



*Your Dreams Our Goal*  
**POORNIMA**  
**UNIVERSITY**

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

# **FACULTY OF ENGINEERING & TECHNOLOGY**

## **DEPARTMENT OF CIVIL ENGINEERING**



# **SCHEME & SYLLABUS BOOKLET**

**BATCH 2022-2026**

# **SCHEME & SYLLABUS**

**BATCH: 2022-26**

# INDEX

| S. No | Contents   |
|-------|--|
| 1     | Vision, Mission and Quality Policy of University |
| 2     | Knowledge Wheel                                  |
| 3     | Preamble   |
| 4     | About Program and Program Outcomes (POs)         |
| 5     | Examination System                               |
| 6     | Assessment & Grade Point Average: SGPA, CGPA     |
| 7     | Guidelines for MOOC Courses                      |
| 8     | Teaching Scheme of all Semesters                 |
| 9     | Teaching Syllabus of all Semesters               |

**Disclaimer:** The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

## Student Details

Name of Student:

Name of Program:

Semester:

Year:

Batch:

Faculty of:



*Your Dreams Our Goal*  
**POORNIMA**  
**UNIVERSITY**

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

### ***VISION***

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

### ***Mission***

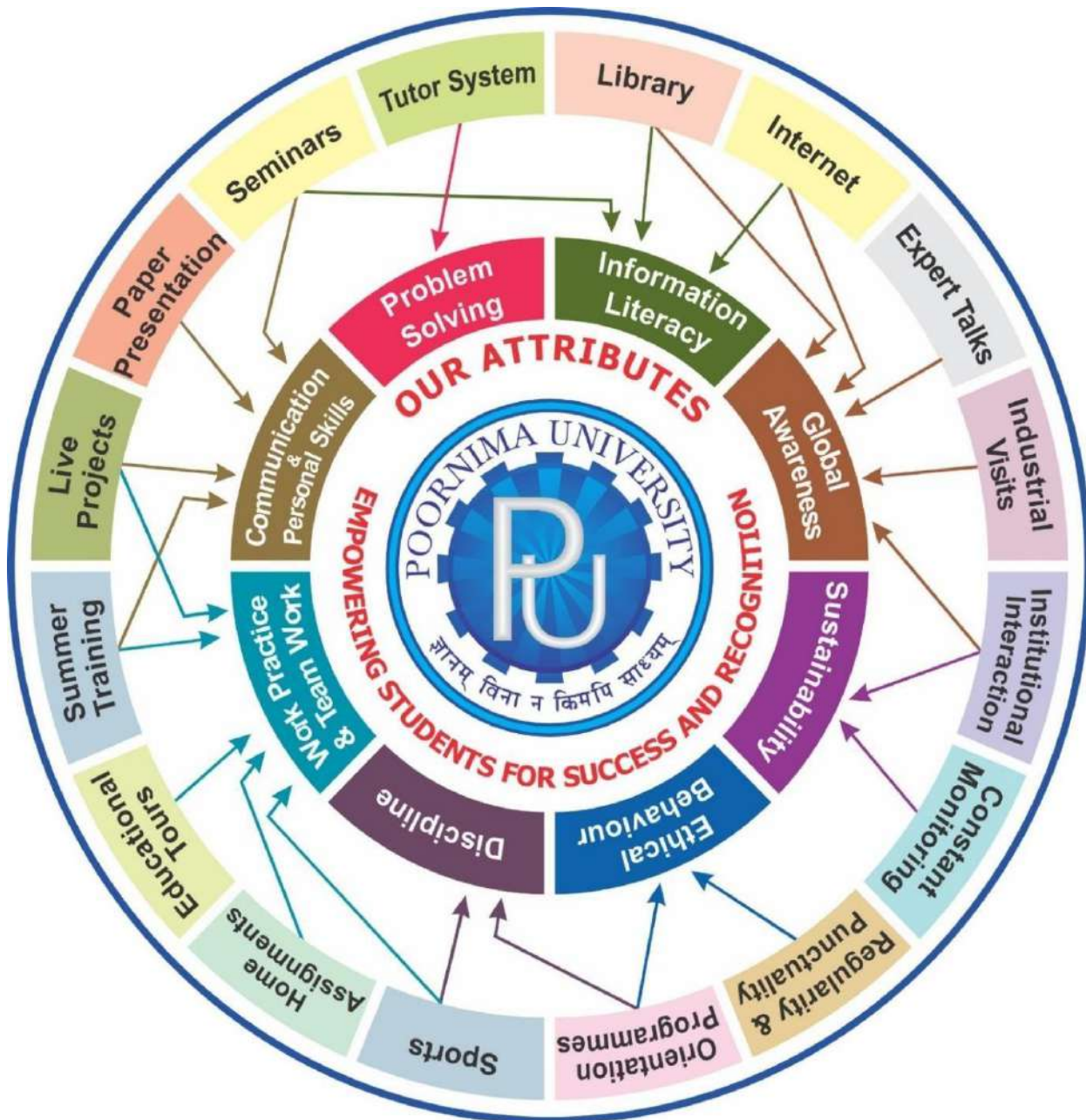
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

### ***Quality Policy***

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied.

## Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



## **About Program and Program Outcomes (PO):**

**Title of the Programme:** Bachelor of Technology (B. Tech.)

**Nature of the Programme:** B. Tech. is four year full-time programme.

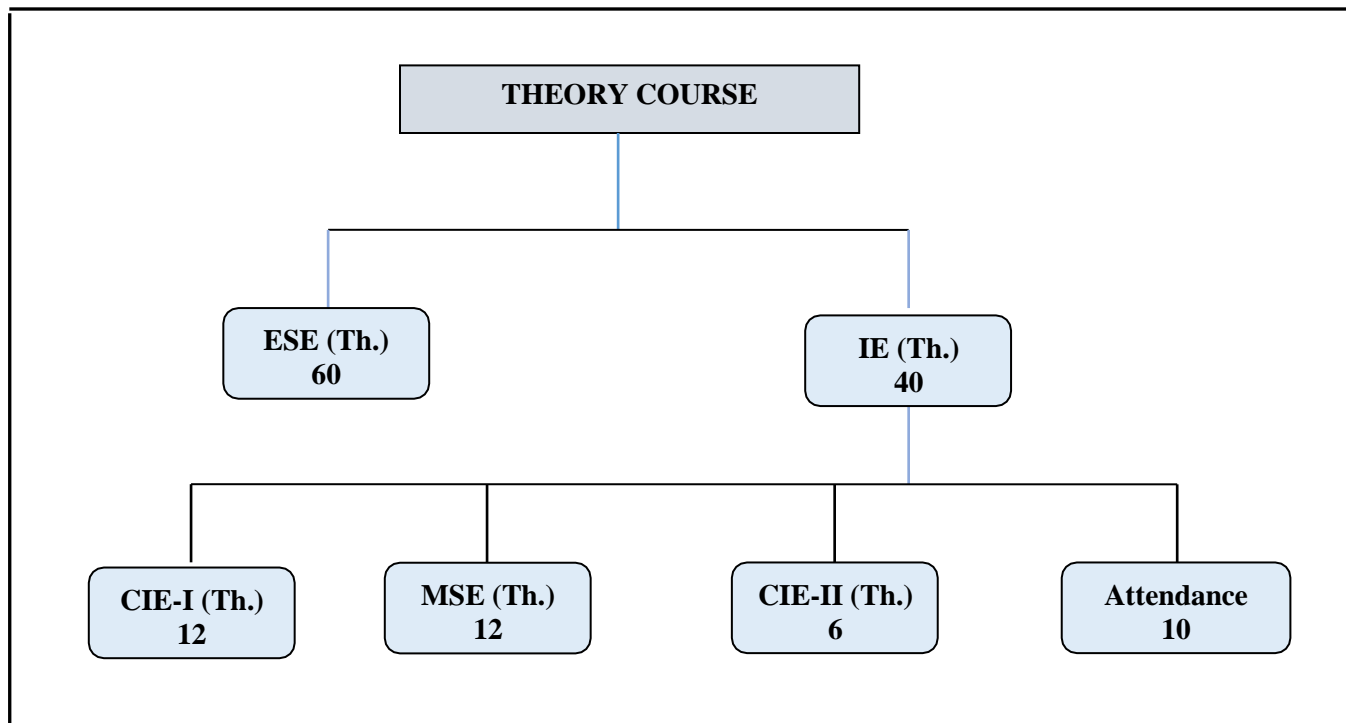
## **Program Outcomes (PO):**

Engineering Graduates will be able to:

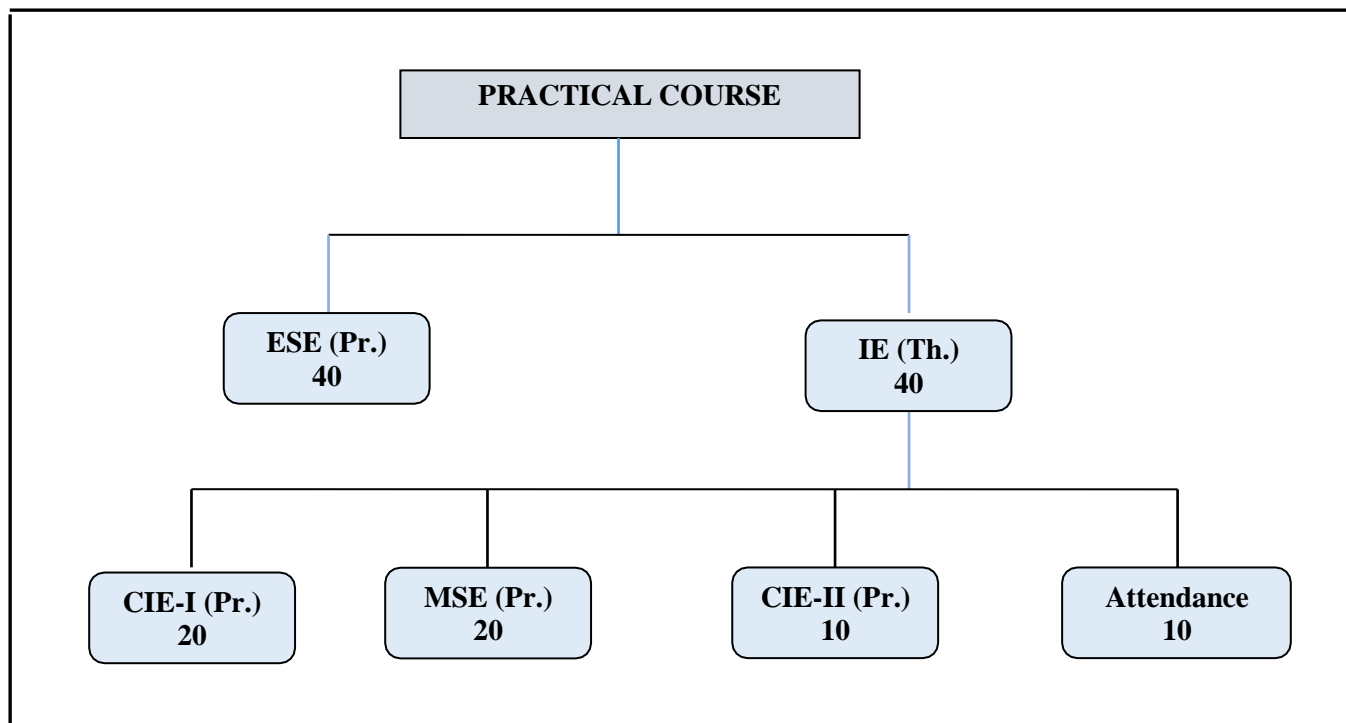
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Examination System:

### A. Marks Distribution of Theory Course:



### B. Marks Distribution of Practical Course :



**Th.:** Theory, **Pr.:** Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

## Marks Distribution of Attendance:

| Guidelines for Marks Distribution of Attendance Component |  |                            |
|---|--|----------------------------|
| S No.   | Total Course Attendance (TCA)<br>range in Percentage | Marks allotted (out of 10) |
| 1   | $95\% \leq \text{TCA}$                               | 10                         |
| 2   | $90\% \leq \text{TCA} < 95\%$                        | 9                          |
| 3   | $85\% \leq \text{TCA} < 90\%$                        | 8                          |
| 4   | $80\% \leq \text{TCA} < 85\%$                        | 7                          |
| 5   | $70\% \leq \text{TCA} < 80\%$                        | 6                          |
| 6   | $60\% \leq \text{TCA} < 70\%$                        | 5                          |
| 7   | $50\% \leq \text{TCA} < 60\%$                        | 4                          |
| 8   | $40\% \leq \text{TCA} < 50\%$                        | 3                          |
| 9   | $30\% \leq \text{TCA} < 40\%$                        | 2                          |
| 10  | $20\% \leq \text{TCA} < 30\%$                        | 1                          |
| 11  | $\text{TCA} < 20\%$                                  | 0                          |

## CO Wise Marks Distribution:

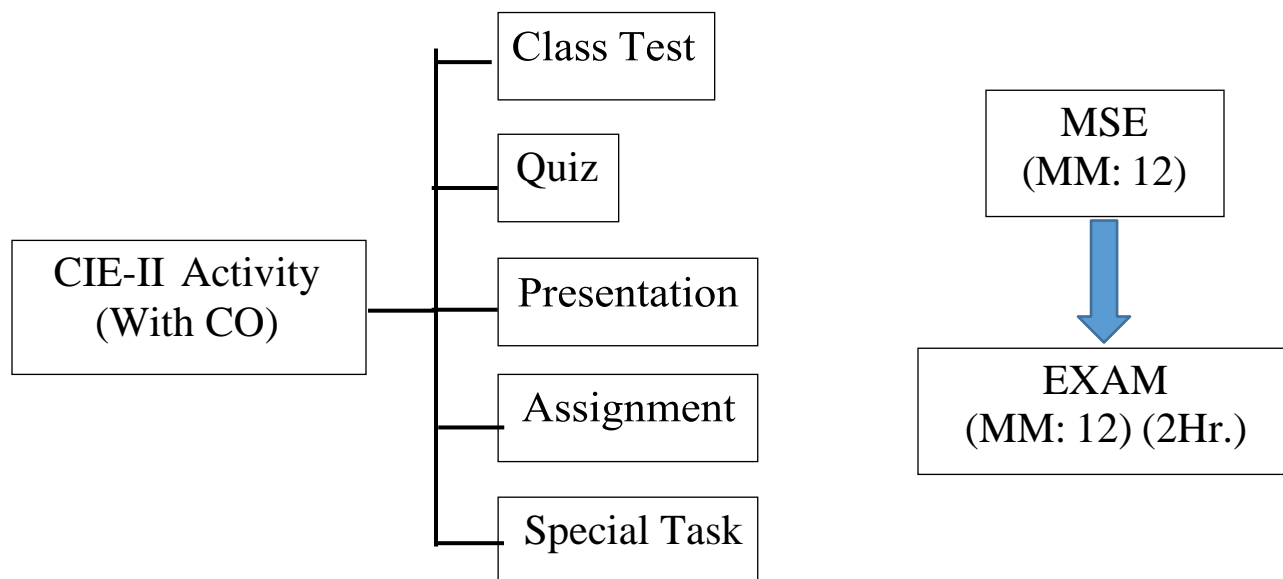
|   | Theory Subject |                  | Practical/ Studio Subject |               |
|---|----------------|------------------|---------------------------|---------------|
|   | Maximum Marks  | CO to be Covered | CO to be Covered          | Maximum Marks |
| <b>CIE-I (Class Test)</b>                 | 12 ( 6 + 6)    | 1 & 2            | 1 & 2                     | 20 (10 + 10)  |
| <b>MSE</b>                                | 12 ( 6 + 6)    | 3 & 4            | 3 & 4                     | 20 (10 + 10)  |
| <b>CIE-II (Activity/<br/>Assignment )</b> | 6 (6)          | 5                | 5                         | 10 (10)       |
| <b>Attendance</b>                         | 10             | -                | -                         | 10            |
| <b>ESE</b>                                | 60             | -                | -                         | 40            |
| <b>TOTAL</b>                              | 100            | -                | -                         | 100           |



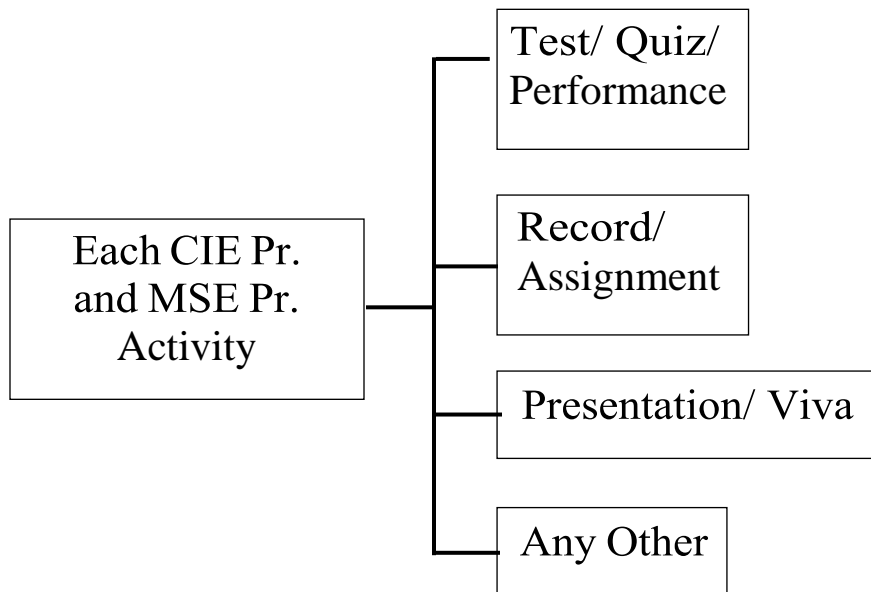
**Minimum Passing Percentage in All Exams:**

| S. No. | Program   | Minimum Passing Percentage<br>in All Exam |                                     |
|--------|---|---|-------------------------------------|
|        |   | ESE<br>Component                          | Total<br>Component                  |
| 1      | Course Work for Ph. D Registration  | -----                                     | 50 %                                |
| 2      | B. Arch.  | 45 %                                      | 50 %                                |
| 3      | MBA, MHA, MPH, MCA, M. Tech., M. Plan.<br>and M. Des.                         | 40 %                                      | 40 %                                |
| 4      | B. Tech., B. Des., BCA, B.Sc., BVA, B. Voc.,<br>BBA, B.Com., B.A. and Diploma | 35 %                                      | 40 %                                |
| 5      | B. Sc. (Hospitality & Hotel Administration)                                   | 35 %                                      | 40 % (Theory) &<br>50 % (Practical) |

**Break-up of Internal Exam (Theory):**



**Break-up of Internal Exam (Practical):**



**Assessment & Grade Point Average: SGPA, CGPA:**

**SGPA Calculation**

$$SGPA = \frac{C_1 G_1 + C_2 G_2 + \dots + C_n G_n}{C_1 + C_2 + \dots + C_n}$$

|   |  |
|---|--|
| $SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$ | <p>Where ( as per teaching Scheme &amp; Syllabus) :</p> <p>C<sub>i</sub> is the number of Credits of Courses i,</p> <p>G<sub>i</sub> is the Grade Point for the Course i and i = 1, 2,.....n</p> <p>n = number of courses in a programme in the Semester</p> |
|---|--|

**CGPA Calculation**

$$CGPA = \frac{C_1 G_1 + C_2 G_2 + \dots + C_n G_n}{C_1 + C_2 + \dots + C_n}$$

|   |  |
|---|--|
| $CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$ | <p>Where ( as per teaching Scheme &amp; Syllabus) :</p> <p>C<sub>i</sub> is the number of Credits of Courses i,</p> <p>G<sub>i</sub> is the Grade Point for the Course i and i = 1, 2,.....n</p> <p>n = number of courses in a programme of all the Semester up to which CGPA is computed.</p> |
|---|--|

## Grading Table:

**Grading Table-A: For B.Arch. and course work for Ph.D. Registration**

| Academic Performance | Grade | Grade Point | Marks Range ( in %)  |
|----------------------|-------|-------------|----------------------|
| Outstanding          | A+    | 10          | $90 \leq x \leq 100$ |
| Excellent            | A     | 9           | $80 \leq x < 90$     |
| Very good            | B+    | 8           | $70 \leq x < 80$     |
| Good                 | B     | 7           | $60 \leq x < 70$     |
| Average              | C     | 6           | $50 \leq x < 60$     |
| Fail                 | F     | 0           | $x < 50$             |

**Grading Table-B: For all courses except B.Arch. and course work for Ph.D. Registration**

| Academic Performance | Grade | Grade Point | Marks Range ( in %)  |
|----------------------|-------|-------------|----------------------|
| Outstanding          | A+    | 10          | $90 \leq x \leq 100$ |
| Excellent            | A     | 9           | $80 \leq x < 90$     |
| Very good            | B+    | 8           | $70 \leq x < 80$     |
| Good                 | B     | 7           | $60 \leq x < 70$     |
| Average              | C     | 6           | $50 \leq x < 60$     |
| Satisfactory         | D     | 5           | $40 \leq x < 50$     |
| Fail                 | F     | 0           | $x < 40$             |

*Calculation of  
SGPA*

$$SGPA = \frac{\sum C_i \times G_i}{\sum C_i}$$

$$SGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

*Calculation of  
CGPA*

$$CGPA = \frac{\sum C_i \times G_i}{\sum C_i}$$

$$CGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

where (as per teaching scheme & syllabus):  $C_i$  is the number of credits of subject  $i$ ,  $G_i$  is the Grade Point for the subject  $i$  and  $i = 1$  to  $n$ ,  $n$  = number of subjects in a course in the semester

## Award of Class:

| CGPA                    | Equivalent Division             |
|-------------------------|---------------------------------|
| $7.50 \leq CGPA$        | First Division with Distinction |
| $6.50 \leq CGPA < 7.50$ | First Division                  |
| $5.50 \leq CGPA < 6.50$ | Second Division                 |
| $4.50 \leq CGPA < 5.50$ | Pass Class                      |

The multiplication factor for conversion of CGPA to percentage is Equivalent % of Marks =  $(CGPA - 0.5) \times 10$ .

For Example if CGPA = 5.5 then % is  $(5.5 - 0.5) \times 10 = 50\%$ .

## **Guidelines for MOOC COURSES:**

1. Applicable from the session 2020 – 21 onwards, for students aspiring for HONOURS Degree.
2. The UGC has issued UGC (Credit Framework for Online Learning Courses) Regulation, 2016. These shall apply to all universities established or incorporated by or under a Central Act, a Provincial Act, or a State/Union Territory Act and all institutions recognized by or affiliated to such Universities and all institutions deemed to be universities under Section 3 of the UGC Act, 1956.
3. All India Council for Technical Education (AICTE) has introduced Model Curriculum for Bachelor programs of 4 years/ 3 Years, and additional credits will be required to be done for the degree of Bachelor program with Honours. These additional credits will have to be acquired with online courses (MOOCs) as per AICTE.
4. This creates an excellent opportunity for students to acquire the necessary skill set for employability through massive online courses where the rare expertise of world famous experts from academics and industry are available.
5. Students are required to complete additional credits through MOOCs within 4 years/ 3years of time (whatever be applicable time for the completion of registered program) so as to become eligible for Honours degree as per norms.
6. It is necessary to complete minimum MOOCs credit course as mentioned below for becoming eligible for the Honours degree in the registered program.
7. MOOC Course Credits shall be calculated as per details given below:
8. Student are required to give the prior information about MOOCs courses to his respective HOD and COE, in which he/she wants to register for online certification.
9. After getting permission from respective HOD, a student can register for the MOOC certification courses.
10. After successful completion of the said MOOC course, the student shall submit the certificate of completion to the respective department. If he/ she fails to provide the certificates of MOOC courses before last teaching day of the semester then these certificates will not be considered later.

**Required credits for Honours:**

| S.No | Program Duration | Required credits for Honours |
|------|------------------|------------------------------|
| 1.   | 2- Year          | 10- Credits                  |
| 2.   | 3- Year          | 15- Credits                  |
| 3.   | 4- Year          | 20- Credits                  |

| S. No | NPTEL/ SWAYAM<br>Course duration (in weeks) | Equivalent Credits |
|-------|---|--------------------|
| 1     | 4   | 2                  |
| 2     | 8   | 3                  |
| 3     | 12  | 4                  |

**Attached Items:**

|                            |            |
|----------------------------|------------|
| Open Elective Booklet      | Annexure-1 |
| Soft Skills Booklet        | Annexure-2 |
| Value Added Course Booklet | Annexure-3 |

**POORNIMA UNIVERSITY**

**Faculty of Engineering & Technology**

**Department of First Year**

**Batch: 2022-26**

**Name of Programs**

**B.Tech. (ME/EE/Civil)**

**B.Tech. ME/EE (spec. in Hybrid & Electric vehicles)**

**B.Tech. (Electrical and Computer Engineering)**

**B.Tech. (Computer Engineering)**

**Teaching Scheme for Year I Semester I**

| Course Code                | Course Name   | Teaching Scheme<br>(Hrs per Week) |                  |                  | Marks<br>Distribution |     |       | Credits   |
|----------------------------|---|-----------------------------------|------------------|------------------|-----------------------|-----|-------|-----------|
|                            |   | Lecture<br>(L)                    | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE | Total |           |
| <b>A.</b>                  | <b>University Core Courses</b>  |                                   |                  |                  |                       |     |       |           |
| BULCSA1101                 | Environmental Studies   | 2                                 | -                | -                | 40                    | 60  | 100   | 2         |
| <b>B.</b>                  | <b>Department Core Courses</b>  |                                   |                  |                  |                       |     |       |           |
| <b>B.1</b>                 | <b>Theory</b>   |                                   |                  |                  |                       |     |       |           |
| BTXCSA1101 /<br>BTXCSA1102 | Engineering Mathematics /<br>Engineering Physics  | 3                                 | 1                | -                | 40                    | 60  | 100   | 3         |
| BTXCEE1103 /<br>BTXCME1104 | Electrical & Electronics Engineering /<br>Engineering Mechanics   | 3                                 | 1                | -                | 40                    | 60  | 100   | 3         |
| BTXCCE1105/<br>BTXCEE1106  | Programming in C / Introduction to<br>Futuristic Technologies   | 3                                 | -                | -                | 40                    | 60  | 100   | 3         |
| BTXCCE1107                 | Fundamental of computing  | 3                                 | -                | -                | 40                    | 60  | 100   | 3         |
| <b>B.2</b>                 | <b>Practical</b>  |                                   |                  |                  |                       |     |       |           |
| BTXCME1201 /<br>BTXCSA1202 | Machine Drawing Lab/ Engineering<br>Physics Lab-1   | -                                 | 1                | 2                | 60                    | 40  | 100   | 1         |
| BTXCEE1203 /<br>BTXCME1204 | Electrical & Electronics Engineering<br>Lab / Workshop Practice   | -                                 | 1                | 2                | 60                    | 40  | 100   | 1         |
| BTXCCE1205 /<br>BTXCME1206 | Programming in C Lab / Practical<br>Geometry  | -                                 | 1                | 2                | 60                    | 40  | 100   | 1         |
| BTXCHM1207/<br>BTXCHM1208  | Foundation English / Language Lab   | -                                 | -                | 2                | 60                    | 40  | 100   | 1         |
| <b>C.</b>                  | <b>Department Elective</b>  |                                   |                  |                  |                       |     |       |           |
|                            | Nil   |                                   |                  |                  |                       |     |       |           |
| <b>D.</b>                  | <b>Open Elective</b>  |                                   |                  |                  |                       |     |       |           |
|                            | Nil   |                                   |                  |                  |                       |     |       |           |
| <b>E.</b>                  | <b>Humanities and Social Sciences<br/>including Management courses<br/>(AECC)</b>                               |                                   |                  |                  |                       |     |       |           |
|                            | Nil   |                                   |                  |                  |                       |     |       |           |
| <b>F.</b>                  | <b>Skill Enhancement Courses (SEC)<br/>OR Project work, Seminar and<br/>Internship in Industry or Elsewhere</b> |                                   |                  |                  |                       |     |       |           |
| BTXCTX1301                 | Project   | -                                 | -                | 4                | 60                    | 40  | 100   | 2         |
| <b>G.</b>                  | <b>Discipline, Value Added Courses &amp;<br/>Social Outreach</b>  |                                   |                  |                  |                       |     |       |           |
| BTXCTX1601                 | Talent Enrichment Programme (TEP)-I   | -                                 | -                | -                | 50                    | -   | 50    | 1         |
|                            | Library / MOOC / Online Certification<br>Courses  | 1                                 | -                | -                |                       |     |       |           |
|                            | Non syllabus project/ Industrial Visit /<br>CRT   | 1                                 | -                | -                |                       |     |       |           |
|                            | <b>Total</b>  | <b>16</b>                         | <b>05</b>        | <b>12</b>        |                       |     |       |           |
|                            | <b>Total Teaching Hours</b>   |                                   | <b>33</b>        |                  |                       |     |       | <b>21</b> |

**POORNIMA UNIVERSITY**

**Faculty of Engineering & Technology  
Faculty of Computer Science and Engineering**

**Department of First Year**

**Batch: 2022-26**

|  |  |
|--|--|
| <b>Name of Programs</b><br>B.Tech. (ME/EE/Civil) | B.Tech. ME/EE (spec. in Hybrid & Electric vehicles)<br>B.Tech. (Electrical and Computer Engineering) |
|--|--|

**Teaching Scheme for Year I Semester II**

| Course Code                | Course Name   | Teaching Scheme<br>(Hrs per Week) |                  |                  | Marks Distribution |     |       | Credits   |
|----------------------------|---|-----------------------------------|------------------|------------------|--------------------|-----|-------|-----------|
|                            |   | Lecture<br>(L)                    | Tutorials<br>(T) | Practical<br>(P) | IE                 | ESE | Total |           |
| <b>A.</b>                  | <b>University Core Courses</b>  |                                   |                  |                  |                    |     |       |           |
|                            | NIL   |                                   |                  |                  |                    |     |       |           |
| <b>B.</b>                  | <b>Department Core Courses</b>  |                                   |                  |                  |                    |     |       |           |
| <b>B.1</b>                 | <b>Theory</b>   |                                   |                  |                  |                    |     |       |           |
| BTXCSA2101                 | Engineering Chemistry   | 3                                 | -                | -                | 40                 | 60  | 100   | 3         |
| BTXCSA2102 /<br>BTXCSA2103 | Engineering Mathematics /<br>Engineering Physics  | 3                                 | 1                | -                | 40                 | 60  | 100   | 3         |
| BTXCEE2104 /<br>BTXCME2105 | Electrical & Electronics Engineering /<br>Engineering Mechanics   | 3                                 | 1                | -                | 40                 | 60  | 100   | 3         |
| BTXCCE2106/<br>BTXCEE2107  | Programming in C / Introduction to<br>Futuristic Technologies   | 3                                 | -                | -                | 40                 | 60  | 100   | 3         |
| <b>B.2</b>                 | <b>Practical</b>  |                                   |                  |                  |                    |     |       |           |
| BTXCSA2201                 | Engineering Chemistry Lab   |                                   | -                | 2                | 60                 | 40  | 100   | 1         |
| BTXCME2202 /<br>BTXCSA2203 | Machine Drawing Lab / Engineering<br>Physics Lab-1  | -                                 | 1                | 2                | 60                 | 40  | 100   | 1         |
| BTXCEE2204 /<br>BTXCME2205 | Electrical & Electronics Engineering Lab<br>/ Workshop Practice   | -                                 | 1                | 2                | 60                 | 40  | 100   | 1         |
| BTXCCE2206 /<br>BTXCME2207 | Programming in C Lab / Practical<br>Geometry  | -                                 | 1                | 2                | 60                 | 40  | 100   | 1         |
| BTXCHM2208/<br>BTXCHM2209  | Foundation English / Language Lab   | -                                 | -                | 2                | 60                 | 40  | 100   | 1         |
| <b>C.</b>                  | <b>Department Elective</b>  |                                   |                  |                  |                    |     |       |           |
|                            | Nil   |                                   |                  |                  |                    |     |       |           |
| <b>D.</b>                  | <b>Open Elective: Anyone</b>  |                                   |                  |                  |                    |     |       |           |
|                            | <i>As per Annexure-I</i>  | 2                                 | -                | -                | 40                 | 60  | 100   | 2         |
| <b>E.</b>                  | <b>Humanities and Social Sciences<br/>including Management courses</b>  |                                   |                  |                  |                    |     |       |           |
|                            | Nil   |                                   |                  |                  |                    |     |       |           |
| <b>F.</b>                  | <b>Skill Enhancement Courses (SEC) OR<br/>Project work, Seminar and Internship<br/>in Industry or Elsewhere</b> |                                   |                  |                  |                    |     |       |           |
|                            | Nil   |                                   |                  |                  |                    |     |       |           |
| <b>G.</b>                  | <b>Discipline, Value Added Courses &amp;<br/>Social Outreach</b>  |                                   |                  |                  |                    |     |       |           |
| BTXCTX2601                 | Talent Enrichment Programme (TEP)-II  | -                                 | -                | -                | 50                 | -   | 50    | 1         |
|                            | Library / MOOC / Online Certification<br>Courses  | 2                                 | -                | -                |                    |     |       |           |
|                            | Non syllabus project/ Industrial Visit /<br>CRT   | 2                                 | -                | -                |                    |     |       |           |
|                            | <b>Total</b>  | <b>18</b>                         | <b>05</b>        | <b>10</b>        |                    |     |       |           |
|                            | <b>Total Teaching Hours</b>   |                                   | <b>33</b>        |                  |                    |     |       | <b>20</b> |

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Second Year - Third Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>A.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCSA3101  | Engineering Mathematics - II  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCCV3102  | Fluid Mechanics   | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV3103  | Strength of Material  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV3104  | Building Technology   | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| <b>B. 2</b> | <b>Practical</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV3201  | Auto Cad Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV3202  | Fluid Mechanics Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV3203  | Material Testing Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV3204  | Computer Programming for Civil Engineers Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |             |           |
| BCVECV3111  | Building Material & Construction  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVECV3112  | Engineering Geology & Rock Mechanics  |                                    |                  |                  |                       |            |             |           |
| BCVECV3113  | Sustainable Engineering   |                                    |                  |                  |                       |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |             |           |
|             | As Per Annexure-I   | 2                                  | 0                | 0                | 40                    | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |             |           |
| BCVCHM3209  | Human Values & Professional Ethics  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |             |           |
|             | NA  |                                    |                  |                  |                       |            |             |           |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV3601  | Non Syllabus Project  | 1                                  | -                | -                | 50                    | -          | 50          | 1         |
|             | Online Certification Course   | 2                                  | -                | -                |                       |            |             |           |
|             | <b>Total</b>  | <b>20</b>                          | <b>3</b>         | <b>10</b>        |                       |            |             |           |
|             | <b>Total Teaching Hours</b>   | <b>33</b>                          |                  |                  | <b>590</b>            | <b>560</b> | <b>1150</b> | <b>23</b> |



**POORNIMA UNIVERSITY, JAIPUR**

**Faculty of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Second Year - Fourth Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
|             | Nil   |                                    |                  |                  |                       |            |             |           |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCCV4101  | Structure Analysis-I  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV4102  | Surveying   | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV4103  | Disaster Management   | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV4104  | Concrete and Construction Technology  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV4201  | Civil Engineering Material Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV4202  | Concrete Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV4203  | Surveying Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV4204  | STAAD Pro Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |             |           |
| BCVECV4111  | Hydraulic and Hydraulic Machine   | 3                                  | 0                | -                | 40                    | 60         | 100         | 3         |
| BCVECV4112  | Construction Equipment's  |                                    |                  |                  |                       |            |             |           |
| BCVECV4113  | Solid Waste Management  |                                    |                  |                  |                       |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |             |           |
|             | As Per Annexure-I   | 2                                  | 0                | 0                | 40                    | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |             |           |
| BCVCHM4209  | Leadership & Management Skills  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |             |           |
|             | NA  |                                    |                  |                  |                       |            |             |           |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV4601  | Non Syllabus Project  | 2                                  | -                | -                | 50                    | -          | 50          | 1         |
|             | Online Certification Course   | 1                                  | -                | -                |                       |            |             |           |
|             | <b>Total</b>  | <b>20</b>                          | <b>3</b>         | <b>10</b>        |                       |            |             |           |
|             | <b>Total Teaching Hours</b>   |                                    | <b>33</b>        |                  | <b>590</b>            | <b>560</b> | <b>1150</b> | <b>23</b> |

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Third Year - Fifth Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
|             | Nil   |                                    |                  |                  |                       |            |             |           |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCCV5101  | Structural Analysis-II  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5102  | Design of Concrete Structures   | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5103  | Design of Steel Structures  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5104  | Transportation Engineering  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5105  | Irrigation Engineering  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV5201  | Design of Concrete Structures Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV5202  | Design of Steel Structures Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV5203  | Road Material Testing Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |             |           |
| BCVECV5111  | Hydrology & Ground water  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVECV5112  | Repair & Rehabilitation of Structures   |                                    |                  |                  |                       |            |             |           |
| BCVECV5113  | Rural Water Supply & Sanitation   |                                    |                  |                  |                       |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |             |           |
|             | As Per Annexure-I   | 2                                  | 0                | 0                | 40                    | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences<br/>including Management courses (HSSM)<br/>OR Ability Enhancement<br/>Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |             |           |
| BCVCHM5209  | Professional Skills-I   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCHM5210  | Communication Skills-I  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR<br/>Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV5401  | Technical Seminar   | -                                  | -                | 2                | 60                    | 40         | 100         | 1         |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp;<br/>Social Outreach</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV5601  | Campus Recruitment Training   | 1                                  | -                | -                | 50                    | -          | 50          | 1         |
|             | <b>Total</b>  | <b>21</b>                          | <b>0</b>         | <b>12</b>        |                       |            |             |           |
|             | <b>Total Teaching Hours</b>   | <b>33</b>                          |                  |                  | <b>690</b>            | <b>660</b> | <b>1350</b> | <b>27</b> |

| POORNIMA UNIVERSITY, JAIPUR                     |   |                                    |                  |                  |                       |           |            |           |
|---|---|------------------------------------|------------------|------------------|-----------------------|-----------|------------|-----------|
| School of Engineering & Technology              |   |                                    |                  |                  |                       |           |            |           |
| B. Tech. (Civil Engineering), Batch: 2022-26    |   |                                    |                  |                  |                       |           |            |           |
| Teaching Scheme for Third Year - Sixth Semester |   |                                    |                  |                  |                       |           |            |           |
| Course Code                                     | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |           |            | Credits   |
|   |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE       | Total      |           |
| <b>A.</b>                                       | <b>University Core Courses</b>  |                                    |                  |                  |                       |           |            |           |
|   | Nil   |                                    |                  |                  |                       |           |            |           |
| <b>B.</b>                                       | <b>Department Core Courses</b>  |                                    |                  |                  |                       |           |            |           |
| <b>B.1</b>                                      | <b>Theory</b>   |                                    |                  |                  |                       |           |            |           |
|   | Nil   |                                    |                  |                  |                       |           |            |           |
| <b>B.2</b>                                      | <b>Practical</b>  |                                    |                  |                  |                       |           |            |           |
|   | Nil   |                                    |                  |                  |                       |           |            |           |
| <b>C.</b>                                       | <b>Department Elective</b>  |                                    |                  |                  |                       |           |            |           |
|   | Nil   |                                    |                  |                  |                       |           |            |           |
| <b>D.</b>                                       | <b>Open Elective</b>  |                                    |                  |                  |                       |           |            |           |
|   | Nil   |                                    |                  |                  |                       |           |            |           |
| <b>E.</b>                                       | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                       |           |            |           |
|   | Nil   |                                    |                  |                  |                       |           |            |           |
| <b>F.</b>                                       | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |           |            |           |
| BCVCCV6301                                      | Minor Project   | -                                  | -                | 2                | 60                    | 40        | 100        | 1         |
| BCVCCV6401                                      | Industrial Training and Seminar-II  | -                                  | -                | 24               | 60                    | 40        | 100        | 12        |
| <b>G.</b>                                       | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                       |           |            |           |
| BCVCCV6601                                      | Online Certification Course   | 1                                  | -                | -                | 50                    | -         | 50         | 1         |
|   | <b>Total</b>  | <b>1</b>                           | <b>-</b>         | <b>26</b>        |                       |           |            |           |
|   | <b>Total Teaching Hours</b>   |                                    | <b>27</b>        |                  | <b>170</b>            | <b>80</b> | <b>250</b> | <b>14</b> |

Note: all students are required to go to internship for 6 months.

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Fourth Year - Seventh Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|--------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                 | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                    |            |             |           |
|             | Nil   |                                    |                  |                  |                    |            |             |           |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                    |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                    |            |             |           |
| BCVCCV7101  | Geotechnical Engineering-I  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7102  | Environmental Engineering - I   | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7103  | Estimating and Costing  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7104  | Construction Planning & Management  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7105  | Water Resources Engineering   | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                    |            |             |           |
| BCVCCV7201  | Geotechnical Engineering- Lab   | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| BCVCCV7202  | Quantity Surveying and Valuation Lab  | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| BCVCCV7203  | Environmental Engineering Lab   | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                    |            |             |           |
| BCVECV7111  | Design of Pre-Stress Concrete Structures  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVECV7112  | Advanced Foundation Engineering   |                                    |                  |                  |                    |            |             |           |
| BCVECV7113  | Bridge Engineering  |                                    |                  |                  |                    |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                    |            |             |           |
|             | As Per Annexure-I   | 2                                  | -                | -                | 40                 | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                    |            |             |           |
| BCVCHM7209  | Professional Skills-II  | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                    |            |             |           |
| BCVCHM7210  | Use of Social Media   | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                    |            |             |           |
| BCVCCV7601  | Online Certification Courses  | 1                                  | -                | -                | 50                 | -          | 50          | 1         |
|             | Campus Recruitment Training   | 2                                  | -                | -                |                    |            |             |           |
|             | <b>Total</b>  | <b>23</b>                          | <b>0</b>         | <b>10</b>        |                    |            |             |           |
|             | <b>Total Teaching Hours</b>   | <b>33</b>                          |                  |                  | <b>630</b>         | <b>620</b> | <b>1250</b> | <b>26</b> |

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Fourth Year - Eighth Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |            | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total      |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |            |           |
|             | Nil   |                                    |                  |                  |                       |            |            |           |
| <b>B.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |            |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |            |           |
| BCVCCV8101  | Environmental Engineering -II   | 3                                  | -                | -                | 40                    | 60         | 100        | 3         |
| BCVCCV8102  | Geotechnical Engineering-II   | 3                                  | -                | -                | 40                    | 60         | 100        | 3         |
| BCVCCV8103  | Ground Improvement Techniques   | 3                                  | -                | -                | 40                    | 60         | 100        | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                       |            |            |           |
| BCVCCV8201  | Environmental Engg. Lab.  | -                                  | -                | 2                | 60                    | 40         | 100        | 1         |
| BCVCCV8202  | Geotechnical Engineering Lab  | -                                  | -                | 2                | 60                    | 40         | 100        | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |            |           |
|             | Nil   |                                    |                  |                  |                       |            |            |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |            |           |
|             | Nil   |                                    |                  |                  |                       |            |            |           |
| <b>E.</b>   | <b>Humanities and Social Sciences<br/>including Management courses<br/>(HSSM) OR Ability Enhancement<br/>Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |            |           |
| BCVCHM8209  | Communication Skills-II   | -                                  | -                | 2                | 60                    | 40         | 100        | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR<br/>Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |            |           |
| BCVCCV8301  | Major Project/Dissertation  | -                                  | -                | 16               | 60                    | 40         | 100        | 8         |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp;<br/>Social Outreach</b>  |                                    |                  |                  |                       |            |            |           |
| BCVCCV8601  | Online Certification Course   | 2                                  | -                | -                | 50                    | -          | 50         | 1         |
|             | <b>Total</b>  | <b>11</b>                          | <b>0</b>         | <b>22</b>        |                       |            |            |           |
|             | <b>Total Teaching Hours</b>   |                                    | <b>33</b>        |                  | <b>410</b>            | <b>340</b> | <b>750</b> | <b>21</b> |

# FIRST SEMESTER CORE THEORY SUBJECTS

**Code: BULCSA1101**

**ENVIRONMENTAL STUDIES**

**2.0 Credits [LTP: 2-0-0]**

## COURSE OUTCOME

Students will be able to:

CO1: Understand the scope of environmental studies and explain the concept of ecology, ecosystem and biodiversity.

CO2: Implement innovative ideas of controlling different categories of Environmental Pollution.

CO3: Explain different environmental issues together with various Environmental Acts, regulations and International Agreements.

CO4: Summarize social issues related to population, resettlement and rehabilitation of project affected persons and demonstrate disaster management with special reference to floods, earthquakes, cyclones, landslides.

CO5: Determine the local environmental assets with simple ecosystems and identify local flora and fauna.

## A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit                       | Time required for the Unit (Hours) |
|----------|---|------------------------------------|
| 1.       | Introduction to environmental studies   | 6                                  |
| 2.       | Environmental Pollution and its control | 5                                  |
| 3.       | Environmental Policies & Practices      | 5                                  |
| 4.       | Human Communities and the Environment   | 5                                  |
| 5.       | Field work                              | 5                                  |

## B. DETAILED SYLLABUS

| Unit | Unit Details   |
|------|--|
| 1.   | <b>Introduction to environmental studies</b>   |
|      | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Multidisciplinary nature of environmental studies</li> <li>• Concept of sustainability and sustainable development.</li> <li>• Ecosystem: Structure and function of ecosystem</li> <li>• Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies\</li> <li>• Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem<br/>Aquatic ecosystems</li> <li>• Biodiversity and Conservation</li> <li>• Conclusion of Unit including Real Life Application</li> </ul> |
| 2.   | <b>Environmental Pollution and its control</b>   |
|      | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution</li> <li>• Nuclear hazards and human health risks</li> <li>• Solid waste management: Control measures of urban and industrial waste.</li> <li>• Pollution case studies</li> <li>• Conclusion of Unit including Real Life Application</li> </ul>  |
| 3.   | <b>Environmental Policies &amp; Practices</b>  |
|      | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture</li> <li>• Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.</li> <li>• Environment Laws: Environment Protection Act; Air (Prevention &amp; Control of Pollution) Act; Water</li> </ul>  |

|           |   |
|-----------|---|
|           | (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. <ul style="list-style-type: none"> <li>• International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)</li> <li>• Conclusion of Unit including Real Life Application</li> </ul>  |
| <b>4.</b> | <b>Human Communities and the Environment</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Human population growth: Impacts on environment, human health and welfare.</li> <li>• Resettlement and rehabilitation of project affected persons; case studies.</li> <li>• Disaster management: floods, earthquake, cyclones and landslides.</li> <li>• Conclusion of Unit including Real Life Application</li> </ul> |
| <b>5.</b> | <b>Field work</b>   |
|           | <ul style="list-style-type: none"> <li>• Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.</li> <li>• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.</li> <li>• Study of common plants, insects, birds and basic principles of identification.</li> <li>• Study of simple ecosystems-pond, river, Delhi Ridge, etc.</li> </ul>           |

### C. RECOMMENDED STUDY MATERIAL:

| Sr. No                     | Reference Book  | Author            | Edition | Publication             |
|----------------------------|---|-------------------|---------|-------------------------|
| 1                          | Environmental Studies   | Erach Barucha     | Latest  | UGC                     |
| 2                          | Environmental Studies   | Benny Joseph      | Latest  | Tata McgrawHill         |
| 3                          | Environmental Studies   | R. Rajagopalan    | Latest  | Oxford University Press |
| 4                          | Principles of Environmental Science and Engineering   | P. Venugoplan Rao | Latest  | Prentice Hall of India. |
| 5                          | Environmental Science and Engineering   | P. Meenakshi      | Latest  | Prentice Hall India.    |
| <b>Important Web Links</b> |   |                   |         |                         |
| 1                          | <a href="http://www.energy.gov">http://www.energy.gov</a>                                   |                   |         |                         |
| 2                          | <a href="https://nptel.ac.in/courses/122102006/">https://nptel.ac.in/courses/122102006/</a> |                   |         |                         |

**COURSE OUTCOME**

The student would be able to:

CO1 Analyze and prove relationships between matrices, rank of matrix and systems of equations, Inverses.

CO2 Analyze the basic structure of differential equations, and order and degree of the first order and its simple applications.

CO3 Utilize methods of integration to evaluate volumes and surface of objects and lengths of curves.

CO4 Apply vector differentiation, and integration in the scalar and vector fields

CO5 Apply line, surface and volume integral with the help of green's theorem, Gauss's theorem and Stokes theorem.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the Unit               | Time required for the Unit (Hours) |
|----------|---------------------------------|------------------------------------|
| 1        | Matrices                        | 7                                  |
| 2        | Integral Calculus               | 8                                  |
| 3        | Ordinary Differential Equations | 8                                  |
| 4        | Introduction Vector Calculus    | 8                                  |
| 5        | Application of Vector Calculus  | 8                                  |

**B. DETAILED SYLLABUS**

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Matrices</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Rank of a Matrix, Normal form of a Matrix</li> <li>• Consistency of systems of linear equations</li> <li>• Eigen Values and Eigen Vectors</li> <li>• Cayley-Hamilton Theorem (without proof)</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>2.</b> | <b>Ordinary Differential Equations</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• First order and first-degree differential equations-Separable Variables,</li> <li>• Linear Equation and reducible to linear form, Exact Equation</li> <li>• Linear differential equations with constant coefficients</li> <li>• Conclusion of Unit</li> </ul>                                   |
| <b>3.</b> | <b>Integral Calculus</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Beta and Gamma functions and their properties</li> <li>• Surfaces and Volumes of Solids of Revolutions</li> <li>• Double integrals, Double integral by changing into polar form, Areas by Double Integration</li> <li>• Change of order of integration</li> <li>• Conclusion of Unit</li> </ul> |
| <b>4.</b> | <b>Vector Calculus</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Scalar and Vector field</li> <li>• Differentiation and Integration of Vector functions</li> <li>• Gradient, Divergence and Curl, Directional derivatives</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>5.</b> | <b>Application of Vector Calculus</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Line, Surface and Volume integral</li> <li>• Gauss, Stocks and Green theorem (without proof) and its applications</li> <li>• Conclusion of Unit</li> </ul>  |



**C. RECOMMENDED STUDY MATERIAL:**

| Sr.No                       | Reference Book  | Author                     | Edition | Publication                  |
|-----------------------------|---|----------------------------|---------|------------------------------|
| 1.                          | Higher Engineering Mathematics  | B S Grewal                 | Latest  | Khanna Publications, Delhi,  |
| 2.                          | Higher Engineering Mathematics  | Ramana, B.V                | Latest  | Tata McGraw-Hill.            |
| 3                           | Engineering Mathematics: A Tutorial Approach  | Ravish R Singh and M Bhatt | Latest  | Tata McGraw-Hill             |
| 4                           | Calculus and Analytical Geometry  | Thomas and Finney,         | Latest  | Narosa Publishing, New Delhi |
| 5                           | Advanced Engineering Mathematics  | Erwin Kreyszig             | Latest  | John Wiley and Sons          |
| <b>Important Web Links:</b> |   |                            |         |                              |
| 1                           | <a href="https://nptel.ac.in/courses/111105134/">https://nptel.ac.in/courses/111105134/</a>   |                            |         |                              |
| 2                           | <a href="https://nptel.ac.in/courses/122/101/122101001/">https://nptel.ac.in/courses/122/101/122101001/</a>   |                            |         |                              |
| 3                           | <a href="https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000">https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000</a> |                            |         |                              |

**COURSE OUTCOME**

The student will be able to:

CO1 Produce coherent sources and phenomenon of interference and diffraction

CO2 Compare quantum mechanical history with experimental facts and its applications.

CO3 Debates in laser and fibre optics and apply it for suitable applications.

CO4 Point out the basic principles of relativity, twin paradox and energy-mass relations.

CO5 Categorize different bonding in materials, band theory and semiconductor material.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the unit            | Time required for the Unit (Hours) |
|----------|------------------------------|------------------------------------|
| 1        | Wave Optics                  | 8                                  |
| 2        | Quantum Mechanics            | 8                                  |
| 3        | Laser & Optical Fibre        | 8                                  |
| 4        | Special Theory of Relativity | 7                                  |
| 5        | Elements of Material Science | 8                                  |

**B. DETAILED SYLLABUS**

| Unit No.  | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Wave Optics</b>  |
|           | <ul style="list-style-type: none"> <li>• <b>Introduction of Unit</b></li> <li>• <b>Interference of light:</b> Types of interference, Coherent source, methods to produce coherent sources with examples.</li> <li>• Newton's Rings: Principle, Construction, working &amp; Applications</li> <li>• <b>Diffraction of light:</b> Fraunhofer Diffraction from a Single Slit</li> <li>• <b>Diffraction grating:</b> Introduction and its construction</li> <li>• Resolving power and Rayleigh criterion for limit of resolution</li> <li>• Conclusion of Unit</li> </ul> |
| <b>2.</b> | <b>Quantum Mechanics</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Black body radiation and Planck's hypothesis</li> <li>• Compton Effect, Compton shift</li> <li>• Wave function and its basic postulates</li> <li>• Physical interpretation of wave function and its properties</li> <li>• Time dependent and time independent Schrodinger's Wave Equation,</li> <li>• Applications of the Schrodinger's Equation: Particle in one dimensional box</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>3.</b> | <b>Laser &amp; Optical Fibre</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Theory of laser action: Einstein's Coefficients, Components of laser, Threshold conditions for laser action</li> <li>• Theory, Design and Applications of He-Ne Laser</li> <li>• Optical Fibre: Construction and working principle of Optical fiber</li> <li>• Types of optical fibre (on the basis of modes and the refractive index of the medium)</li> <li>• Applications of optical fibre</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>4.</b> | <b>Special Theory of Relativity</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Inertial and non-inertial frames of Reference.</li> <li>• Postulates of special theory relativity</li> <li>• Galilean and Lorentz Transformations, Length contraction, Mass Variation and Time Dilation.</li> <li>• Relativistic Mass-Energy relation</li> </ul>   |

|          |   |
|----------|---|
|          | <ul style="list-style-type: none"> <li>• Relativistic Energy and Momentum</li> <li>• Conclusion of Unit</li> </ul>  |
| <b>5</b> | <b>Elements of Material Science</b>   |
|          | <ul style="list-style-type: none"> <li>• Introduction of Unit: Bonding in solids, Covalent bonding and Metallic bonding</li> <li>• Classification of Solids as Insulator, Semi-Conductor and Conductor</li> <li>• Semiconductors: Conductivity in Semiconductors</li> <li>• Determination of band gap of a semiconductor</li> <li>• Hall Effect: Theory, Hall Coefficients and application to determine the sign of charge carrier</li> <li>• Conclusion of Unit</li> </ul> |

### C. RECOMMENDED STUDY MATERIAL

| Sr.No | Reference Books                              | Author                | Edition         | Publication           |
|-------|--|-----------------------|-----------------|-----------------------|
| 1.    | Fundamental of Optics                        | Jenkins and White     | 4 <sup>th</sup> | Tata McGraw-Hill      |
| 2.    | Optics                                       | Ajoy Ghatak           | 3 <sup>rd</sup> | Tata McGraw-Hill      |
| 3.    | A Text Book of optics                        | Brijlal & Subramaniam | Latest          | S.Chand and co. Ltd   |
| 4.    | Quantum Mechanics                            | Schiff                | 3 <sup>rd</sup> | Tata Mc Graw-Hill     |
| 5.    | Concept of Modern Physics                    | Beiser                | Latest          | Tata McGraw-Hill      |
| 6.    | Introduction to special Theory of Relativity | R. Resnick            | Latest          | Johan Willy Singapore |
| 7.    | Elements of Properties of Matter             | D.S.Mathur            | Latest          | S.Chand & Co.         |
| 8.    | Solid State Physics                          | S.O.Pillai            | Latest          | Wiley Eastern Ltd.    |

#### Important Web Links

|    |   |
|----|---|
| 1. | <a href="https://nptel.ac.in/courses/122107035/">https://nptel.ac.in/courses/122107035/</a>           |
| 2. | <a href="https://nptel.ac.in/courses/122103011/">https://nptel.ac.in/courses/122103011/</a>           |
| 3. | <a href="https://www.khanacademy.org/science/physics">https://www.khanacademy.org/science/physics</a> |
| 4. | <a href="https://ocw.mit.edu/courses/physics/">https://ocw.mit.edu/courses/physics/</a>               |

**COURSE OUTCOME**

The student will be able to:

CO1 Apply basic electrical concepts, including various circuit analysis techniques and fundamentals of theorem, in practical applications.

CO2 Analyze the fundamentals of AC circuits such as the R.M.S value, average value, active power, reactive power, power factor, form factor, peak factor and their applications.

CO3 Analyze the energy conversion process and fundamentals of rotating and stationary electrical machines with their application in real life.

CO4 Analyze the working of semiconductor devices such as Diode, BJT, UJT, photovoltaic cells, filters and fundamentals of digital electronics.

CO5 Illustrate the concepts of Communication systems and Instrumentation engineering in practical applications.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the Unit                                   | Time required for the Unit (Hours) |
|----------|---|------------------------------------|
| 1.       | Basic Concepts of Electrical Engineering            | 8                                  |
| 2.       | Alternating Quantities and Electrical Installations | 8                                  |
| 3.       | Energy Conversion and Electrical Machines           | 7                                  |
| 4.       | Basic Electronics                                   | 8                                  |
| 5.       | Communication Systems and IoT                       | 8                                  |

**B. DETAILED SYLLABUS**

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Basic Concepts of Electrical Engineering</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Basic Concepts: Electric Current, Electromotive Force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction.</li> <li>• DC Network Analysis &amp; Theorems: Kirchhoff's Laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Star-Delta Transformation, Node Voltage Method, Mesh Current Method, Super- Position, Thevenin's, Norton's and Maximum Power Transfer Theorems.</li> <li>• Conclusion of Unit</li> </ul>  |
| <b>2.</b> | <b>Alternating Quantities and Electrical Installations</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Single Phase AC system: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor, Peak Factor, Power Factor and Quality Factor, Phasor Diagram</li> <li>• Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing. Types of Batteries, Important characteristics for Batteries. Elementary calculations for energy consumption and savings, battery backup.</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>3.</b> | <b>Energy Conversion and Electrical Machines</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Introduction to Energy: Types of Energy, Introduction to Energy Conversion, Sources of Energy (Conventional &amp; Non-Conventional), Energy Scenario in India &amp; Rajasthan.</li> <li>• Rotating Machines: DC Machines: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines. AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3-Phase Synchronous Generator (Alternator), Applications of AC Machines. Electric Vehicle: Introduction to Electric Vehicles: Types of EVs, Applications of EV, Charging of EV. Stationary Machines: Introduction, Construction and Principle of Working of Transformer, EMF Equation,</li> <li>• Conclusion of Unit</li> </ul> |

|           |  |
|-----------|--|
| <b>4.</b> | <b>Basic Electronics</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Semiconductor Devices: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behavior of the PN Junction, PN Junction Diode, Zener Diode, LED, Photovoltaic Cell, Rectifiers, L, C, &amp; L-C filters, BJT, UJT, Transistor as an Amplifier.</li> <li>• Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables.</li> <li>• Conclusion of Unit</li> </ul>  |
| <b>5.</b> | <b>Communication Systems and IoT</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Basics of Communication: Introduction, IEEE Spectrum for Communication Systems, Types of Communication, Amplitude and Frequency Modulation.</li> <li>• Basics of Instrumentation: Introduction to Transducers, Thermocouple, RTD, Strain Gauges, Load Cell and Bimetallic Strip.</li> <li>• An overview of Internet of Things-Building blocks of IoT, IoT enabling technologies, Characteristics of IoT systems and IoT levels, Evolution of the Internet paradigm, Device-to-Device/ Machine-to-Machine Integration</li> <li>• Conclusion of Unit</li> </ul> |

### C. RECOMMENDED STUDY MATERIAL

| Sr.No                      | Reference Book  | Author   | Edition | Publication         |
|----------------------------|---|--|---------|---------------------|
| 1                          | Electrical and Electronic Technology  | Edward Hughes et al,                             | Latest  | Pearson Publication |
| 2                          | Basic Electrical & Electronics Engineering  | V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar | Latest  | Wiley India         |
| 3                          | Basic Electrical & Electronics Engineering  | Van Valkenburge                                  | Latest  | Cengage learning    |
| 4                          | Basic Electrical and Electronics Engineering by,  | Muthusubramian                                   | Latest  | TMH                 |
| 5                          | Basic Electrical & Electronics Engineering  | Ravish Singh                                     | Latest  | TMH                 |
| <b>Important Web Links</b> |   |  |         |                     |
| 1.                         | <a href="https://nptel.ac.in/courses/108108076/">https://nptel.ac.in/courses/108108076/</a>                 |  |         |                     |
| 2.                         | <a href="https://nptel.ac.in/courses/117103063/">https://nptel.ac.in/courses/117103063/</a>                 |  |         |                     |
| 3.                         | <a href="https://nptel.ac.in/courses/108/101/108101091/">https://nptel.ac.in/courses/108/101/108101091/</a> |  |         |                     |

**COURSE OUTCOME**

The student will be able to:

CO1 Analyze the forces act on a component and method of resolution.

CO2 Evaluate centroid and center of gravity of an object and also analyze how to minimize the effort for lifting a load.

CO3 Evaluate the effect of friction and also evaluate forces with the effect of friction.

CO4 Analyze the conversion of linear motion into angular motion and vice versa.

CO5 Analyze the effect of impact on elastic and non-elastic body.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the Unit                      | Time required for the Unit (Hours) |
|----------|--|------------------------------------|
| 1.       | <b>Fundamentals of Mechanics</b>       | <b>8</b>                           |
| 2.       | <b>Machine &amp; Moment of Inertia</b> | <b>8</b>                           |
| 3.       | <b>Friction &amp; Belt Drive</b>       | <b>7</b>                           |
| 4.       | <b>Dynamics of Particles</b>           | <b>8</b>                           |
| 5.       | <b>Work, Power &amp; Impact</b>        | <b>8</b>                           |

**B. DETAILED SYLLABUS**

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Fundamentals of Mechanics</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Fundamental laws of mechanics, Principle of transmissibility.</li> <li>• System of forces, Resultant force, Resolution of force.</li> <li>• Moment and Couples, Varignon's Theorem,</li> <li>• Equilibrium, Conditions for equilibrium, Lami's theorem.</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>2.</b> | <b>Machine &amp; Moment of Inertia</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines.</li> <li>• Centroid &amp; Moment of Inertia: Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section.</li> <li>• Conclusion of Unit</li> </ul>                |
| <b>3.</b> | <b>Friction &amp; Belt Drive</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder.</li> <li>• Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>4.</b> | <b>Dynamics of Particles</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration.</li> <li>• Kinetics of Particles and Rigid Bodies: Newton's laws, Linear Momentum, Equation of motion in rectangular coordinate, Equation of motion in plane for a rigid body, D' Alembert principle.</li> <li>• Conclusion of Unit</li> </ul> |
| <b>5.</b> | <b>Work, Power &amp; Impact</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Work, Energy and Power: Work of a force, weight, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy.</li> <li>• Impact: Collision of elastic bodies, types of impact, conservation of momentum, Newton's law of collision.</li> <li>• Conclusion of Unit</li> </ul>   |

### C. RECOMMENDED STUDY MATERIAL

| Sr.No               | Reference Book  | Author                       | Edition | Publication        |
|---------------------|---|------------------------------|---------|--------------------|
| 1.                  | Vector Mechanics for Engineers  | Beer and Johnston            | Latest  | Tata McGraw Hill   |
| 2.                  | Engineering Mechanics   | D S Kumar                    | Latest  | S K Kataria & Sons |
| 3.                  | Engineering Mechanics Statics   | Meriam, J. L. & Kraige, L. G | Latest  | John Wiley & Son   |
| 4.                  | Engineering Mechanics   | S. Ramamruthan               | Latest  | Dhanpat Rai Pub.   |
| 5.                  | Engineering Mechanics   | Shames                       | Latest  | Pearson Education  |
| Important Web Links |   |                              |         |                    |
| 1.                  | <a href="https://nptel.ac.in/courses/112103109/">https://nptel.ac.in/courses/112103109/</a>   |                              |         |                    |
| 2.                  | <a href="https://nptel.ac.in/courses/112106286/">https://nptel.ac.in/courses/112106286/</a>   |                              |         |                    |
| 3.                  | <a href="https://freevideolectures.com/course/2264/engineering-mechanics">https://freevideolectures.com/course/2264/engineering-mechanics</a> |                              |         |                    |

**Course Outcomes: -**

On completion of the course, students will be able to:

CO1 Identify parts of computer hardware

CO2 Evaluate data representation techniques like binary, hexadecimal and octal

CO3 Design algorithms to solve small computer problems related to daily life

CO4 Apply arithmetic operations and sequential programming using C Language

CO5 Discriminate among while, for and do-while iterative statements

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the unit                                | Time required for the Unit (Hours) |
|----------|--|------------------------------------|
| 1.       | <b>Introduction to C</b>                         | 8                                  |
| 2.       | <b>Data Representation and Looping Statement</b> | 8                                  |
| 3.       | <b>Functions</b>                                 | 7                                  |
| 4.       | <b>Memory Allocation</b>                         | 8                                  |
| 5.       | <b>Concept of I/O File Allocation</b>            | 8                                  |

**B. DETAILED SYLLABUS**

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Introduction to C</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction to the C Language – Algorithm, Pseudo code,</li> <li>• Flow chart, Background, C Programs, Identifiers,</li> <li>• Data Types, Variables, Constants, Input / Output, Operators (Arithmetic, relational, logical, bitwise etc.),</li> <li>• Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.</li> </ul>  |
| <b>2.</b> | <b>Data Representation and Looping Statement</b>   |
|           | <ul style="list-style-type: none"> <li>• Statements- Selection Statements (making decisions) – if and switch statements,</li> <li>• Repetition statements (loops)-while, for, do-while statements,</li> <li>• other statements related to looping – break, continue, go to</li> </ul>  |
| <b>3.</b> | <b>Functions</b>   |
|           | <ul style="list-style-type: none"> <li>• Functions- Introduction to Structured Programming,</li> <li>• Functions- basics, user defined functions, inter function communication (call by value, call by reference),</li> <li>• Standard functions. Storage classes-auto, register, static, extern,</li> <li>• scope rules, arrays to functions, recursive functions,</li> </ul>   |
| <b>4.</b> | <b>Memory Allocation</b>   |
|           | <ul style="list-style-type: none"> <li>• Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays,</li> <li>• Pointers – Introduction (Basic Concepts), pointers to pointers, compatibility, Pointer Applications, Arrays and Pointers, Pointer Arithmetic,</li> <li>• Memory allocation functions, array of pointers, pointers to void</li> <li>• pointers to functions, command –line arguments, Introduction to structures and unions.</li> </ul>  |
| <b>5.</b> | <b>Concept of I/O File Allocation</b>  |
|           | <ul style="list-style-type: none"> <li>• Strings – Concepts, C Strings, String Input / Output functions, string manipulation functions,</li> <li>• string /data conversion. Input and Output – Concept of a file, streams, text files and binary files,</li> <li>• Differences between text and binary files, State of a file,</li> <li>• Opening and Closing files, file input / output functions (standard library input / output functions for files),</li> <li>• file status functions (error handling), Positioning functions.</li> </ul> |



### C. RECOMMENDED STUDY MATERIAL

| Sr.No                      | Reference Book  | Author             | Edition   | Publication      |
|----------------------------|---|--------------------|-----------|------------------|
| 1.                         | Fundamentals of Computers   | V.Rajaraman        | Sixth     | PHI              |
| 2.                         | Computer Fundamentals and Programming in C  | ReemaThareja       | Second    | Oxford           |
| 3.                         | Fundamentals of Computers   | E Balagurusamy     | First     | Tata McGraw Hill |
| 4.                         | Programming in ANSI C   | E Balagurusamy     | Eight     | Tata McGraw Hill |
| 5.                         | Let US C  | Yashavant Kanetkar | Fifteenth | BPB Publications |
| 6.                         | The C Programming language  | Ritchie Kernighan  | Third     | PHI              |
| <b>Important Web Links</b> |   |                    |           |                  |
| 1.                         | <a href="https://www.learn-c.org/">https://www.learn-c.org/</a>   |                    |           |                  |
| 2.                         | <a href="https://www.sanfoundry.com/">https://www.sanfoundry.com/</a>                                       |                    |           |                  |
| 3.                         | <a href="https://nptel.ac.in/courses/106/104/106104128/">https://nptel.ac.in/courses/106/104/106104128/</a> |                    |           |                  |
| 4.                         | <a href="http://www.tutorials4u.com/c/">http://www.tutorials4u.com/c/</a>                                   |                    |           |                  |
| 5.                         | <a href="http://www.howstuffworks.com/c.htm">www.howstuffworks.com/c.htm</a>                                |                    |           |                  |

**COURSE OUTCOME**

The student would be able to:

CO1 Analyze the design and working of Hybrid and Electric Vehicle.

CO2 Understand the importance of Additive Manufacturing (AM) and Rapid Prototyping (RP).

CO3 Create smart devices using Internet of Things (IoT).

CO4 Analyze the future with AI, and AI in Action

CO5 Analyze the Opportunities and Challenges in adoption of Industry 4.0.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the unit  | Time Required for the Unit (Hours) |
|----------|--|------------------------------------|
| 1.       | Introduction to Hybrid and Electric Vehicle                            | 8                                  |
| 2.       | Introduction to Additive Manufacturing (AM) and Rapid Prototyping (RP) | 8                                  |
| 3.       | Introduction to Internet of Things (IoT)                               | 7                                  |
| 4.       | Introduction to Artificial Intelligence (AI) and Blockchain            | 8                                  |
| 5.       | Introduction to Industry 4.0 and 5.0                                   | 8                                  |

**B. DETAILED SYLLABUS**

| Unit      | Contents  |
|-----------|---|
| <b>1.</b> | <b>Introduction to Hybrid and Electric Vehicle</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Hybrid and Electric Vehicles (HEV): History Overview and Modern Applications</li> <li>• Power Flow and Power Management in HEV</li> <li>• Introduction to Electric Drives: Shunt Drives, Series Drives, Compound Drives</li> <li>• Types of Batteries and Energy Storages</li> <li>• Introduction to Power Electronics in Hybrid Electric Vehicles</li> <li>• Case Studies: Toyota Camry Hybrid, MG Hector Hybrid, Tata Nexon EV</li> <li>• Conclusion of Unit</li> </ul>                            |
| <b>2.</b> | <b>Introduction to Additive Manufacturing (AM) and Rapid Prototyping (RP)</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Introduction to reverse engineering Traditional manufacturing v/s AM</li> <li>• Computer aided design (CAD) and manufacturing (CAM) and AM</li> <li>• Different AM processes and relevant process physics AM process chain</li> <li>• Growth of RP industry, and classification of RP systems</li> <li>• Application level: Stereo Lithography Systems, Selective Laser Sintering Fusion, Deposition Modelling, Solid Ground Curing, 3-D Printing processes</li> <li>• Conclusion of Unit</li> </ul> |
| <b>3.</b> | <b>Introduction to Internet of Things (IoT)</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Introduction to IoT</li> <li>• Sensing, Actuation, Basics of Networking</li> <li>• Interoperability in IoT,</li> <li>• Introduction to Arduino Programming: Sensors and Actuators with Arduino</li> <li>• Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi</li> <li>• Case Studies: Smart Cities and Smart Homes, Connected Vehicles, Healthcare,</li> <li>• Conclusion of Unit</li> </ul>  |
| <b>4.</b> | <b>Introduction to Artificial Intelligence (AI) and Blockchain</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• What is AI? Applications and Examples of AI</li> <li>• AI Concepts, Terminology, and Application Areas</li> <li>• AI: Issues, Concerns and Ethical Considerations</li> </ul>   |

|           |  |
|-----------|--|
|           | <ul style="list-style-type: none"> <li>• The Future with AI, and AI in Action</li> <li>• Case Studies: Travel &amp; Navigation, Social Media Feeds, Google Lens and OCR, Smart Cars, Security &amp; surveillance</li> <li>• Introduction to Blockchain Technology</li> <li>• Conclusion of Unit</li> </ul>   |
| <b>5.</b> | <b>Introduction to Industry 4.0 and 5.0</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Introduction to Industry 4.0</li> <li>• Road to Industry 4.0: Smart Manufacturing, Smart Devices and Products, Smart Logistics, Smart Cities, Predictive Analytics</li> <li>• Technologies for enabling Industry 4.0</li> <li>• Opportunities and Challenges</li> <li>• Future of Works and Skills for Workers in the Industry 4.0 Era</li> <li>• Industry 4.0 vs Industry 5.0</li> <li>• Conclusion of Unit</li> </ul> |

### C. RECOMMENDED STUDY MATERIAL:

| Sr. No              | ReferenceBook   | Author           | Edition              | Publication       |
|---------------------|---|------------------|----------------------|-------------------|
| 1                   | Electric and Hybrid Vehicles  | A.K. Babu        | Second Edition, 2022 | Khanna Publishing |
| 2                   | Artificial Intelligence: Concepts and Applications  | Lavika Goel      | 2021                 | Wiley             |
| 3                   | Industry 4.0: Challenges, Trends, and Solutions in Management and Engineering   | Carolina Machado | 2021                 | CRC Press         |
| 4                   | Additive Manufacturing  | C. P. Paul       | 2021                 | McGraw Hill       |
| Important Web Links |   |                  |                      |                   |
| 1                   | <a href="https://nptel.ac.in/courses/106105195">https://nptel.ac.in/courses/106105195</a>   |                  |                      |                   |
| 2                   | <a href="https://www.linkedin.com/learning/foundations-of-the-fourth-industrial-revolution-industry-4-0">https://www.linkedin.com/learning/foundations-of-the-fourth-industrial-revolution-industry-4-0</a> |                  |                      |                   |
| 3                   | <a href="https://nptel.ac.in/courses/108103009">https://nptel.ac.in/courses/108103009</a>   |                  |                      |                   |
| 4                   | <a href="https://onlinecourses.nptel.ac.in/noc22_cs56/preview">https://onlinecourses.nptel.ac.in/noc22_cs56/preview</a>   |                  |                      |                   |

# PRACTICAL

Code: BTXCME2201

MACHINE DRAWING LAB

1 Credit [LTP: 1-0-2]

## COURSE OUTCOME

The student would be able to:

CO1 Apply the concepts of sectioning, true section and apparent section and create the sectional views of the engineering components.

CO2 analyze the development of surface and analyze the sheet metal requirement for fabricating a surface.

CO3 analyze the curves produced due to intersections of different surfaces.

CO4 create isometric views of various engineering components.

CO5 create multi view drawings of simple and complex engineering components

## A. LIST OF EXPERIMENT

|              |   |
|--------------|---|
| 1.           | Introduction to machine drawing   |
| 2.           | Dimensioning, locations and placing   |
| 3.           | <b>Orthographic projections:</b> First & third angle methods<br>Drawing Sheet 1: Orthographic Projections (3 Problems)<br>Drawing Sheet 2: Sectional Views (3 Problems)<br>Drawing Sheet 3: Riveted joints, lap joints, butt joints, chain riveting, zig-zag riveting<br>Drawing Sheet 4: Screw fasteners, different threads, Nuts & bolts locking devices, set screws, foundation<br>Drawing Sheet 5: Bearing, Plumber block |
| 4.           | Instructions on free hand sketches List of free hand sketches <ul style="list-style-type: none"><li>• Different type of lines</li><li>• Conventional representation of materials</li><li>• Screw fasteners</li><li>• Bearing: Ball, roller, needle, foot step bearing</li><li>• Coupling: Protected type, flange, and pin type flexible coupling</li><li>• Welded joints</li></ul>  |
| Virtual Labs |   |
| 1            | <a href="http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php">http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php</a>   |

**COURSE OUTCOME:-**

Students will be able to:

CO1 Analyze the concept of interference with the help of Newton's ring and dispersive power through prism.

CO2 Evaluate the resolving power through diffraction grating and double slit arrangement.

CO3 Apply the numerical aperture of optical fiber and Coherent length and time using He-Ne laser.

CO4 Evaluate the height of the unknown object by Sextant.

CO5 Analyze the mechanism of Ballistic Galvanometer and evaluate the specific resistance of wire through Carey's foster bridge.

**A. LIST OF EXPERIMENTS:**

|              |   |
|--------------|---|
| 1.           | To determine the wave length of Sodium light by Newton's Ring   |
| 2.           | To determine the dispersive power of material of a prism for violet, red and yellow color of mercury light with the help of spectrometer.                                     |
| 3.           | To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer   |
| 4.           | To verify the expression for the resolving power of Telescope   |
| 5.           | To measure the numerical Aperture of an optical fibre by He-Ne laser  |
| 6.           | To determine the coherent length and coherent time by using He-Ne laser   |
| 7.           | To study the variation of a semiconductor resistance with temperature and hence determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode. |
| 8.           | To study the characteristics of semiconductor diode and determine forward and reverse bias resistance   |
| 9.           | To Determine the height of a given line drawn on the wall by sextant  |
| 10.          | To study the charging and discharging of a condenser and hence determine time constant (both current and voltage graphs are to be plotted)                                    |
| 11.          | To determine the high resistance by method of leakage, using a ballistic galvanometer.  |
| 12.          | To specify the specific resistance of a material of a wire by carey foster's bridge.  |
| Virtual Labs |   |
| 1            | <a href="http://vlab.amrita.edu/?sub=1&amp;brch=282">http://vlab.amrita.edu/?sub=1&amp;brch=282</a>   |
| 2            | <a href="http://vlabs.iitb.ac.in/vlab/labsps.html">http://vlabs.iitb.ac.in/vlab/labsps.html</a>   |
| 3            | <a href="https://praxilabs.com/en/virtual-labs.aspx?TAB=1#LOL">https://praxilabs.com/en/virtual-labs.aspx?TAB=1#LOL</a>   |

**COURSE OUTCOMES:-**

Students will be able to:

CO1 Analyze the house wiring connections of various equipments such as energy meter, ceiling fan, tubelight etc.

CO2 Create the connections of single phase and three phase induction motors.

CO3 Create circuits and connects of various electrical components such as Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, etc.

CO4 Analyze the effect of L, C and L-C filters in single phase half wave and full wave bridge rectifier

CO5 Analyze the effect of LC and LC filters in current and power rectifiers

**A. LIST OF EXPERIMENTS:**

|             |  |
|-------------|--|
| 1           | Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring. |
| 2           | Prepare the connection of ceiling fan along with the regulator and vary the speed.   |
| 3           | Prepare the connection of single phase induction motor through 1-Phase Auto-transformer and vary the speed.  |
| 4           | Prepare the connection of three phase squirrel cage induction motor through 3-Phase Autotransformer and vary the speed.  |
| 5           | Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.  |
| 6           | Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.                 |
| 7           | Measure the frequency, voltage, current with the help of CRO.  |
| 8           | Assemble the single phase half wave and full wave bridge rectifier & the analyse effect of L, C and L-C filters in rectifiers.   |
| 9           | Study the BJT amplifier in common emitter configuration. Measure voltage gain plot gain frequency response and calculate its bandwidth.  |
| 10          | Verify the truth table of AND, OR, NOT, NOR and NAND gates   |
| 11          | Prepare the connection of sodium lamp and measure voltage  |
| 12          | Analyze the effect of LC and LC filters in current and power rectifiers  |
| Virtual Lab |  |
| 1           | <a href="http://vlabs.iitkgp.ernet.in/be/">http://vlabs.iitkgp.ernet.in/be/</a>  |
| 2           | <a href="http://em-coep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical%20Engineering">http://em-coep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical%20Engineering</a>                                  |

**COURSE OUTCOMES:-**

Students will be able to:

CO1 Create a model of T Lap and T- Bridle Joint through carpentry shop

CO2 Analyze the making of prototype model through foundry shop

CO3 Analyze the difference between gas welding and arc welding and their applications

CO4 Create a model on fitting shop through filing, drilling and tapping operation

CO5 Analyze the difference between forging, moulding and casting

**A. LIST OF EXPERIMENTS**

|    |  |
|----|--|
| 1. | <b>Carpentry Shop</b> <ul style="list-style-type: none"> <li>• Timber, definition, engineering applications, seasoning and preservation</li> <li>• Plywood and ply boards</li> </ul>   |
| 2. | <b>Foundry Shop</b> <ul style="list-style-type: none"> <li>• Moulding Sands, constituents and characteristics</li> <li>• Pattern, definition, materials types, core prints</li> <li>• Role of gate, runner, riser, core and chaplets</li> <li>• Causes and remedies of some common casting defects like blow holes, cavities, inclusions</li> </ul>  |
| 3. | <b>Welding Shop</b> <ul style="list-style-type: none"> <li>• Definition of welding, brazing and soldering processes and their applications</li> <li>• Oxyacetylene gas welding process, equipment and techniques, types of flames and their applications</li> <li>• Manual metal arc welding technique and equipment, AC and DC welding</li> <li>• Electrodes: Constituents and functions of electrode coating, welding positions</li> <li>• Types of welded joints, common welding defects such as cracks, undercutting, slag inclusion and boring</li> </ul> |
| 4. | <b>Fitting Shop</b> <ul style="list-style-type: none"> <li>• Files, materials and classification.</li> </ul>   |
| 5. | <b>Smithy Shop</b> <ul style="list-style-type: none"> <li>• Forging, forging principle, materials</li> <li>• Operations like drawing, upsetting, bending and forge welding</li> <li>• Use of forged parts</li> </ul>   |

**List of Jobs to be made in the Workshop Practice**

|    |  |
|----|--|
| 1. | <b>Carpentry Shop</b> <ol style="list-style-type: none"> <li>1. T – Lap joint</li> <li>2. Bridle joint</li> </ol>  |
| 2. | <b>Foundry Shop</b> <ol style="list-style-type: none"> <li>3. Mould of any pattern</li> </ol>  |
| 3. | <b>Welding Shop</b> <ol style="list-style-type: none"> <li>4. Square butt joint by MMA welding</li> <li>5. Lap joint by MMA welding</li> </ol>   |
| 4. | <b>Machine Shop Practice</b> <ol style="list-style-type: none"> <li>6. Job on lathe with facing operation</li> <li>7. Job on lathe with one step turning and chamfering operations</li> <li>8. Job on shaper for finishing two sides of a job</li> </ol>                         |
| 5. | <b>Fitting Shop</b> <ol style="list-style-type: none"> <li>9. Finishing of two sides of a square piece by filing</li> <li>10. Drilling operation on fitted job (two holes)</li> <li>11. Slotting operation on fitted job</li> <li>12. Tapping operation on fitted job</li> </ol> |

**COURSE OUTCOME: -**

On completion of the course, students will be able to:

CO1 Prepare documents, worksheets and presentations using MS Word, Excel and PowerPoint.CO2

Perform arithmetic and conditional operations using C Language.

CO3 Design program based on iterative statements using C Language.CO4

Perform array operations to solve computer problems.

CO5 Demonstrate the use of pointers and structures.

**A. LIST OF EXPERIMENTS:**

|     |   |
|-----|---|
|     | MS Office   |
| 1.  | Implement basic features of MS Office, Prepare a document using MS-Word                                       |
| 2.  | Prepare a Sheet using MS Excel and Slides using MS PowerPoint   |
|     | Programming In C  |
| 3.  | Programs to demonstrate the use of input and output in C Language including data types and format specifiers. |
| 4.  | Program to evaluate arithmetic operations in C Language   |
| 5.  | Program to apply conditional operators. (if-else, switch-case)  |
| 6.  | Program to design program using iterative statements. (while, for and do-while)                               |
| 7.  | Program to implement input, output and manipulation operations on Array.                                      |
| 8.  | Program to perform matrix addition and multiplication.  |
| 9.  | Program to demonstrate declaration, definition, initialization and access operations on pointers.             |
| 10. | Program to solve problems of collection of different data types using structures.                             |
|     | Virtual Lab   |
| 1   | <a href="http://cse02-iiith.vlabs.ac.in/">http://cse02-iiith.vlabs.ac.in/</a>                                 |



**COURSE OUTCOME: -**

Students will be able to:

CO1 Apply the concept of scale and their applications

CO2 Analyze the different applications of conic section and engineering curves and also how to draw on sheet

CO3 Analyze the use of projection and also analyze the difference between first and third angle projection method

CO4 Apply the concept of sectioning and draw sheet on section of solid

CO5 Analyze the use of development and their application

**(Theory Concepts)****A. List of Experiments**

|    |  |
|----|--|
| 1. | <ul style="list-style-type: none"> <li>• Lines, Lettering and Dimension (Sketch Book)</li> <li>• Scales: Representative Fraction, plain scales, diagonal scales, (In drawing sheet)</li> </ul>   |
| 2. | <ul style="list-style-type: none"> <li>• Conic Sections: Construction of ellipse, parabola and hyperbola by different methods( in drawing sheet)</li> <li>Engineering Curves: Construction of Cycloid, Epicycloids, Hypo-cycloid( in drawing sheet)</li> </ul>   |
| 3. | <ul style="list-style-type: none"> <li>• Type of Projection, Orthographic projection: first angle and third angle projection (in drawing sheet)</li> <li>• Projection of Points</li> <li>• Projection of Straight lines</li> <li>• Projection of planes: Different positions of plane lamina like: regular polygon, circle of three planes (four problems in drawing sheet)</li> <li>• Projection of Solids: Projection of right and regular polyhedron, cone (four problem in drawing sheet)</li> </ul> |
| 4. | <ul style="list-style-type: none"> <li>• Sections of Solids: Projection of Frustum of a cone and pyramid (in drawing sheet)</li> </ul>   |
| 5. | <ul style="list-style-type: none"> <li>• Development of Surfaces: Parallel line and radial line method for right solids, Regular Solids (in drawing sheet)</li> <li>• Isometric Projections: Isometric Scale, Isometric axes, Isometric View of geometrical shapes (in drawing sheet)</li> </ul>   |

**(Practical Concepts)**

|                     |  |
|---------------------|--|
| 6.                  | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Line (coordinate Methods)</li> <li>• Dimension</li> <li>• Scale</li> </ul>  |
| 7.                  | <ul style="list-style-type: none"> <li>• Rectangle</li> <li>• Conic Section</li> <li>• Construction of ellipse, Parabola &amp; Hyperbola, Polygon</li> <li>• Circle</li> </ul>   |
| 8.                  | <ul style="list-style-type: none"> <li>• AutoCAD commands (copy, Mirror, Move, Array, Block, Group, Join, Hatch etc.)</li> </ul>   |
| 9.                  | <ul style="list-style-type: none"> <li>• Type of Projection , Orthographic projection: First Angle and Third Angle projection</li> <li>• Projection of Points</li> <li>• Projection of Straight lines, different positions of straight lines</li> <li>• Projection of planes</li> <li>• Projection of Solids: projection of right and regular polyhedron and cone</li> </ul> |
| 10.                 | <ul style="list-style-type: none"> <li>• Section of solids: projection of frustum of a cone and pyramid</li> <li>• Isometric projections</li> </ul>  |
| <b>Virtual Labs</b> |  |
| 1                   | <a href="http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php">http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php</a>  |

**COURSE OUTCOME:**

On successful completion of the course, the learners will be able to:

| CO    | Cognitive Abilities              | Course Outcomes   |
|-------|----------------------------------|---|
| CO-01 | Understanding/ Applying/Creating | Demonstrate the grammar skills involved in writing sentences and short paragraphs.  |
| CO-02 | Understanding/ Applying          | Build up a good command over English grammar and vocabulary to be able to ace error spotting.   |
| CO-03 | Understanding/ Applying/Creating | Define unknown words in sentence level context using a picture dictionary or by creating a memory link for support.                           |
| CO-04 | Understanding / Applying         | Understand, analyze and effectively use the conventions of the English language.  |
| CO-05 | Understanding/Applying           | Develop their interest in reading and enhance their oral and silent reading skills along with sharpen their critical and analytical thinking. |

| UNIT NO. | UNIT NAME   | HOURS |
|----------|---|-------|
| 1        | Basics of Grammar                                 | 8     |
| 2        | Spotting the grammatical errors and rectification | 2     |
| 3        | Vocabulary Building                               | 4     |
| 4        | Basics of Writing Skills                          | 2     |
| 5        | Reading Comprehension                             | 8     |

| LIST OF ACTIVITIES |   |
|--------------------|---|
| 1.                 | Parts of Speech: Theory & Practice through various Exercises  |
| 2.                 | Sentence Structures: Theory & Practice through various Exercises  |
| 3.                 | Tenses: Theory & Practice through various Exercises   |
| 4.                 | Spotting the Errors: Applying the rules and Practice Questions  |
| 5.                 | Vocabulary Building-I: Practice by sentence formation   |
| 6.                 | Vocabulary Building-II: Practice by sentence formation  |
| 7.                 | Paragraph Writing   |
| 8.                 | Article Writing   |
| 9.                 | Précis Writing  |
| 10.                | Formal & Informal Letter Writing  |
| 11.                | Reading Comprehension- I: Beginner's level reading and Answering the Questions (Competitive Exams)      |
| 12.                | Reading Comprehension- II: Intermediate's level reading and Answering the Questions (Competitive Exams) |

**COURSE OUTCOME:**

On successful completion of the course the learners will be able to

| CO    | Cognitive Abilities              | Course Outcomes   |
|-------|----------------------------------|---|
| CO-01 | Understanding/ Applying/Creating | Understand the nuances of language through audio-visual experience and group activities.  |
| CO-02 | Understanding/ Applying          | Neutralize the accent for intelligibility and develop confidence in speaking with clarity enhancing their employability skills. |
| CO-03 | Understanding/ Applying/Creating | Demonstrate an understanding of grammatical structures in conversations and discussions.  |
| CO-04 | Understanding / Applying         | Utilize the knowledge of confidence building strategies to manage one's own thoughts and emotions.                              |
| CO-05 | Understanding/Applying           | Identify the requirements of skills development and apply their learning to sharpen the same.                                   |

| UNIT NO. | UNIT NAME   | HOURS |
|----------|---|-------|
| 1        | Introduction to Communication Skills on Learning Software | 6     |
| 2        | Concepts of Phonetics                                     | 4     |
| 3        | Grammar Practice  | 2     |
| 4        | Confidence Enhancement Activities                         | 4     |
| 5        | Skills Enhancement Activities                             | 8     |

| LIST OF LABS |                                 |
|--------------|---------------------------------|
| 1.           | Listening Skills                |
| 2.           | Reading Comprehension           |
| 3.           | Writing Skills                  |
| 4.           | Phonetics I                     |
| 5.           | Phonetics II                    |
| 6.           | Grammar and Common Errors Usage |
| 7.           | Conversation                    |
| 8.           | Role Plays                      |
| 9.           | Presentation Skills I           |
| 10.          | Presentation Skills II          |
| 11.          | Group Discussion                |
| 12.          | Interview Skills                |

**Software used in Language Lab: EL-Client**

| S.No. | Topics   | Exercises  |
|-------|--|--|
| I     | Listening Skills:<br>Fourteen Lessons each containing five exercises   |  |
| II    | Fundamental Language Skills:<br>Introductory Lessons<br>Basic Lessons (a) Reading<br>Basic Lessons (a) Grammar<br>Basic Lessons (a) Vocabulary<br>Basic Lessons (a) Writing<br>Basic Lessons (b)-(c) Reading<br>Basic Lessons (b)-(c) Grammar<br>Basic Lessons (b) Vocabulary<br>Basic Lessons (b) Writing | 5exercises<br>6exercises<br>3exercises<br>6exercises<br>5exercises<br>9exercises<br>9exercises<br>5exercises<br>3exercises |
| III   | Communication Skills:  |  |

|     |  |             |
|-----|--|-------------|
|     | Reading Comprehension<br>Vocabulary<br>Grammar<br>Writing<br>Exercises on Reading, Vocabulary, Grammar and Writing |             |
| IV  | Vocabulary:<br>Word mentor: Various games based on the formation of words.   |             |
| V   | Phonetics:<br>Consonants<br>Vowels<br>Diphthongs<br>Intonation<br>Correct Pronunciation                            |             |
| VI  | English as Second Language   | 45exercises |
| VII | Conversations:<br>Nine topics for conversations.   |             |

- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students

**COURSE OUTCOME**

The student would be able to:

CO1 Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.

CO2 Use their knowledge of polymers and glass and its use in industries and daily life.

CO3 Identify practices for the prevention and remediation of corrosion.

CO4 Characterize the fuels and analyze the combustion mechanisms of various fuels.

CO5 Understand the manufacturing of cement and the chemistry involved in setting and hardening of it and also learn about the suitable use of lubricants.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the unit                | Time required for the Unit (Hours) |
|----------|----------------------------------|------------------------------------|
| 1.       | Water Technology                 | 8                                  |
| 2.       | Polymer and Glass                | 7                                  |
| 3.       | Corrosion and its control        | 6                                  |
| 4.       | Fuel and Fuel Analysis           | 8                                  |
| 5.       | Binding Materials and Lubricants | 7                                  |

**B. DETAILED SYLLABUS**

| Unit | Unit Details   |
|------|--|
| 1.   | <p><b>Water Technology</b></p> <ul style="list-style-type: none"> <li>• Introduction of Unit</li> </ul> <p><b>Water</b></p> <ul style="list-style-type: none"> <li>• Sources of water, Impurities in water and effect of impurities</li> <li>• Municipal water supply: Requisites of drinking water, Steps involved in purification of water, Sedimentation, Coagulation, Filtration and Disinfection, Break Point Chlorination</li> </ul> <p><b>Water Analysis</b></p> <ul style="list-style-type: none"> <li>• Hardness of water; Type of hardness, Degree of hardness, Units of hardness, Disadvantages of hard water, Determination of hardness by Complexometric (EDTA) method, Numericals based on hardness by EDTA method</li> <li>• Boiler Troubles: Formation of solids (scale and sludge), Carry over (Priming and Foaming), Caustic Embrittlement, Disadvantages and Prevention</li> <li>• Treatment of hard water: Lime-soda method, Permutit (zeolite) method and Deionization or Demineralization method, Numerical problems based on Lime-soda and Zeolite softening methods</li> <li>• Desalination: Reverse osmosis, Electrodialysis</li> <li>• Conclusion of Unit</li> </ul> |
| 2.   | <p><b>Polymer and Glass</b></p> <ul style="list-style-type: none"> <li>• Introduction of Unit</li> </ul> <p><b>Polymers</b></p> <ul style="list-style-type: none"> <li>• Introduction to Polymer chemistry:, Classification of Polymers and Types of polymerization</li> <li>• Plastics: Constituents of plastics, Thermosets and Thermoplastics, Preparation, Properties and Uses of Polyethylene, Bakelite, Teflon, Terylene and Nylon</li> <li>• Elastomers: Natural rubber, Vulcanization, Synthetic rubber- Preparation, Properties and Applications of SBR, Buna-N, Butyl and Neoprene rubber.</li> </ul> <p><b>Glass</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition of glass, its Properties, Manufacturing of glass, Importance of annealing in glass making, Types of silicate glasses and their commercial uses.</li> <li>• Conclusion of Unit</li> </ul>   |

|           |  |
|-----------|--|
| <b>3.</b> | <b>Corrosion and its control</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> </ul> <p><b>Corrosion and its control</b></p> <ul style="list-style-type: none"> <li>• Definition of corrosion and its Significance</li> <li>• Mechanisms of Corrosion: Chemical (Dry) corrosion and Electrochemical (Wet) corrosion</li> <li>• Types of corrosion: Galvanic corrosion, Concentration cell corrosion, Stress corrosion, Pitting corrosion</li> <li>• Factors affecting the rate of corrosion</li> <li>• Protection from corrosion : Material selection and design, Improvement of Environment , Coating of metallic surface, Cathodic protection, Anodic protection, Electroplating, Tinning, Galvanization and Modification in designs . Some practical examples of corrosion.</li> <li>• Conclusion of Unit</li> </ul>  |
| <b>4.</b> | <b>Fuel and Fuel Analysis</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> <li>• Classification and general aspects of fuel.</li> <li>• Solid fuel: Coal, Types of coal, Carbonization of coal</li> <li>• Liquid fuel: Processing of crude petroleum, Cracking, Thermal Cracking and Catalytic Cracking, Synthetic petrol (Coal to Liquid (CTL) Technology): Bergius and Fischer Tropsch process. Knocking, Octane number and Cetane number, Anti-knocking and Anti-knocking agents</li> <li>• Gaseous fuel: Advantages of gaseous fuel, Biogas, LPG, CNG</li> <li>• Analysis of Coal: Ultimate and Proximate analysis of coal</li> <li>• Calorific Value: Definition, Higher calorific value, Lower calorific value, Determination of higher &amp; lower calorific value by Bomb Calorimeter</li> <li>• Fuel gas analysis by Orsat's apparatus and its significance</li> <li>• Numericals based on Bomb</li> <li>• Numericals based on combustion and requirement of oxygen/ air in combustion process</li> <li>• Conclusion of Unit</li> </ul> |
| <b>5.</b> | <b>Binding Materials and Lubricant</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction of Unit</li> </ul> <p><b>Binding Materials</b></p> <ul style="list-style-type: none"> <li>• Cement: Composition and Significance of cement</li> <li>• Manufacturing of Portland cement by Rotary Kiln Technology</li> <li>• Chemistry of setting and hardening of cement and role of gypsum</li> </ul> <p><b>Lubricants</b></p> <ul style="list-style-type: none"> <li>• Introduction of lubricants, Classification, Properties and Uses of lubricants</li> <li>• Mechanism of lubrication, Selection of lubricants</li> <li>• Properties of lubricants: Viscosity &amp; Viscosity Index, Flash and Fire Point, Cloud and Pour Point, Carbon Residue, Oiliness, Aniline Point, Steam Emulsification Number, Precipitation Number and Neutralization Number</li> <li>• Conclusion of Unit</li> </ul>  |

### C. RECOMMENDED STUDY MATERIAL

| Sr.No                       | Reference Book  | Author             | Edition | Publication              |
|-----------------------------|---|--------------------|---------|--------------------------|
| 1.                          | Engineering Chemistry   | P.C. Jain          | Latest  | Dhanpat Rai&Sons         |
| 2.                          | Engineering Chemistry.  | S. S. Dara         | Latest  | S. Chand & Co.           |
| 3.                          | Chemistry in Engineering & Tech.  | Rajaram, Kuriacose | Latest  | Tata McgrawHill          |
| 4.                          | Physical Chemistry  | P.W. Atkins        | Latest  | Oxford University Press. |
| <b>Important Web Links:</b> |   |                    |         |                          |
| 1.                          | <a href="https://civilengineersforum.com/cement-manufacturing-process/">https://civilengineersforum.com/cement-manufacturing-process/</a> |                    |         |                          |
| 2.                          | <a href="https://www.explainthatstuff.com/lubricants.html">https://www.explainthatstuff.com/lubricants.html</a>                           |                    |         |                          |
| 3.                          | <a href="https://nptel.ac.in/courses/122/101/122101001/">https://nptel.ac.in/courses/122/101/122101001/</a>                               |                    |         |                          |

**COURSE OUTCOME**

The student would be able to:

CO1 Analyze hardness and fluoride content of water.

CO2 Analyze the strength of NaOH and Na<sub>2</sub>CO<sub>3</sub> solutions.

CO3 Analyze hardness strength of Ferrous Ammonium sulphate solution and CuSO<sub>4</sub> solution

CO4 Analyze the different properties of lubricating oil.

CO5 Use different instruments & analytical techniques.

**A. LIST OF EXPERIMENTS**

| EXPERIMENTS  |   |
|--------------|---|
| 1.           | To determine the hardness of water by EDTA method.  |
| 2.           | To determine the amount of fluoride in drinking water   |
| 3.           | To determine the strength of NaOH and Na <sub>2</sub> CO <sub>3</sub> in a given alkali mixture.  |
| 4.           | To determine the strength of Ferrous Ammonium sulphate solution with the help of K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> solution using diphenyl amine as internal indicator. |
| 5.           | To determine the strength of CuSO <sub>4</sub> solution with the help of hypo solution.   |
| 6.           | To determine the acid value of a given oil.   |
| 7.           | To determine the viscosity of a given lubricating oil by Redwood viscometer.  |
| 8.           | To determine the flash and fire point of a given lubricating oil.   |
| 9.           | To determine the cloud and pour point of a given oil.   |
| 10.          | Synthesis of Bakelite   |
| 11.          | To determine the calorific value of a fuel by Bomb Calorimeter.   |
| 12.          | To determine the Saponification No. of a given oil.   |
| Virtual Labs |   |
| 1.           | <a href="https://www.youtube.com/watch?v=RzAPQPWOINI">https://www.youtube.com/watch?v=RzAPQPWOINI</a>   |
| 2.           | <a href="https://vlab.amrita.edu/?sub=3&amp;brch=63&amp;sim=688&amp;cnt=1">https://vlab.amrita.edu/?sub=3&amp;brch=63&amp;sim=688&amp;cnt=1</a>                                     |

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Second Year - Third Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>A.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCSA3101  | Engineering Mathematics - II  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCCV3102  | Fluid Mechanics   | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV3103  | Strength of Material  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV3104  | Building Technology   | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| <b>B. 2</b> | <b>Practical</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV3201  | Auto Cad Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV3202  | Fluid Mechanics Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV3203  | Material Testing Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV3204  | Computer Programming for Civil Engineers Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |             |           |
| BCVECV3111  | Building Material & Construction  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVECV3112  | Engineering Geology & Rock Mechanics  |                                    |                  |                  |                       |            |             |           |
| BCVECV3113  | Sustainable Engineering   |                                    |                  |                  |                       |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |             |           |
|             | As Per Annexure-I   | 2                                  | 0                | 0                | 40                    | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |             |           |
| BCVCHM3209  | Human Values & Professional Ethics  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |             |           |
|             | NA  |                                    |                  |                  |                       |            |             |           |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV3601  | Non Syllabus Project  | 1                                  | -                | -                | 50                    | -          | 50          | 1         |
|             | Online Certification Course   | 2                                  | -                | -                |                       |            |             |           |
|             | <b>Total</b>  | <b>20</b>                          | <b>3</b>         | <b>10</b>        |                       |            |             |           |
|             | <b>Total Teaching Hours</b>   | <b>33</b>                          |                  |                  | <b>590</b>            | <b>560</b> | <b>1150</b> | <b>23</b> |



**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Analyze different numerical methods which can be used for the solution of non-linear problems.
- CO2** Analyze application of numerical methods, statistical concepts and linear algebra for solving different engineering problems.
- CO3** Know the usage of an adequate scientific language to formulate the basic concepts of the course.
- CO4** Apply the fundamental concepts of Ordinary Differential Equations and Partial Differential Equations and the basic numerical methods for their resolution.
- CO5** Gain the knowledge of ordinary and partial differential equations and their application in Civil Engineering.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the unit                        | Time required for the Unit (Hours) |
|----------|--|------------------------------------|
| 1.       | Approximation & Error Analysis           | 9                                  |
| 2.       | Linear Algebraic Equation                | 9                                  |
| 3.       | Interpolation                            | 10                                 |
| 4.       | Numerical Integration                    | 10                                 |
| 5.       | Ordinary & Partial Differential Equation | 10                                 |

**B. DETAILED SYLLABUS**

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Approximation &amp; Error Analysis</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Approximation &amp; Error analysis</li> <li>• Approximations and round of errors</li> <li>• Truncation errors and Taylor Series</li> <li>• Roots of Non-linear Equations</li> <li>• Determination of roots of polynomials and transcendental equations by Bisection, Secant and Bairstow’s method</li> <li>• Newton-Raphson method</li> <li>• Successive substitution method.</li> </ul> |
| <b>2.</b> | <b>Linear Algebraic Equation</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Linear Algebraic Equation</li> <li>• Solutions of linear simultaneous linear algebraic equations by Gauss Elimination and Gauss- Siedel iteration methods</li> <li>• LU Decomposition methods.</li> </ul>  |
| <b>3.</b> | <b>Interpolation</b>  |

|           |   |
|-----------|---|
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Interpolation</li> <li>• Newton Forward interpolation</li> <li>• Newton Backward Interpolation</li> <li>• Stirling formula</li> <li>• Lagrange's Formula</li> <li>• Numerical Differentiation (Upto First derivative)</li> <li>• Curve fitting- Fitting of Straight Line, fitting of Parabola.</li> </ul>  |
| <b>4.</b> | <b>Numerical Integration</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Numerical Integration</li> <li>• Trapezoidal method</li> <li>• Simpson's 1/3 method</li> <li>• Simpson's 3/8 method</li> <li>• Applications of Numerical Integration in finding Area under the curve.</li> </ul>   |
| <b>5.</b> | <b>Ordinary &amp; Partial Differential Equation</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Ordinary Differential Equation</li> <li>• Numerical solution of ordinary differential equations by Euler, Modified Euler, Runge-Kutta and Milne's Predictor-Corrector method.</li> <li>• Partial Differential Equation: Elliptic equation &amp; parabolic equation &amp; their solution techniques.</li> <li>• Finite Element Method: General approach and concept.</li> </ul> |

### C. RECOMMENDED STUDY MATERIAL:

| Sr. No | Reference Book   | Author              | Edition | Publications         |
|--------|--|---------------------|---------|----------------------|
| 1.     | Numerical Methods and Statistical Techniques using 'C' | Manish Goyal        | Latest  | Laxmi Publications   |
| 2.     | Numerical Methods for Engineers and Scientists         | Jain- Iyenger- Jain | Latest  | New Age Publications |
| 3.     | Advanced Engineering Mathematics                       | B S Grewal          | Latest  | Khanna Publications  |
| 4.     | Numerical Methods with programming in C                | T Veerarajan        | Latest  | (TMH)                |

#### Websites

<https://nptel.ac.in/courses/122107036/>  
<https://nptel.ac.in/courses/122104017/>  
<https://nptel.ac.in/courses/111107127/>  
<https://nptel.ac.in/courses/111107119/>  
<https://nptel.ac.in/courses/111105035/>  
<https://nptel.ac.in/courses/111105134/>  
<https://nptel.ac.in/courses/111105121/>

**COURSE OUTCOME:** After Successful completion of the course students will be able to-:

**CO1:** Differentiate among ideal, real, Newtonian and non-Newtonian types of fluid based on Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

**CO2:** Apply absolute, gauge and atmospheric pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.

**CO3:** Derive velocity, discharge and shear stress of laminar and turbulent flow of fluid.

**CO4:** Apply Bernoulli and momentum equations on pitot tube, orifice meter, venturimeter, notches, weirs and mouthpiece to measure discharge and velocity.

**CO5:** Evaluate between laminar and turbulent flow through pipes based on Reynold's number, friction factor and losses.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit  | Time required for the Unit (Hours) |
|----------|--|------------------------------------|
| 1.       | Fluids & Its Properties                                  | 7                                  |
| 2.       | Hydrostatics & Buoyancy                                  | 11                                 |
| 3.       | Hydro – Kinematics                                       | 11                                 |
| 4.       | Bernoulli's Theorem, Momentum Equation & its Application | 10                                 |
| 5.       | Flow through Pipes                                       | 9                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Fluids &amp; Its Properties</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition</li> <li>• Ideal fluids, real fluids</li> <li>• Newtonian and non-Newtonian fluids</li> <li>• Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.</li> </ul>  |
| <b>2.</b> | <b>Hydrostatics &amp; Buoyancy</b>  |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure</li> <li>• Manometers Bourdon pressure gauge.</li> <li>• Forces acting on immersed plane surface.</li> <li>• Centre of pressure, forces on curved surfaces.</li> <li>• Conditions of equilibrium for floating bodies, meta-center and metacentric height experimental and analytical determination of metacentric height.</li> </ul> |
| <b>3.</b> | <b>Hydro – Kinematics</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> </ul>  |

|           |   |
|-----------|---|
|           | <ul style="list-style-type: none"> <li>• Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.</li> <li>• <b>Types of Flows</b> : Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes</li> <li>• Principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective,</li> <li>• Rotational and irrotational motions, free and forced vortex, circulation and vorticity velocity potential and stream function, elementary treatment of flow net.</li> <li>• Euler's equations of motion and integration of Euler's equations</li> <li>• Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.</li> </ul> |
| <b>4.</b> | <b>Bernoulli's Theorem, Momentum Equation &amp; its Application</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Pitot tube, Venturimeter, orifice meter, orifices &amp; mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches</li> <li>• Francis formula. Velocity of approach.</li> <li>• End contractions Cippoletti Weir, time of emptying reservoirs by weirs.</li> <li>• Development of momentum equation by control volume concept,</li> <li>• Momentum correction factor, applications – Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.</li> </ul>  |
| <b>5.</b> | <b>Flow through Pipes</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Laminar flow, Reynolds experiment, transition from laminar to turbulent flow.</li> <li>• Turbulent Flow: Laws of fluid friction, friction factor Moody's diagram, loss of head due to friction and other causes.</li> <li>• Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes.</li> <li>• Flow along a by-pass</li> <li>• Power transmission through pipe, condition for maximum power.</li> <li>• Elementary water hammer concept.</li> </ul>  |

### C. RECOMMENDED STUDY MATERIAL:

| S.No  | Reference Book  | Author        | Edition | Publisher   |
|---|-----------------|---------------|---------|---|
| 1.  | Fluid Mechanics | Modi& Seth    | 22nd    | STANDARD BOOK HOUSE;  |
| 2.  | Fluid Mechanics | D.S. Kumar    | Latest  | S.K. Kataria & Sons;  |
| 3.  | Fluid Mechanics | R.K. Bansal   | Latest  | Laxmi Publications; (2018)                                  |
| 4.  | Fluid Mechanics | Frank M White | Latest  | McGraw Hill Education India Private Limited; Eighth edition |
| 5.  | Fluid Mechanics | R.K. Rajput   | Latest  | S Chand & Company   |
| <b>Websites</b>   |                 |               |         |   |
| <a href="https://nptel.ac.in/courses/112104118/">https://nptel.ac.in/courses/112104118/</a><br><a href="https://nptel.ac.in/courses/112105171/">https://nptel.ac.in/courses/112105171/</a><br><a href="https://nptel.ac.in/courses/103104043/">https://nptel.ac.in/courses/103104043/</a><br><a href="https://swayam.gov.in/nd1_noc19_ce28/preview">https://swayam.gov.in/nd1_noc19_ce28/preview</a><br><a href="https://nptel.ac.in/courses/105103192/">https://nptel.ac.in/courses/105103192/</a><br><a href="https://nptel.ac.in/courses/105101082/">https://nptel.ac.in/courses/105101082/</a><br><a href="https://nptel.ac.in/courses/105103095/">https://nptel.ac.in/courses/105103095/</a><br><a href="https://nptel.ac.in/courses/112105269/">https://nptel.ac.in/courses/112105269/</a><br><a href="https://nptel.ac.in/courses/112105183/">https://nptel.ac.in/courses/112105183/</a> |                 |               |         |   |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO-1** Evaluate stresses and strains in prismatic and non-prismatic members.
- CO-2** Analyze the compound stresses on elements in 1-D, 2-D and 3-D and stresses on the column using Euler's, Rankine's and Secant's Formula.
- CO-3** Demonstrate the centroid and moment of inertia of symmetrical and un-symmetrical section.
- CO-4** Derive the formula for bending of beams and trusses based on types of supports, determinacy and stability.
- CO-5** Analyze the theories of simple bending for simple and composite section.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit                  | Time required for the Unit (Hours) |
|----------|------------------------------------|------------------------------------|
| 1.       | Simple Stresses & Strains          | 8                                  |
| 2.       | Compound Stress & Columns          | 6                                  |
| 3.       | Centroid & Moment of Inertia       | 6                                  |
| 4.       | Bending of Beams and Plane Trusses | 8                                  |
| 5.       | Theory of Simple Bending           | 8                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Simple Stresses &amp; Strains</b>   |
|           | <ul style="list-style-type: none"> <li>Introduction, Concept of stress and strain in three dimensions and generalized Hooke's law, Direct stress and strain: free body diagrams, Hooke's law, Young's modulus, Tension test of mild steel and other materials: true and apparent stress, ultimate strength, yield stress and permissible stress, Stresses in prismatic &amp; non prismatic members and in composite members</li> <li>Thermal stresses, Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress, Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, Strain energy for gradually applied, suddenly applied and impact loads.</li> </ul> |
| <b>2.</b> | <b>Compound Stress &amp; Columns</b>   |
|           | <ul style="list-style-type: none"> <li>Introduction, Two dimensional stress systems: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle &amp; its application. Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads</li> <li>Euler's theory and its limitation, concept of effective length of columns; Rankine's &amp; Secant formulae.</li> </ul>   |
| <b>3.</b> | <b>Centroid &amp; Moment of Inertia</b>  |
|           | <ul style="list-style-type: none"> <li>Introduction, First moment of area, Centroid and moment of inertia of symmetrical &amp; unsymmetrical sections, radius of gyration, polar moment of inertia, product moment of inertia, parallel axis theorem, principal axes and principal moment of inertia.</li> </ul>   |

|           |   |
|-----------|---|
| <b>4.</b> | <b>Bending of Beams and Plane Trusses</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction, Types of supports, support reactions, determinate and indeterminate structures, static stability of plane structures; Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments. Simple pin jointed trusses and their analysis: method of joints, method of section.</li> </ul> |
| <b>5.</b> | <b>Theory of Simple Bending</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction, Distribution of bending and shear stresses for simple and composite sections; Shear center and its location in flanged sections.</li> <li>• Introduction to unsymmetrical bending.</li> </ul>  |

**C. RECOMMENDED STUDY MATERIAL:**

| S. No  | Reference Book  | Author               | Edition | Edition                               |
|--|---|----------------------|---------|---------------------------------------|
| 1.   | Strength of Materials: Mechanics of Solids                | R.S. Khurmi          | Latest  | S.Chand                               |
| 2.   | A Text book of Strength of Materials: Mechanics of Solids | R.K Bansal           | Latest  | Laxmi Publications                    |
| 3.   | Elements of Strength of Materials                         | Timoshenko & Young   | Latest  | CBS publishers                        |
| 4.   | Mechanics of Materials                                    | B.C.Punmia, A.K.Jain | Latest  | Laxmi Publications                    |
| 5.   | Strength of Materials                                     | S Ramamurtham        | Latest  | DhanpatRai Publishing Company (P) Ltd |
| 6.   | Mechanics of Materials (SI Units)                         | R.C. Hibbler         | Latest  | Pearson Education                     |
| <b>Websites</b>  |   |                      |         |                                       |
| <a href="https://nptel.ac.in/courses/112107146/">https://nptel.ac.in/courses/112107146/</a><br><a href="https://nptel.ac.in/courses/105105108/">https://nptel.ac.in/courses/105105108/</a><br><a href="https://nptel.ac.in/content/syllabus_pdf/105105108.pdf">https://nptel.ac.in/content/syllabus_pdf/105105108.pdf</a><br><a href="https://nptel.ac.in/courses/112101095/">https://nptel.ac.in/courses/112101095/</a><br><a href="https://swayam.gov.in/nd1_noc19_ce18/preview">https://swayam.gov.in/nd1_noc19_ce18/preview</a><br><a href="http://www.nptelvideos.in/2012/11/strength-of-materials-prof.html">http://www.nptelvideos.in/2012/11/strength-of-materials-prof.html</a> |   |                      |         |                                       |

**COURSE OUTCOMES:** After Successful completion of the course students will be able-

- CO-1** Select the location and site for different types of buildings as per NBC and the different methods of drawing sun chart and sun shading devices.
- CO-2** Analyze the Orientation of Building based on climatic and comfort Consideration as per Building Bye Laws and NBC Regulations.
- CO-3** Analyze the building as per vastushastra by considering principle of planning.
- CO-4** Design the residential and nonresidential building.
- CO-5** Develop the lighting, ventilation, doors, windows, acoustics, sound insulation and noise control services in buildings.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit                             | Time required for the Unit (Hours) |
|----------|---|------------------------------------|
| 1.       | Site Selection                                | 6                                  |
| 2.       | Orientation of Building & Building Bye – Laws | 8                                  |
| 3.       | Vastushastra & principles of planning         | 8                                  |
| 4.       | Functional Design of Buildings                | 6                                  |
| 5.       | Services in Buildings                         | 8                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Site Selection</b>  |
|           | <ul style="list-style-type: none"> <li>Introduction, Types of buildings as per NBC, criteria for location and site selection, site plan and its detail. Sun shading devices, brief introduction to sun path and method to draw sun chart, design of louvers, energy conservation in buildings, passive solar cooling and heating of buildings.</li> </ul>  |
| <b>2.</b> | <b>Orientation of Building &amp; Building Bye – Laws</b>   |
|           | <ul style="list-style-type: none"> <li>Introduction, Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, climate modulating devices. Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.</li> <li>Building Bye Laws and NBC Regulations : Objective of by-laws, Regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height &amp; sizes of rooms, plinth regulation and sanitation provisions.</li> </ul> |
| <b>3.</b> | <b>Vastu Shastra&amp; Principles of Planning</b>   |
|           | <ul style="list-style-type: none"> <li>Introduction, Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc. VastuShastra in Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings.</li> </ul>   |
| <b>4.</b> | <b>Functional Design of Buildings</b>  |
|           | <ul style="list-style-type: none"> <li>Introduction, Functional design and Accommodation requirements</li> <li><b>Residential Buildings</b> : Anthropometry, activities and their spatial requirements; Area planning, living area, sleeping area, service area; Bubble diagram showing</li> </ul>   |

|           |  |
|-----------|--|
|           | <p>sequence of arrangement of area, plan, elevation, sectional elevation.</p> <ul style="list-style-type: none"> <li>• <b>Non Residential Buildings:</b> viz-school buildings, rest house, primary health centers, post office, bank, college library, cinema theatres etc.</li> </ul> |
| <b>5.</b> | <b>Services in Buildings</b>   |
|           | <ul style="list-style-type: none"> <li>• Introduction, Services in Buildings, Lighting and ventilation, doors and windows. Acoustics, sound insulation and noise control.</li> </ul>   |

**C. RECOMMENDED STUDY MATERIAL:**

| S.No  | Reference Book                   | Author          | Edition | Publisher                           |
|---|----------------------------------|-----------------|---------|-------------------------------------|
| 1.  | Building Material & Construction | Gurcharan Singh | Latest  | Charotar Publishing House Pvt. Ltd. |
| 2.  | Building Material & Construction | Bindra&Arora    | Latest  | DhanpatRai Publications             |
| 3.  | Building construction            | SC Rangawala    | Latest  | Standard Book House                 |
| <b>Websites</b>   |                                  |                 |         |                                     |
| <a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf</a> |                                  |                 |         |                                     |
| <a href="http://www.nptelvideos.in/2012/11/building-materials-and-construction.html">http://www.nptelvideos.in/2012/11/building-materials-and-construction.html</a>                           |                                  |                 |         |                                     |



**COURSE OUTCOMES:** After Successful completion of the course students will be able-

- CO1** To learn the various building materials and their utilization in construction.
- CO2** To learn the various building materials and their utilization in construction.
- CO3** To learn standardized techniques used to evaluate construction materials performance..
- CO4** To understand the various types of masonry works, causes and effects of dampness, various damp proofing methods.
- CO5** To understand and utilize basic principles used in building construction.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the Unit                 | Time required for the Unit (Hours) |
|----------|-----------------------------------|------------------------------------|
| 1.       | Stones & Bricks                   | 8                                  |
| 2.       | Lime and Timber                   | 6                                  |
| 3.       | Cement, Concrete and Masonry      | 6                                  |
| 4.       | Building Component and technology | 8                                  |
| 5.       | Construction Technology           | 8                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Stones &amp; Bricks</b>  |
|           | <ul style="list-style-type: none"> <li><b>Stones:</b> General, Qualities of a good building stone, Deterioration of stones, Preservation of stones, Common building stones of India &amp; their Uses, Artificial stones.</li> <li><b>Bricks:</b> General, Constituents of bricks, desirable and harmful ingredients in brick earth, qualities of good bricks, testing of bricks, strength, Absorption, weathering of bricks. Varieties of fire bricks, sand lime bricks, building tiles- roofing; flooring and wall tiles.</li> </ul> |
| <b>2.</b> | <b>Lime and Timber</b>  |
|           | <ul style="list-style-type: none"> <li><b>Lime:</b> Cementing material, Characteristics of good quality lime, classification &amp; testing of Lime, Hydraulic test, acid test, setting &amp; slaking of lime, uses of different varieties of lime.</li> <li><b>Timber:</b> Advantages of timber construction, timber trees- exogenous and endogenous trees; soft and hard woods, structure of tree, felling of trees, defects in timber, characteristics of good timber, uses and testing of timber.</li> </ul>                       |
| <b>3.</b> | <b>Cement, Concrete and Masonry</b>   |
|           | <ul style="list-style-type: none"> <li><b>Cement and Concrete:</b> Constituents of concrete, different types of cements used and their strengths, Ingredients and manufacture of cements. Hydration and compounds of hydration. Properties and various tests of cement.</li> <li><b>Brick &amp; Stone Masonry:</b> Terms used; types of bonds; their merits and demerits; Rubble and ashlar joints in stone masonry, introduction to cement concrete hollow blocks.</li> </ul>  |
| <b>4.</b> | <b>Building Component and technology</b>  |
|           | <ul style="list-style-type: none"> <li><b>Walls and Foundation:</b> Load bearing and non-load bearing walls, estimation of load on walls and footings, Thickness considerations, partition and cavity walls.</li> </ul>   |

|           |   |
|-----------|---|
|           | <ul style="list-style-type: none"> <li>• <b>Damp Proofing:</b> Sources, Causes of dampness in buildings, bad effects of dampness, methods of damp proofing.</li> <li>• <b>Plastering, Pointing and Painting:</b> Introduction, objects and types, special materials for plastered surfaces, distempering, white washing and color washing of plastered surfaces.</li> </ul>   |
| <b>5.</b> | <b>Construction Technology</b>  |
|           | <ul style="list-style-type: none"> <li>• <b>Arches and Lintels:</b> Introduction to terms used in Arches; different types of arches; brick and stone arches, types and functions of lintels.</li> <li>• <b>Doors and Windows:</b> Introduction terms used location of doors and windows, types of doors and windows, Ventilators</li> <li>• <b>Floors:</b> Introduction, various types of floors commonly used and their suitability for different buildings, anti- termite treatment.</li> </ul> |

### C. RECOMMENDED STUDY MATERIAL:

| S. No.   | Reference Book                      | Author                  | Edition | Edition                                      |
|--|-------------------------------------|-------------------------|---------|--|
| 1.   | Building Materials                  | P. C. Varghese          | Latest  | Prentice Hall India Learning Private Limited |
| 2.   | Building Construction and Materials | Rangwala                | Latest  | Charotar Publishing House Pvt. Ltd.          |
| 3.   | Building Construction and Materials | Gurcharan Singh         | Latest  | Standard Book House                          |
| 4.   | Building Construction               | Sushil Kumar            | Latest  | Standard Publisher Dist.                     |
| 5.   | Building Construction               | B. C. Punamia           | Latest  | Laxmi Publications                           |
| 6.   | Building Construction               | S.P. Bindra, S.P. Arora | Latest  | DhanpatRai Publications                      |
| <b>Websites:</b>   |                                     |                         |         |  |
| <a href="http://www.nptelvideos.in/2012/11/building-materials-and-construction.html">http://www.nptelvideos.in/2012/11/building-materials-and-construction.html</a><br><a href="https://nptel.ac.in/content/syllabus_pdf/105102088.pdf">https://nptel.ac.in/content/syllabus_pdf/105102088.pdf</a><br><a href="https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330">https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330</a><br><a href="https://nptel.ac.in/courses/105102088/">https://nptel.ac.in/courses/105102088/</a> |                                     |                         |         |  |

**COURSEOUTCOMES:** After Successful completion of the course students will be able-

- CO1** Differentiate among the igneous, sedimentary and metamorphic rocks based on Origin, Classification, Texture and Structure.
- CO2** Classify the Fold, Fault, Joints & Unconformities in rocks according to Electrical resistivity & Seismic refraction method.
- CO3** Select and improve the site for Dams, Tunnels, Reservoirs and Bridges.
- CO4** Evaluate Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, elasticity, Plasticity Deformability, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test on rocks.
- CO5** Investigate the in-situ rock joints based on properties, Roughness Co-efficient, Scale effects, Dilatation, Orientation, Gouge, Intensity, Uniaxial Compressive strength.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit                        | Time required for the Unit (Hours) |
|----------|--|------------------------------------|
| 1.       | General Geology                          | 6                                  |
| 2.       | Petrology                                | 6                                  |
| 3.       | Structural Geology & Geophysical methods | 6                                  |
| 4.       | Engineering Geology                      | 6                                  |
| 5.       | Introduction to Remote Sensing           | 6                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>General Geology &amp; Petrology</b>   |
|           | <ul style="list-style-type: none"> <li>Introduction, Subdivision of Geology &amp; importance of Geology in Civil Engg, Internal Structure of the Earth, Physical properties of Minerals, Weathering and Geological Works of Wind &amp; River, Geological Time Scale, Origin, Classification, Texture &amp; Structures of Igneous, Sedimentary and Metamorphic Rocks, Engineering Properties of Rocks.</li> </ul>   |
| <b>2.</b> | <b>Structural Geology &amp; Geophysical methods</b>  |
|           | <ul style="list-style-type: none"> <li>Introduction, Definition, Causes &amp; Classification of Fold, Fault, Joints &amp; Unconformities. Electrical resistivity &amp; Seismic refraction method for civil engineering importance.</li> </ul>  |
| <b>3.</b> | <b>Geological investigation in Engineering projects</b>  |
|           | <ul style="list-style-type: none"> <li>Introduction, Geological investigation for site selection of site for Dams, Tunnels, Reservoirs and Bridges, Site improvement for different engineering projects.</li> </ul>  |
| <b>4.</b> | <b>Engineering Properties And Laboratory Tests On Rocks</b>  |
|           | <ul style="list-style-type: none"> <li>Introduction, Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability.</li> <li>Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.</li> </ul> |
| <b>5.</b> | <b>Insitu Tests On Rocks</b>   |

|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>• Introduction, Necessity of in situ test, Plate load test for deformability, Shear test, Test for internal stresses – flat Jack, pressure meter test.</li> <li>• Jointed Rocks: Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.</li> </ul> |
|--|--|

**C. RECOMMENDED STUDY MATERIAL:**

| S.No | Reference Book   | Author              | Edition | Publication/Edition              |
|------|--|---------------------|---------|----------------------------------|
| 1.   | Engineering Geology                                    | Parbin Singh        | Latest  | S.K. Kataria& Sons               |
| 2.   | Engineering Geology                                    | GB Mahapatra        | Latest  | CBS Publishers                   |
| 3.   | Engineering Geology                                    | KM Bangar           | Latest  | Standard Publishers Distributors |
| 4.   | Engineering Geology                                    | Reddy D V           | Latest  | Vikas Publishing                 |
| 5.   | Engineering Geology                                    | Arora               | Latest  | Mohindra Capital Publishers      |
| 6.   | Rock Engg. For Engineers                               | B.P. Verma          | Latest  | Khanna Publishers.               |
| 7.   | Rock Engg.   | Bhawani Singh       | Latest  | Elsevier Science Ltd.            |
| 8.   | Foundation on Rocks                                    | Duncan<br>C.Wyllie, | Latest  | Spon Press.                      |
| 9.   | Engineering in Rock for Slopes, Foundation and Tunnels | Ramamurthy          | Latest  | PHI Delhi.                       |

**Websites**

<http://www.nptelvideos.in/2012/11/engineering-geology.html>  
[https://nptel.ac.in/content/syllabus\\_pdf/105105106.pdf](https://nptel.ac.in/content/syllabus_pdf/105105106.pdf)  
<https://nptel.ac.in/courses/105105106/>  
<https://nptel.ac.in/courses/105106055/>  
[https://nptel.ac.in/content/syllabus\\_pdf/105106055.pdf](https://nptel.ac.in/content/syllabus_pdf/105106055.pdf)  
<https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture1.pdf>

**COURSEOUTCOMES:** After Successful completion of the course students will be able-

- CO1** Understand the relevance and the concept of sustainability and the global initiatives in this direction.
- CO2** Explain the different types of environmental pollution problems and their sustainable solutions.
- CO3** Discuss the environmental regulations and standards.
- CO4** Outline the concepts related to conventional and non-conventional energy
- CO5** Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit                  | Time required for the Unit (Hours) |
|----------|------------------------------------|------------------------------------|
| 1.       | Sustainability                     | 6                                  |
| 2.       | Pollution                          | 6                                  |
| 3.       | Environmental management standards | 6                                  |
| 4.       | Green buildings                    | 6                                  |
| 5.       | Green Engineering                  | 6                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Sustainability</b>   |
|           | Sustainability - Introduction, Need and concept of sustainability, Social environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act.   |
| <b>2.</b> | <b>Pollution</b>  |
|           | Air Pollution, Effects of Air Pollution; Water pollution- sources, Sustainable wastewater treatment, Solid waste - sources, impacts of solid waste, Zero waste concept, 3 R concept. Global environmental issues- Resource degradation, Climate change, Global warming, Ozone layer depletion, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print.   |
| <b>3.</b> | <b>Environmental management standards</b>   |
|           | Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) - Procedures of EIA in India.  |
| <b>4.</b> | <b>Green buildings</b>  |
|           | Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Sustainable cities, Sustainable transport. Energy sources: Basic concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy |
| <b>5.</b> | <b>Green Engineering</b>  |
|           | Green Engineering, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.  |

**C. RECOMMENDED STUDY MATERIAL:**

| S.No  | Reference Book   | Author           | Edition                 | Publication/Edition              |
|---|--|------------------|-------------------------|----------------------------------|
| 1.  | Introduction to Sustainable Engineering                | R. L. Rag        | 2 <sup>nd</sup> Edition | S.K. Kataria& Sons               |
| 2.  | Sustainable Engineering: Concept Design and case study | Allen            | Latest                  | CBS Publishers                   |
| 3.  | Sustainable Engineering                                | Krishna R. Reddy | Latest                  | Standard Publishers Distributors |
| <b>Websites</b>   |  |                  |                         |                                  |
| <a href="https://nptel.ac.in/content/syllabus_pdf/105105106.pdf">https://nptel.ac.in/content/syllabus_pdf/105105106.pdf</a>                                     |  |                  |                         |                                  |
| <a href="https://nptel.ac.in/courses/105105106/">https://nptel.ac.in/courses/105105106/</a>   |  |                  |                         |                                  |
| <a href="https://nptel.ac.in/courses/105106055/">https://nptel.ac.in/courses/105106055/</a>   |  |                  |                         |                                  |
| <a href="https://nptel.ac.in/content/syllabus_pdf/105106055.pdf">https://nptel.ac.in/content/syllabus_pdf/105106055.pdf</a>                                     |  |                  |                         |                                  |
| <a href="https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture1.pdf">https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture1.pdf</a> |  |                  |                         |                                  |

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Demonstrate basic concepts of the AutoCAD software.
- LO2** Develop the ability to manipulate drawings through editing and plotting techniques.
- LO3** Analyze the geometric construction.
- LO4** Produce the template drawings.
- LO5** Apply basic concepts to develop construction (drawing) techniques.

**LIST OF EXPERIMENTS:**

|     |  |
|-----|--|
| 1.  | Introduction to Auto Cadd, Understanding of file format and X-Y Coordinate system. Introduction to different commands - Rectangle   Multi Line   Extend   Offset   Trim   Introduction to Object Snaps Rotate   Fillet   Chamfer   Array |
| 2.  | Introduction to Layer, Dtext, Table style, Zoom, Pan, Redraw & Regen Commands. Hatch, Pline, Pedit, Fillet, chamfer, spline, multiline command, Tolerance, Leader, Associative Dim, Dimedit, Dimstyle, X line, Ray command               |
| 3.  | Using the commands learned draw brick & stone masonry, Partition wall, cavity wall & cross section of external wall  |
| 4.  | Draw the details of doors and windows & Draw the details of cross sections of different type of stairs   |
| 5.  | To design and draw working drawing of a Residential building with following detail<br>(a) Site plan<br>(b) Foundation plan<br>(c) Plan<br>(d) Two sectional elevations<br>(e) Front elevation  |
| 6.  | To continue the above design and draw working drawing of a Residential building with following additional detail<br>(f) Furniture plan<br>(g) Water supply and sanitary plan<br>(h) Electric fitting plan                                |
| 7.  | Development of Front Elevation and Sectional Elevation from a given plan.  |
| 8.  | Development of Plan, Front Elevation and Sectional Elevation from line diagram.  |
| 9.  | To design and draw a Rest House  |
| 10. | To design and draw a Post Office   |
| 11. | To design and draw a Bank  |
| 12. | To design and draw a College Library   |

**VIRTUAL LABS:**

- <https://www.youtube.com/watch?v=-7hrEIZrul4>
- <https://www.youtube.com/watch?v=cmR9cfWJRUU>

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Demonstrate the basic properties and characteristics of incompressible fluid in the laboratory.
- LO2** Demonstrate fundamental theorems governing fluid flows i.e. continuity, energy and momentum in the laboratory.
- LO3** Able to measure different fluid properties using various types of equipment like measurement of flow, pressure velocity and head loss.
- LO4** Determine various coefficients of mouthpiece.
- LO5** Know about the working principles of orifice meter, venturimeter, and mouthpiece.

**LIST OF EXPERIMENTS:**

|     |  |
|-----|--|
| 1.  | To Verify the Bernoulli's Theorem                            |
| 2.  | To study the variation of Reynolds Number.                   |
| 3.  | To determine air flow using orifice meter                    |
| 4.  | Determination of Metacentric Height                          |
| 5.  | To determine the minor losses.                               |
| 6.  | To determine the friction factor and major losses.           |
| 7.  | To determine the $C_d$ , $C_v$ and $C_c$ for the mouthpiece  |
| 8.  | To determine the Coefficient of discharge of a V – notch.    |
| 9.  | To determine the Speed of fluid using Pitot tube             |
| 10. | To Determine the viscosity of given fluid using Stoke's Law. |

**VIRTUAL LABS:**

<http://fm-nitk.vlabs.ac.in/#>

<http://eerc03-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering>



**COURSE OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Analyze young Modulus and hardness of given specimens.
- LO2** Evaluate impact value and crushing value of coarse aggregates.
- LO3** Evaluate the compressive strength of concrete cubes and bricks.
- LO4** Analyze stiffness of open coiled and closed coiled springs, physical properties of given coarse aggregate, fine aggregate and cement samples.
- LO5** Analyze and perform different test for tensile strength for given material.

**A. LIST OF EXPERIMENTS:**

|     |  |
|-----|--|
| 1.  | To determine tensile strength of Mild Steel & HYSD Bars.             |
| 2.  | To find out compressive strength of Bricks                           |
| 3.  | To determine compressive strength of Wooden Blocks                   |
| 4.  | To determine hardness of given specimen using Rockwell Hardness Test |
| 5.  | To determine hardness of given specimen using Brinell Hardness Test  |
| 6.  | To find out impact strength by IZOD test                             |
| 7.  | To find out impact strength by Charpy test                           |
| 8.  | To find out fatigue strength by Fatigue Test                         |
| 9.  | To determine characteristics of given Spring                         |
| 10. | To determine torsional strength of given specimen                    |
| 11. | To determine compressive strength for Precast Tile blocks            |

**B. VIRTUAL LABS:**

<http://sm-nitk.vlabs.ac.in/#>

<http://eerc01-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering>

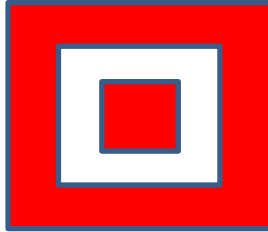
**COURSE OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Understand why Python is a useful scripting language for developers..
- LO2** Identify the key issues in Python code, develop and experiment with python programming.
- LO3** Develop problem solving and critical thinking skills in fundamental enable techniques like conditionals and loops
- LO4** Construct and explain with structure and concept of different data type like, List and Dictionary
- LO5** Implement read and write data from/to files in Python Develop Python programs step-wise by defining functions with tinker

**C. LIST OF EXPERIMENTS:**

| <b>Part A</b> |  |
|---------------|--|
|               | <p>1. Write and run a Python program that outputs the value of each of the following expressions:</p> <p style="text-align: center;">5.0/9.0<br/>5.0/9<br/>5/9.0<br/>5/9<br/>9.0/5.0<br/>9.0/5<br/>9/5.0<br/>9/5</p> <p>Based on your results, what is the rule for arithmetic operators when integers and floating point numbers are used?</p> <p>2. Write and run a Python program that asks the user for a temperature in Celsius and converts and outputs the temperature in Fahrenheit. (Use the formula given in the example above and solve for tempFin terms of tempC.)</p> <p>3. Here is an algorithm to print out n! (n factorial) from 0! to 19!:</p> <ol style="list-style-type: none"> <li>1. Set f = 1</li> <li>2. Set n = 0</li> <li>3. Repeat the following 20 times:               <ol style="list-style-type: none"> <li>a. Output n, "! = ", f</li> <li>b. Add 1 to n</li> <li>c. Multiply f by n</li> </ol>               Using a for loop, write and run a Python program for this algorithm.             </li> </ol> <p>4. Modify the program above using a <code>while</code> loop so it prints out all of the factorial values that are less than 1 billion.</p> <p>5. Modify the first program so it finds the minimum in the array instead of the maximum.</p> <p>6. (Harder) Modify the first program so that it finds the <b>index</b> of the maximum in the array rather than the maximum itself.</p> |
| <b>Part B</b> |  |

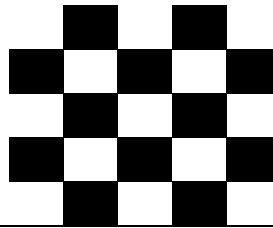
7. Modify the bubble sort program so it implements the improvements discussed in class. (HINT: To exit the main loop if the array is already sorted, simply change the loop variable to equal the last value so the loop ends early.)
8. Draw the Target symbol (a set of concentric Squares, alternating red and white) in a graphics window that is 200 pixels wide by 200 pixels high. Hint: Draw the largest circle first in red, then draw the next smaller circle in white, then draw the next smaller circle in red. Graphical objects drawn later appear "on top of" graphical objects drawn earlier.



9. Try entering the following literal values at the prompt. (Hit ENTER after each)
  - 5
  - 4.2
  - 4.5
  - 4.14
  - 0.90

Something odd should occur. *Describe it on paper.*

10. Create a 5 X 5 rectangle whose top left corner is at ( $row*5, col*5$ ). (Where is the bottom right corner?) If the sum of the *row* and *col* numbers is even, set the fill color of the rectangle to white, otherwise set it to black. Then draw the rectangle.



#### D. VIRTUAL LABS:

|   |   |
|---|---|
| 1 | <a href="http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp1/index.php">http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp1/index.php</a> |
| 2 | <a href="http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp3/index.php">http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp3/index.php</a> |
| 3 | <a href="http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp2/index.php">http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp2/index.php</a> |
| 4 | <a href="http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp5/index.php">http://vlabs.iitb.ac.in/vlabs-dev/labs/oops/labs/exp5/index.php</a> |

**Course Outcomes:**

On successful completion of the course the learners will be able to:

| CO    | Cognitive Abilities      | Course Outcomes  |
|-------|--------------------------|--|
| CO-01 | Understanding/ Applying  | Understand the importance of human values and learn from others' experiences to become the conscious practitioners of the same.      |
| CO-02 | Understanding/ Applying  | Enhance their self-esteem, confidence and assertive behaviour to handle difficult situations with grace, style, and professionalism. |
| CO-03 | Understanding/ Applying  | Distinguish among various levels of professional ethics while developing an understanding of them as a process in an organization.   |
| CO-04 | Understanding / Applying | Implement emotional intelligence to achieve set targets and excel in interpersonal as well as intrapersonal                          |
| CO-05 | Understanding/Applying   | Demonstrate knowledge of personal beliefs and values and a commitment to continuing personal reflection and reassessment.            |

| UNIT NO. | UNIT NAME                           | Hours |
|----------|-------------------------------------|-------|
| 1        | Introduction to Human Values        | 6     |
| 2        | Study of Self                       | 4     |
| 3        | Introduction to Professional Ethics | 4     |
| 4        | Emotional Intelligence              | 6     |
| 5        | Life Skills & Value Education       | 5     |

| LIST OF LABS |   |
|--------------|---|
| 1.           | Human Values: Love & Compassion   |
| 2.           | Truth, Non-Violence, Righteousness  |
| 3.           | Peace, Service, Renunciation (Sacrifice)  |
| 4.           | Self-Esteem: Do's and Don'ts to develop positive self-esteem  |
| 5.           | Self-Assertiveness: Development of Assertive Personality  |
| 6.           | Ambition & Desire: Self & Body (concepts & differences )  |
| 7.           | Professional Ethics: Personal & Professional Ethics   |
| 8.           | Emotional Intelligence: Skill Building for Strengthening the Elements of Self-awareness, Self-regulation, Internal motivation, Empathy, Social skills |
| 9.           | Governing Ethics & Ethics Dilemma   |
| 10.          | Profession, Professionalism & Professional Risks  |
| 11.          | Professional Accountabilities & Professional Success  |
| 12.          | Life Skills & Value Education   |

**Code: BCVCCV3601- DISCIPLINE AND TALENT ENRICHMENT PROGRAMME (TEP)-III**  
**1 Credit [LTP: 0-0-2]**

**OVERVIEW AND OBJECTIVES:** The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non- technical categories.

**Discipline and Talent Enrichment Programme (TEP)-III** shall be evaluated irrespective of period / time allocation ( as in the case of Extra Curricular activity) in the teaching scheme as a One credit course. There cord related to discipline and related activities are maintained for each student and they shall be evaluated for the same also. It shall be counted in calculation of SGP Abut it is not a backlog subject. However, the attendance of the classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

| <b>Code</b> | <b>Activity</b>             | <b>Hours</b> | <b>Credit</b> |
|-------------|-----------------------------|--------------|---------------|
| BCVCCV3601  | Non Syllabus Project        | 1            | <b>1</b>      |
|             | Online Certification Course | 2            |               |

**POORNIMA UNIVERSITY, JAIPUR**

**Faculty of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Second Year - Fourth Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
|             | Nil   |                                    |                  |                  |                       |            |             |           |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCCV4101  | Structure Analysis-I  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV4102  | Surveying   | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV4103  | Disaster Management   | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV4104  | Concrete and Construction Technology  | 3                                  | 1                | 0                | 40                    | 60         | 100         | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV4201  | Civil Engineering Material Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV4202  | Concrete Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV4203  | Surveying Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV4204  | STAAD Pro Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |             |           |
| BCVECV4111  | Hydraulic and Hydraulic Machine   | 3                                  | 0                | -                | 40                    | 60         | 100         | 3         |
| BCVECV4112  | Construction Equipment's  |                                    |                  |                  |                       |            |             |           |
| BCVECV4113  | Solid Waste Management  |                                    |                  |                  |                       |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |             |           |
|             | As Per Annexure-I   | 2                                  | 0                | 0                | 40                    | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |             |           |
| BCVCHM4209  | Leadership & Management Skills  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |             |           |
|             | NA  |                                    |                  |                  |                       |            |             |           |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV4601  | Non Syllabus Project  | 2                                  | -                | -                | 50                    | -          | 50          | 1         |
|             | Online Certification Course   | 1                                  | -                | -                |                       |            |             |           |
|             | <b>Total</b>  | <b>20</b>                          | <b>3</b>         | <b>10</b>        |                       |            |             |           |
|             | <b>Total Teaching Hours</b>   |                                    | <b>33</b>        |                  | <b>590</b>            | <b>560</b> | <b>1150</b> | <b>23</b> |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Determine Slope and deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.
- CO2** Analyze the fixed and continuous beams using three moment theorem and area moment method.
- CO3** Analyze torsion and membrane in shafts, shells and springs.
- CO4** Investigate stress transformations in structural elements by using energy methods.
- CO5** Evaluate the resistance of structure during vibrations.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit              | Time required for the Unit (Hours) |
|----------|--------------------------------|------------------------------------|
| 1.       | Deflection of Beams            | 9                                  |
| 2.       | Fixed & Continuous Beams       | 10                                 |
| 3.       | Torsion & Membrane analysis    | 9                                  |
| 4.       | Introduction to Energy Methods | 12                                 |
| 5.       | Vibrations                     | 8                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Deflection of Beams</b>   |
|           | Introduction, Differential relation between load, shear force, bending moment, slope & deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.   |
| <b>2.</b> | <b>Fixed &amp; Continuous Beams</b>  |
|           | Introduction, Analysis of fixed beams & continuous beams by three moment theorem and area moment method.   |
| <b>3.</b> | <b>Torsion &amp; Membrane analysis</b>   |
|           | Introduction, Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion<br><b>Springs:</b> stiffness of springs, close coiled helical springs, springs in series and parallel, laminated plate springs.<br><b>Membrane Analysis:</b> Stress and strain in thin cylindrical & spherical shells under internal pressures. |
| <b>4.</b> | <b>Introduction to Energy Methods</b>  |
|           | Introduction, Strain energy due to bending, shear and torsion; Castigliano's theorems, unit load method & their applications in analysis of redundant frames up to two degree of redundancy and deflection of determinate beams, frames and trussed beams, Stresses due to temperature & lack of fit in redundant frames. Theories of Failures.  |
| <b>5.</b> | <b>Vibrations</b>  |
|           | Introduction, Stress tensor and failure criterion, Elementary concepts of structural vibration, degree of freedom, free vibration of un damped single degree of freedom systems.   |

Newton's law of motion, D'Alembert's principle, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Damped single degree of freedom system: types of damping, analysis of viscously damped, under-damped, over-damped & critically-damped systems, logarithmic decrement.

**C. RECOMMENDED STUDY MATERIAL:**

| S. No   | Reference Book      | Author        | Edition | Publisher  |
|---|---------------------|---------------|---------|--|
| 1.  | Structural Analysis | B.C.Punmia    | Latest  | Laxmi Publications   |
| 2.  | Structural Analysis | CS Reddy      | Latest  | McGraw Hill Education                                      |
| 3.  | Structural Analysis | SS Bhavakitti | Latest  | Vikas Publishing House                                     |
| 4.  | Structural Analysis | S Ramamurtham | Latest  | DhanpatRai Publishing Company<br>Private Limited-New Delhi |
| 5.  | Structural Analysis | RC Hibbeler   | Latest  | Pearson Education  |
| <b>Websites</b>   |                     |               |         |  |
| <a href="https://nptel.ac.in/content/syllabus_pdf/105105166.pdf">https://nptel.ac.in/content/syllabus_pdf/105105166.pdf</a> |                     |               |         |  |
| <a href="https://nptel.ac.in/courses/105105166/">https://nptel.ac.in/courses/105105166/</a>                                 |                     |               |         |  |
| <a href="https://nptel.ac.in/courses/105101085/">https://nptel.ac.in/courses/105101085/</a>                                 |                     |               |         |  |



**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Analyze the importance of surveying and the methods for measuring angles and elevation using theodolite.
- CO2** Methods for measuring angles and elevation using auto level, Use of Plane table.
- CO3** Select simple, compound, transition and reverse curves for proper alignment of roads.
- CO4** Analyze the aerial photograph, aerial triangulation, radial triangulation and photographic mapping in photogrammetry surveying.
- CO5** Implement setting out works & modern field survey systems.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit                               | Time required for the Unit (Hours) |
|----------|---|------------------------------------|
| 1.       | Introduction: Linear and Angular Measurements   | 10                                 |
| 2.       | Levelling and Plane Table                       | 8                                  |
| 3.       | Curve Surveying                                 | 7                                  |
| 4.       | Tacheometry and Photogrammetry Surveying        | 5                                  |
| 5.       | Setting Out Works & Modern Field Survey Systems | 6                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Introduction: Linear and Angular Measurements</b>  |
|           | Method of linear measurements, Correction to length measured with a chain/tape, Ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, Traversing with tape and compass, Correction to measured bearing, Angular measurement by theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, plotting of traverse and determining the closing error, Balancing traverse.                           |
| <b>2.</b> | <b>Levelling</b>  |
|           | Measurements of elevations methods of levelling; direct/differential, Indirect/Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements.<br>Plane Table Surveying: Elements of plane table survey working operations, methods of plane table survey; intersection, traversing and resection, two point and three point problems |
| <b>3.</b> | <b>Curve Surveying</b>  |
|           | Elements of simple and compound curves, Types of curves, Elements of circular, reverse, and transition curves. Method of setting out simple, circular, transition and reverse curves, Types of vertical curves, length of vertical curves, setting out vertical curves. Tangent corrections   |
| <b>4.</b> | <b>Tacheometry and Photogrammetry Surveying</b>   |
|           | Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic  |

|           |   |
|-----------|---|
|           | concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetry, flight planning   |
| <b>5.</b> | <b>Setting Out Works &amp; Modern Field Survey Systems</b>  |
|           | Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines. Principle of E.D.M. (Electronic Distance Measurements), Modulation, Types of E.D.M., Distomat, Total station, parts of total station, advantages and application |

### C. RECOMMENDED STUDY MATERIAL:

| S. No.  | Reference Book   | Author                                    | Edition | Publisher                               |
|---|--|---|---------|---|
| 1.  | Advanced Surveying: Total Station, GIS and Remote Sensing, | Madhu, N, Sathikumar, R and Satheesh Gobi | Latest  | Pearson India, 2006                     |
| 2.  | Geomatics Engineering                                      | Manoj, K. Arora and Badjatia              | Latest  | Nem Chand & Bros, 2011                  |
| 2.  | Surveying and Levelling, Vol. I and II                     | Bhavikatti, S.S.                          | Latest  | I.K. International, 2010                |
| 3.  | Higher Surveying, Third Edition                            | Chandra, A.M.                             | First   | New Age International (P) Limited, 2002 |
| 4.  | Remote sensing and Geographical information system         | Anji Reddy, M                             | First   | B.S. Publications, 2001                 |
| 5.  | Surveying, Vol-I, II and III                               | Arora, K.R.                               | Latest  | Standard Book House, 2015               |
| <b>Websites:</b>  |  |   |         |   |
| <a href="http://www.nptelvideos.in/2012/11/surveying.html">http://www.nptelvideos.in/2012/11/surveying.html</a> |  |   |         |   |
| <a href="https://nptel.ac.in/courses/105107122/">https://nptel.ac.in/courses/105107122/</a>                     |  |   |         |   |
| <a href="https://nptel.ac.in/courses/105108077/">https://nptel.ac.in/courses/105108077/</a>                     |  |   |         |   |
| <a href="https://nptel.ac.in/courses/105102015/">https://nptel.ac.in/courses/105102015/</a>                     |  |   |         |   |

**COURSE OUTCOMES:** After Successful completion of the course students will be able-

- CO-1** Describe the basic concepts of disaster and hazards.
- CO-2** Discuss various types of natural and man-made disasters.
- CO-3** Explain the types of disasters, causes, impact and preventive measure.
- CO-4** Evaluate the risk and vulnerability associated with disasters.
- CO-5** Assess the role of production people in disaster management of Indian textile industries.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit   | Time required for the Unit (Hours) |
|----------|---|------------------------------------|
| 1.       | Introduction  | 6                                  |
| 2.       | Types of Disasters, their occurrence/ causes, impact and preventive | 8                                  |
| 3.       | Disaster profile of Indian continent                                | 8                                  |
| 4.       | Disaster Management Cycle   | 6                                  |
| 5.       | Disaster management system in India                                 | 8                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Introduction</b>   |
|           | Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Natural and Manmade Disasters, Disaster and Development, and Climate Change.   |
| <b>2.</b> | <b>Types of Disasters, their occurrence/ causes, impact and preventive</b>  |
|           | <b>Types of Disasters, their occurrence/ causes, impact and preventive measures:</b><br><b>Geological Disasters:</b> earthquakes, landslides, tsunami, mining;<br><b>Hydro-Meteorological Disasters:</b> floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves  |
| <b>3.</b> | <b>Disaster profile of Indian continent</b>   |
|           | <b>Biological Disasters:</b> epidemics, pest attacks, forest fire.<br><b>Technological Disasters:</b> chemical, industrial, radiological, nuclear.<br><b>Manmade Disasters:</b> building collapse, rural and urban fire, road and rail accidents.<br><b>Disaster profile of Indian continent, Mega Disasters of India and Lessons Learnt. Risk mapping.</b> |
| <b>4.</b> | <b>Disaster Management Cycle</b>  |
|           | Disaster Management Cycle and its components: Pre disaster and post disaster, Paradigm Shift in Disaster Management. Safety tips for various types of disasters.  |
| <b>5.</b> | <b>Disaster management system in India</b>  |
|           | Disaster Management Act 2005, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter- Governmental Agencies.  |

**C. RECOMMENDED STUDY MATERIAL:**

| S.No  | Reference Book                       | Author                          | Edition | Publisher                      |
|---|--------------------------------------|---------------------------------|---------|--------------------------------|
| 1.  | Disaster Management                  | <a href="#">S.C. Sharma</a>     | Latest  | Khanna Publishing House        |
| 2.  | Disaster Management<br>Paperback     | <a href="#">Harsh K. Gupta</a>  | Latest  | Universities Press             |
| 3.  | Textbook of Disaster<br>Management   | <a href="#">Dr Nitesh Kumar</a> | Latest  | Satish Serial Publishing House |
| 4.  | Disaster Management                  | <a href="#">R. Subramanian</a>  | Latest  | Vikas Publishing House         |
| 5.  | Environment & Disaster<br>Management | <a href="#">McGraw Hill</a>     | Latest  | D.R Khullar                    |
| <b>Websites</b>   |                                      |                                 |         |                                |
| <a href="https://www.physio-pedia.com/Disaster_Management">https://www.physio-pedia.com/Disaster_Management</a> |                                      |                                 |         |                                |
| <a href="https://ndma.gov.in/">https://ndma.gov.in/</a>   |                                      |                                 |         |                                |
| <a href="https://nidm.gov.in/">https://nidm.gov.in/</a>   |                                      |                                 |         |                                |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to

- CO1** Relate the properties of concrete such as workability, air content, flow ability, strengths, permeability, creep and shrinkage.
- CO2** Examine the mixing & batching methods, transportation, placing, compaction methods, curing methods and finishing and distinguish between admixture such as water reducers, accelerator, retarders, water-proofing plasticizers and super plasticizers.
- CO3** Analyze light weight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self compacting and high performance concrete, ferro-cement concrete, Transparent concrete, cellular light weight concrete, pre-stressed concrete and roller compacted concrete.
- CO4** Demonstrate form work and damp proofing processes.
- CO5** Investigate the strength and durability of concrete by non-destructive testing and construction systems for joints, arches and lintels and stairs.

#### A. OUTLINE OF THE COURSE

| Unit No. | Title of the Unit                       | Time required for the Unit (Hours) |
|----------|---|------------------------------------|
| 1.       | Ingredients of concrete & Aggregate     | 8                                  |
| 2.       | Properties of fresh & hardened concrete | 6                                  |
| 3.       | NDT & Concrete Handling in Field        | 6                                  |
| 4.       | Admixture in concrete and Formwork      | 8                                  |
| 5.       | Special Concrete                        | 8                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Ingredients of concrete &amp; Aggregate</b>  |
|           | Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio etc.<br>Aggregates: types, physical properties and standard methods for their determination, including Grading of aggregates as per IS. Manufactured sand- properties and IS Specifications for use in concrete.  |
| <b>2.</b> | <b>Properties of fresh &amp; hardened concrete</b>  |
|           | Concrete: Grade of concrete, proportioning of ingredients, water content and its quality, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. Factors affecting, methods of determination.<br><br>Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, its effect on properties of concrete. |
| <b>3.</b> | <b>NDT &amp; Concrete Handling in Field</b>   |
|           | NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half-cell potential meter, corrosion resistivity meter, core sampling. Interpretation of their results,<br>Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipment's for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipment's.<br>Curing of concrete: various methods their suitability.             |

|           |  |
|-----------|--|
|           | Durability of concrete. Causes of deterioration, Carbonation, Tests for durability assessment.   |
| <b>4.</b> | <b>Admixture in concrete and Formwork</b>  |
|           | Admixture in concrete: Chemical and mineral admixtures, their types and uses: accelerator, retarders, water-proofing, plasticisers, super plasticizers-types, and their suitability. Fly ash-properties for use in concrete, specifications of flyash as per IS 3812, and effect on properties of concrete. GGBFS, Microsilica and metakaolin- propertie, specifications and utility in concrete.<br>Form work: Requirements, their types. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, etc. Slip and moving formwork. |
| <b>5.</b> | <b>Special Concrete</b>  |
|           | Special types of concrete: Sulphate resisting concrete, under water concreting, pumpable concrete: methods and issues in making, salient properties and applications.<br>Concretes with tailored properties- including high performance concrete, with specific properties in fresh and hardened states, self-compacting concrete-materials, mix proportioning, test methods, use and applications with case studies   |

### C. RECOMMENDED STUDY MATERIAL:

| S. No. | Reference Book                      | Author                  | Edition | Publisher                           |
|--------|-------------------------------------|-------------------------|---------|-------------------------------------|
| 1.     | Concrete Technology                 | M. S. Shetty            | Latest  | S Chand Publishing                  |
| 2.     | Concrete Technology                 | M. L. Gambhir           | Latest  | McGraw Hill Education               |
| 2.     | Building Construction and Materials | Rangwala                | Latest  | Charotar Publishing House Pvt. Ltd. |
| 3.     | Building Construction               | Sushil Kumar            | Latest  | Standard Publisher Dist.            |
| 4.     | Building Construction               | B. C. Punamia           | Latest  | Laxmi Publications                  |
| 5.     | Building Construction               | S.P. Bindra, S.P. Arora | Latest  | DhanpatRai Publications             |

#### Websites:

<https://nptel.ac.in/courses/105/102/105102012/>

<https://nptel.ac.in/courses/105106176/>

<https://nptel.ac.in/courses/105104030/>

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Derive the governing equations of transients in pipes and channels  
Able to apply method of characteristics and finite difference methods to solve unsteady flow problems in pipes and channels.
- CO2** Analyze transients in pumping and hydropower systems.
- CO3** Analyze the dam break problems.
- CO4** Know about the basic working principles of pumps and turbines.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the unit                 | Time required for the Unit (Hours) |
|----------|-----------------------------------|------------------------------------|
| 1.       | Dimensional Analysis              | 8                                  |
| 2.       | Laminar & Turbulent Flow in pipes | 8                                  |
| 3.       | Flow through Open Channels        | 6                                  |
| 4.       | Rapidly varied flow               | 6                                  |
| 5.       | Pumps & Turbines                  | 8                                  |

**B. DETAILED SYLLABUS**

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Dimensional Analysis</b>  |
|           | Introduction, Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect. Principle of dimensional analysis Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, resistance to motion of partially and fully submerged bodies and other simple problems. Ship model experiments.   |
| <b>2.</b> | <b>Laminar &amp; Turbulent Flow in pipes</b>   |
|           | <b>Laminar Flow:</b> Relation between shear & pressure gradient. Flow between plates & pipes. Equations for velocity distribution, pressure difference.<br><b>Turbulent Flow in pipes:</b> Theories of Turbulence, Nikuradse's Experiments. Hydrodynamically smooth & rough boundaries.<br>Laminar, Sublayer, Equations of velocity distribution and friction coefficient. Stanton Diagram, Moody's diagram. Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, laminar sub layer, separation and its control.  |
| <b>3.</b> | <b>Flow through Open Channels</b>  |
|           | Introduction, Flow through channels: Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Manning and Bazin. Section factor for uniform flow.<br>Most Efficient rectangular, triangular and trapezoidal sections. Equations of gradually varied flow in Prismatic channels. Limitation of its applicability and assumption made in its derivation.<br>Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation. |
| <b>4.</b> | <b>Rapidly varied flow</b>   |

|           |  |
|-----------|--|
|           | Introduction, Rapidly varied flow: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. Broad crested weirs for channel flow: Measurement, velocity distribution in open channels, parshal flume.  |
| <b>5.</b> | <b>Pumps &amp; Turbines</b>  |
|           | Introduction, Centrifugal pumps and turbines: Volute and whirlpool chambers, Losses of head due to variation of discharge Manometric and Hydraulic efficiencies, Description of single and multistage pumps. Specific speed, characteristic curves. Model Test. Reaction and Impulse turbines, specific speed, Mixed flow turbines. Pelton wheel turbine, Francis turbine, propeller turbine and Kaplan turbine Efficiency, Characteristics of turbines. Basic principles of governing of turbines, Draft-tube, Selection of turbines, model tests.<br><b>Impact of free Jets:</b> Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes. |

C.

**RECOMMENDED STUDY MATERIAL:**

| S. No   | Reference Book  | Author        | Edition                 |  |
|---|-----------------|---------------|-------------------------|--|
| 1.  | Fluid Mechanics | Modi& Seth    | 22nd edition<br>(2017)  | Standard Book House                            |
| 2.  | Fluid Mechanics | D.S. Kumar    | Latest                  | S.K. Kataria& Sons                             |
| 3.  | Fluid Mechanics | R.K. Bansal   | Tenth edition<br>(2018) | Laxmi Publications                             |
| 4.  | Fluid Mechanics | Frank M White | Eighth edition          | McGraw Hill Education India<br>Private Limited |
| 5.  | Fluid Mechanics | R.K. Rajput   | Latest                  | S Chand & Company                              |
| <b>Websites</b>   |                 |               |                         |  |
| <a href="https://nptel.ac.in/courses/105103096/">https://nptel.ac.in/courses/105103096/</a><br><a href="https://nptel.ac.in/courses/105103021/">https://nptel.ac.in/courses/105103021/</a><br><a href="https://nptel.ac.in/courses/112105182/">https://nptel.ac.in/courses/112105182/</a><br><a href="https://nptel.ac.in/courses/112104117/">https://nptel.ac.in/courses/112104117/</a><br><a href="https://nptel.ac.in/courses/112/105/112105206/">https://nptel.ac.in/courses/112/105/112105206/</a> |                 |               |                         |  |



**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Introduction of different types of construction equipment
- CO2** Uses, operations & efficiency, owning procedures, costs and maintenance of Earth Moving Equipment
- CO3** Uses, operations & efficiency, owning procedures, costs and maintenance of Hauling Equipment & Compaction Equipment
- CO4** Uses, operations & efficiency, owning procedures, costs and maintenance of Drilling, Blasting and Tunneling Equipment
- CO5** Uses, operations & efficiency, owning procedures, costs and maintenance of Piling Equipment & Pumping Equipment

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                          | Time Required for the Unit (Hours) |
|------|--|------------------------------------|
| 1    | Introduction                               | 8                                  |
| 2    | Earth Moving Equipment                     | 6                                  |
| 3    | Hauling Equipment & Compaction Equipment   | 8                                  |
| 4    | Drilling, Blasting and Tunneling Equipment | 6                                  |
| 5    | Piling Equipment & Pumping Equipment       | 8                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction</b>  |
|          | Construction economy; Factors affecting the selection of construction equipment; rolling resistance, effect of grade on required tractive effort, effect of altitude and temperature on the performance of internal combustion engines, drawbar pull, rimpull and acceleration, owning and operating cost of equipment.  |
| <b>2</b> | <b>Earth Moving Equipment</b>  |
|          | Crawler and wheel tractors-their functions, types and specifications; grade-ability, bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade and rolling resistance on the output of tractor pulled scrapers; earth loaders; placing and compacting earth fills. Power shovels - functions, selection, sizes, shovel dimensions and clearances, output, Draglines – functions types ,sizes ,output, Clamshells; Safe lifting capacities and working ranges of cranes; Hoes ,trenching machines, types and production rates calculation of production rates of equipment; examples. |
| <b>3</b> | <b>Hauling Equipment &amp; Compaction Equipment</b>  |
|          | Trucks; capacities of trucks, balancing the capacities of hauling units with the size of excavator; effect of grade and rolling resistance on the cost/performance of hauling equipment. Compaction Equipment: Roller class: sheep's foot rollers, pneumatic tyre rollers, steel wheel rollers, vibrating rollers, grid type rollers-their applications.   |
| <b>4</b> | <b>Drilling, Blasting and Tunneling Equipment</b>  |
|          | Definition of terms ,bits, jackhammers, drifters, wagon drills, churn drills, piston drills, blast hole drills, shot drills, diamond drills; Tunneling equipment; selecting the drilling method and equipment; selecting drilling pattern; rates for drilling rock, air compressors.   |

|          |   |
|----------|---|
| <b>5</b> | <b>Piling Equipment &amp; Pumping Equipment</b>   |
|          | <p>Pile hammers, selecting a pile hammer loss of energy due to impact, energy losses due to causes other than impact.</p> <p>Equipment for bored and cast in-situ piles</p> <p>Pumping equipment in construction, Classification of pumps; Selection of pumps –Air-operated centrifugal type sump pumps; performance of centrifugal pumps; well point system.</p> |

**B. RECOMMENDED STUDY MATERIAL**

| <b>S. No</b> | <b>Book</b>  | <b>Author</b>     | <b>Edition</b> | <b>Publication</b>               |
|--------------|--|-------------------|----------------|----------------------------------|
| 1            | Construction equipment and its planning and applications | Verma, Mahesh     | Latest         | Metropoliton Book Co. Ltd.       |
| 2            | Heavy construction Planning, Equipment and Methods       | Jagman Singh      | Latest         | Oxford and IBH                   |
| 3            | Construction Planning and Equipment                      | Satya Narayana B. | 1990           | Standard Publishers Distributors |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Examine composition and properties of municipal solid waste.
- CO2** Interpret solid waste generation, solid waste quantities and process of collection.
- CO3** Demonstrate processing of waste separation and handling of solid waste at residence e.g. Storage, conveying, compacting, Shredding, pulping, granulating etc.
- CO4** Distinguish among disposal processes of municipal solid wastes like combustion, landfill, and biochemical processes.  
Analyze the characteristics of hazardous solid waste such as toxicity, reactivity, infectiousness, flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity and explosiveness.
- CO5**

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                                   | Time Required for the Unit (Hours) |
|------|---|------------------------------------|
| 1    | Composition and Properties of Municipal Solid Waste | 8                                  |
| 2    | Solid Waste Generation and Collection               | 6                                  |
| 3    | Separation and Processing of Solid Waste            | 8                                  |
| 4    | Disposal of Municipal Solid Waste                   | 6                                  |
| 5    | Hazardous Solid Waste                               | 8                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details  |
|-----------|---|
| <b>1.</b> | <b>Composition and Properties of Municipal Solid Waste</b>  |
|           | Introduction, Sources of solid waste, Types of solid waste. Composition of solid waste and its determination. Types of materials recovered from Municipal solid waste (MSW). Physical, Chemical and Biological and properties of Municipal Solid Waste, Transformation of Municipal Solid Waste.  |
| <b>2.</b> | <b>Solid Waste Generation and Collection</b>  |
|           | Introduction, Measurements, and methods to measure solid waste quantities. Solid waste generation and collection. Factors affecting solid waste generation rate. Quantities of materials recovered from MSW.  |
| <b>3.</b> | <b>Separation and Processing of Solid Waste</b>   |
|           | Introduction, Handling and separation of solid waste At site.<br>Material separation by pick in, screens, float and separator magnets and electromechanical separator and other latest devices for material separation.<br>Processing of solid waste at residence e.g. Storage, conveying, compacting, Shredding, pulping, granulating etc. Processing of solid waste at Commercial and industrial site.  |
| <b>4.</b> | <b>Disposal of Municipal Solid Waste</b>  |
|           | Introduction, Combustion and energy recovery of municipal solid waste, Effects of combustion, undesirable effects of Combustion.<br><b>Landfill:</b> Classification, planning, siting, permitting, landfill processes, landfill design, landfill operation, use Of old landfill. Differentiate sanitary land fill and incineration as final disposal system for solid waste<br><b>Biochemical processes:</b> Methane generation by anaerobic digestion, composting and other biochemical Processes. |
| <b>5.</b> | <b>Hazardous Solid Waste</b>  |

|   |
|---|
| Introduction, Definition, identification and classification of hazardous solid waste. Characteristics Hazardous waste toxicity, reactivity, infectiousness, flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity, explosiveness. Bio-medical waste, its sources, generation, storage, transportation and Disposal. |
|---|

**D. RECOMMENDED STUDY MATERIAL:**

| S. No   | Title of the Book                              | Author   | Edition | Publisher                                |
|---|--|--|---------|--|
| 1.  | Integrated Solid Waste Management              | George Tchobanoglous and Hillary theisen, Samuel Vigil | Latest  | McGraw Hill                              |
| 2.  | Disposal and recovery of municipal solid waste | Michael E Henstock                                     | Latest  | Butterworth-Heinemann Ltd (January 1983) |
| 3.  | Solid Waste Management                         | P Aarne Vesilig  | Latest  | Cengage Learning Custom Publishing       |
| 4.  | Environmental Engineering                      | Mackenzie L Davis, David A Cornwell                    | Latest  | McGraw-Hill Inc.                         |
| <b>Websites</b>   |  |  |         |  |
| <a href="https://nptel.ac.in/courses/120108005/">https://nptel.ac.in/courses/120108005/</a>                 |  |  |         |  |
| <a href="https://nptel.ac.in/courses/105/106/105106056/">https://nptel.ac.in/courses/105/106/105106056/</a> |  |  |         |  |
| <a href="https://nptel.ac.in/courses/105105160/">https://nptel.ac.in/courses/105105160/</a>                 |  |  |         |  |

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Determination of properties of stone, bricks and tile  
**LO2** Determination of properties of timber.  
**LO3** Construction and uses of Rat Trap bond  
**LO4** Study of properties of building aggregate, fly-ash, aluminum, steel section, concrete hollow bricks etc.  
**LO5** Study of the Properties and Uses of Ferro cement.

**A. LIST OF EXPERIMENTS:**

|     |  |
|-----|--|
| 1.  | To determine compressive strength and water absorption of stone.                   |
| 2.  | To determine impact value and tensile strength of stone.                           |
| 3.  | To determine dimension and tolerance, water absorption and compressive strength of |
| 4.  | To determine Water absorption, Tolerance and Impact value of tiles.                |
| 5.  | Timber: Compressive and Tensile Strength of Timber across and along the Grain      |
| 6.  | Construction and uses of Rat Trap bond   |
| 7.  | To Study the Properties and Uses of recycle building aggregate.                    |
| 8.  | To Study the Properties & Utilization of Fly Ash in Construction                   |
| 9.  | To Study the Different Aluminum and Steel Sections                                 |
| 10. | To Study the Manufacturing and Use of Concrete Hollow Blocks                       |
| 11. | To Study the Properties and Uses of Kota Stone, Marble and its Slurry              |
| 12. | To Study the Properties and Uses of Ferro cement.                                  |

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Analyze the cement and its basic properties.
- LO2** Evaluate Grade of concrete, proportioning of ingredients.
- LO3** Analyze the property of fine aggregate.
- LO4** Evaluate the impact of admixture in concrete.
- LO5** Analyze form work and design concrete mix.

**A. LIST OF EXPERIMENTS:**

|     |   |
|-----|---|
| 1.  | To determine Normal Consistency, Initial & Final Setting Time of Cement                         |
| 2.  | To determine specific gravity of cement   |
| 3.  | To determine fineness of cement   |
| 4.  | To determine compressive strength of cement   |
| 5.  | To determine Soundness of cement by Le-Chatelier apparatus.                                     |
| 6.  | To determine specific gravity of fine and coarse aggregates                                     |
| 7.  | To determine the bulking of fine aggregate and to draw curve between water content and bulking. |
| 8.  | To determine the fineness modulus of coarse aggregates and fine aggregates                      |
| 9.  | To determine workability of concrete mix by slump test  |
| 10. | To determine workability of concrete mix by compaction factor test                              |
| 11. | To determine workability of concrete mix by Flow table test                                     |
| 12. | To design a concrete mix as per IS recommendation and check its compressive strength.           |
| 13. | To determine the split tensile strength of a given concrete sample.                             |

**VIRTUAL LABS**

<http://civ02.vlabs.ac.in/index.html#>

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Analyze the basic principles and implementation of survey.
- LO2** Analyze procedures of triangulation.
- LO3** Analyze the measurements and adjust the angles of a braced quadrilateral using theodolite.
- LO4** Identify and correct errors and prepare map in field measurements using instruments.
- LO5** Evaluate angles, length of survey line and area measurement using Total Station.

**A. LIST OF EXPERIMENTS:**

|     |  |
|-----|--|
| 1.  | Ranging & fixing of Survey Stations using chain surveying.   |
| 2.  | Determine Magnetic Bearing of a Line using Surveyor's Compass and Prismatic Compass.                 |
| 3.  | To measure and adjust the included angles of a closed traverse using prismatic compass.              |
| 4.  | Determine the reduced levels using Tilting level.  |
| 5.  | Measurement of horizontal angle by Theodolite using Repetition & Reiteration method.                 |
| 6.  | Determine Tachometric Constant and calculate horizontal and vertical distance by tachometric survey. |
| 7.  | Prepare a plan for a given area using Plane Table Surveying.   |
| 8.  | Prepare a contour map for the given area   |
| 9.  | To measure the horizontal and vertical angles by Theodolite.   |
| 10. | To determine the Height of an object by trigonometrical levelling.                                   |
| 11. | To measure and adjust the angles of a braced quadrilateral.  |
| 12. | To Prepare a topographic sheet incorporating features like contours, horizontal & vertical angles.   |
| 13. | To determine angles using EDM & Total station.   |

**B. VIRTUAL LABS**

<http://sl-iitr.vlabs.ac.in/index.php?section=List%20of%20experiments>

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Analyze the basic principles and implementation of staad.
- LO2** Analyze procedures of design.
- LO3** Analyze the framed structure.
- LO4** Design the framed structure.
- LO5** Design of Bridge Deck.

**A. LIST OF EXPERIMENTS:**

|     |   |
|-----|---|
| 1.  | Introduction to Staad Pro               |
| 2.  | Analysis of Continuous beam             |
| 3.  | Analysis of Single storey frame         |
| 4.  | Analysis of Multi-storey frame          |
| 5.  | Design of Multi-storey frame            |
| 6.  | Analysis of Multi-storeyed building     |
| 7.  | Design of Multi-storeyed building       |
| 8.  | Wind load analysis on RCC building      |
| 9.  | Analysis and design of Steel truss.     |
| 10. | Analysis and design of Isolated footing |
| 11. | Analysis and design of Combined footing |
| 12. | Analysis of Bridge deck.                |

**B.. VIRTUAL LABS**

<http://sl-iitr.vlabs.ac.in/index.php?section=List%20of%20experiments>



**Course Outcomes:**

On successful completion of the course the learners will be able to

| CO    | Cognitive Abilities      | Course Outcomes   |
|-------|--------------------------|---|
| CO-01 | Understanding/ Applying  | Integrate their understanding into their leadership skills development process.   |
| CO-02 | Understanding/ Applying  | Demonstrate knowledge of the working environment impacting business organizations and exhibit an understanding of ethical implications of decisions.  |
| CO-03 | Understanding/ Applying  | Assess leadership styles and sharpen the managerial skills to communicate effectively and facilitate decision making in relation with self-management, stress management and conflict management. |
| CO-04 | Understanding / Applying | Generate a creative thinking, something beyond the obvious answers and solution to a specific problem.  |
| CO-05 | Creating/Applying        | Understand the significance of trust and team skills, creating new innovative ideas with the help of brainstorming and learn work etiquettes.   |

| UNIT NO. | UNIT NAME  | Hours |
|----------|--|-------|
| 1        | Leadership Skills  | 4     |
| 2        | Entrepreneurial Skills   | 4     |
| 3        | Managerial Skills: Self –Management, Stress Management & Conflict Management | 6     |
| 4        | Creative Thinking & Design Thinking  | 6     |
| 5        | Team Building & Confidence Building  | 5     |

**LIST OF LABS**

|     |  |
|-----|--|
| 1.  | Leadership Skills: Stages of development   |
| 2.  | Leadership Skills I: Attributes of great leaders, decision making, activities to enhance such qualities          |
| 3.  | Leadership Through Biographies   |
| 4.  | Entrepreneurial Skills: Traits & Competencies of an Entrepreneur   |
| 5.  | Managerial Skills: Conflict Management   |
| 6.  | Self-Management: Challenges & Solutions  |
| 7.  | Stress Management : Causes of stress and regulation  |
| 8.  | Creating Business Plans: Problem Identification and Idea Generation  |
| 9.  | Design Thinking: Transforming Challenges into Opportunities  |
| 10. | Creative Thinking & Analytical Thinking: Presentation  |
| 11. | Team building: Developing teams and team work  |
| 12. | Confidence Building : Improving engagement, communicating effectively & activities to facilitate decision making |

**Code: BCVCCV4601- DISCIPLINE AND TALENT ENRICHMENT PROGRAMME (TEP)-III**  
**1 Credit [LTP: 0-0-2]**

**OVERVIEW AND OBJECTIVES:** The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non- technical categories.

**Discipline and Talent Enrichment Programme (TEP)-III** shall be evaluated irrespective of period / time allocation ( as in the case of Extra Curricular activity) in the teaching scheme as a One credit course. There cord related to discipline and related activities are maintained for each student and they shall be evaluated for the same also. It shall be counted in calculation of SGP A but it is not a backlog subject. However, the attendance of the classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

| Code       | Activities                   | Hours | Credits |
|------------|------------------------------|-------|---------|
| BCVCCV4601 | Non Syllabus Project (NSP)   | 2     | 1       |
|            | Online Certification Courses | 1     |         |

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Third Year - Fifth Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
|             | Nil   |                                    |                  |                  |                       |            |             |           |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                       |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |             |           |
| BCVCCV5101  | Structural Analysis-II  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5102  | Design of Concrete Structures   | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5103  | Design of Steel Structures  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5104  | Transportation Engineering  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVCCV5105  | Irrigation Engineering  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV5201  | Design of Concrete Structures Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV5202  | Design of Steel Structures Lab  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCCV5203  | Road Material Testing Lab   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |             |           |
| BCVECV5111  | Hydrology & Ground water  | 3                                  | 0                | 0                | 40                    | 60         | 100         | 3         |
| BCVECV5112  | Repair & Rehabilitation of Structures   |                                    |                  |                  |                       |            |             |           |
| BCVECV5113  | Rural Water Supply & Sanitation   |                                    |                  |                  |                       |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |             |           |
|             | As Per Annexure-I   | 2                                  | 0                | 0                | 40                    | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences<br/>including Management courses (HSSM)<br/>OR Ability Enhancement<br/>Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |             |           |
| BCVCHM5209  | Professional Skills-I   | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| BCVCHM5210  | Communication Skills-I  | 0                                  | 0                | 2                | 60                    | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR<br/>Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV5401  | Technical Seminar   | -                                  | -                | 2                | 60                    | 40         | 100         | 1         |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp;<br/>Social Outreach</b>  |                                    |                  |                  |                       |            |             |           |
| BCVCCV5601  | Campus Recruitment Training   | 1                                  | -                | -                | 50                    | -          | 50          | 1         |
|             | <b>Total</b>  | <b>21</b>                          | <b>0</b>         | <b>12</b>        |                       |            |             |           |
|             | <b>Total Teaching Hours</b>   | <b>33</b>                          |                  |                  | <b>690</b>            | <b>660</b> | <b>1350</b> | <b>27</b> |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Evaluate degree of freedoms for beams, frames with or without sway and moments in indeterminate structure by applying Maxwell's reciprocal theorem, Betti's theorem and slope-deflection method.
- CO2** Analyze continuous beams and portal frames with and without inclined members using Moment distribution method.
- CO3** Value forces in elements of suspension bridges, hinged arches and hinged stiffening girders.
- CO4** Examine indeterminate structures using Column analogy method and Kani's method.
- CO5** Create influence line diagram using concentrated loads and uniformly distributed loads applying Muller Breslau principle.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                        | Time Required for the Unit (Hours) |
|------|--|------------------------------------|
| 1    | Introduction to Indeterminate structures | 6                                  |
| 2    | Analysis of structures                   | 8                                  |
| 3    | Analysis of forces                       | 8                                  |
| 4    | Column Analogy method                    | 8                                  |
| 5    | Moving loads and influence lines         | 6                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction to Indeterminate structures</b>  |
|          | Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic Indeterminacy for beams, frames & portal with & without sway, Releases in structures, Maxwell's reciprocal theorem and Betti's theorem, Analysis of Statically Indeterminate Structures using Slope-deflection method.   |
| <b>2</b> | <b>Analysis of structures</b>  |
|          | Analysis of structures using Moment distribution method applied to continuous beams and portal frames with and without inclined members.   |
| <b>3</b> | <b>Analysis of forces</b>  |
|          | Introduction, Cables, suspension bridges and arches. Analysis of forces in cables-temperature effects-suspension bridges with three hinged and two hinged stiffening girders-theory of arches-Eddy's theorem-analysis of three hinged and two hinged arches -settlement and temperature effects.   |
| <b>4</b> | <b>Column Analogy method</b>   |
|          | Introduction, Column Analogy method for indeterminate structures, determination of carry over factor for Non-prismatic section. Kani's Method: Analysis of beams and frames with & without sway by Kani's method.  |
| <b>5</b> | <b>Moving loads and influence lines</b>  |
|          | Introduction to moving loads-concept of influence lines-influence lines for reaction, shear force and bending moment in simply supported beams and over hanging beams, Muller Breslau principle and its application to propped cantilevers<br>Influence lines for forces in beams and trusses analysis for different types of moving loads, Single concentrated load-several concentrated loads uniformly distributed load shorter and longer than the span. |

### C. RECOMMENDED STUDY MATERIAL

| Sr. No.   | Book                                | Author               | Publication                |
|---|-------------------------------------|----------------------|----------------------------|
| 1   | Mechanics of Structures Vol. I & II | S.B. Junarkar& Shah, | Charotar Publishing House. |
| 2   | Theory of Structures                | B.C. Purnmia,        | Laxmi Publication (P) Ltd. |
| 3   | Theory of Structures                | Timoshenko,          | McGraw Hill Book Co.       |
| 4   | Structural Analysis                 | Ghali& Neville       | E&FN Spon.                 |
| 5   | Structural Analysis                 | Hibbler R.C.,        | PearsonS                   |
| <b>Websites</b>   |                                     |                      |                            |
| <a href="https://nptel.ac.in/courses/105105166/">https://nptel.ac.in/courses/105105166/</a> |                                     |                      |                            |
| <a href="https://nptel.ac.in/courses/105101085/">https://nptel.ac.in/courses/105101085/</a> |                                     |                      |                            |
| <a href="https://nptel.ac.in/courses/105105109/">https://nptel.ac.in/courses/105105109/</a> |                                     |                      |                            |
| <a href="https://nptel.ac.in/courses/105105109/">https://nptel.ac.in/courses/105105109/</a> |                                     |                      |                            |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Compare designing philosophies such as working stress method and limit states method in concrete structures.
- CO2** Design the singly-reinforced beam, T-beam and double-reinforced beam according to limit state method using IS: 456 -2000.
- CO3** Design the columns and slabs according to limit state method using IS: 456 -2000.
- CO4** Analyze the continuous, curved beams considering torsion and design rectangular, circular and Intze type water tanks.
- CO5** Demonstrate the yield line theory, retaining wall and elements of pre-stressed concrete.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                           | Time Required for the Unit (Hours) |
|------|---|------------------------------------|
| 1    | Concept of RCC Design                       | 8                                  |
| 2    | Analysis and design of beams                | 8                                  |
| 3    | Analysis and design on Limit state          | 7                                  |
| 4    | Analysis and design of slab                 | 7                                  |
| 5    | Analysis and design of columns and footings | 6                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details  |
|----------|---|
| <b>1</b> | <b>Concept of RCC Design</b>  |
|          | Fundamental concepts of design of RC members, assumptions. Types and function of reinforcement. Introduction to various related IS codes, Characteristic load and characteristic strength.<br>Working Stress Method: Working stress design philosophy. Analysis and Design of singly reinforced rectangular beam section for flexure.   |
| <b>2</b> | <b>Analysis and design of beams</b>   |
|          | Limit state design philosophy. Assumptions, Analysis and design of singly reinforced, doubly reinforced rectangular beams and flanged beams for flexure using codal provisions for simply supported, cantilever, fixed and continuous beams.  |
| <b>3</b> | <b>Analysis and design on Limit state</b>   |
|          | Limit state of serviceability for deflection: control of deflection as per codal provisions of empirical coefficients.<br>Limit state of collapse in shear: Types of shear reinforcement and its detailing, analysis and design of shear reinforcement for prismatic sections.<br>Limit state of collapse in bond: concept of bond stress, anchorage length and development length. Detailing and curtailment of reinforcement as per codal provisions. |
| <b>4</b> | <b>Analysis and design of slab</b>  |
|          | Slabs: Analysis and design of one way and two way slabs using LSM, Detailing of reinforcement. Check for shear and deflection.  |
| <b>5</b> | <b>Analysis and design of columns and footings.</b>   |
|          | Columns: Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of eccentrically loaded short columns. Introduction to Pu- Mu interaction curves and their use for eccentrically loaded columns.<br>Footings: Analysis and design of Isolated column footing for axial load. Introduction to combined footing for two columns (without central beam) for axial loads using LSM.   |

### C. RECOMMENDED STUDY MATERIAL

| S. N.   | Book                                      | Author          | Edition | Publication                      |
|---|---|-----------------|---------|----------------------------------|
| 1   | Illustrated Reinforced Concrete Design    | Karve& Shah     | Latest  | Standard Publishers, Delhi.      |
| 2   | Limit State Design of Reinforced Concrete | Verghese P.C.;  | Latest  | PHI Delhi.                       |
| 3   | Reinforced Concrete : Limit State Design  | A.K.Jain        | Latest  | Nem Chand and Brothers, Roorkee. |
| 4   | Reinforced Concrete Structural Elements   | P Purushothaman | Latest  | McGraw Hill                      |
| 5   | Design of Concrete Structures             | Nilson & Winter | Latest  | McGraw Hill                      |
| <b>Websites</b>   |   |                 |         |                                  |
| <a href="https://nptel.ac.in/courses/105105104/">https://nptel.ac.in/courses/105105104/</a>   |   |                 |         |                                  |
| <a href="https://nptel.ac.in/courses/105105105/">https://nptel.ac.in/courses/105105105/</a>   |   |                 |         |                                  |
| <a href="https://nptel.ac.in/content/syllabus_pdf/105105105.pdf">https://nptel.ac.in/content/syllabus_pdf/105105105.pdf</a>   |   |                 |         |                                  |
| <a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105105/lec3.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105105/lec3.pdf</a> |   |                 |         |                                  |
| <a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105105/lec3.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105105/lec3.pdf</a> |   |                 |         |                                  |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Demonstrate plastic analysis of steel structure and classification of cross sections as per IS 800-2007.
- CO2** Design the bolted and welded connections under axial and eccentric loadings and axially loaded tension members.
- CO3** Design of steel compression member as per IS: 800 – 2007.
- CO4** Design the laterally supported and unsupported beam beams and their connections.
- CO5** Design the column bases, slab base, gusseted base for axial and eccentric compressive load and grillage foundation and demonstrate plate girder, gantry girder, foot over bridges.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                   | Time Required for the Unit (Hours) |
|------|-------------------------------------|------------------------------------|
| 1    | Introduction                        | 6                                  |
| 2    | Connections                         | 8                                  |
| 3    | Compression Member                  | 6                                  |
| 4    | Beams                               | 8                                  |
| 5    | Member design under combined forces | 8                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction</b>  |
|          | <b>Introduction:</b> Types of steels and their broad specifications.<br><b>Plastic Analysis:</b> Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor. Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including moment- rotation. |
| <b>2</b> | <b>Connections</b>   |
|          | <b>Connections:</b> Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings.<br><b>Tension Members:</b> Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members.   |
| <b>3</b> | <b>Compression Member</b>  |
|          | <b>Compression Member:</b> Types of buckling. Column buckling curves, Imperfection factor, Buckling curves for different cross sections. Design of compression member. Axially loaded compression members including angle section design: single and in pair, built up columns, design of lacings and battens.   |
| <b>4</b> | <b>Beams</b>   |
|          | <b>Beams:</b> Design of beams: simple and compound sections, main and subsidiary beams and their connections. Laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.  |
| <b>5</b> | <b>Member design under combined forces</b>   |
|          | <b>Member design under combined forces:</b> Compressive load and uniaxial moment. Tension and uniaxial moment.<br><b>Column Bases:</b> Design of column bases, Slab base, gusseted base for axial and eccentric compressive load. Grillage foundation design. Basic introduction of Plate girder, gantry girder, foot over bridges and water tank.   |



### C. RECOMMENDED STUDY MATERIAL

| S. N. | Book                                   | Author         | Edition | Publication                  |
|-------|--|----------------|---------|------------------------------|
| 1     | Design of Steel Structures             | N. Subramanian | Latest  | Oxford University Press.     |
| 2     | Limit state Design of Steel Structures | S K Duggal     | Latest  | TMH publication              |
| 3     | Design of Steel Structures             | S. Bhavikatti  | Latest  | I.K. International Pvt. Ltd. |
| 4     | Design of Steel Structures             | V.L. Shah      | Latest  | Structures Publications.     |

#### Websites

<https://nptel.ac.in/courses/105105162/>

<https://nptel.ac.in/courses/105105132/>

<https://nptel.ac.in/courses/105106113/>

[https://nptel.ac.in/content/syllabus\\_pdf/105105162.pdf](https://nptel.ac.in/content/syllabus_pdf/105105162.pdf)

[https://www.hindawi.com/journals/jstruc/?utm\\_source=google&utm\\_medium=cpc&utm\\_campaign=HDW\\_MRK\\_T\\_GBL\\_SUB\\_ADWO\\_PAI\\_DYNA\\_JOUR\\_X&gclid=EAIaIQobChMI\\_uvtoZ756AIVRIWPCh2XxQC0EAAY\\_ASAAEgIE\\_PD\\_BwE](https://www.hindawi.com/journals/jstruc/?utm_source=google&utm_medium=cpc&utm_campaign=HDW_MRK_T_GBL_SUB_ADWO_PAI_DYNA_JOUR_X&gclid=EAIaIQobChMI_uvtoZ756AIVRIWPCh2XxQC0EAAY_ASAAEgIE_PD_BwE)

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Demonstrate the planning, characteristics and development of transportation systems.
- CO2** Analyze the Testing Procedures for highway construction-flexible and rigid pavements and methods of constructing bituminous roads and concrete roads.
- CO3** Evaluate highway geometric elements such as sight distances, super elevation, extra widening and length of transition curves, gradients and camber.
- CO4** Interpret the several road traffic engineering studies and types of traffic signs.
- CO5** Design the plain and hilly pavement by G. I., CBR, Westergad's and modified methods.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                      | Time Required for the Unit (Hours) |
|------|--|------------------------------------|
| 1    | Introduction                           | 6                                  |
| 2    | Highway Materials and Construction     | 8                                  |
| 3    | Highway Geometric Design               | 8                                  |
| 4    | Elementary Traffic Engineering         | 6                                  |
| 5    | Structural design of Highway Pavements | 8                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details  |
|----------|---|
| <b>1</b> | <b>Introduction</b>   |
|          | Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison.<br>Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment. |
| <b>2</b> | <b>Highway Materials and Construction</b>   |
|          | <b>Highway Materials and Construction:</b> Desirable Properties, Testing Procedures for highway construction-flexible and rigid pavements, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash, Marshall Mix design method<br>Methods of constructing different types of roads viz. Stabilized roads, WBM & WMM , Bituminous roads and Concrete roads. Specific features of rural roads.  |
| <b>3</b> | <b>Highway Geometric Design</b>   |
|          | <b>Highway Geometric Design:</b> Cross Sectional Elements, camber, Sight Distances-definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, and transition curves. Design of Vertical Alignment – Gradients, Vertical curves.  |
| <b>4</b> | <b>Elementary Traffic Engineering</b>   |
|          | Introduction, Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study, analysis and application of different traffic survey data, Importance and types of Traffic Signs, Signals and 2 phase signal design , Road Markings and Road Intersections.  |
| <b>5</b> | <b>Structural design of Highway Pavements</b>   |

**Structural design of Highway Pavements:** Design of Flexible Pavements by G. I. and CBR methods. Design of Rigid Pavements by Westergad's and modified methods. (As per guidelines of IRC) Hill Roads: Special factors in Alignment and Geometric design, Drainage and maintenance of Hill roads. Road side Arboriculture and Landscaping. Recent Developments in Urban Roads and their role in economic developments.

### C. RECOMMENDED STUDY MATERIAL

| S. No  | Book  | Author                         | Edition | Publication             |
|--|---|--------------------------------|---------|-------------------------|
| 1  | Highway Engineering                             | Khanna, S.K. and Justo, C.E.G. | Latest  | Nem Chand & Bros. 2004  |
| 2  | Highway Material Testing Manual                 | Khanna, S.K. and Justo, C.E.G. | Latest  | Nem Chand & Bros. 2004  |
| 3  | Traffic Engineering and Transportation Planning | Kadiyali, L.R.                 | Latest  | Khanna Publishers. 2002 |
| 4  | Principles and Design of Highway Engineering    | Sharma, S.K.                   | Latest  | S. Chand & Co. 1995     |
| <b>Websites</b>  |   |                                |         |                         |
| <a href="https://nptel.ac.in/courses/105101087/">https://nptel.ac.in/courses/105101087/</a><br><a href="https://nptel.ac.in/courses/105105107/">https://nptel.ac.in/courses/105105107/</a><br><a href="https://nptel.ac.in/courses/105107123/">https://nptel.ac.in/courses/105107123/</a><br><a href="https://nptel.ac.in/courses/105104098/">https://nptel.ac.in/courses/105104098/</a><br><a href="https://nptel.ac.in/courses/105101008/">https://nptel.ac.in/courses/105101008/</a><br><a href="https://www.journals.elsevier.com/transportation-engineering/">https://www.journals.elsevier.com/transportation-engineering/</a> |   |                                |         |                         |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Analyze agriculture conditions based on soil moisture, crop water relations, irrigation water quality, and consumptive use of water, multiple cropping and hybrid crops.
- CO2** Design channel by Kennedy's theory and Lacey's theory and demonstrate the role of command area development authority, functions and organizational structures.
- CO3** Demonstrate system of regulation and control, outlets, assessment of canal revenue, hydraulics of alluvial rivers and river training.
- CO4** Examine water logging causes and types of channels lining, design of lined channel and well irrigation.
- CO5** Interpret hydrology and hydrological cycle, measurement of rainfall, rain gauge, peak flow and flood frequency methods.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit           | Time Required for the Unit (Hours) |
|------|-----------------------------|------------------------------------|
| 1    | Introduction                | 6                                  |
| 2    | Irrigation system           | 8                                  |
| 3    | Distribution of Canal Water | 8                                  |
| 4    | Water Logging               | 8                                  |
| 5    | Hydrology                   | 6                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction</b>  |
|          | Introduction: Definitions, functions and advantages of irrigation, Present status of irrigation in India, Classification for agriculture, Soil moisture and crop water relations, Irrigation water quality, Consumptive use of water, principal Indian crop seasons. Water requirements, multiple cropping, hybrid crops, water harvesting and conservation.   |
| <b>2</b> | <b>Irrigation system</b>   |
|          | <b>Canal Irrigation:</b> Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirement, Estimation of channel losses, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals.<br><b>Water Distribution System:</b> Rotational delivery (Warabandi, Jama Bandi, Khasra Bandi, Sajra Sheets), continuous delivery and delivery on demand, Role of command area development authority, Functions and organizational structures. |
| <b>3</b> | <b>Distribution of Canal Water</b>   |
|          | Introduction, System of regulation and control, outlets, assessment of canal revenue. Hydraulics of Alluvial Rivers : Critical tractive force, regimes of flow, resistance relationship for natural streams, bed load, suspended load and total equations, Different stages of rivers, meandering, aggradations, and degradation, river training & bank protection works.  |
| <b>4</b> | <b>Water Logging</b>   |
|          | <b>Water Logging:</b> Causes, preventive and curative measures, drainage of irrigated lands, saline and alkaline lands. Types of channels lining and design of lined channel.<br><b>Well Irrigation:</b> Open wells and tube wells, types of tube wells, Duty of tube well water.  |
| <b>5</b> | <b>Hydrology</b>   |
|          | Introduction, Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph, Estimation of run off.   |

### C. RECOMMENDED STUDY MATERIAL

| S. No   | Book  | Author          | Edition | Publication                           |
|---|---|-----------------|---------|---------------------------------------|
| 1   | Irrigation engineering                                | N N BUSAK       | Latest  | McGraw Hill Education (India) Pvt Ltd |
| 2   | Irrigation Water Power and Water Resource Engineering | DR. K. R. ARORA | Latest  | Standard Publishers Distributor       |
| 3   | Irrigation And Water Power Engineering                | DR. B.C. PUNMIA | Latest  | Laxmi Publications                    |
| 4   | Irrigation Engineering                                | S. K. Garg      | Latest  | Standard Publishers Distributor       |
| Websites  |   |                 |         |                                       |
| <ul style="list-style-type: none"><li>• <a href="https://nptel.ac.in/courses/105105110/">https://nptel.ac.in/courses/105105110/</a></li><li>• <a href="https://nptel.ac.in/courses/105102159/">https://nptel.ac.in/courses/105102159/</a></li><li>• <a href="https://nptel.ac.in/courses/126105010/">https://nptel.ac.in/courses/126105010/</a></li><li>• <a href="https://nptel.ac.in/courses/105108081/">https://nptel.ac.in/courses/105108081/</a></li></ul> |   |                 |         |                                       |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Analyze hydrologic components such as hydrologic cycle, water budget equations, world water balance and precipitation.
- CO2** Demonstrate evapotranspiration, interception, depression storage and infiltration.
- CO3** Evaluate runoff and hydrographs based on runoff characteristics of stream, yield and rainfall.
- CO4** Design flood and flood routing using rational method, empirical formulae, unit hydrograph method and flood frequency studies.
- CO5** Interpret groundwater, aquifers, well losses specific capacity, and rain water harvesting and ground water irrigation.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit      | Time Required for the Unit (Hours) |
|------|------------------------|------------------------------------|
| 1    | Hydrologic components  | 6                                  |
| 2    | Hydrologic processes   | 8                                  |
| 3    | Runoff and Hydrographs | 8                                  |
| 4    | Floods                 | 8                                  |
| 5    | Groundwater            | 6                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Hydrologic components</b>   |
|          | Introduction: hydrologic cycle, water budget equations, world water balance, application in Engineering.<br><b>Precipitation:</b> Forms of precipitation, measurement, depth-area-duration & intensity- duration-frequency relationships, probable maximum precipitation.  |
| <b>2</b> | <b>Hydrologic processes</b>  |
|          | Introduction, Abstraction from Precipitation: Evaporation – process, measurement and estimation, Evapotranspiration-measurement and estimation, Initial Losses- Interception & Depression storage, Infiltration- process, capacities, indices, measurement & estimation.   |
| <b>3</b> | <b>Runoff and Hydrographs</b>  |
|          | Introduction, Runoff and Hydrographs: Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.  |
| <b>4</b> | <b>Floods</b>  |
|          | <b>Flood:</b> Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor.<br><b>Flood Routing:</b> Basic equation, hydrologic storage routing & Attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing. |
| <b>5</b> | <b>Groundwater</b>   |
|          | <b>Groundwater:</b> introduction, forms of subsurface water, aquifers & its properties, Compressibility Of aquifers, flow equations for confined and unconfined aquifers, well hydraulics- steady and Unsteady flow to a well in confined aquifer, well losses, specific capacity, ground water irrigation, rain water harvesting.   |

### C. RECOMMENDED STUDY MATERIAL

| S. N.   | Book                                    | Author   | Edition        | Publication                     |
|---|---|--|----------------|---------------------------------|
| 1   | Hydrology for Engineers                 | Linsley R. K., Kohler M. A. and Paulhus J. L. H. | Latest         | McGraw-Hill                     |
| 2   | Engineering Hydrology                   | K. Subramanya                                    | Fourth edition | McGraw Hill Education           |
| 3   | Hydrology: Principles. Analysis. Design | Raghunath H. M.                                  | Third edition  | New Age International Pvt Ltd   |
| 4   | Handbook of Applied Hydrology           | Chow V. T.                                       | Second         | McGraw-Hill                     |
| 5   | Irrigation: Theory & Practice           | Michael A. M                                     | Second edition | Vikas Publication House Pvt Ltd |
| <b>Websites</b>   |   |  |                |                                 |
| <a href="https://nptel.ac.in/courses/105105110/">https://nptel.ac.in/courses/105105110/</a><br><a href="https://nptel.ac.in/courses/105101008/">https://nptel.ac.in/courses/105101008/</a><br><a href="https://nptel.ac.in/content/syllabus_pdf/105107123.pdf">https://nptel.ac.in/content/syllabus_pdf/105107123.pdf</a><br><a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105107/lec2.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105107/lec2.pdf</a><br><a href="https://www.journals.elsevier.com/engineering/">https://www.journals.elsevier.com/engineering/</a> |   |  |                |                                 |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Demonstrate the corrosion of reinforcements, carbonation, chloride ingress, alkali-silica reaction, freeze-thaw effects, chemical attack, abrasion, erosion and cavitation in concrete.
- CO2** Analyze the structural conditions in RCC structures using rapid visual screening.
- CO3** Examine structures damage with allied tests such as destructive, semi-destructive and nondestructive tests.
- CO4** Apply rehabilitation and retrofitting methods on concrete structures.
- CO5** Evaluate seismic retrofitting of RCC buildings.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                         | Time Required for the Unit (Hours) |
|------|---|------------------------------------|
| 1    | Deterioration of Concrete Structures      | 6                                  |
| 2    | Cracks in Concrete and Masonry Structures | 8                                  |
| 3    | Assessment of Risk/Damage in Structures   | 8                                  |
| 4    | Materials for Repair & Repair Technique   | 8                                  |
| 5    | Case Studies                              | 6                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Deterioration of Concrete Structures</b>  |
|           | <ul style="list-style-type: none"> <li>Deterioration of Concrete Structures: Penetrability of concrete- permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfate attack. Alkali – Aggregate Reaction. Corrosion- mechanism.</li> <li>Factors affecting and Preventive measures :for all the above, including water – proofing techniques for various conditions, sacrificial anode, corrosion resistant steel, corrosion inhibitors, protective coatings etc.</li> </ul>            |
| <b>2.</b> | <b>Cracks in Concrete and Masonry Structures</b>   |
|           | <ul style="list-style-type: none"> <li>Cracks in Concrete and Masonry Structures- Types, patterns, measurement and preventive measures</li> </ul>  |
| <b>3.</b> | <b>Assessment of Risk/Damage in Structures</b>   |
|           | <ul style="list-style-type: none"> <li>Materials for Repair: polymers and resins, self-curing compounds, FRP, ferro-cement- properties, selection criterion, cement based and polymer modified mortars etc.</li> <li>Repair Techniques: Grouting, Jacketing, External bonded plates- processes, limitations, design computations etc. including numerical problems.</li> <li>Under Water Repair: Processes</li> </ul>  |
| <b>4.</b> | <b>Materials for Repair &amp; Repair Technique</b>   |
|           | <ul style="list-style-type: none"> <li>Assessment of Risk/Damage in Structures: Preliminary investigation- visual, history collection etc.</li> <li>Detailed Investigation: core cutting, rebar locator, corrosion meter, penetration resistance, pull out tests, half-cell potential, concrete resistivity etc.</li> <li>Interpretation of non-destructive test data from all the above tests as well as rebound hammer number and ultra-sonic pulse velocity.</li> <li>Destructive and chemical tests- on material samples from site.</li> </ul> |
| <b>5.</b> | <b>Case Studies</b>  |
|           | <ul style="list-style-type: none"> <li>Case Studies: related to rehabilitation of bridge piers, heritage structures, masonry structures etc.</li> </ul>  |



### C. RECOMMENDED STUDY MATERIAL

| S. N. | Title of the Book                                       | Author                              | Edition | Publication                |
|-------|---|-------------------------------------|---------|----------------------------|
| 1.    | Earthquake resistant design of structures               | PankajAgarwal and Manish Shrikhande | Latest  | Prentice-Hall of India     |
| 2.    | Handbook on Repairs and Rehabilitation of RCC buildings | CPWD, Government of India           | Latest  | CPWD                       |
| 3.    | Appraisal and Repair of Reinforced concrete             | R.Holland                           | Latest  | Thomas Telford Ltd. London |
| 4.    | Repair and Strengthening of Concrete structures         | FIP guide                           | Latest  | Thomas Telford Ltd. London |

#### Website

- <https://nptel.ac.in/courses/105/106/105106202/>
- [https://nptel.ac.in/content/storage2/nptel\\_data3/html/mhrd/ict/text/105104030/lec38.pdf](https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105104030/lec38.pdf)
- <https://www.tandfonline.com/doi/abs/10.1080/19378629.2019.1655566?journalCode=test20>

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Demonstrate water-borne diseases, water treatments and ground water contamination.
- CO2** Design water supply and sanitation system for rural community.
- CO3** Examine sanitation process for industrial plant, schools, public buildings, hospitals, eating establishments and swimming pools.
- CO4** Analyze refuse collection and disposal process such as salvaging, dumping, incineration, composting, dung disposal-digester and biogas plant.
- CO5** Discuss milk pasteurization, cattle borne diseases, communicable diseases and general methods of control.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                      | Time Required for the Unit (Hours) |
|------|--|------------------------------------|
| 1    | Rural water supply                     | 6                                  |
| 2    | Rural sanitation                       | 8                                  |
| 3    | Industrial Hygiene and Sanitation      | 8                                  |
| 4    | Refuse collection and disposal         | 8                                  |
| 5    | Milk sanitation& Communicable diseases | 6                                  |

#### B. DETAILED SYLLABUS

| Unit      | Contents   |
|-----------|--|
| <b>1.</b> | <b>Rural water supply</b>  |
|           | Introduction; Need for a protected water supply, Well waters, water-borne diseases. Types of systems viz., BWS, MWS, PWS, Water treatment defluoridation, hardness and iron removal, Ground water contamination and control.   |
| <b>2.</b> | <b>Rural sanitation</b>  |
|           | Introduction, conservancy, public latrine, concept of eco sanitation, trenching and composting methods, two pit latrines, aqua privy, W.C., septic tank, soak pit, Low cost excreta disposal systems, sludge disposal, Identify problems pertaining to rural water supply and sanitation. Design water supply and sanitation system for rural community. |
| <b>3.</b> | <b>Industrial Hygiene and Sanitation</b>   |
|           | Introduction, Occupational Hazards- Schools Public Buildings-Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort- Industrial plant sanitation.  |
| <b>4.</b> | <b>Refuse collection and disposal</b>  |
|           | Introduction, Garbage, ash, rubbish, collection methods, transportation, disposal- salvaging, dumping, controlled tipping, incineration, composting, dung disposal-digester, biogas plant.   |
| <b>5.</b> | <b>Milk sanitation&amp; Communicable diseases</b>  |
|           | Introduction, Essentials, test for milk quality, pasteurization, quality control, cattle borne diseases, planning for a cow shed.<br>Communicable diseases: Terminology, classifications, methods of communication, general methods of control.  |

#### C. RECOMMENDED STUDY MATERIAL:

| S. No | Title of the Book                        | Author            | Edition | Publisher          |
|-------|--|-------------------|---------|--------------------|
| 1.    | Environmental Engineering and Sanitation | Joseph A. Solveto | Fourth  | Wiley-Interscience |

|    |                                     |                         |        |                               |
|----|-------------------------------------|-------------------------|--------|-------------------------------|
| 2. | Water Supply & Sanitary Engineering | G.S.Birdie              | Latest | DhanpatRai Publishing Company |
| 3. | Environmental Engineering-II        | B.C Punmia & Ashok Jain | Latest | Lakshmi publications          |

**Website**

- <https://nptel.ac.in/courses/105104102/>
- <https://nptel.ac.in/courses/105105201/>
- <https://www.google.com/search?q=rural+and+water+supply+engg&oq=rural+and+water+supply+engg+&aqs=chrome..69i57j0.11533j1j7&sourceid=chrome&ie=UTF-8>
- <https://www.journals.elsevier.com/water-science-and-engineering>

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Design philosophies of reinforced concrete structures.
- LO2** Apply the principles, procedures and current code requirements to the analysis and design of reinforced concrete beams.
- LO3** Identify the behavior of reinforced concrete members in bond, anchorage, shear and torsion
- LO4** Analyze and design reinforced concrete compression members.
- LO5** Analyze the load on the structure and design the footings.

|                            |
|----------------------------|
| <b>LIST OF EXPERIMENTS</b> |
|----------------------------|

|                                   |
|-----------------------------------|
| Design as per syllabus of theory. |
|-----------------------------------|

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1**      Appropriate methods of structural design for the design of steel structures by applying the fundamentals of mechanics.
- LO2**      Acquire adequate knowledge in the design of steel structural elements.
- LO3**      Identify the behavior of compression member.
- LO4**      Analyze and design the steel joist beam.
- LO5**      Apply the principle, procedure and current code in the design of column base.

|                            |
|----------------------------|
| <b>LIST OF EXPERIMENTS</b> |
|----------------------------|

|                                   |
|-----------------------------------|
| Design as per syllabus of theory. |
|-----------------------------------|

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Identify the fineness modulus of coarse aggregate.
- LO2** Acquire the adequate knowledge on angularity, impact and abrasion value of aggregate.
- LO3** Identify the viscosity, crushing, specific gravity and water absorption of the aggregate.
- LO4** Justify the construction practices of aggregate by knowing the ductility, flakiness and elongation index of the aggregate.
- LO5** Test the marshall stability test.

**A. LIST OF EXPERIMENTS**

1. To determine fineness modulus of a given sample of coarse aggregate.
2. Angularity number test
3. Aggregate impact test
4. Los angles abrasion test
5. Aggregate crushing value test
6. Standard tar viscometer test
7. Specific gravity and water absorption test
8. To determine the elongation index for given sample of aggregate.
9. To determine the flakiness index of given sample of aggregate.
10. Ductility test
11. To determine the softening point for give a sample of bitumen.
12. Marshall stability test
13. Flash and Fire Point

**VIRTUAL LAB**

- <https://www.youtube.com/watch?v=Mn7aeorMpTs>
- <https://www.youtube.com/watch?v=acfJIG9o8iw>
- <https://www.youtube.com/watch?v=k6wXH50Kwkw>
- <https://www.youtube.com/watch?v=IE7LFOuGKyI>
- <https://www.youtube.com/watch?v=BPdzkfkFnvw>
- <https://www.youtube.com/watch?v=hqXFPq676iM>
- [https://www.youtube.com/watch?v=\\_0OUwEDorYg](https://www.youtube.com/watch?v=_0OUwEDorYg)

**Course Outcomes:**

On successful completion of the course the learners will be able to:

| CO    | Cognitive Abilities              | Course Outcomes   |
|-------|----------------------------------|---|
| CO-01 | Understanding/ Applying          | Compare the professional and personal approach towards any task and demonstrate their understanding by displaying professional attitude in the assigned tasks.  |
| CO-02 | Understanding/ Applying/Creating | Recognize, explain, and use the formal elements of specific genres of organizational communication: reports, proposals, memorandums, web pages, wikis, blogs, business letters, and promotional documents etc.  |
| CO-03 | Understanding/ Applying          | Prepare and deliver a clear and fluent demonstrative, informative, and persuasive presentation and enlarge their vocabulary by keeping a vocabulary journal.  |
| CO-04 | Understanding / Applying         | Demonstrate preparedness for any type of interview from classic one-on-one interview to panel interviews, Phone/Skype interviews, Behavioral/Situational etc. along with sharpening the ability to critically analyze a given piece of information and collectively work in a group to arrive at a solution or develop a perspective. |
| CO-05 | Creating/Applying                | Understand negotiation and time management to identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain and move negotiations from bargaining to closing.   |

| UNIT NO. | UNIT NAME                            | Hours |
|----------|--------------------------------------|-------|
| 1        | Professional Attitude & Approach     | 4     |
| 2        | Professional Writing-I               | 6     |
| 3        | Presentation Skills: Structure Study | 4     |
| 4        | Interview Skills & Group Discussion  | 6     |
| 5        | Negotiation Skills & Time Management | 5     |

**LIST OF ACTIVITIES**

|     |   |
|-----|---|
| 1.  | Professional & Ethical Approaches : Degree of adherence, Business world & meeting deadlines                           |
| 2.  | Job Hunting and Networking: Skill Branding & Usage of Online Platforms  |
| 3.  | Trust Building & Cultural Etiquettes  |
| 4.  | Professional Writing-I: Direct-Indirect approaches to Business Writing-Five main stages of writing Business Messages. |
| 5.  | Professional Email Writing  |
| 6.  | Resume Building-I: Difference between C.V. & Resume, formats, points to cover, practice sessions                      |
| 7.  | E-Learning & E-Content Development-I  |
| 8.  | Presentation Skills: format & structure of presentations, using tools & techniques                                    |
| 9.  | Job Interviews I: Preparation and Presentation  |
| 10. | Advanced Group Discussion – I   |
| 11. | Negotiation Skills & and Conflict Resolution-I  |
| 12. | Professional Code of Ethics & Effective Time Management   |

**Course Outcomes:**

On successful completion of the course the learners will be able to:

| CO    | Cognitive Abilities              | Course Outcomes  |
|-------|----------------------------------|--|
| CO-01 | Understanding/ Applying/Creating | Demonstrate depth of understanding, observing complexity, improve insight and develop independent thought and persuasiveness.                                      |
| CO-02 | Understanding/ Applying          | Determine the main ideas of the text by using key details and compare & contrast the most important points with the help of their perspective.                     |
| CO-03 | Understanding/ Applying/Creating | Practice the qualities of writing style by applying the concepts of sentence conciseness, accuracy, readability, coherence and by avoiding wordiness or ambiguity. |
| CO-04 | Understanding / Applying         | Distinguish words and phrases as per their intonation patterns and interpret the audios based on different situations  |
| CO-05 | Understanding/Applying           | Demonstrate the understanding of impactful conversational skills, presentation skills & telephonic conversation by considering the need of the audience.           |

| UNIT NO. | UNIT NAME                          | Hours |
|----------|------------------------------------|-------|
| 1        | Intrapersonal/Interpersonal Skills | 6     |
| 2        | Reading Skills                     | 4     |
| 3        | Writing Skills                     | 6     |
| 4        | Listening Skills                   | 4     |
| 5        | Speaking Skills                    | 5     |

| LIST OF ACTIVITIES |   |
|--------------------|---|
| 1.                 | Self – Awareness & Self-Introduction  |
| 2.                 | Goal Setting: Ambition induced, interest induced or environment conditioned     |
| 3.                 | Cultivating Conversational Skills   |
| 4.                 | Role Plays : Selection of varied plots, characters & settings                   |
| 5.                 | Reading skills I: Newspaper Reading & General Article Reading                   |
| 6.                 | Writing Skills I: Story Making by jumbled words                                 |
| 7.                 | Understanding and Applying Vocabulary   |
| 8.                 | Listening Skills I: Types and practice by analyzing situational listening       |
| 9.                 | Speaking Skills I: JAM  |
| 10.                | PowerPoint Presentation Skills-I  |
| 11.                | Telephonic Etiquettes and Communication   |
| 12.                | Recognizing, understanding and applying communication style (Verbal/Non-Verbal) |



**OVER VIEW AND OBJECTIVES:**

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated in to the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

**Discipline and Talent Enrichment Programme (TEP)-V** shall be evaluated irrespective of period / time allocation (as in the case of Extra Curricular activity) in the teachings Scheme as a One credit course. There cord related to discipline and related activities are maintained for each student and they shall be evaluated for the same also. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of the classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

| <b>Code</b> | <b>Activity</b>             | <b>Hours</b> | <b>Credits</b> |
|-------------|-----------------------------|--------------|----------------|
| BCVCCV5601  | Campus Recruitment Training | 1            | 1              |

\*\*\*\*\*

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Third Year - Sixth Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |           |            | Credits  |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|-----------|------------|----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE       | Total      |          |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |           |            |          |
|             | Nil   |                                    |                  |                  |                       |           |            |          |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                       |           |            |          |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |           |            |          |
|             | Nil   |                                    |                  |                  |                       |           |            |          |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                       |           |            |          |
|             | Nil   |                                    |                  |                  |                       |           |            |          |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |           |            |          |
|             | Nil   |                                    |                  |                  |                       |           |            |          |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |           |            |          |
|             | Nil   |                                    |                  |                  |                       |           |            |          |
| <b>E.</b>   | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                       |           |            |          |
|             | Nil   |                                    |                  |                  |                       |           |            |          |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |           |            |          |
| BCVCCV6301  | Minor Project   | -                                  | -                | 2                | 60                    | 40        | 100        | 1        |
| BCVCCV6401  | Industrial Training and Seminar-II  | -                                  | -                | 24               | 60                    | 40        | 100        | 12       |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                       |           |            |          |
| BCVCCV6601  | Online Certification Course   | 1                                  | -                | -                | 50                    | -         | 50         | 1        |
|             | <b>Total</b>  | <b>1</b>                           | <b>-</b>         | <b>26</b>        |                       |           |            |          |
|             | <b>Total Teaching Hours</b>   | <b>27</b>                          |                  |                  | <b>170</b>            | <b>80</b> | <b>250</b> | <b>8</b> |

**LABOUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Predict a problem of current relevance to society
- LO2** Formulate the problem and identify suitable modeling paradigm
- LO3** Categorize the problem and identify the solution methodology
- LO4** Simulate and design systems using various modern tools
- LO5** Validate the results and prepare a project report

**GUIDELINES FOR MINOR PROJECT:**

1. Every student individually or in a group (group size is of 4students. However, if project complexity demands a maximum group size of 5 students, the committee should be convinced about such complexity and scope of the work.) Shall take a project in the beginning of the seventh term in consultation with the guide and the project must be completed in the eighth term.
2. The project proposal must be submitted in the institute in the beginning of the seventh term. While submitting project proposal carries to be taken that project will be completed within the available time of two term. The final title of the project work should be submitted at the beginning of eighth semester.
3. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
4. The group is expected to complete details system design, layout etc. in seventh term, as apart of term work in the form of a joint report. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
5. One guide will be assigned at the most three project groups.
6. The guides should regularly monitor the progress of the project work.
7. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.
8. The guide should be internal examiner for oral examination (If experience is greater than three years).
9. The external examiner should be from the related area of the concerned project. He should have minimum of five Years of experience at degree level / industry.

The evaluations at final oral examination should be done jointly by the internal and external examiner

**OBJECTIVE:** To expose engineering students to technology development at work places and appraise them regarding shop-floor problems. To provide practical experience in solving open ended problems in real work setting so as to cause transfer of college based knowledge and skills to solve practical problems and there by develop confidence in the students in the analysis, synthesis and evaluation of practical problems leading to creative thinking.

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Illustrate the effectiveness of research paper reading and writing.
- LO2** Examine well recognized research papers from reputed journals, conferences.
- LO3** Analyzethemethodofsearchingofresearchpaperconcludingtheworkdoneinpaper.
- LO4** Analyze the abstract and methodologies of the research paper.
- LO5** Illustrate the techniques to create a review paper.

**GUIDELINES:**

- At the end of the Fifth semester each student would undergo Industrial Training in an industry / Professional organization Research Laboratory with the prior approval of the Head of Department and Training & Placement Officer,
- Students shall be required to submit a written type report along with a certificate from the organization and present a PPT based on the training.
- Students shall be required to give the presentations in the allotted period about the training attended after 5th Semester.

The presentation and report of the Trainings hall be evaluated during this period (=2 hrs per week) by Board of Examiners to be appointed by the Faculty Coordinator-Training Seminar who will award the grades.

**OVER VIEW AND OBJECTIVES:**

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated in to the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

**Discipline and Talent Enrichment Programme (TEP)–VI** shall be evaluated irrespective of period / time allocation (as in the case of Extra Curricular activity) in the teachings Scheme as a One credit course. There cord related to discipline and related activities are maintained for each student and they shall be evaluated for the same also. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of the classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

| CODE       | ACTIVITY                    | HOURS | CREDITS |
|------------|-----------------------------|-------|---------|
| BCVCCV6601 | Online Certification Course | 1     | 1       |

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Fourth Year - Seventh Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks Distribution |            |             | Credits   |
|-------------|---|------------------------------------|------------------|------------------|--------------------|------------|-------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                 | ESE        | Total       |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                    |            |             |           |
|             | Nil   |                                    |                  |                  |                    |            |             |           |
| <b>B.</b>   | <b>Department Core Courses</b>  |                                    |                  |                  |                    |            |             |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                    |            |             |           |
| BCVCCV7101  | Geotechnical Engineering-I  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7102  | Environmental Engineering - I   | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7103  | Estimating and Costing  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7104  | Construction Planning & Management  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVCCV7105  | Water Resources Engineering   | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                    |            |             |           |
| BCVCCV7201  | Geotechnical Engineering- Lab   | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| BCVCCV7202  | Quantity Surveying and Valuation Lab  | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| BCVCCV7203  | Environmental Engineering Lab   | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                    |            |             |           |
| BCVECV7111  | Design of Pre-Stress Concrete Structures  | 3                                  | -                | -                | 40                 | 60         | 100         | 3         |
| BCVECV7112  | Advanced Foundation Engineering   |                                    |                  |                  |                    |            |             |           |
| BCVECV7113  | Bridge Engineering  |                                    |                  |                  |                    |            |             |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                    |            |             |           |
|             | As Per Annexure-I   | 2                                  | -                | -                | 40                 | 60         | 100         | 2         |
| <b>E.</b>   | <b>Humanities and Social Sciences including Management courses (HSSM) OR Ability Enhancement Compulsory Course (AECC)</b> |                                    |                  |                  |                    |            |             |           |
| BCVCHM7209  | Professional Skills-II  | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship</b>  |                                    |                  |                  |                    |            |             |           |
| BCVCHM7210  | Use of Social Media   | -                                  | -                | 2                | 60                 | 40         | 100         | 1         |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp; Social Outreach</b>  |                                    |                  |                  |                    |            |             |           |
| BCVCCV7601  | Online Certification Courses  | 1                                  | -                | -                | 50                 | -          | 50          | 1         |
|             | Campus Recruitment Training   | 2                                  | -                | -                |                    |            |             |           |
|             | <b>Total</b>  | <b>23</b>                          | <b>0</b>         | <b>10</b>        |                    |            |             |           |
|             | <b>Total Teaching Hours</b>   | <b>33</b>                          |                  |                  | <b>630</b>         | <b>620</b> | <b>1250</b> | <b>26</b> |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Evaluate the properties of soil i.e. water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights and density index.
- CO2** Demonstrate clay mineralogy, clay structure and Darcy's law of permeability of soil.
- CO3** Examine stresses in soil mass, quicksand phenomenon, seepage and seepage pressure, laplace's equation for seepage, phreatic line and flow net through earth dam.
- CO4** Investigate the shear strength of soil by direct shear box triaxial and unconfined compression test apparatuses.
- CO5** Analyze the Principles of soil compaction and soil stabilization.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit    | Time Required for the Unit (Hours) |
|------|----------------------|------------------------------------|
| 1    | Introduction to Soil | 6                                  |
| 2    | Clay mineralogy      | 6                                  |
| 3    | Stresses in soil     | 8                                  |
| 4    | Shear in soil        | 8                                  |
| 5    | Compaction of soil   | 8                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction to soil</b><br>Introduction: Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, Degree of saturation, air void and air content, unit weights, density index etc., Inter-relationships of the above .<br>Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, Consistency limits, void ratio and density index, Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems. |
| <b>2</b> | <b>Clay mineralogy</b><br><b>Clay mineralogy:</b> Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, Clay structure; basic structure, mineral structures, structures of Illite Montmorilinite and kaolinite and their characteristics, Soil water absorbed, capillary and free water<br>Darcy's law of permeability of soil and its determination in laboratory, Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.   |
| <b>3</b> | <b>Stresses in soil</b><br>Stresses in soil mass: total, effective and neutral pressure, Calculation of stresses, influence of water table on effective stress, Quicksand phenomenon, Seepage and Seepage Pressure , Laplace's equation for seepage. Flow net and its construction, Uplift pressure, piping, principle of drainage by electro Osmosis, Phreatic line, Flow net through earth dam.  |
| <b>4</b> | <b>Shear in soil</b><br>Introduction, Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box, Triaxial and unconfined compression test apparatuses, Typical stress-stain curves for soils, Typical failure envelopes for cohesion less soils and normally consolidated clay soils.  |
| <b>5</b> | <b>Compaction of soil</b><br>Introduction, Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction, compaction equipment, Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen.   |

### C. RECOMMENDED STUDY MATERIAL

| S. No   | Book  | Author      | Edition | Publication                                  |
|---|---|-------------|---------|--|
| 1   | Basic and applied Civil Mechanics                 | Rajan&Rao,  | Latest  | New Age International Publishers.            |
| 2   | Soil Mechanics & Foundation Engineering           | Arora K.R,  | Latest  | Standard Publishers and Distributers, Delhi. |
| 3   | Soil Engineering in Theory & Practice             | Alam Singh, | Latest  | CBS Publishers and Distributers, Delhi.      |
| 4   | Geotechnical Engineering—Principles and Practices |             | Latest  | Coduto PHI Publishers.                       |
| <b>Website</b>  |   |             |         |  |
| <ul style="list-style-type: none"><li>• <a href="https://nptel.ac.in/courses/105101201/">https://nptel.ac.in/courses/105101201/</a></li><li>• <a href="https://nptel.ac.in/courses/105105168/">https://nptel.ac.in/courses/105105168/</a></li><li>• <a href="https://nptel.ac.in/courses/105106142/">https://nptel.ac.in/courses/105106142/</a></li><li>• <a href="https://nptel.ac.in/courses/105101001/">https://nptel.ac.in/courses/105101001/</a></li><li>• <a href="https://nptel.ac.in/courses/105105185/">https://nptel.ac.in/courses/105105185/</a></li></ul> |   |             |         |  |



**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Demonstrate the environment and its component and design water demand based on flow, periods and population.
- CO2** Compare sources of water and collection works and also investigate the physical and chemical properties of water.
- CO3** Analyze the hydraulic Conduits, pipe material, pipe joints, pump station and types of water treatment process.
- CO4** Interpret advanced treatment of water such as filtration, disinfection and dissolved solids removal and design water treatment plant.
- CO5** Design the water distribution system and analyze plumbing system for water supply.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                    | Time Required for the Unit (Hours) |
|------|--------------------------------------|------------------------------------|
| 1    | General                              | 8                                  |
| 2    | Source of water and collection works | 8                                  |
| 3    | Transmission of water                | 6                                  |
| 4    | Advanced Treatment of Water          | 6                                  |
| 5    | Distribution of water                | 8                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>General</b>   |
|          | Introduction, Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview.<br><b>Water Demand:</b> Design flow, design periods, and design population, factors affecting water consumption, variation in water demand, design capacities for various water supply components.  |
| <b>2</b> | <b>Source of water and collection works</b>  |
|          | Introduction, Alternative sources i.e. rain, surface and ground water, Assessment of yield and development of the source.<br><b>Quality of water:</b> The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards.  |
| <b>3</b> | <b>Transmission of water</b>   |
|          | Introduction, Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps station. Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes (theory and application): aeration, solids separation, settling operations, coagulation, softening.  |
| <b>4</b> | <b>Advanced Treatment of Water</b>   |
|          | Introduction, filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles.  |
| <b>5</b> | <b>Distribution of water</b>   |
|          | Method of distributing water, distribution reservoirs, distribution system, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems, pumping required for water supply system.<br><b>Plumbing of Building for water supply:</b> Service connections, fixture units, simultaneous flow, design of plumbing system. |

### C. RECOMMENDED STUDY MATERIAL

| S. N. | Book  | Author                                    | Edition | Publication                                    |
|-------|---|---|---------|--|
| 1     | Water Supply  | S.K. Garg,                                | Latest  | Khanna Publishing Co.                          |
| 2     | Environmental Engineering   | Peavy, H.S., Rowe D.R. and Techobanoglous | Latest  | McGraw Hill, Book Company                      |
| 3     | Manual of Water Supply and Water Treatment  |   |         | Ministry of Urban Development, Govt. of India. |
|       | <b>Website</b>  |   |         |  |
|       | <a href="https://nptel.ac.in/courses/105106119/">https://nptel.ac.in/courses/105106119/</a><br><a href="https://nptel.ac.in/courses/105107176/">https://nptel.ac.in/courses/105107176/</a><br><a href="https://nptel.ac.in/courses/127105018/">https://nptel.ac.in/courses/127105018/</a><br><a href="https://nptel.ac.in/courses/105103025/">https://nptel.ac.in/courses/105103025/</a><br><a href="https://nptel.ac.in/courses/105102160/">https://nptel.ac.in/courses/105102160/</a> |   |         |  |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Understand the preparation of an Abstract Estimate and detailed estimate of building.
- CO2** Understand the standard methods for working out quantities in estimating.
- CO3** Evaluate the valuation of building for different specifications and create new technologies to develop concrete estimating methods
- CO4** Rate analysis - Working out data for various items of work over head.
- CO5** To understand method of valuation of building.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                 | Time Required for the Unit (Hours) |
|------|-----------------------------------|------------------------------------|
| 1    | Introduction                      | 8                                  |
| 2    | Types of estimate & cost of works | 9                                  |
| 3    | Estimates                         | 9                                  |
| 4    | Rate Analysis                     | 8                                  |
| 5    | Valuation                         | 9                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction</b>  |
|          | Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities.   |
| <b>2</b> | <b>Types of estimate &amp; cost of works</b>   |
|          | Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.<br>Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. |
| <b>3</b> | <b>Estimates</b>   |
|          | Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification  |
| <b>4</b> | <b>Rate Analysis</b>   |
|          | Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.), Basic schedule of rates.(B.S.R.)   |
| <b>5</b> | <b>Valuation</b>   |
|          | Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.   |

#### C. RECOMMENDED STUDY MATERIAL

| S. N. | Book                                      | Author                  | Publication               |
|-------|---|-------------------------|---------------------------|
| 1     | Estimating & Costing in Civil Engineering | B.N. Dutta and S. Dutta | CBS Publishers            |
| 2     | Estimating & Costing (Civil)              | D.D. Kohli,             | S. Chand Publishing, 2012 |

**Websites**

- <https://theconstructor.org/practical-guide/quality-control/>
- <https://en.wikipedia.org/wiki/Estimation>

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Apply the business and management skills in positions within the construction industry.
- CO2** Analyze, evaluate, and select computer applications for the purpose of efficient and effective project management.
- CO3** Apply professional and ethical standards of behavior in dealing with all stakeholders in the construction process.
- CO4** Apply the risk management plan and analyze the role of stakeholders.
- CO5** Interpret safety and other aspects of construction management.

**A. OUTLINE OF THE COURSE**

| Unit | Title of the unit                                     | Time Required for the Unit (Hours) |
|------|---|------------------------------------|
| 1    | Financial evaluation of projects and project planning | 8                                  |
| 2    | Project scheduling                                    | 8                                  |
| 3    | Project cost and time control                         | 8                                  |
| 4    | Contract management                                   | 6                                  |
| 5    | Safety and other aspects of construction management   | 6                                  |

**B. DETAILED SYLLABUS**

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Financial evaluation of projects and project planning</b>   |
|          | Introduction, Financial evaluation of projects and project planning: Capital investment proposals, criteria to judge the worth, wholeness of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure, Categories of construction projects. Objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process & objectives of construction project management. |
| <b>2</b> | <b>Project scheduling</b>  |
|          | <b>Project scheduling:</b> Importance of project scheduling, project work breakdown process determining activities involved, work breakdown structure, Assessing activity duration, duration estimate procedure, Project work scheduling.<br><b>Project management techniques</b> – CPM and PERT networks analysis, Concept of precedence network analysis.  |
| <b>3</b> | <b>Project cost and time control</b>   |
|          | Project cost and time control: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, Determination of the optimum duration of a project, Updating of project networks, resources allocation.  |
| <b>4</b> | <b>Contract management</b>   |
|          | Introduction, Contract management: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, Determination of a contract, arbitration.  |
| <b>5</b> | <b>Safety and other aspects of construction management</b>   |
|          | Introduction, Safety and other aspects of construction management: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, Demolition of structures & explosive handling, hot bitumen work.<br>Project Management Information System – Concept, frame work, benefits of computerized information system, Environmental and social aspects of various types of construction projects.   |

### C. RECOMMENDED STUDY MATERIAL

| S. No   | Title of Book                           | Author           | Edition | Publication                   |
|---|---|------------------|---------|-------------------------------|
| 1   | Construction equipment and Job planning | Dr. S.V. Deodhar | Latest  | Khanna Publishers             |
| 2   | Construction Project Management         | K KChitkara      | Third   | McGraw Hill Publishers        |
| 3   | Construction planning and Management    | U.K. Shrivastava | Latest  | Galgotia Publications Pvt Ltd |
| 4   | Construction cost & Management          | Keith Potts      | Second  | Taylor & Francis publishing   |
| 5   | Construction Planning & Management      | Gehlot and Dhir  | First   | New Age International (P) Ltd |
| 6   | Construction Engineering & Management   | S. Seetharaman   | Latest  | Umesh Publications            |
| <b>Websites</b>   |   |                  |         |                               |
| <ul style="list-style-type: none"><li>• <a href="https://nptel.ac.in/courses/105103093/">https://nptel.ac.in/courses/105103093/</a></li><li>• <a href="https://nptel.ac.in/courses/105104161/">https://nptel.ac.in/courses/105104161/</a></li><li>• <a href="https://nptel.ac.in/courses/105/106/105106149/">https://nptel.ac.in/courses/105/106/105106149/</a></li><li>• <a href="https://nptel.ac.in/content/syllabus_pdf/">https://nptel.ac.in/content/syllabus_pdf/</a></li><li>• <a href="https://ascelibrary.org/journal/jcemd4.pdf">https://ascelibrary.org/journal/jcemd4.pdf</a></li></ul> |   |                  |         |                               |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Design of Regulation of works- Falls and Cross-Drainage Structure.
- CO2** Design of diversion head works using Bligh's and Khosla's method.
- CO3** Analyze suitable sites, causes of failures, stability and seepage, flow net, slope stability of embankment dams and forces acting on gravity dams.
- CO4** Demonstrate spillway capacity, flood routing through spillways, energy dissipation below spillways, hydroelectric schemes, power house structure, turbines, draft tube and cavitations.
- CO5** Interpret impact of water projects on river regimes and environment, reservoir sedimentation and computer aided irrigation design.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit    | Time Required for the Unit (Hours) |
|------|----------------------|------------------------------------|
| 1    | Regulation of works  | 7                                  |
| 2    | Diversion Head works | 7                                  |
| 3    | Embankment Dams      | 8                                  |
| 4    | Spillways            | 8                                  |
| 5    | Reservoirs           | 6                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Regulation of works</b>   |
|          | Introduction, Falls, Classification of falls, Design of sarda type fall. Distributory head regulator and cross-head regulator, Escape, bed bars.<br><b>Cross-Drainage Structure:</b> Necessity of Cross-drainage structures; Types and selection, comparative merits and demerits. Design of various types of cross-drainage structure-aqueducts, syphon aqueduct, super passage syphon, level crossing and other types. |
| <b>2</b> | <b>Diversion Head works</b>  |
|          | Introduction, Surface and Subsurface flows, Bligh's and Khosla's method, Selection of site and layout, Different parts of diversion head works, types of weirs and barrages, Silt excluders and different types of silt ejectors, Energy dissipation.  |
| <b>3</b> | <b>Embankment Dams</b>   |
|          | Introduction, Embankment Dams: Suitable sites, causes of failures, Stability and seepage analysis, flow net, slope stability analysis, Precautions of piping, principles of design of earth dams.<br><b>Gravity Dams:</b> Force acting on a gravity dam, stability requirements, Instrumentation.  |
| <b>4</b> | <b>Spillways</b>   |
|          | <b>Spillways:</b> Spillway capacity, flood routing through spillways, different types of spillways and gates, energy dissipation below spillways.<br><b>Hydro Power Plant:</b> General features of hydroelectric schemes, elements of power house structure, selection of turbines, draft tube and setting of turbine. Cavitations.  |
| <b>5</b> | <b>Reservoirs</b>  |
|          | <b>Reservoirs:</b> Evaluation of impact of water projects on river regimes and environment. Reservoir sedimentation and water shed management<br><b>Optimization:</b> Introduction to optimization techniques and system approach. Introduction to G.I.S. and Computer aided irrigation design.  |

### C. RECOMMENDED STUDY MATERIAL

| S. No.  | Book  | Author             | Edition           | Publication                                  |
|---|---|--------------------|-------------------|--|
| 1   | Irrigation Water Power and Water Resource Engineering | KR Arora           | Second            | Standard Publishers and Distributers, Delhi. |
| 2   | Water Resource Engineering                            | Modi               | Latest            | Standard Publishers.                         |
| 3   | Irrigation and Water Power Engineering                | BC Punmia & B BLal | Sixteenth edition | Laxmi Publication (P) Ltd.                   |
| 4   | Irrigation Engineering                                | G.L.Asawa          | First             | New Age International Publishers, New Delhi. |
| 5.  | Irrigation & Water Power Engineering                  | Das & Saikia       | Latest            | PHI  |
| <b>Websites</b>   |   |                    |                   |  |
| <ul style="list-style-type: none"><li>• <a href="https://nptel.ac.in/courses/105105110/">https://nptel.ac.in/courses/105105110/</a></li><li>• <a href="https://nptel.ac.in/courses/105108081/">https://nptel.ac.in/courses/105108081/</a></li><li>• <a href="https://nptel.ac.in/courses/105108130/">https://nptel.ac.in/courses/105108130/</a></li><li>• <a href="https://agupubs.onlinelibrary.wiley.com/journal/19447973">https://agupubs.onlinelibrary.wiley.com/journal/19447973</a></li></ul> |   |                    |                   |  |



**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Analyze techniques of pre-stressing with and without pre-stressing cables, different systems of pre-stressing, materials and design concepts.
- CO2** Design pre-stresses beams and end blocks on criteria of flexure and shear.
- CO3** Design pre-stressed tension members, tanks and compression members.
- CO4** Evaluate the losses in pre-stressed elements.
- CO5** Analyze deflection and cracking, anchorage, bond and end block stresses in pre-stressed element.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                        | Time Required for the Unit (Hours) |
|------|--|------------------------------------|
| 1    | Techniques and material of pre-stressing | 8                                  |
| 2    | Designing Concept of pre-stress          | 8                                  |
| 3    | Pre- cast element design                 | 8                                  |
| 4    | Loess in pre-stress                      | 6                                  |
| 5    | Standard Consideration of design         | 6                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Techniques and material of pre-stressing</b>  |
|           | Basic philosophy of pre-stressing: Various techniques of pre-stressing with and without pre-stressing cables, Different systems of pre-stressing, materials and design concepts. |
| <b>2.</b> | <b>Designing Concept of pre-stress</b>   |
|           | Pre-stressing of concrete structures, Analysis and design of beams, Design of end blocks, Ultimate strength in flexure and shear.  |
| <b>3.</b> | <b>Pre- cast element design</b>  |
|           | Statically indeterminate structures, Tension members, tanks, compression members, partial pre-stressing, composite construction, precast pre-stressed elements.                  |
| <b>4.</b> | <b>Loess in pre stress</b>   |
|           | Materials, pre-stressing systems, losses in pre-stress. Analysis and design of simple and continuous beams by working stress and limit-state methods.                            |
| <b>5.</b> | <b>Standard consideration of design</b>  |
|           | Deflection and cracking consideration. Anchorage and bond. End block stresses.   |

#### C. RECOMMENDED STUDYMATERIAL:

| S. No | Title of the Book                        | Author            | Edition                 | Publisher            |
|-------|--|-------------------|-------------------------|----------------------|
| 1.    | Design of Reinforced Concrete Structure  | P. Dayaratnam     | 5 <sup>th</sup> Edition | Oxford and IBH,      |
| 2.    | Design of Pre-Stress Concrete structures | T.Y. Lin and Burn | Latest                  | John Wiley, New York |

#### Websites

- <https://nptel.ac.in/courses/105106117/>
- [https://nptel.ac.in/content/storage2/nptel\\_data3/html/mhrd/ict/text/105106118/lec22.pdf](https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105106118/lec22.pdf)
- [https://nptel.ac.in/content/storage2/nptel\\_data3/html/mhrd/ict/text/105106118/lec9.pdf](https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105106118/lec9.pdf)
- <https://ascelibrary.org/journal/jcemd4>

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Evaluate bearing capacity of shallow foundation based on loading and water table location.  
**CO2** Demonstrate the settlement under shallow foundation with reference to Indian Standard codes.  
**CO3** Analyze settlement of pile foundation based on their use, modes of failure and bearing capacity.  
**CO4** Design the foundation for collapsible and expansive soils.  
**CO5** Interpret rafts, modes of failure, bearing capacity, settlement of raft and well foundation.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                   | Time Required for the Unit (Hours) |
|------|-------------------------------------|------------------------------------|
| 1    | Shallow Foundation                  | 6                                  |
| 2    | Settlement Under Foundation         | 6                                  |
| 3    | Pile Foundation                     | 6                                  |
| 4    | Foundation on Difficult Soils       | 6                                  |
| 5    | Raft foundation and well foundation | 6                                  |

#### B. DETAILED SYLLABUS

| Unit      | Unit Details   |
|-----------|--|
| <b>1.</b> | <b>Shallow Foundation</b>  |
|           | Introduction, Shallow Foundation: Methods of estimation of bearing capacity, computation of bearing capacity factors, Effect of eccentric and inclined loads, effect of water table on bearing capacity, Bearing capacity of stratified soils, IS code recommendation for minimum depth, factor of safety, Design for local shear and general shear failure.   |
| <b>2.</b> | <b>Settlement Under Foundation</b>   |
|           | Introduction, Methods of estimation of settlement of footings, Limits of settlements for various structures, Indian Standard Code Provisions (IS: 1904, 6403, 8009), Determination of allowable bearing capacity as per IS code, Schemartman's method, Dee beer's and Mortin method of finding out settlement from static cone penetration test, Methods of finding out bearing capacity from plate load test, standard penetration test data. |
| <b>3.</b> | <b>Pile Foundation</b>   |
|           | Introduction of pile, Types of pile and their use, modes of failure, Bearing capacity and settlement of pile foundation, Allowable load, Pile load test, Dynamic and static formulae. Bearing Capacity factors, Pile group bearing capacity and settlement, Negative skin friction.  |
| <b>4.</b> | <b>Foundation on Difficult Soils</b>   |
|           | Introduction, Collapsible soil; identification, Collapse settlement: foundation design, Sanitary landfills settlement of sanitary landfills.<br><b>Expansive soils:</b> Behavior of expansive soil, foundation practices, under-reamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil.  |
| <b>5.</b> | <b>Raft foundation and well foundation</b>   |
|           | <b>Raft foundation:</b> Common types of raft, combined footing, Bearing capacity of raft, differential, Settlement of raft; semi empirical method of design of raft foundation<br><b>Well foundations:</b> design and construction. Bearing capacity, IS codes methods.  |

#### C. RECOMMENDED STUDY MATERIAL

| S. No  | Book   | Author        | Edition       | Publication                    |
|--|--|---------------|---------------|--------------------------------|
| 1  | Soil Mechanics & Foundation Engineering (Geotechnical Engineering) | K.R. Arora    | Latest        | Standard Publisher Distributor |
| 2  | Soil Mechanics & Foundation Engineering                            | B.C. Punmia   | First         | Laxmi publication              |
| 3  | Basic & Applied Soil Mechanics                                     | Ranjan&Rao,   | Third edition | New Age International Pub.     |
| 4  | Geotechnical Engineering   | Gulhati&Dutta | First         | Tata McGraw Hills, Delhi.      |
| 5  | Design Aids in foundation Engineering                              | Kaniraj,      | Latest        | Tata McGraw Hills, Delhi.      |
| <b>Websites</b>  |  |               |               |                                |
| <ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/105/108/105108075/">https://nptel.ac.in/courses/105/108/105108075/</a></li> <li>• <a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105108075/lec2.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105108075/lec2.pdf</a></li> <li>• <a href="https://nptel.ac.in/content/storage2/courses/105108075/module1/Lecture03.pdf">https://nptel.ac.in/content/storage2/courses/105108075/module1/Lecture03.pdf</a></li> <li>• <a href="https://ascelibrary.org/journal/jcemd4">https://ascelibrary.org/journal/jcemd4</a></li> </ul> |  |               |               |                                |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Evaluate dead and live, wind load and earthquake forces on bridges.  
**CO2** Design reinforced concrete culverts & bridges.  
**CO3** Design pre-stressed and post-stressed concrete bridges.  
**CO4** Demonstrate Bearings for slab bridges, girder bridges and elastomeric bearings as per IRC 83 (Part II).  
**CO5** Analyze expansion joints, contraction joints and temperature joints in the bridges.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                      | Time Required for the Unit (Hours) |
|------|--|------------------------------------|
| 1    | Introduction                           | 6                                  |
| 2    | Reinforced concrete culverts & bridges | 6                                  |
| 3    | Prestressed Concrete bridges           | 6                                  |
| 4    | Bearings                               | 6                                  |
| 5    | Joints                                 | 6                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction</b>  |
|          | Introduction: Type of bridges & classification of road & railways bridges, IRC & Railway loadings for bridges, wind load & Earthquake forces. Steel bridges Design of through type & deck type steel bridges for IRC loading, Design of deck type & through type truss bridges for railway loadings. |
| <b>2</b> | <b>Reinforced concrete culverts &amp; bridges</b>  |
|          | Introduction, Reinforced concrete slab culvert, T-beam bridges-courbons& Hendry-Jaegar methods, Design of balanced cantilever bridge.  |
| <b>3</b> | <b>Prestressed Concrete bridges</b>  |
|          | Introduction, Prestressed& Post stressed concrete bridges, Design of deck slab & girder sections.  |
| <b>4</b> | <b>Bearings</b>  |
|          | Introduction, Bearings for slab bridges and girder bridges, Elastomeric bearings, design concepts as per IRC 83 (Part II).   |
| <b>5</b> | <b>Joints</b>  |
|          | Introduction, Expansion joints.  |

#### C. RECOMMENDED STUDY MATERIAL

| S. N. | Book  | Author          | Edition | Publication                           |
|-------|---|-----------------|---------|---------------------------------------|
| 1     | Bridge engineering                            | S Ponnuswamy    | Third   | McGraw Hill Education (India) Pvt Ltd |
| 2     | Prestressed Concrete Bridges                  | N. Krishna Raju | First   | CBS Publisher                         |
| 3     | Principles and Practice of Bridge Engineering | S. P. Bindra    | Latest  | Dhanpat Rai Publications              |

#### Websites

- <https://nptel.ac.in/courses/105105165/>
- [https://nptel.ac.in/content/syllabus\\_pdf/105105165.pdf](https://nptel.ac.in/content/syllabus_pdf/105105165.pdf)
- [https://nptel.ac.in/content/storage2/nptel\\_data3/html/mhrd/ict/text/105105165/lec2.pdf](https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105165/lec2.pdf)
- [https://swayam.gov.in/nd1\\_noc19\\_ce23/preview](https://swayam.gov.in/nd1_noc19_ce23/preview)
- [http://vssut.ac.in/doc/Transportation-1\\_Lecture-Note.pdf](http://vssut.ac.in/doc/Transportation-1_Lecture-Note.pdf)
- <https://www.journals.elsevier.com/engineering-structures>

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Differentiate grain sizes by sieve analysis for soil.
- LO2** Evaluate water content and specific gravity for soil by pycnometer.
- LO3** Examine consistency tests, standard proctor test and modified proctor test.
- LO4** Analyze engineering properties of soil like shear strength, swelling pressure, free swell.
- LO5** Evaluate bearing strength by soil by different laboratory tests.

#### LIST OF EXPERIMENTS

1. Grain size distribution by sieving.
2. Determination of water content by Pycnometer.
3. Determination of specific Gravity by Pycnometer.
4. Determination of liquid limit by Casagrande's apparatus.
5. Determination of liquid limit by cone penetrometer.
6. Determination of plastic limit
7. Determination of shrinkage limit
8. Determination of field density by core-cutter
9. Determination of field density by sand replacement method
10. Determination of compaction properties by standard Proctor Test Apparatus
11. Determination of C- $\phi$  values by Direct Shear Test Apparatus
12. Determination of Unconfined Compressive Strength by unconfined compression Test Apparatus

#### VIRTUAL LABS

<http://smfe-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering>

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Select and finalize the method of quantity survey of building.
- LO2** Rate analysis of different building items.
- LO3** Introduction of different plans of Building.
- LO4** Introduction of Bar bending schedule.
- LO5** Introduction of Specifications and Valuation.

#### LIST OF EXPERIMENTS

|    |   |
|----|---|
| 1  | Preliminary Estimate (Plinth Area and Cubic Content)  |
| 2  | Detailed Estimate of buildings (Long wall-Short wall and Centre line method)  |
| 3  | Rate Analysis of different Items of Works (Earthwork, Concrete Work, DPC, Stone masonry, Brickwork, RCC, Roofing, Flooring, and Finishing etc.)   |
| 4  | Earthwork Calculation for Roads, Irrigation Canals and Channels (cutting and filling)   |
| 5  | Valuation of Buildings and Properties Visual interpretation of satellite images   |
| 6  | Site plan, index plan, layout plan, plinth area, floor area of buildings.   |
| 7  | Foundation plan layout infield  |
| 8  | Bar bending schedule  |
| 9  | Specifications- For different classes of building and Civil Engineering works   |
| 10 | Specifications of building components   |
| 11 | Valuation of buildings and properties   |
| 12 | Work at heights – scaffolding and ladders use, type of scaffolds, safety requirements, design and load factors, defects and inspection norms, type of ladders, upkeep, defects and good maintenance tips. |

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Examine the water parameters like p<sup>H</sup>, alkalinity, turbidity etc.
- LO2** Evaluate the solid contents in water among dissolved, suspended, or total.
- LO3** Analyze the hardness and chloride content of water.
- LO4** Test the alum by jar test for water.
- LO5** Demonstrate the water supply fitting in buildings.

#### LIST OF EXPERIMENTS

1. To determine the pH of the given sample of water.
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water sample.
4. To determine the Total Dissolved Solids of the given water sample.
5. To find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8. To determine alkalinity of the given water sample.
9. To find out acidity of the given water sample.
10. To determine hardness of the given water sample.
11. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings.

#### VIRTUAL LABS

[http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk\\_labs/Environmental\\_Engineering\\_1/labs/index.html](http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk_labs/Environmental_Engineering_1/labs/index.html)  
[http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk\\_labs/Environmental\\_Engineering\\_2/labs/index.html](http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk_labs/Environmental_Engineering_2/labs/index.html)

**Course Outcomes:**

On successful completion of the course the learners will be able to:

| CO    | Cognitive Abilities         | Course Outcomes   |
|-------|-----------------------------|---|
| CO-01 | Understanding/<br>Applying  | Learn how to update and manage the experience, education, and skills & expertise sections on social media & formulate appropriate updates as a means to promote business activities.  |
| CO-02 | Understanding/<br>Applying  | Understand how to leverage grammar and formatting in formal documents & demonstrate how to follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing tasks. |
| CO-03 | Understanding/<br>Applying  | Evaluate presentation's weak spots and areas for improvement & learn, practice and acquire the skills necessary to deliver effective presentation with clarity and impact.  |
| CO-04 | Understanding /<br>Applying | Evaluate basic factors such as personal skills & abilities, career fields, willingness to learn and strengthen the chances to get desirable jobs.   |
| CO-05 | Creating/Applying           | Understand negotiation and team skills dynamics and how to prepare for uncertainty & learn to craft agile strategy and be quick on your feet in changing circumstances.   |

| UNIT NO. | UNIT NAME   | Hours |
|----------|---|-------|
| 1        | Personal Branding   | 4     |
| 2        | Professional Writing-II   | 6     |
| 3        | Presentation Skills: Professional Setting                       | 4     |
| 4        | Job Interview & Group Discussion : Preparation by Mock Practice | 6     |
| 5        | Negotiation Skills, Team Management & Professional Awareness    | 5     |

| LIST OF ACTIVITIES |   |
|--------------------|---|
| 1.                 | Personal Branding : Its best practices  |
| 2.                 | Professional Writing II: Abstract Writing, Statement of purpose and other formal documents                          |
| 3.                 | Expanding Professional Vocabulary   |
| 4.                 | Resume Building-II: Revising & Updating   |
| 5.                 | E-Learning & E-Content Development-II   |
| 6.                 | Presentation Skills in Professional Setting   |
| 7.                 | Job Interviews II: Preparation and Presentation for Mock Interviews   |
| 8.                 | Advanced Group Discussion-II: Analysis of professional GD Videos and Practices on Topics/Video/Article based topics |
| 9.                 | Negotiation Skills & and Conflict Resolution-II   |
| 10.                | Change and Transition Management  |
| 11.                | Team Building Strategies: Project Management  |
| 12.                | Career Awareness & Productive Mindset   |



**COURSE OUTCOMES:**

On successful completion of the course the learner will be able to

| CO    | Cognitive Abilities         | Course Outcomes  |
|-------|-----------------------------|--|
| CO-01 | Understanding/<br>Applying  | To develop analytical framework to recognize, understand, and manage new social practices online, together with a familiarity with the literature regarding social media and identity, community, collective action, public sphere, social capital, and social networks. |
| CO-02 | Understanding/<br>Applying  | Learn to use new social media, assess a new social medium's potential cognitive, social, and political impact, and to tune or relinquish use of the medium for their own purposes.   |
| CO-03 | Understanding/<br>Applying  | Understand the importance of monitoring and responding to the community that forms around your message or lack of message.   |
| CO-04 | Understanding /<br>Applying | Understand the difference between traditional marketing and social media marketing & learn the functionality of LinkedIn, Facebook, Instagram etc.   |
| CO-05 | Creating/Applying           | Learn how to update and manage the experience, education, and skills & expertise sections & formulate appropriate updates as a means to promote business activities.   |

| Unit No. | Title of the Unit  | Time required for the Unit (Hours) |
|----------|--|------------------------------------|
| 1        | Introduction to Social Media   | 2                                  |
| 2        | The shift of marketing and PR tactics  | 3                                  |
| 3        | Utilization of social media platforms like Facebook, Blogging, Twitter & LinkedIn, Instagram, Pinterest, YouTube & Snapchat best Practices | 10                                 |
| 4        | Introduction to web, domain, IP, web hosting, website creation, various platforms and CMS  | 5                                  |
| 5        | How to create website using WordPress CMS, themes and plugins and how to make website live.  | 5                                  |

**A. DETAILED SYLLABUS**

| Unit | Unit Details   | Method  |
|------|--|---|
| 1.   | <b>Introduction to Social Media</b>  |   |
|      | Introduction of the Course & the topic<br>Know your why - why you want to be on social media.<br>Attraction towards social online portals<br>Practice Sessions.<br>Conclusion & Summary of the Unit. | Theory/Practical<br>Practical<br>Practical<br>Practical<br>Theory/Practical |
| 2.   | <b>The shift of marketing and PR tactics</b>   |   |

|           |   |   |
|-----------|---|---|
|           | <p>Introduction of the Course &amp; the topic.<br/>         What value your SM profiles will add on your resume.<br/>         Practice Sessions.<br/>         Conclusion &amp; Summary of the Unit.</p> | <p>Theory/Practical<br/>         Practical<br/>         Practical<br/>         Theory/Practical</p> |
| <b>3.</b> | <b>Utilization of Social Media Platforms like Facebook, Blogging, Twitter, LinkedIn, Instagram, Pinterest, YouTube &amp; Snapchat best Practices</b>  |   |
|           | <p>Introduction of the Course &amp; the topic<br/>         Practice Sessions.<br/>         Conclusion &amp; Summary of the Unit</p>   | <p>Theory/Practical<br/>         Practical<br/>         Theory/Practical</p>                        |
| <b>4.</b> | <b>Introduction to web, domain, IP, web hosting, website creation, various platforms and CMS</b>  |   |
|           | <p>Introduction of the Course &amp; the topic<br/>         Practice Sessions.<br/>         Conclusion &amp; Summary of the Unit.</p>  | <p>Theory/Practical<br/>         Practical<br/>         Theory/Practical</p>                        |
| <b>5.</b> | <b>How to create website using Word Press CMS, themes and plugins and how to make website live.</b>   |   |
|           | <p>Introduction of the Course &amp; the topic<br/>         Practice Sessions.<br/>         Conclusion &amp; Summary of the Unit.</p>  | <p>Theory/Practical<br/>         Practical<br/>         Theory/Practical</p>                        |

**OVER VIEW AND OBJECTIVES:**

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated in to the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

**Discipline and Talent Enrichment Programme (TEP)–VII** shall be evaluated irrespective of period / time allocation (as in the case of Extra Curricular activity) in the teachings Scheme as a One credit course. There cord related to discipline and related activities are maintained for each student and they shall be evaluated for the same also. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of the classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

| CODE       | ACTIVITY                    | HOURS | CREDITS |
|------------|-----------------------------|-------|---------|
| BCVCCV7601 | Online Certification Course | 1     | 1       |
|            | Campus Recruitment Training | 2     |         |

**POORNIMA UNIVERSITY, JAIPUR**

**School of Engineering & Technology**

**B. Tech. (Civil Engineering), Batch: 2022-26**

**Teaching Scheme for Fourth Year - Eighth Semester**

| Course Code | Course Name   | Teaching Scheme<br>(Hrs. per Week) |                  |                  | Marks<br>Distribution |            |            | Credits   |
|-------------|---|------------------------------------|------------------|------------------|-----------------------|------------|------------|-----------|
|             |   | Lecture<br>(L)                     | Tutorials<br>(T) | Practical<br>(P) | IE                    | ESE        | Total      |           |
| <b>A.</b>   | <b>University Core Courses</b>  |                                    |                  |                  |                       |            |            |           |
|             | Nil   |                                    |                  |                  |                       |            |            |           |
| <b>B.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |            |           |
| <b>B.1</b>  | <b>Theory</b>   |                                    |                  |                  |                       |            |            |           |
| BCVCCV8101  | Environmental Engineering -II   | 3                                  | -                | -                | 40                    | 60         | 100        | 3         |
| BCVCCV8102  | Geotechnical Engineering-II   | 3                                  | -                | -                | 40                    | 60         | 100        | 3         |
| BCVCCV8103  | Ground Improvement Techniques   | 3                                  | -                | -                | 40                    | 60         | 100        | 3         |
| <b>B.2</b>  | <b>Practical</b>  |                                    |                  |                  |                       |            |            |           |
| BCVCCV8201  | Environmental Engg. Lab.  | -                                  | -                | 2                | 60                    | 40         | 100        | 1         |
| BCVCCV8202  | Geotechnical Engineering Lab  | -                                  | -                | 2                | 60                    | 40         | 100        | 1         |
| <b>C.</b>   | <b>Department Elective</b>  |                                    |                  |                  |                       |            |            |           |
|             | Nil   |                                    |                  |                  |                       |            |            |           |
| <b>D.</b>   | <b>Open Elective</b>  |                                    |                  |                  |                       |            |            |           |
|             | Nil   |                                    |                  |                  |                       |            |            |           |
| <b>E.</b>   | <b>Humanities and Social Sciences<br/>including Management courses<br/>(HSSM) OR Ability Enhancement<br/>Compulsory Course (AECC)</b> |                                    |                  |                  |                       |            |            |           |
| BCVCHM8209  | Communication Skills-II   | -                                  | -                | 2                | 60                    | 40         | 100        | 1         |
| <b>F.</b>   | <b>Skill Enhancement Courses (SEC) OR<br/>Project work, Seminar and Internship</b>  |                                    |                  |                  |                       |            |            |           |
| BCVCCV8301  | Major Project/Dissertation  | -                                  | -                | 16               | 60                    | 40         | 100        | 8         |
| <b>G.</b>   | <b>Discipline, Value Added Courses &amp;<br/>Social Outreach</b>  |                                    |                  |                  |                       |            |            |           |
| BCVCCV8601  | Online Certification Course   | 2                                  | -                | -                | 50                    | -          | 50         | 1         |
|             | <b>Total</b>  | <b>11</b>                          | <b>0</b>         | <b>22</b>        |                       |            |            |           |
|             | <b>Total Teaching Hours</b>   | <b>33</b>                          |                  |                  | <b>410</b>            | <b>340</b> | <b>750</b> | <b>21</b> |

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Evaluate the waste water parameters and sewage quality parameters with quality assessment methods.
- CO2** Analyze the types of sewerage system and design of sewerage system.
- CO3** Apply the treatment processes for sewage with consideration of sustainable or economical uses.
- CO4** Demonstrate wastewater disposal and reuse, self-purification of streams and design plumbing system for buildings.
- CO5** Interpret air and noise pollution through Air quality, Emission standards and vehicular pollution.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit             | Time Required for the Unit (Hours) |
|------|-------------------------------|------------------------------------|
| 1    | General                       | 8                                  |
| 2    | Collection of Sewage          | 8                                  |
| 3    | Sewage Treatment              | 6                                  |
| 4    | Wastewater Disposal and Reuse | 6                                  |
| 5    | Air and Noise Pollution       | 8                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>General</b>   |
|          | <b>General Terms:</b> sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmental engineer, historical overview.<br><b>Sewage Characteristics:</b> Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, and Standards of disposal into natural watercourses and on land, Indian standards.   |
| <b>2</b> | <b>Collection of Sewage</b>  |
|          | <b>Collection of Sewage:</b> Systems of sewerage, Separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of storms water, rational method, shapes of sewer<br><b>Hydraulic design of sewers:</b> diameter self-cleansing velocity and slopes, construction and testing of sewer line, Sewer materials, joints and appurtenances, Sewage pumping and pumping stations, maintenance of sewerage system. |
| <b>3</b> | <b>Sewage Treatment</b>  |
|          | <b>Sewage Treatment:</b> Various units: their purpose, sequence and efficiencies, preliminary treatment, screening and grit removal units, oil and grease removal, primary treatment, secondary treatment, activated sludge process, trickling filter, sludge digestion and drying beds, stabilization pond, septic tank, soakage systems, recent trends in sewage treatment, advanced wastewater treatment :nutrient removal, solids removal.   |
| <b>4</b> | <b>Wastewater Disposal and Reuse</b>   |
|          | Introduction of Wastewater Disposal and Reuse: Disposal of sewage by dilution, self-purification of streams, sewage disposal by irrigation sewage farming, waste waters reuse.<br>Plumbing for Design of Buildings: Various systems of plumbing – one pipe, two pipes, single stack, traps, layout of house drainage.  |
| <b>5</b> | <b>Air and Noise Pollution</b>   |

**Air and Noise Pollution:** Air quality, Emission standards, vehicular pollution, Effect of air pollution on human health, Noise Pollution, global effect of air and noise pollution, greenhouse effect, acid rain etc.

### C. RECOMMENDED STUDY MATERIAL

| S. No | Book                         | Author      | Edition | Publication   |
|-------|------------------------------|-------------|---------|---|
| 1     | Environmental Engineering II | B.C. Punmia | Latest  | Arihant Publishers, Jodhpur.                            |
| 2     | Sanitary Engineering         | SK Garg,    | Latest  | Khanna Publishing Co.                                   |
| 3     | Manual on Sewage and Sewage  |             | Latest  | Treatment Ministry of Urban Development Govt. of India. |

#### Websites

- <https://nptel.ac.in/courses/103107084/>
- <https://nptel.ac.in/courses/103107085/>
- <https://nptel.ac.in/courses/105104102/>
- <https://nptel.ac.in/courses/105103025/>
- <https://nptel.ac.in/courses/105102160/>

**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Evaluate stresses in soil under surface loadings by Bossinesq's, Westerguard's, Newmark's chart and Fensk's methods of analysis.
- CO2** Apply the concept of compressibility and consolidation under spring analogy and Terzaghi's one dimensional consolidation theory.
- CO3** Analyze classifications of slopes and stability analysis by Swedish and friction circle method, Taylor stability number curves and Bishop's method.
- CO4** Demonstrate the earth pressure theory through Rankine's and Coulomb's theories and evaluate with Rebhann's and Culman's graphical methods
- CO5** Interpret the bearing capacity of shallow foundation at eccentric loadings and water level conditions Rankine's, Skempton's and IS code method.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                      | Time Required for the Unit (Hours) |
|------|--|------------------------------------|
| 1    | Stresses in Soil under surface loading | 7                                  |
| 2    | Compressibility and Consolidation      | 8                                  |
| 3    | Stability of Slopes                    | 7                                  |
| 4    | Earth Pressure                         | 7                                  |
| 5    | Bearing Capacity of Soils              | 7                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Stresses in Soil under surface loading</b>  |
|          | Introduction, Bossinesq's and Westerguard's analysis for vertical pressure and its distribution in a soil mass, Vertical stresses due to concentrated loads, Horizontal and shear stresses due to concentrated loads. Isobar diagram, Vertical stress distribution on a horizontal plane, Influence diagram, Vertical stresses at point under line load and strip load, Vertical stresses at a point under circular and rectangular loaded area, Approximate methods of obtaining vertical pressure due to surface loading.<br>Newmark's chart, Fensk's Chart. Pressure bulb and its significance in Foundation exploration, Contact pressure below foundations. |
| <b>2</b> | <b>Compressibility and Consolidation</b>   |
|          | Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, coefficient of consolidation, Pre consolidation pressure and its determination, Normally, Over and Under consolidated soils, Methods of computation of Settlement and its rate, Coefficient of consolidation for layered soil. Total and differential Settlement.   |
| <b>3</b> | <b>Stability of Slopes</b>   |
|          | Introduction, Classifications of slopes, Stability analysis of infinite slopes, Stability analysis of finite slopes by Swedish and Friction circle method, Stability analysis by Taylor's stability number, Taylor stability number curves, Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction, Bishop's method of stability analysis.  |
| <b>4</b> | <b>Earth Pressure</b>  |
|          | <b>Earth Pressure:</b> Active, passive and earth pressure at rest, Rankine's and Coulomb's theories of earth pressure, Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, Horizontal and inclined cohesion less back fill, Earth pressure on cantilever sheet piles Stability analysis of retaining walls.   |
| <b>5</b> | <b>Bearing Capacity of Soils</b>   |

|  |   |
|--|---|
|  | <p>Introduction, Terminology related to bearing capacity, Common types of foundations, Terzaghi and Meyehoff's theory for bearing capacity, Rankine's method for minimum depth of foundation, Skempton's method, Effect of eccentricity and water table on bearing capacity. IS code method, Plate load and penetration tests for determining bearing capacity. Introduction to pile, well and machine Foundations.</p> <p><b>Site Investigations:</b> Methods of explorations. Planning of Investigations, Depth of exploration, Number of boreholes. Undisturbed and Disturbed samples, Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples, Geophysical methods of investigations.</p> |
|--|---|

### C. RECOMMENDED STUDY MATERIAL

| S. N.   | Book                                       | Author           | Edition | Publication                                |
|---|--|------------------|---------|--|
| 1   | Engineering in Theory & Practice Vol. I    | Alam Singh,      | Second  | CBS Publishers & Distributers, Delhi.      |
| 2   | Geotechnical Engineering                   | Purushottam Raj, | First   | Tata McGraw Hills, Delhi.                  |
| 3   | Soil Mechanics in Engineering Practices    | Terzaghi & Peck, | Latest  | John Wiley & Co.                           |
| 4   | Soil Mech. & Foundation Engg               | K.R. Arora,      | Latest  | Standard Publishers & Distributers, Delhi. |
| 5   | Theory & Practice Of Foundation Design     | Som & Das,       | Latest  | PRENTICE Hall of India Delhi (PHI).        |
| 6   | Soil Mechanics in Engineering and Practice | Terzaghi,        | Latest  | CBS Publishers and Distributers.           |
| <b>List of Weblinks /Journals/Periodicals/Magazines/Newspapers</b>  |  |                  |         |  |
| Indian Geotech Journal /Indian Geotechnical Society. <ul style="list-style-type: none"> <li>● <a href="http://www.igs.org.in">www.igs.org.in</a></li> <li>● <a href="https://nptel.ac.in/courses/105105168/">https://nptel.ac.in/courses/105105168/</a></li> <li>● <a href="https://nptel.ac.in/courses/105101201/">https://nptel.ac.in/courses/105101201/</a></li> <li>● <a href="https://nptel.ac.in/courses/105105185/">https://nptel.ac.in/courses/105105185/</a></li> <li>● <a href="https://nptel.ac.in/courses/105103097/">https://nptel.ac.in/courses/105103097/</a></li> </ul> |  |                  |         |  |



**COURSE OUTCOMES:** After Successful completion of the course students will be able to-

- CO1** Demonstrate collapsible soil, expansive soil, reclaimed soil, sanitary land fill, ground improvements and principles of compaction.
- CO2** Analyze ground improvement in granular soil, compaction piles in sand, vibro compaction piles, dynamic compaction and blasting.
- CO3** Investigate compressibility vertical and radial consolidation, rate of consolidation, vertical drains, load carrying capacity and settlement of foundation.
- CO4** Examine ground improvement by grouting and soil reinforcement.
- CO5** Select soil stabilization technique such as lime stabilization, cement stabilization, fly ash-lime stabilization and soil bitumen stabilization.

#### A. OUTLINE OF THE COURSE

| Unit | Title of the unit                                   | Time Required for the Unit (Hours) |
|------|---|------------------------------------|
| 1    | Introduction  | 6                                  |
| 2    | Ground Improvement in Granular soil                 | 8                                  |
| 3    | Ground improvement in Cohesive soil                 | 8                                  |
| 4    | Ground Improvement by Grouting & Soil Reinforcement | 8                                  |
| 5    | Soil Stabilization                                  | 8                                  |

#### B. DETAILED SYLLABUS

| Unit     | Unit Details   |
|----------|--|
| <b>1</b> | <b>Introduction</b>  |
|          | <b>Introduction:</b> Formation of soil, major soil types, Collapsible soil, expansive soil, reclaimed soil, sanitary land fill, Ground improvements; objective, potential<br><b>General principles of compaction:</b> Mechanics, field procedure, quality control in field.  |
| <b>2</b> | <b>Ground Improvement in Granular soil</b>   |
|          | <b>Ground Improvement in Granular soil:</b> In-place densification by Vibro floatation, Compaction piles in sand, Vibro compaction piles, Dynamic compaction, Blasting.  |
| <b>3</b> | <b>Ground improvement in Cohesive soil</b>   |
|          | Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate of consolidation, Preloading methods.<br>Types of drains, Design of vertical drains, Construction techniques, Stone column: Function, Design principles, load carrying capacity, construction techniques, Settlement of stone column foundation. |
| <b>4</b> | <b>Ground Improvement by Grouting &amp; Soil Reinforcement</b>   |
|          | <b>Grouting in soil:</b> Types of grout, desirable characteristics, Grouting pressure, Grouting methods , Soil Reinforcement – Mechanism, Types of reinforcing elements, Reinforcement- Soil interaction, Reinforced soil application beneath roads, foundation and retaining wall.  |
| <b>5</b> | <b>Soil Stabilization</b>  |
|          | <b>Lime Stabilization</b> – Base Exchange mechanism, Pozzolonic reaction, lime-soil interaction, lime columns, Design of foundation on lime column.<br><b>Cement stabilization</b> -Mechanism, amount, Age and curing, Fly ash-Lime stabilization, Soil bitumen stabilization.   |

## Websites

- [https://nptel.ac.in/content/syllabus\\_pdf/105108075.pdf](https://nptel.ac.in/content/syllabus_pdf/105108075.pdf)
- [https://nptel.ac.in/content/storage2/nptel\\_data3/html/mhrd/ict/text/105108075/lec3.pdf](https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105108075/lec3.pdf)
- [http://www.cdeep.iitb.ac.in/webpage\\_data/nptel/Civil%20Engineering/Foundation\\_Engineering/Course\\_home36.1.html](http://www.cdeep.iitb.ac.in/webpage_data/nptel/Civil%20Engineering/Foundation_Engineering/Course_home36.1.html)
- [http://www.cdeep.iitb.ac.in/webpage\\_data/nptel/Civil%20Engineering/Foundation\\_Engineering/Course\\_home36.1.html](http://www.cdeep.iitb.ac.in/webpage_data/nptel/Civil%20Engineering/Foundation_Engineering/Course_home36.1.html)

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Distinguish the pH and total solids of the sewage.
- LO2** Apply knowledge of suspended solid.
- LO3** Differentiate the biologically oxygen demand and chemical oxygen demand.
- LO4** Analyze the dissolved oxygen in water.
- LO5** Investigate the sanitary fittings and its accessories.

#### LIST OF EXPERIMENTS

1. To determine the pH of the given sample of sewage.
2. To determine Total Solids of the given sewage sample.
3. To determine the Total Dissolved Solids of the given sewage sample.
4. To find out Total Settle-able Solids of the given sewage sample.
5. To determine Total Suspended Solids of the given sewage sample.
6. To find out the quantity of Dissolved Oxygen present in the given water sample by Winkler's Method.
7. To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
8. To find out Chemical Oxygen Demand of the waste water sample.
9. To study various sanitary fittings.

#### VIRTUAL LABS

- [http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk\\_labs/Environmental\\_Engineering\\_1/labs/index.html](http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk_labs/Environmental_Engineering_1/labs/index.html)
- [http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk\\_labs/Environmental\\_Engineering\\_2/labs/index.html](http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk_labs/Environmental_Engineering_2/labs/index.html)

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Distinguish the swelling property of soil.
- LO2** Evaluate the compressibility of soil by consolidation test.
- LO3** Differentiate the shear strength behavior of soil.
- LO4** Examine the bearing capacity of soil.
- LO5** Investigate the behavior of fine-grained soil.

#### LIST OF EXPERIMENTS

1. To determine the differential free swell index of soil.
2. To determine the compressibility parameters of soil by consolidation test.
3. To determine the swelling pressure of soil.
4. To determine the shear strength parameters of soil by tri-axial test.
5. To determine the permeability of soil by constant and falling head methods.
6. To determine the CBR of soil.
7. To determine the grain size distribution of fine grained soil by Hydrometer.

#### VIRTUAL LABS

- <https://www.youtube.com/watch?v=XHpJa0G19a8>
- <https://www.youtube.com/watch?v=fCmMW73rP64>
- <https://www.youtube.com/watch?v=bmpn5oNDvOs>

**Course Outcomes:**

On successful completion of the course the learners will be able to

| CO    | Cognitive Abilities      | Course Outcomes  |
|-------|--------------------------|--|
| CO-01 | Understanding/ Applying  | Develop the ability to identify difficult sounds, words and phrases to strengthen listening and applying these improved skills in spoken communication.  |
| CO-02 | Understanding/ Applying  | Cultivating knack for reading and writing by understanding the nuances of sentence structure and presentation style.   |
| CO-03 | Understanding/ Applying  | Understand negotiation and Identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain and move negotiations from bargaining to closing. |
| CO-04 | Understanding / Applying | Develop a heightened awareness of the potential of digital communication and apply their knowledge in creating documents considering the needs of the netizens.  |
| CO-05 | Creating/Applying        | Propose their outlook through exposure to new and different experiences and ideas and enrich their understanding of the issues under discussion.   |

| UNIT NO. | UNIT NAME                            | Hours |
|----------|--------------------------------------|-------|
| 1        | Advanced Listening & Speaking Skills | 6     |
| 2        | Advanced Reading & Writing Skills    | 6     |
| 3        | Art of Negotiation Skills            | 4     |
| 4        | Email Etiquettes                     | 4     |
| 5        | Group Discussion                     | 5     |

#### LIST OF LABS

|     |  |
|-----|--|
| 1.  | Listening Skills II: Analysis of videos/audios by famous personalities   |
| 2.  | Speaking Skills II: Extempore, Debate etc.   |
| 3.  | Public Speaking: Key Concepts, Overcoming Stage Fear   |
| 4.  | Story-Telling Skills: Techniques of Story Telling, Prompts for story creation  |
| 5.  | Situational Conversational Skills  |
| 6.  | PowerPoint Presentation Skills-II  |
| 7.  | Reading Skills II: Technical Writings, Research Papers& Articles   |
| 8.  | Writing Skills II: Blog Writing &Review Writing  |
| 9.  | Picture Perception & Discussion  |
| 10. | Art of Negotiation: Identify the qualities of successful and unsuccessful negotiators. Identify different negotiation situations to practice during class. |
| 11. | Email Etiquettes   |
| 12. | Group Discussion: Dos &Don'ts, Informal GD   |

**LAB OUTCOMES:** After Successful completion of the lab students will be able to-

- LO1** Predict a problem of current relevance to society
- LO2** Formulate the problem and identify suitable modelling paradigm
- LO3** Categorize the problem and identify the solution methodology
- LO4** Simulate and design systems using various modern tools
- LO5** Validate the results and prepare a project report

**GUIDE LINES:**

1. The Project group in seventh term will continue the project work in eighth term and complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a log book of activities. It should have entries related to the worked one, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in eighth term on or before the last day of the eighth term.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project forward of marks shall be done by the guide and a departmental committee.
7. The guide should be internal examiner for oral examination.
8. The external examiner should be from the related area of the concerned project. He should have experience at degree level / industry.

The evaluation at final oral examination should be done jointly by the internal and external examiner.

**OVER VIEW AND OBJECTIVES:**

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated in to the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

**Discipline and Talent Enrichment Programme (TEP)–VI** shall be evaluated irrespective of period / time allocation (as in the case of Extra Curricular activity) in the teachings Scheme as a One credit course. There cord related to discipline and related activities are maintained for each student and they shall be evaluated for the same also. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of the classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

| CODE       | ACTIVITY                    | HOURS | CREDITS |
|------------|-----------------------------|-------|---------|
| BCVCCV8601 | Online Certification Course | 3     | 1       |

\*\*\*\*\***END**\*\*\*\*\*