in Food Technology First Year (I-Semester) ADFT-5192 Unit Operations Lab Practical 250 0 0 6

Course Assessment Method
1. Class Work (150 Marks)
2. End-Semester Examination (100 Marks) – 2 Hours

Course Objectives
1. To impart practical skills to operate general food processing equipment.
2. To provide practical know-how to perform important unit operations.
3. To explain the use of governing equations of various unit operations in calculating the results from the experiments.
4. To explain the plotting of various graphs depicting the results from the experiments.

Course Outcomes
Upon successful completion of this course, it is expected that the students will be able to:
1. Operate various equipment such as ball mill, filter press, double-jacketed heating vessel, parallel and counter flow heat exchangers, etc.
2. Understand the properties of materials and processing conditions during the operation of equipment.
3. Select and evaluate food processing equipment for their performances and efficiencies.
4. Supervise and troubleshoot the operation of food processing equipment.

Topics Covered/ List of Experiments
Experiment No.1 Culture media preparation for different types of microorganisms
Experiment No.2 Sterilization of media and glassware's using autoclave apparatus
Experiment No.3 Counting of microbial colonies using digital colony counter
Experiment No.4 Identification of bacteria using gram staining technique.
Experiment No.5 Study of microbial growth curves.
Experiment No.6 Yeast and mould count for a given sample of food
Experiment No.7 Preparation of standard solutions
Experiment No.8 Determination of moisture in a given food sample
Experiment No.9 Determination of protein and ash contents in a given food sample
Experiment No.10 Determination of sugars (reducing, non-reducing and total sugars) in a given food sample by Lane-Eynon method
Experiment No.11 Determination of crude fat in a given food sample
Experiment No.12 Determination of pH and titratable acidity of a given food sample
Experiment No.13 Determination of ascorbic acid in a given food sample

Text Books and/or Reference Books

Additional Learning Source
Section | Course Designation | Year/Semester | Course No. | Course Title | Course Type | Total Marks | Contact Hours |
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<td>Civil Engineering</td>
<td>Advance Diploma in Food Technology</td>
<td>First Year (II-Semester)</td>
<td>ADFT-5201</td>
<td>Food Preservation Technology</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

Provide students with advanced technical skills in Food Preservation technology that will enable them to

1. To prevent undesirable changes in the wholesomeness, nutritive value or sensory quality of food and reduce chemical, physical and physiological changes of an objectionable nature and eliminate contamination.
2. To increase the shelf life of a food while keeping it safe. It ultimately ensures its supply during times of scarcity and natural drought.
3. Lengthening lag phase of bacterial growth; delaying undesired autolysis; minimizing pest/ physical damage and preventing microbial action

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Classify food spoilage microorganism.
2. Calculate the freezing time for low temperature preservation method.
3. Understand different types of preservation methods

**Topics Covered**

Unit-I Introduction to food preservation, Different types of food spoilage viz. physical, chemical, bio-chemical and microbiological. Classification of foods on the basis of perishability, pH, origin. Intermediate Moisture Foods (IMF). Refrigerated and cold storages.

Unit-II Low temperature Preservation: Freezing and frozen storage, freezing curve, freezing techniques, effect of freezing on quality, thawing of frozen foods. Food additives: Classification, functions and uses of different food additives – Preservatives, antioxidants, emulsifiers, stabilizers, anticaking agents, buffering agents, food colors and flavors, texture modifiers (thickeners), leavening agents, low calorie sweeteners, humectants.

Unit-III Preservation by High Temperature: Principles of thermal processing, Blanching, Pasteurization, Sterilization, Canning: their definitions, methods, advantages and disadvantages. Moisture Removal: Methods and equipment for evaporation/concentration (Open kettle, Flash, Thin-film and Vacuum evaporators, Freeze concentration). Drying and dehydration methods (Tray, Tunnel, Belt trough, Spray and Drum driers).

Unit-IV Non-thermal Preservation Methods: Basic principles of Irradiation, High pressure technology, Biological methods (fermentation and pickling), Pulse electric field technology and Ultrasonic treatment for food preservation.

**Text Books and/or Reference Books**

1. The Technology of Food Preservation by Norman W Desrosier& James N Desrosier; Avi Publishing Co.

**Additional Learning Source**

2. https://nptel.ac.in/courses/103107088/17
Section | Course Designation | Year/Semester | Course No. | Course Title | Course Type | Total Marks | Contact Hours |
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<td>Civil Engineering</td>
<td>Advance Diploma in Food Technology</td>
<td>First Year (II-Semester)</td>
<td>ADFT-5202</td>
<td>Technology of Fermented and Baked Foods</td>
<td>Theory</td>
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**Course Assessment Method**
1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**
1. To impart basic knowledge about the process of fermentation and its types.
2. To teach about fermentations occurring in different types of foods.
3. To explain the manufacturing process for various bakery products such as biscuits, cookies, breads, cakes, pastries, etc.
4. To explain the effect of various factors on the quality of the bakery products.
5. To generate awareness about the importance of hygiene and sanitation in bakery industry.
6. To explain the preparation of financial estimate for setting up a bakery plant.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Start up their own bakery plant or fermented food manufacturing plant.
2. Estimate the funds required for setting up a bakery unit.
3. Estimate various losses occurring in a bakery plant
4. Conduct various quality control tests for bakery products
5. Supervise the production lines for baked and fermented foods
6. Work in research and development department in a bakery unit or fermented food plant.

**Topics Covered**

Unit-I Introduction of fermentation, Definition, advantages of fermentation and nutritive value of fermented food products. Type of fermentation processes; requirements for fermentation and equipment. Production technology for yoghurt and sauerkraut.

Unit-II Oriental fermented foods: Introduction, classification and their preparation (Soy sauce, miso, tempeh, tofu and sofu). Fermented Dairy Products (cheese, acidophilus milk)

Unit-III Raw Materials for Bakery Products: their roles. Technology of bread manufacture, different methods for bread making, bread defects and their causes. Quality control in bread manufacture (Testing of raw materials, intermediate products and finished products). Equipments used to test the rheology of dough-Farinograph, Alveograph, Extensometer, Maturograph. Different types of biscuits and cookies, preparation of biscuits using different methods, problems in biscuit manufacture.

Unit-IV Different types of cakes & pastries and their preparation using different methods, Balancing cake formula, Cake defects and their causes. FSSAI standards for bakery products. Bakery sales. Losses in a bakery. Hygiene and sanitation in a bakery. Layout plan of a bakery, financial estimate for setting up a bakery unit.

**Text Books and/or Reference Books**
4. Textbook of bakery and confectionary by Yogambal Ashok Kumar; Prentice Hall.

**Additional Learning Source**
### Course Assessment Method

3. Assignments, Oral Quizzes and Class Work (10 Marks)
4. Mid-Semester Examination (15 Marks) – 1 Hour
5. End-Semester Examination (75 Marks) – 2 Hours

### Course Objectives

The specific objectives are to:

1. Equip students with advanced knowledge in milk chemistry and enable them appreciate the role of the various components of milk as functional components of different dairy products.
2. To introduce students to starter culture technology and selection of starters for production of different dairy products.
3. Introduce the students to milk proteomics and genomics
4. To introduce the students to latest developments in milk processing technologies.

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Calculate the physicochemical analysis of milk.
2. Understand the manufacturing process of milk and various milk products.
3. Understand different types of preservation methods for milk and its products.

### Topics Covered

**Unit-I**
Introduction, status and scope of dairy industry in India, definition of milk, composition, factors affecting the composition of milk. Physico-chemical properties of milk- color, flavor, taste, specific gravity and density, boiling and freezing points, thermal conductivity, specific heat, acidity and pH, viscosity, refractive index, surface tension.

**Unit-II**
Platform tests- smell, appearance, sediment, acidity, alcohol-alizurin test, Resazurin and MBR tests. Types of milks, chilling, receiving, filtration, straining and clarification, pasteurization (LTLT, HTST, UHT, vacuum pasteurization methods), Sterilization (batch and continuous methods).

**Unit-III**
Standardization, Homogenization, Packaging of milk, Cleaning and sanitation of dairy plants and equipment, Manufacturing process for cream, butter and ghee.

**Unit-IV**
Manufacturing process for evaporated and condensed milk, milk powder, instant milk powder, ice cream, cheese.

### Text Books and/or Reference Books

1. The technology of milk processing by C P Anantakrishnan, A Q Khan & P N Padmanabhan; Shri Lakshmi Publishers.

### Additional Learning Source

2. https://nptel.ac.in/courses/126105013/
### Annexure III: SPL BOS, CES: 28.3.2019

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<td>Advance Diploma in Food Technology</td>
<td>First Year</td>
<td>ADFT-5204</td>
<td>Technology of Plantation Crops and Spices</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. Explaining the processing technology for various plantation crops such as tea, coffee, cocoa, etc.
2. To teach about quality control in tea, coffee, chocolate and cocoa industries.
3. To impart knowledge about the processing technology for various spices.
4. To describe the processes for extraction of oils and oleoresins from spices.
5. To discuss the processed products obtained from various plantation crops and spices.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the factors affecting the quality of various plantation crops and spices.
2. Work as production supervisor in spices and plantation crop processing plants.
3. Carry out research and development work for spices and plantation crop processing units.
4. Conduct quality tests for various spices and plantation crops processing plants.
5. Set-up their own processing plant for spices and plantation crops.

**Topics Covered**

- **Unit-I**  
  Tea Processing: Chemical composition and processing of tea. Processing of instant tea. FSSA standards for tea.

- **Unit-II**  

- **Unit-III**  
  Processing of Cashewnuts, Cashew-apple juice, Almonds, Almond oil, Peanut, Peanut butter, Saffron, Apricots (dried, canned frozen), Raisins.

- **Unit-IV**  
  Definition of spices, Processing of Spices, Extraction of essential oils and oleoresins from spices, Spice products. Processing and uses – Pepper, Small Cardamom, Black Cardamom, Ginger, Chilies, Turmeric, Asafoetida, Aniseeds, Cloves.

**Text Books and/or Reference Books**

2. Major Spices of India; ICAR Publishers.

**Additional Learning Source**

1. Internet sources
ANNEXURE-III: SPL BOS, CES: 28.3.2019

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<td>First Year (II-Semester)</td>
<td>ADFT-5205</td>
<td>Fruits and Vegetables Processing technology</td>
<td>Theory</td>
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**Course Assessment Method**
1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**
1. To impart basic knowledge of composition, classification and biochemistry of fruits and vegetables.
2. To equip the students with the knowledge of preservation techniques such as drying, freezing, canning, etc. for fruits and vegetables.
3. To teach about processing technologies for various value-added products such as jam, jelly, ketchup, juices, etc. prepared from fruits and vegetables.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Apply the fundamental knowledge of fruits and vegetable processing to enhance the shelf life of fruits and vegetables and their products.
2. Work in production, quality control and research and development departments in fruit and vegetable processing units.
3. Involve in export and import of fruits and vegetables and their products.
4. Establish a fruit and vegetable processing plant of their own.

**Topics Covered**
- **Unit-II** Climacteric and non-climacteric fruits, Biochemistry of respiration in fruits and vegetables, Physiological defects in fruits and vegetables. Canning of fruits and vegetables- process scheme, specific requirements for canning of fruits and vegetables, general considerations in establishing commercial fruit and vegetable canneries, causes of spoilage and defects in cans.
- **Unit-III** Dehydration of fruits and vegetables- tray, vacuum, tunnel driers. Osmotic dehydration- concept & applications. Rehydration ratio, Case hardening and Shrinkage. Jam- (definition, standards, method of manufacture); Jelly- (definition, standards, extraction of pectin, gel-formation); Marmalades- (definition, standards, method of manufacture). Tomato processing- manufacture and standards of tomato juice, tomato puree, tomato paste, tomato ketchup. Freezing of fruits and vegetables- Physical and chemical changes during freezing and frozen storage of fruits and vegetables.
- **Unit-IV** Juice Processing (Extraction, Clarification, Preservation) Unfermented beverages- classification, standards and preparation of Natural juice, sweetened juice, RTS, Nectar, Cordial, Squash, Crush, Syrup. Fermented beverages- Wine and Beer manufacture. Potato Processing- manufacture of potato chips, French fries and potato flour.

**Text Books and/or Reference Books**
2. Fruits and vegetable preservation: Principles and practices by R P Srivastava & Sanjeev Kumar.

**Additional Learning Source**
1. [https://nptel.ac.in/courses/103107088/module13/lecture1/lecture1.pdf](https://nptel.ac.in/courses/103107088/module13/lecture1/lecture1.pdf)
2. [https://nptel.ac.in/courses/103107088/module28/lecture2/lecture2.pdf](https://nptel.ac.in/courses/103107088/module28/lecture2/lecture2.pdf)
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<td>Civil Engineering</td>
<td>Advance Diploma in Food Technology</td>
<td>First Year (II-Semester)</td>
<td>ADFT-5291</td>
<td>Bakery and Dairy Technology Lab</td>
<td>Practical</td>
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**Course Assessment Method**
1. Class Work (150 Marks)
2. End-Semester Examination (100 Marks) – 2 Hours

**Course Objectives**
1. To impart necessary skills to prepare bakery and dairy products.
2. To explain the method of sensory evaluation of the prepared bakery and dairy products.
3. To explain the procedures involved in testing of bakery raw materials.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Prepare bakery products like biscuits, breads, cakes, pizza base, etc.
2. Perform sensory evaluation of to determine the quality of the prepared products.
3. Operate the equipment needed in the preparation of bakery and dairy products.
4. Perform quality tests of bakery products.
5. Perform some platform tests on raw milk.
6. Supervise bakery and dairy production lines.

**Topics Covered/ List of Experiments**
- Experiment No.1 Study of bakery equipments
- Experiment No.2 Determination of gluten content of wheat flour
- Experiment No.3 Determination of alcoholic acidity of wheat flour
- Experiment No.4 Determination of dough-raising capacity of yeast
- Experiment No.5 Preparation of bread
- Experiment No.6 Preparation of salty biscuits
- Experiment No.7 Preparation of sweet biscuits
- Experiment No.8 Preparation of sponge cake
- Experiment No.9 Preparation of decorated cake
- Experiment No.10 Preparation of pizza base
- Experiment No.11 Curd on boiling test for given sample of milk
- Experiment No.12 Sedimentation test for given sample of milk
- Experiment No.13. Preparation of cottage cheese
- Experiment No.14 Preparation of khoa
- Experiment No.15 Preparation of chhana
- Experiment No.16 Determination of TSS, Specific gravity and SNF of milk using lactometer
- Experiment No.17 Study of mini pasteurization plant

**Text Books and/or Reference Books**
1. Manual of methods of Analysis of foods: Milk and milk products, FSSAI.

**Additional Learning Source**
ANNEXURE-III: SPL BOS, CES: 28.3.2019

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<th>Year/ Semester</th>
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<td>Advance Diploma in Food Technology</td>
<td>First Year (II-Semester)</td>
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<td>Computer Lab</td>
<td>Practical</td>
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</table>

**Course Assessment Method**
1. Class Work (150 Marks)
2. End-Semester Examination (100 Marks) – 2 Hours

**Course Objectives**
1. To impart basic computer skills to the students.
2. To teach the use of MS Word for preparation of documents, reports, etc.
3. To teach the use of MS Excel for basic computing and data analysis.
4. To teach the use of MS PowerPoint for preparation of presentations.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Use MS Office package for day to day office work.
2. Use internet and email.

**Topics Covered/ List of Experiments**
Experiment No.1 Introduction to computer.
Experiment No.2 Use of word processing software (MS Word) for creating reports, documents, resume and flowsheets.
Experiment No.3 Applying hyperlink in MS Word file.
Experiment No.4 Typing of equations in MS Word.
Experiment No.5 Mail merge in MS Word.
Experiment No.6 Solving problems related to food technology using MS Excel (linear equations).
Experiment No.7 Use of statistical package for analysis of data using MS Excel (Regression).
Experiment No.8 Preparing charts and graphs in MS Excel.
Experiment No.9 Using logical function (IF function) in MS Excel.
Experiment No.10 Use of MS Power Point for preparing presentation slides.
Experiment No.11 Applying slide transition and custom animations in power-point slides.
Experiment No.12 Use of Internet and E-mail.

**Text Books and/or Reference Books**

**Additional Learning Source**
Civil Engineering
Advance Diploma in Food Technology
Second Year (III-Semester)
ADFT-5301
Food Packaging, Handling And Transportation
Theory
100
3
0
0

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

Provision of advanced technical skills in Food Packaging that will enable them to:

1. To ensure the safety of the product and preserve it in good condition for the anticipated shelf life.
2. Acquire the basic material knowledge used for food packaging and transportation.
3. Learn principles related to active and modified atmospheric packaging.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Master the skills to determine material properties (such as barrier, mechanical and thermal properties of packaging materials).
2. Estimate shelf life and mechanical energy absorption during transportation.
3. Get insights in migration of potential toxic compound from food contact materials and regulatory affairs.

**Topics Covered**

**Unit-I**
Introduction to food packaging, Importance, definition and function of food packaging, Form-Fill-Seal packaging machines, types of packaging materials, Glass (construction of jars and bottles, optical, thermal and mechanical properties of glass), Metal (types of base metal sheets, construction of metal cans, lacquering), Plastics- substituted olefins, tetrafluoro ethylene, PET, polyamides, polyesters.

**Unit-II**
Environmental factors and food stability: Effect of oxygen and light, Light Protection characteristics of packages, permeability to gases and vapors, methods of measuring permeability, permeability to fixed gases, permeability to humidified gases, flow through pin holes, cracks and imperfect seals, permeability of multilayer materials. Packaging tests: tensile strength, compression, bursting, tear and impact test for packages. Integrity testing of packages, cushioning effect on packaged foods.

**Unit-III**
Deterioration of packaged foods, shelf life calculation for packaged foods. Aseptic packaging techniques, aseptic systems Tetrapack, Bag-in-Box), integrity testing of aseptic packages.

**Unit-IV**
Modified Atmosphere and Controlled Atmosphere Packaging, Selective packaging: Important considerations in packaging of fruits and vegetables, meat, fish and poultry, milk and dairy products, cereal and bakery products.

**Text Books and/or Reference Books**

2. Physical Principles of Food preservation by Marcus Karel & Daryl B Lund; CRC Press.
3. Handbook on food packaging by P J John; Daya Publishing House

**Additional Learning Source**

1. https://nptel.ac.in/courses/103107088/37
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<td>Advance Diploma in Food Technology</td>
<td>Second Year (III-Semester)</td>
<td>ADFT-5302</td>
<td>Food Quality Standards And Regulations</td>
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**Course Assessment Method**

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

Provide students with advanced technical skills in Food quality control that will enable them to
1. Protecting public health by reducing the risk of food-borne illness;
2. Protecting consumers from unsanitary, unwholesome, mislabelled or adulterated food; and
3. Contributing to economic development by maintaining consumer confidence in the food system and providing a sound regulatory foundation for domestic and international trade in food.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:
1. Calculate the proximate composition and analysis of proximate constituents.
2. Calculate the physicochemical and mechanical properties.
3. Understand the food laws and standards.
4. Understand the statistical quality control.

**Topics Covered**

- **Unit-I** Introduction: Concept, objectives and need for quality, difference between quality control and quality assurance, method of quality control. Proximate composition and analysis of proximate constituents (Moisture, Fat, Protein, Sugars, Ascorbic acid, Riboflavin, Thiamine).
- **Unit-II** Sampling and testing: definition of sampling, purpose, sampling techniques, requirements and sampling procedure for liquid, powdered and granular materials, Measurement of physicochemical and mechanical properties- color (CIE system, working principles of Hunter colour difference meter, Disc colorimeter, Lovibond Tintometer, Spectrophotometer), Primary and secondary texture characteristics-consistency (Bostwick and Adams consistometer), viscosity (Efflux tube viscometer, Brookfield viscometer), texture (Texturemeter).
- **Unit-III** Sensory quality control: definition, objectives, panel selection, laboratory set-up, sensory evaluation methods (Duo-Trio test, Paired comparison test, Triangle test, Ranking test, Rating test, Hedonic rating test, Threshold test). Statistical quality control (control chart by variables, control chart by attribute), Basic concept of TQM. General Hygiene and sanitation in food industry, GMP, Objectives and principles of HACCP.
- **Unit-IV** Food laws: Objectives, requirements and benefits of food standards (FSSA, PFA, BIS, AGMARK, FPO, FDA, Codex Alimentarious Commission), FPO standards for fruits and vegetable products, ISO series.

**Text Books and/or Reference Books**


**Additional Learning Source**

2. https://nptel.ac.in/courses/103107088/33
Civil Engineering  |  Advance Diploma in Food Technology  |  Second Year (III-Semester)  |  ADFT-5303  |  Livestock and Marine Products Processing  |  Theory  |  Total Marks  |  100  |  Contact Hours  |  3  |  0  |  0

**Course Assessment Method**

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To give an introduction about meat processing.
2. To discuss different processing techniques for meat.
3. To impart knowledge about egg processing.
4. To teach about the preservation and processing of fishes.
5. To discuss the by-products from livestock and aquaculture industry.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Evaluate the effect of slaughtering methods and conditions on the quality of meat.
2. Evaluate the effect of rearing, breeding practices and environmental factors on the quality of meat.
3. Process the meat by various methods such as curing, smoking, canning, etc. to enhance their shelf life.
4. Apply the basic knowledge of egg processing for preservation of eggs.
5. Understand and evaluate various methods for preservation of fishes.
6. Understand and apply the fundamental knowledge for utilization of by-products from meat, egg, poultry and fish industries.
7. Establish a processing plant for meat, poultry, eggs and fishes.

**Topics Covered**

**Unit-I**  
Introduction: Composition of muscle, muscle proteins. Ante-mortem examination of animals, Slaughter of animals, Abattoir, different cuts of meat, Post-mortem changes (loss of homeostasis and rigor mortis), Proximate analysis of meat. By-products of meat industry and their uses.

**Unit-II**  

**Unit-III**  

**Unit-IV**  
Fish Processing: Types of fish, composition and nutritive value, factors affecting the quality of fish. Drying, Curing, Smoking, Freezing and Canning of fishes. By-products of fish industry and their uses.

**Text Books and/or Reference Books**

1. Processed meats by A M Pearson, T M Gillett; Springer
2. Food Theory Applications by Jane Bowers; Macmillian Publishers

**Additional Learning Source**

1. https://swayam.gov.in/courses/4968-introduction-to-poultry-farming
## Course Assessment Method

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

## Course Objectives

1. To create awareness about the various types of pollution caused by food industries.
2. To teach about different types of impurities present in the food industry wastes.
3. To explain primary, secondary and tertiary treatment methodologies for the effluents from food industries.
4. To teach about waste management strategies implemented for solid, liquid and gaseous wastes from food industries.

## Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Supervise the working of effluent treatment plant of food industries.
2. Understand the types of pollution, their management and treatment.
3. Understand the working of various waste treatment equipment.
4. Perform research and development work to reduce and mitigate pollution from food industries.

## Topics Covered

- **Unit-I** Introduction: Types of physical, chemical and biological impurities present in water, drinking water standards (IS-10500) and quality tolerances for water for processed food industry (IS-4251), effects of water quality parameters on food processing. Surface water and ground water treatment systems.

- **Unit-II** Water treatment: Types of hardness - temporary and permanent hardness and their removal, water softening using ion exchange column, methods of disinfection and selection criteria for disinfectants, Waste water treatment: magnitude of wastewater generation in food industries, wastewater treatment units and their functions, preliminary treatment system, primary treatment systems.

- **Unit-III** Biological/secondary treatment system using Activated Sludge Process and Trickling Filter. Advanced/tertiary treatment: Membrane separation processes in water treatment – osmosis and reverse osmosis (RO), feed, permeate and concentrate, single and two stage RO system, single and two pass RO system, concept of domestic and industrial water purification systems.

- **Unit-IV** Solid waste management: classification and characterization of municipal solid waste, treatment method – pelletization, composting and biogas generation, overview of solid waste generation and its utilization in food industries such as dairy, meat, sugar, fruits and vegetables.

## Text Books and/or Reference Books

2. Elements of Environmental Engineering by K N Duggal; S Chand Publications.
3. Environmental Engineering by D Srinivasan; Prentice Hall

## Additional Learning Source

1. https://nptel.ac.in/courses/105102089/8
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<td>Advance Diploma in Food Technology</td>
<td>Second Year (III-Semester)</td>
<td>ADFT-5305</td>
<td>Entrepreneurship Development</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To familiarize with the concept and overview of entrepreneurship.
2. To impart knowledge on the basics of entrepreneurial skills and competencies.
3. To develop and enhance entrepreneurial talent.
4. To explore new vistas of entrepreneurship in 21st century environment to generate innovative business ideas.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:
1. Appreciate the importance of embarking on self-employment.
2. Developed the confidence and personal skills for the same.
3. Identify business opportunities in chosen sector / sub-sector and plan and market and sell products / services.
4. Start a small business enterprise by liaising with different stake holders.

**Topics Covered**

- **Unit-I** Entrepreneurship: Concept and Meaning, Need and Scope in food industry, Qualities of a successful entrepreneur, types of enterprises (large, medium, small, cottage scale industries), classification of management, functions of management, industrial organization structure.
- **Unit-II** Project formulation: Meaning and definition of project. Preparation of detailed project report (DPR) and Techno-Economic feasibility reports (TEFR). Production system, Factors affecting productivity, Material handling equipments, Process charts and diagrams.
- **Unit-III** Project management: Production, planning and control. Project scheduling by network techniques such as bar chart, CPM and PERT and their applications in food industry.
- **Unit-IV** Inventory Control: terminology, Economic Order Quantity (EOQ), Purchase, Financial Management: Sources of finance, Elements of cost, Prime cost, Factory cost, Other overheads, Total cost, Selling price. Types of cost estimates. Pricing policy.

**Text Books and/or Reference Books**

1. Industrial Engineering and Production Management by MartandTelsang; S Chand Publishers.
2. Industrial Engineering and Management by D Ravi Shankar; Galgotia Publishers.
6. Industrial Management by H S Bawa
7. Industrial Management by Mittal

**Additional Learning Source**

1. [https://www.edx.org/learn/entrepreneurship](https://www.edx.org/learn/entrepreneurship)
2. [https://onlinecourses.nptel.ac.in/noc19_ge08/preview](https://onlinecourses.nptel.ac.in/noc19_ge08/preview)
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<td>Advance Diploma in Food Technology</td>
<td>Final Year (III-Semester)</td>
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<td>Product Development and Water Quality Lab</td>
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**Course Assessment Method**

1. Class Work (150 Marks)
2. End-Semester Examination (100 Marks) – 2 Hours

**Course Objectives**

The specific objectives of Product Development Lab are

1. Methodology and procedures for different food products
2. Document control
3. Standardization of test methods to ensure consistency.
4. Test and calibration of equipments.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Prepare different types of food products.
2. Determine the quality of water.

**Topics Covered/ List of Experiments**

- Experiment No.1 Preparation of Jam
- Experiment No.2 Preparation of Jelly
- Experiment No.3 Preparation of Pickle
- Experiment No.4 Preparation of Puree
- Experiment No.5 Preparation of Paste
- Experiment No.6 Preparation of RTS beverage
- Experiment No.7 Preparation of dehydrated food products
- Experiment No.8 Determination of Total Hardness and Calcium Hardness of a given water sample
- Experiment No.9 Determination of Biochemical Oxygen Demand (BOD) of a given water sample
- Experiment No.10 Determination of Chemical Oxygen Demand (COD) of a given water sample
- Experiment No.11 Determination of Total Solids (TS), Total Suspended Solids (TSS) and Total Dissolved Solids (TDS) in a given water sample

**Text Books and/or Reference Books**

1. Fruits and vegetable preservation: Principles and practices by R P Srivastava & Sanjeev Kumar.

**Additional Learning Source**
## Course Assessment Method

1. Class Work (200 Marks)
2. End-Semester Examination (150 Marks) – 2 Hours

## Course Objectives

The specific objectives of Seminar is to
1. Analyse, compare and develop literacy practices and basic skills methodology.
2. Develop and perfect their skills in collaborative, self-critical approaches to Food Technology.
3. To deepen and integrate the understandings of theoretical approaches in Food Technology.
4. To cultivate and refine their abilities to present research findings in effective ways.

## Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:
1. To deliver a lecture, where the participants engage in the discussions for a better insight of the subjects
2. To impart some skills or knowledge to the participants.

## Topics Covered/ List of Experiments

The seminar, on any topic pertaining to food technology, would involve:

a) Exhaustive literature review, comprising of atleast 30 references, based on various reputed journals (peer reviewed), conference proceedings, latest books, etc.

b) Preparation, submission and presentation of the seminar report (3 Hard copies of seminar report and a soft copy of seminar report and presentation)

## Text Books and/or Reference Books

## Additional Learning Source
### Course Assessment Method

1. Class Work (200 Marks)
2. End-Semester Examination (150 Marks) – 2 Hours

### Course Objectives

1. To provide a theoretical background and technical knowledge on the topic of the project.
2. To develop confidence in the students through practical use of various equipment.
3. To inculcate a sense of responsibility and accountability in the students for the practical work done by them in their project.
4. To develop a habit of discipline and routine work in the students

### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Gain a strong hold on the topic of the project with in-depth theoretical as well as practical knowledge.
2. Have more confidence, sense of responsibility and more discipline.
3. Have knowledge of preparing project report.
4. Prepare power point presentation on the project topic.
5. Improved communication skills due to presentations carried out on regular basis.

### Topics Covered/ List of Experiments

Each student shall undertake project work assigned to him related to the area of food technology under the supervision of a faculty member. The work will be allotted specifying the different aspects to be carried out by the student. Weekly progress report has to be submitted by each student (in the prescribed format) to the supervisor/course teacher. At the end of the semester the student will submit a final report on his work. Preparation, submission and presentation of the project report (3 Hard copies of the project report and a soft copy of the project report and presentation).

### Text Books and/or Reference Books

### Additional Learning Source
### Course Objectives

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<td>Applied Statistics</td>
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#### Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

#### Course Objectives

1. To understand the different measures of frequency distribution.
2. To learn about the different measures of dispersion.
3. To understand the different types of distributions and their uses.
4. To learn about the Chi square and t-test.

#### Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the different types of frequency distributions.
2. Understand the different types of deviation measures namely RMSD, Standard Deviation, etc.
3. Understand the different types of theoretical distributions such as Binomial, Poisson and Normal distributions.
4. Evaluate the experimental data on the basis of Chi-square and t-test.

#### Topics Covered

- **Unit-I** Frequency distribution: Bar chart, histogram, frequency polygon, pie chart, ogive curve, measure of central tendency- mean, median, mode, quartile, percentile.
- **Unit-II** Measure of dispersion: Quartile deviation, root mean square deviation, standard deviation, variance, coefficient of variation.
- **Unit-III** Theoretical distributions: Binomial distribution, Poisson distribution, Normal distribution and their uses.
- **Unit-IV** Test of significance based on Chi square, Student’s t-test and their applications.

#### Text Books and/or Reference Books

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<td>Environmental Hydraulics</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To be able to understand the basics of hydraulics.
2. To be able to understand the water distribution system.
3. To be able to understand the working operation of pumps.
4. To be able to understand the municipal water collection system.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Apply the basic principles of fluid mechanics in different engineering applications.
2. Calculate the discharge and head loss in water distribution systems using different methods.
3. Calculate the head, power and efficiency, size and standby capacity of pumps.
4. Perform the hydraulic design of sewers.

**Topics Covered**

Unit-I Hydraulics - Introduction and basic concepts, properties of fluids, Pressure – hydrostatic pressure, pressure head and its measurement. Flow – conservation of energy, measurement.

Unit-II Water distribution system – Requirements, objectives and methods, Components of supply, methods of layout, pressure requirement. Analysis of distribution system.

Unit-III Pumps – Necessity, types, characteristics and selection criteria. Head, power and efficiency, pumping station and its suitable site, sizing of pump units and standby capacity.

Unit-IV Municipal water collection system: Sewers – Construction materials used, classification based on materials, sewer appurtenances, storm water regulators. Hydraulic design of sewers, determination of flow velocities, hydraulic characteristics, hydraulic profile of treatment plants.

**Text Books and/or Reference Books**

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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To be able to understand the water demand and its sources, understand the importance of standards for municipal and industrial supplies.
2. To be able to understand the steps involved in the treatment of raw water thoroughly.
3. To be able to understand the techniques involved in making water safe for drinking purpose and also for industrial use.
4. To be able to understand the corrosion and its effect and control, i/c boiler feed water characteristics, Industrial water recycling and reuse.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand various sources of water and their uses, different water demands, different distribution systems and standards for municipal and Industrial water supplies and also their characteristics.
2. Understand the methods of purification of water, chemicals use as coagulants and their doses, different types of filters and their working including their use as per the requirements.
3. Understand minor and major methods of disinfection, chlorination and their types, doses of chlorine, hardness of water and methods of removing temporary and permanent hardness.
4. Understand water stabilization, corrosion, its effects and control, Deflouridation and their methods.
5. Understand the characteristics of boiler feed water, its treatment, Iron and manganese removal, Industrial water recycling and its reuse.

**Topics Covered**

Unit-I Sources of water, Water demand: Types, factor affecting and variations, Distribution systems; Requirements, Layout and methods, Standards for municipal and industrial supplies.

Unit-II Sedimentation, Characteristics of solids, Settling – types, application, Filtration principle, application and classification, Floatation, Coagulation and Flocculation.

Unit-III Disinfection-application and techniques; Chlorination, Ozonisation and UV ray treatment. Hardness- effects on municipal and industrial application. Methods of water softening.

Unit-IV Water stabilisation, Corrosion and its control, Ion exchange and membrane separation process in water treatment. Adsorption- principles, kinetics and isotherms, Defluoridation, Boiler Feed water treatment, Iron and manganese removal, Industrial water and recycling and reuse.

**Text Books and/or Reference Books**

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<th>Contact Hours</th>
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<tbody>
<tr>
<td>Civil Engineering</td>
<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (I-Semester)</td>
<td>ADEE-4104</td>
<td>Environmental Chemistry and Microbiology</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To be able to understand the basic concepts of chemistry, molecular and equivalent weights. Understand the solutions, titration and ionization.
2. To be able to understand the basic concepts of organic chemistry, electrochemistry, colloidal and biochemistry.
3. To be able to understand the classification of micro-organisms, basic principles of microbial transformation of matter and acclimatization of wastes, microbial growth.
4. To be able to understand the pathogenic and indicator organisms, methods of counting bacteria, application of microbiology in pollution control.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand basic concepts of chemistry including molecular and equivalent weights, different types of solutions, theory involves in titration and ionization.
2. Understand the difference in suspension and colloids, Tyndall effect, acids and bases, pH concept and buffer solutions. Water quality parameters for drinking purposes.
3. Understand basic concepts of organic chemistry including isomerism and hydrocarbons, basic concepts of electrochemistry including galvanic protection, basic concepts of colloidal chemistry including Brownian movement etc., basic concepts of biochemistry including enzymes and cofactors etc.
4. Understand Micro-organisms and their classification, measurement and kinetics of microbial growth etc.
5. Understand the pathogens and indicators and their sources, coliform bacteria and methods of counting bacteria, application of microbiology in pollution control.

**Topics Covered**

- **Unit-I** Basic Concepts of Chemistry- molecular and equivalent weights, solutions, titration, Ionisation.
- **Unit-III** Classification of micro-organisms, Basic principles of microbial transformations of matter and acclimatisation of wastes: Municipal growth and rare kinetics.
- **Unit-IV** Pathogenic and Indicator organisms, Standard plate count and MPN number, Role of micro-organisms in water and waste water treatment, Application of microbiology in pollution control

**Text Books and/or Reference Books**

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<td>Civil Engineering</td>
<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (I-Semester)</td>
<td>ADEE-4105</td>
<td>Environmental Impact Assessment and Auditing</td>
<td>Theory</td>
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</table>

**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To develop an understanding of environmental management system
2. To provide basic understanding to harmful impacts of any developmental activities
3. To make awareness for the valued natural resources and their conservation

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the importance of Environmental concerns against any developmental activity
2. Figure out the role of government in the protection of environment
3. Learn the processes involved in the Impact Assessment of developmental activity
4. Understand the social concern requiring any type of industrial or non-industrial development

**Importance of Environmental Audit as a management tool**

**Topics Covered**

- **Unit-I**  EIA -Definition and terminologies, objectives, description of EIA process, EIA process, EIA in project assessment & evaluation, types of EIA studies
- **Unit-II**  Pre and Post audit of development projects. Methods and approaches for screening, scoping, baseline data generation impact identification, prediction & evaluation.
- **Unit-III**  Preparation of Environmental Management Plan (EMP) and Environmental impact Statement (EIS) report. Legislative requirements of EIA Public hearing Environmental audit methodology and requirements, Environmental Management System (EMS)

**Text Books and/or Reference Books**

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<td>Civil Engineering</td>
<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (I-Semester)</td>
<td>ADEE-4191</td>
<td>Environmental Engineering Lab-I</td>
<td>Practical</td>
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**Course Assessment Method**
1. Class Work (150 Marks)
2. End-Semester Examination (100 Marks) – 2 Hours

**Course Objectives**
1. To develop the understanding of different equipment related to water and wastewater analysis
2. To learn about the preparations of standard solutions, their handling, storage, etc.
3. To understand the different experiments involved in water and wastewater analysis.
4. To learn more about the titration techniques of chemical analysis.

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Characterize water and wastewater samples.
2. Predict the quality of treated water and wastewater samples.
3. Make decisions regarding dosing of different chemicals involved in water treatment processes.
4. Select the appropriate technologies for wastewater treatment.

**Topics Covered/ List of Experiments**
- Experiment No.1 Sample Collection and preservation
- Experiment No.2 Preparation of Standard solutions
- Experiment No.3 Determination of pH of a given sample of water
- Experiment No.4 Determination of acidity of a given sample of water
- Experiment No.5 Determination of alkalinity of a given sample of water
- Experiment No.6 Determination of hardness in a given sample of water
- Experiment No.7 Determination of electrical conductivity of a given sample of water
- Experiment No.8 Analysis of bleaching powder in a given water sample
- Experiment No.9 Determination of Dissolved Oxygen (DO) in a given water sample
- Experiment No.10 Determination of Biochemical Oxygen Demand (BOD) in a given sample of water
- Experiment No.11 Determination of Chemical Oxygen Demand (COD) in a given sample of water
- Experiment No.12 Determination of chloride content of a given sample of water
- Experiment No.13. To perform Standard Plate Count on a given sample
- Experiment No. 14 To perform Most Probable Number (MPN) Count on a given sample
- Experiment No. 15 Determination of efficiency of centrifugal pump/ reciprocating pump
- Experiment No. 16 To perform pressure drop studies/flow measurement using flow measuring device

**Text Books and/or Reference Books**
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<tr>
<td>Civil Engineering</td>
<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (I-Semester)</td>
<td>ADEE-4191</td>
<td>Computer Lab</td>
<td>Practical</td>
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**Course Assessment Method**

3. Class Work (150 Marks)
4. End-Semester Examination (100 Marks) – 2 Hours

**Course Objectives**

1. To impart knowledge to the students on basic concepts of computer and its applications.

**Course Outcomes**

By the end of practical exercises, the students will be able to:

1. Train and practice with the computer softwares- WINDOWS and M.S. OFFICE packages of Word, Excel and PowerPoint in a professional way; internet browsing and sending mail.

**Topics Covered/ List of Experiments**

- Experiment No.1 Study of computer components, booting of computer and its shut down
- Experiment No.2 Practicing windows operating system- use of Mouse, Title bar, Minimum, Maximum and Close buttons, Scroll bars, Menus and Tool bars.
- Experiment No.3 Windows Explorer- Creating Folders/Files/Suitcase/Compressed Folders, Save, Delete, Unzip, Copy and Paste functions.
- Experiment No.4 M.S. Word- Writing a specimen application, editing and saving; Use of options from tool bars- Format, Insert and Tools (Spelling, Grammar, Synonyms, Antonyms, etc.), Alignment of paragraphs and text.
- Experiment No.5 Preparation of Class Time-Table in M.S. Word using table command, merging of cells, column and row width.
- Experiment No.6 Preparation of Curriculum Vitae in M.S. Word using Indentation and Tab commands
- Experiment No.7 M.S. Excel- Creating a spreadsheet, alignment of rows, columns and cells using Format toolbar. Entering formula expressions through the formula toolbar and use of inbuilt functions- SUM, AVERAGE, STDEV.
- Experiment No.8 Plotting of graphs in M.S. Excel.
- Experiment No.9 M.S. PowerPoint- Preparation of slides on power point.
- Experiment No.10 Internet Browsing- Use of Internet Explorer, browsing a Webpage through search engines.
- Experiment No.11 E-mail- Creation of email ID, attaching files and sending.

**Text Books and/or Reference Books**


**Additional Learning Source**

1. https://swayam.gov.in/course/4067-computer-fundamentals
2. https://swayam.gov.in
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<tr>
<td>Civil Engineering</td>
<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (II-Semester)</td>
<td>ADFT-4201</td>
<td>Water Quality Management</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. To understand the different types of impurities in water bodies.
2. To learn about the different self-purification mechanisms in streams.
3. To understand the groundwater flow and its mechanism.
4. To learn about the different types of wells.
5. To understand the importance of water conservation.

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Classify the different sources of water and their impurities on the basis of the nature of occurrence.
2. Understand the different types of self-cleansing/purification mechanisms in streams.
3. Understand the different parameters governing the flow of water through porous media.
4. Understand the importance of wells and other water conservation techniques at different levels of the society.

**Topics Covered**

**Unit-I**


**Unit-II**

Stream water quality, impact of wastewater discharge on streams, self-purification mechanism and factors affecting it. Zones of pollution in streams. BOD and its kinetics, standards for disposal.

**Unit-III**

Groundwater: occurrence, forms, zones, flow/movement, velocity, drainage, yield, hydraulic gradient, aquifers and their types, protection from contamination, comparison of surface and groundwater.

**Unit-IV**

Wells: classification, yield, location, finishing and maintenance, inference, well loss, specific capacity, efficiency. Water conservation techniques: rain water harvesting- introduction, terminology associated, location planning, components and conditions

**Text Books and/or Reference Books**


**Additional Learning Source**

1. [https://nptel.ac.in/courses/105101010/29](https://nptel.ac.in/courses/105101010/29)
2. [https://nptel.ac.in/courses/105101010/downloads/Lecture30.pdf](https://nptel.ac.in/courses/105101010/downloads/Lecture30.pdf)
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<tr>
<td>Civil Engineering</td>
<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (II-Semester)</td>
<td>ADFT-4202</td>
<td>Municipal and Industrial Wastewater Treatment</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**

1. Understand sewage network and influencing parameters
2. Understand and design different unit operation involved in conventional and biological treatment processes.
3. Apply the principles of industrial effluent treatment process for different industrial waste
4. Evaluate self-purification of streams depending on hydraulic and organic loading of sewage.

**Course Outcomes**

After studying this course students will able to:

1. Acquires capabilities to design sewer and sewage treatment plants
2. Evaluate degree of treatment and type of treatment for disposal, reuse and recycle.
3. Identify waste streams and design the industrial waste water treatment plant.
4. Manage sewage and industrial effluent issues.

**Topics Covered**

|------|---------------------------------------------------------------------------------------------------|

**Text Books and/or Reference Books**

## Course Assessment Method

1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

## Course Objectives

Provide students with advanced technical skills in Air Pollution & Control technology that will enable them to:

1. To assess the existing air quality.
2. To assess the extent of air pollution due to developmental activities.
3. To assess the quality of noise and odour pollution.

## Course Outcomes

Upon successful completion of this course, it is expected that the students will be able to:

1. Classify Air Pollutants and air quality standards.
2. Understand air pollution meteorology.
3. Understand different types of emission control devices.

## Topics Covered

- **Unit-I** Air pollutants- Classification, sources and behaviour. Effect of air pollution on health and environment. Air quality standards.
- **Unit-II** Air pollution and meteorology- adiabatic lapse rate, atmospheric stability and temperature inversion, Atmospheric dispersion- mixing depth, plume characteristics.
- **Unit-IV** Air quality management in industrial, urban and transport sectors. Odour pollution- Sources, effects and its control. Noise pollution- sources, standards, measurement and its control.

## Text Books and/or Reference Books

1. Environmental Engineering By Howard S Peavey

## Additional Learning Source

1. https://nptel.ac.in/courses/105102089/8
2. http:// CPCB.nic.in/air-pollution/
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<td>Civil Engineering</td>
<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (II-Semester)</td>
<td>ADEE-4204</td>
<td>Solid and Hazardous Waste Management</td>
<td>Theory</td>
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**Course Assessment Method**
1. Assignments, Oral Quizzes and Class Work (10 Marks)
2. Mid-Semester Examination (15 Marks) – 1 Hour
3. End-Semester Examination (75 Marks) – 2 Hours

**Course Objectives**
1. Define and characterize solid and hazardous wastes from technical and regulatory points of view.
2. Understand risk and adverse effects on living organisms and the environment.
3. Provide comprehensive overviews of hazardous wastes management from both scientific and engineering principles.
4. Identify the most common techniques for preventing, minimizing, recycling, disposing and treatment of waste and their application on site remediation

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Understand various physical, chemical and biological characteristics of solid waste
2. Apply principles of sustainable development to the management of solid by-products
3. Identify design inputs to enable the avoidance, minimization, recycling, re-use and treatment of solid by-products
4. Analyze the role of regulatory systems in solid & hazardous wastes management

**Topics Covered**

**Unit-I** Solid Waste- Introduction, types, sources, composition, characteristics and properties of MSW. Health impacts of MSW, Sampling techniques


**Text Books and/or Reference Books**

**Additional Learning Source**
2. [https://nptel.ac.in/courses/105106056/](https://nptel.ac.in/courses/105106056/)
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<td>Advance Diploma in Environmental Engineering</td>
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<td>Environmental Engineering Lab-II</td>
<td>Practical</td>
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**Course Assessment Method**
1. Class Work (150 Marks)
2. End-Semester Examination (100 Marks) – 2 Hours

**Course Objectives**
1. To provide necessary skills for determination of air pollutants.
2. Treatment of polluted water by addition of coagulant.
3. To perform characterization of sludge and solid wastes.
4. To determine the components of solid waste

**Course Outcomes**
Upon successful completion of this course, it is expected that the students will be able to:
1. Determine and analyze air pollutants.
2. Determine and treat liquid and solid wastes.
3. Understand reaction kinetics of absorption.
4. Characterization of different types of wastes.

**Topics Covered/ List of Experiments**
- Experiment No.1 Measurement of major air pollutants
- Experiment No.2 Measurement of major vehicular exhaust pollutants
- Experiment No.3 Determination of optimum dose of coagulants for polluted water by Jar test
- Experiment No.4 Sludge characterization
- Experiment No.5 Reactor kinetics and adsorption
- Experiment No.6 Collection of solid waste samples
- Experiment No.7 Determination of individual components of solid waste
- Experiment No.8 Characterization of solid waste

**Text Books and/or Reference Books**
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<td>Advance Diploma in Environmental Engineering</td>
<td>First Year (I-Semester)</td>
<td>ADEE-4292</td>
<td>Project/Industrial Study and Seminar</td>
<td>Practical</td>
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**Course Assessment Method**

1. Class Work (200 Marks)
2. End-Semester Examination (50 Marks) – 2 Hours

**Course Objectives**

1. Providing in-depth theoretical and technical knowledge of the project topic.
2. To develop practical skills needed to work on the project topic.
3. To develop an analytical bent of mind for analysing the results.
4. To develop confidence, team work and responsibility in the students.
5. To enhance the presentation communication skills of the students

**Course Outcomes**

Upon successful completion of this course, it is expected that the students will be able to:

1. Understand the theoretical, technical and practical aspects of the project topic.
2. Able to prepare reports for projects.
3. Able to present his/her project work efficiently.

**Topics Covered/ List of Experiments**

Project/Industrial Study and Seminar would involve:

1. Collection of qualitative and quantitative data from field survey/industries on current environmental topics and/or polluting industry sectors using appropriate methodologies and techniques.
2. Data analysis and interpretation to bring out the findings.
3. Preparation and presentation of the report.

The report would include either:

1. Design/estimation and modelling of environmental engineering systems or
2. Sampling analysis and characterization of environmental pollutants

**Text Books and/or Reference Books**