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**Department of Civil Engineering**

**SYLLABI**

**(Session 2018-19)**

Of

**Bachelor of Technology**

**(Civil engineering)**

**B. TECH. CIVIL ENGINEERING – 4 YEARS PROGRAM**

**FEATURES OF B.TECH PROGRAM OF SGVU**

Bachelor of Technology in Civil Engineering (B. Tech) is a four year graduation degree program in Civil Engineering. The course has been so designed that the students can meet all the demands of professionals in the field of Civil Engineering.

**NEED, OBJECTIVES & MAIN FEATURES OF B.TECH PROGRAM**

**NEED –**

* To develop a platform for higher studies in the field of Civil Engineering and its applications
* To develop the ability in students for understanding the basic concepts and their applications in the industries.
* To develop the capability in students for relevant research work.
* To obtain and generate an employment in computing field.

**OBJECTIVES**

* The main objective of B.Tech program is to provide a basic platform for higher studies of Civil engineering. This will only be achieved by an approach involving rigorous and comprehensive academic course work covering practical hands on experience with real world applications.

**FEATURES OF BTECH CURRICULUM**

* 1st year of the program offered by SGVU is common to all B. Tech. programs covering courses related to Basic Sciences, Humanities Communication skills .
* 2nd year covers the areas of Strength of Material & Mechanics of Structures, Fluid Mechanics, Transportation Engg.-1, Engineering Geology,Building Material & Construction Elementary Survey, EMET LAB, Fluid Mechanics Lab, Survey Lab 1, Road Material Testing Lab, Building Planning & Design 1, Material Testing Lab.
* 3rd year covers the subjects – Theory of Structures – I , Concrete Structures-I , Steel Structures-I , Modern concrete technology and practice , Remote Sensing and GIS , Design of Concrete Structures II , Design of Steel Structures II , Environmental Engg. Design & Lab. I , Surveying Lab. – II
* 4th year covers the subjects - Geotechnical Engineering – I, Water Resources Engineering –I, Building Design, Project Planning & Construction Management, Bridge Engineering**,** Design of Foundations, Water Resources Engineering Design-I
* B.Tech course contains the job oriented and advanced practical labs which help students understand the practical applications of the areas of Civil engineering with the theoretical knowledge as well.
* B.Tech Civil Engineering Curricula includes the industry visits, Summer Training, Seminars Projects to develop the creativity and enhance the developed Attitude towards the industrial sector.

**ROLE OF BTECH CURRICULUM IN NATIONAL DEVELOPMENT**

Civil engineering plays a major role in the employment as well as in the economy of the country, the curriculum plays an important role in the development of graduates who can serve world class services and take the nation forward.

**GLOBAL TRENDS REFLECTED IN B.Tech CURRICULUM**

There is always a demand of Civil engineers globally. The department of Civil engineering aims to produce high quality engineers in technology with a sound theoretical and practical knowledge who can under take responsibility to contribute effectively in the progress of the country and society.

**POSSIBILITY OF MOTIVATION & SELF DEVELOPMENT**

There are various possibilities of motivation and self-development of the students through curriculum. The curriculum has been so designed that a student can

* Understand the professional/industry environment
* Understand team work and group dynamism.
* Develop a sense of effective problem solving and decision making.
* Think and develop projects independently.
* Develop career as computer professional.

**PLACEMENT OPPORTUNITY**

Technical UG programs are basically a foundation for technical PG programs and research. Now a day because of the economy boom, there is high placement opportunities in industries in India and across the world as well. UG program of Civil engineering includes study of various aspects of Civil engineering to meet the requirements of various companies. A technical graduate can work for any construction company big or small as a Civil engineer and handle various roles like –

* Construction engineer
* Designing engineer
* Civil engineer
* Development engineer

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| **SURESH GYAN VIHAR UNIVERSITY** | | | | | | | | | |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **II YEAR III SEM** | | | | | | | | | |
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| **S.NO** | **Course Code** | **Course Name** | **Credit** | **Contact Hours/Week** | | | **Exam Hours** | **Weightage (%)** | |
| **L** | **T** | **P** | **CE** | **ESE** |
| **A. THEORY PART** | | | | | | | | | |
| 1 | CE 201 | Strength of Material-I | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 2 | CE 203 | Fluid Mechanics | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 3 | CE 205 | Environmental Engg. I | 3 | 3 |  |  | 3 | 30 | 70 |
| 4 | CE 207 | Surveying-I | 3 | 3 |  |  | 3 | 30 | 70 |
| 5 | CE 209 | Solar Architecture | 3 | 3 |  |  | 3 | 30 | 70 |
|  |  | **Elective** | 3 | 3 |  |  | 3 | 30 | 70 |
| 6.1 | CE 211 | Modern concrete technology and  practice |  |  |  |  |  |  |  |
| 6.2 | CE213 | Design of Pre-stressed Concrete  Structures |  |  |  |  |  |  |  |
| **B. PRACTICALS** | | | | | | | | | |
| 7 | CE 251 | EMET LAB | 1 |  |  | 2 | 3 | 60 | 40 |
| 8 | CE 253 | Fluid Mechanics Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| 9 | CE 255 | Environmental Engg. Lab-I | 1 |  |  | 2 | 3 | 60 | 40 |
| 10 | CE 257 | Survey Lab | 2 |  |  | 3 | 3 | 60 | 40 |
| 11 | CE 259 | Road Material Testing Lab | 2 |  |  | 3 | 3 | 60 | 40 |
| **C. DISCIPLINE & CO-CURRICULAR ACTIVITES** | | | | | | | | | |
| 12 | DE 201 | Discipline& Co-curricular activities | 2 |  |  |  |  | 100 |  |
|  |  | TOTAL | 29 | 18 | 2 | 12 |  |  |  |
|  |  | GRAND TOTAL |  | 32 |  |  |  |  |  |

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| **SURESH GYAN VIHAR UNIVERSITY** | | | | | | | | | |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **II YEAR IV SEM** | | | | | | | | | |
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| S.NO | Course Code | Course Name | Credit | Contact Hours/Week | | | Exam Hours | Weightage (%) | |
| L | T | P | CE | ESE |
| **A. THEOY PART** | | | | | | | | | |
| 1 | CE 202 | Strength of Material-II | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 2 | CE 204 | Hydrology & Hydraulics | 3 | 3 |  |  | 3 | 30 | 70 |
| 3 | CE 206 | Engineering Geology | 3 | 3 |  |  | 3 | 30 | 70 |
| 4 | CE 208 | Surveying-II | 3 | 3 |  |  | 3 | 30 | 70 |
| 5 | CE 210 | Building Material & Construction | 3 | 3 |  |  | 3 | 30 | 70 |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **ELECTIVE** | 3 | 3 |  |  | 3 | 30 | 70 |
| 6.1 | CE 212 | Construction Equipment & Material Management |  |  |  |  |  |  |  |
| 6.2 | CE 214 | Green Building Technology |  |  |  |  |  |  |  |
| 6.3 | CE 216 | Solid Waste Management |  |  |  |  |  |  |  |
| **B. PRACTICALS** | | | | | | | | | |
| 7 | CE 252 | Material Testing Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| 8 | CE 254 | Hydraulics & Hydraulics Machine | 2 |  |  | 3 | 3 | 60 | 40 |
| 9 | CE 256 | Auto CAD | 1 |  |  | 2 | 3 | 60 | 40 |
| 10 | CE 258 | Survey Lab-II | 2 |  |  | 3 | 3 | 60 | 40 |
| 11 | CE 260 | Eng. Material & Geology Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| **C. DISCIPLINE & CO-CURRICULAR ACTIVITES** | | | | | | | | | |
| 12 | DE 202 | Discipline& Co-curricular activities | 2 |  |  |  |  | 100 |  |
|  |  | TOTAL | 28 | 18 | 1 | 12 |  |  |  |
|  |  | GRAND TOTAL |  | 31 |  |  |  |  |  |

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| **SURESH GYAN VIHAR UNIVERSITY.** |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **III YEAR V SEM** |
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| |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **S.No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **(Hours)** | **Weightage(%)** | | | **CE** | **ESE** | | L | T | P | |  |  | **A: Theory Papers** |  |  |  |  |  |  |  | | 1 | CE 301 | Theory of Structures – I | 4 | 3 | 1 |  | 3 | 30 | 70 | | 2 | CE 303 | Concrete Structures-I | 3 | 3 |  |  | 3 | 30 | 70 | | 3 | CE 305 | Steel Structures-I | 3 | 3 |  |  | 3 | 30 | 70 | | 4 | CE 307 | Building information Modeling(BIM) | 3 | 3 |  |  | 3 | 30 | 70 | | 5 | CE 309 | Quantity Surveying & Valuation | 3 | 3 |  |  | 3 | 30 | 70 | | 6 |  | **Elective** | 3 | 3 |  |  | 3 | 30 | 70 | | 6.1 | CE 311 | Repair And Rehabilitation of Structures |  |  |  |  |  |  |  | | 6.2 | CE 313 | Remote Sensing and GIS |  |  |  |  |  |  |  | | 6.3 | CE 315 | Theory of Pre-stressed |  |  |  |  |  |  |  | |  |  | **B. Practicals And Sessionals** |  |  |  |  |  |  |  | | 7 | CE 351 | Design of Steel Structures I | 2 |  |  | 3 | 3 | 60 | 40 | | 8 | CE 353 | Structural Engineering Lab | 1 |  |  | 2 | 3 | 60 | 40 | | 9 | CE 355 | Design of Concrete Structures I | 2 |  |  | 3 | 3 | 60 | 40 | | 10 | CE 357 | STAAD Pro. | 1 |  |  | 2 | 3 | 60 | 40 | |  |  | **C. Discipline & co curricular activities** |  |  |  |  |  |  |  | | 12 | DE 301 | Discipline & co curricular activities | 2 |  |  |  |  | 100 |  | |  |  | Total | 27 | 18 | 1 | 12 |  |  |  | |  |  | Grand total |  | 31 |  |  |  |  |  | |

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| **SURESH GYAN VIHAR UNIVERSITY** |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **III YEAR VI SEM** |

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| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **Hours** | **Weightage(%)** | |
| **CE** | **CE** |
| **L** | **T** | **P** |
| **A: Theory Papers** | | | | | | | | | |
| 1 | CE 302 | Theory of Structures – II | 4 | 3 | 1 | - | 3 | 30 | 70 |
| 2 | CE 304 | Concrete Structures-II | 3 | 3 | - | - | 3 | 30 | 70 |
| 3 | CE 306 | Steel Structures-II | 3 | 3 | - | - | 3 | 30 | 70 |
| 4 | CE 308 | Environmental Engineering– I | 3 | 3 | - | - | 3 | 30 | 70 |
| 5 | CE 310 | Transportation Engineering-I | 3 | 3 | - | - | 3 | 30 | 70 |
|  |  | **Elective – IV** | 3 | 3 | - | - | 3 | 30 | 70 |
| 6.1 | CE 312 | Modern concrete technology and practice |  |  |  |  |  |  |  |
| 6.2 | CE 314 | Construction Equipments and Material Management |  |  |  |  |  |  |  |
| 6.3 | CE 316 | Solid Waste Management |  |  |  |  |  |  |  |
| 6.4 | HS 302 | Employability skills-IV : Technical writing |  |  |  |  |  |  |  |
| **B. Practicals And Sessionals** | | | | | | | | | |
| 7 | CE 352 | Matrix Methods of Structural Analysis | 1 | - | - | 2 | 3 | 60 | 40 |
| 8 | CE 354 | Design of Concrete Structures II | 1 | - | - | 2 | 3 | 60 | 40 |
| 9 | CE 356 | Design of Steel Structures II | 1 | - | - | 2 | 3 | 60 | 40 |
| 10 | CE 358 | Environmental Engg. Design & Lab. I | 1 | - | - | 2 | 3 | 60 | 40 |
| 11 | CE 360 | Road Materials Testing Lab. | 1 | - | - | 2 | 3 | 60 | 40 |
| 12 | CE 362 | **PROJECT STAGE 1** | 2 |  |  | 3 |  | 60 | 40 |
| **C. Discipline & Co- curricular activities** | | | | | | | | | |
| 13 | DE 302 | Discipline & Co- Curricular Activities | 2 | - | - | - | - | 100 | - |
|  |  | **Total** | **28** | **18** | **1** | **13** |  |  |  |
|  |  | **Grand total** |  | **32** |  |  |  |  |  |

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| **SURESH GYAN VIHAR UNIVERSITY**  **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **IV YEAR VII SEM** | | | | | | | | | |
| **S.No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **Hours** | **Weightage (%)** | | |
| **CE** | **ESE** | |
| **L** | **T** | **P** |
|  |  | **A: Theory Papers** |  |  |  |  |  |  |  | |
| 1 | CE 401 | Geotechnical Engineering – I | 3 | 3 | - | - | 3 | 30 | 70 | |
| 2 | CE 403 | Water Resources Engineering –I | 3 | 3 | - | - | 3 | 30 | 70 | |
| 3 | CE 405 | Environmental Engineering– II | 3 | 3 | - | - | 3 | 30 | 70 | |
| 4 | CE 407 | Building Design | 3 | 3 | - | - | 3 | 30 | 70 | |
| 5 | CE 409 | Transportation Engineering – II | 4 | 3 | 1 | - | 3 | 30 | 70 | |
| 6 |  | **Elective – IV** | 3 | 3 | - | - | 3 | 30 | 70 | |
| 6.1 | CE 411 | Earthquake Resistant building Design | - | - | - | - | - | - | - | |
| 6.2 | CE 413 | Ground Improvement Techniques | - | - | - | - | - | - | - | |
| 6.3 | CE 415 | Smart cities and Automation | - | - | - | - | - | - | - | |
|  |  | **B. Practicals And Sessionals** |  |  |  |  |  |  |  | |
| 7 | CE 451 | Geotechnical Engg. Design & Lab.-I | 1 | - | - | 2 | 3 | 60 | 40 | |
| 8 | CE 453 | Water Resources Engineering Design-I | 1 | - | - | 2 | 3 | 60 | 40 | |
| 9 | CE 455 | Environmental Engg. Design & Lab. II | 1 | - | - | 2 | 3 | 60 | 40 | |
| 10 | CE 457 | Industrial Training & Seminar | 2 | - | - | 3 | 3 | 60 | 40 | |
| 11 | CE 459 | Project-Stage I | 2 | - | - | 3 | 3 | 60 | 40 | |
| **12** | DE 401 | Discipline & Co- Curricular Activities | **2** | **-** | **-** | **-** |  |  |  | |
|  |  | **Total** | **28** | **18** | **1** | **12** |  |  |  | |
|  |  | **Grand total** |  | **31** |  |  |  |  |  | |

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| **SURESH GYAN VIHAR UNIVERSITY** |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **IV YEAR VIII SEM**   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **S.No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **Hours** | **Weightage (%)** | | | **CE** | **ESE** | | **L** | **T** | **P** | |  |  | **A: Theory Papers** |  |  |  |  |  |  |  | | 1 | CE 402 | Geotechnical Engineering–II | 3 | 3 | - | - | 3 | 30 | 70 | | 2 | CE 404 | Water Resources Engineering-II | 3 | 3 | - | - | 3 | 30 | 70 | | 3 | CE 406 | Project Planning & Construction  Management | 3 | 3 | - | - | 3 | 30 | 70 | | 4 |  | **Elective – V** | 3 | 3 | - | - | 3 | 30 | 70 | | 4.1 | CE 408 | Bridge Engineering | - | - | - | - | - | - | - | | 4.2 | CE 410 | Advance Foundation Engineering | - | - | - | - | - | - | - | | 4.3 | CE 412 | Advanced Transportation Engg. | - | - | - | - | - | - | - | |  |  | **B. Practicals And Sessionals** |  |  |  |  |  |  |  | | 5 | CE 452 | Geotechnical Engg. Design & Lab.-II | 1 | - | - | 2 | 3 | 60 | 40 | | 6 | CE 454 | Water Resources Engineering Design-II | 1 | - | - | 2 | 3 | 60 | 40 | | 7 | CE 456 | Professional Practice and Estimating | 1 | - | - | 2 | 3 | 60 | 40 | | 8 | CE 458 | Design of Foundations | 1 | - | - | 2 | 3 | 60 | 40 | | 9 | CE 460 | Revit Architecture | 1 | - | - | 2 | 3 | 60 | 40 | | 10 | CE 462 | Seminar | 1 | - | - | 2 | 3 | 60 | 40 | | 11 | CE 464 | Project-Stage II | 2 | - | - | 3 | 3 | 60 | 40 | |  |  |  |  |  |  |  |  |  |  | |  |  | **Total** | **22** | **12** | **0** | **15** |  |  |  | |  |  | **Grand total** |  | **27** |  |  |  |  |  | |

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| **SURESH GYAN VIHAR UNIVERSITY** | | | | | | | | | |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **II YEAR III SEM** | | | | | | | | | |
| **S.NO** | **Course Code** | **Course Name** | **Credit** | **Contact Hours/Week** | | | **Exam Hours** | **Weightage (%)** | |
| **L** | **T** | **P** | **CE** | **ESE** |
| **A. THEORY PART** | | | | | | | | | |
| 1 | CE 201 | Strength of Material-I | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 2 | CE 203 | Fluid Mechanics | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 3 | CE 205 | Environmental Engg. I | 3 | 3 |  |  | 3 | 30 | 70 |
| 4 | CE 207 | Surveying-I | 3 | 3 |  |  | 3 | 30 | 70 |
| 5 | CE 209 | Solar Architecture | 3 | 3 |  |  | 3 | 30 | 70 |
|  |  | **Elective** | 3 | 3 |  |  | 3 | 30 | 70 |
| 6.1 | CE 211 | Modern concrete technology and  practice |  |  |  |  |  |  |  |
| 6.2 | CE213 | Design of Pre-stressed Concrete  Structures |  |  |  |  |  |  |  |
| **B. PRACTICALS** | | | | | | | | | |
| 7 | CE 251 | EMET LAB | 1 |  |  | 2 | 3 | 60 | 40 |
| 8 | CE 253 | Fluid Mechanics Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| 9 | CE 255 | Environmental Engg. Lab-I | 1 |  |  | 2 | 3 | 60 | 40 |
| 10 | CE 257 | Survey Lab | 2 |  |  | 3 | 3 | 60 | 40 |
| 11 | CE 259 | Road Material Testing Lab | 2 |  |  | 3 | 3 | 60 | 40 |
| **C. DISCIPLINE & CO-CURRICULAR ACTIVITES** | | | | | | | | | |
| 12 | DE 201 | Discipline& Co-curricular activities | 2 |  |  |  |  | 100 |  |
|  |  | TOTAL | 29 | 18 | 2 | 12 |  |  |  |
|  |  | GRAND TOTAL |  | 32 |  |  |  |  |  |

**CE 201 STRENGTH OF MATERIALS AND MECHANICS OF STRUCTURES-I C(L,T,P)=4(3,1,0)**

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| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Simple Stresses and Strains :** 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 & non prismatic members and in composite members; 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. | 8 |
| **II** | **Compound Stress :**Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr’s circle & it’s application.  **Columns :** Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler’s theory and its limitation, concept of effective length of columns; Rankine& Secant formulae. | 8 |
| **III** | **Centroid and Moment of Inertia :** First moment of area, Centroid and moment of inertia of symmetrical & unsymmetrical sections, radius of gyration, polar moment of inertia, product moment of inertia, parallel axis theorem, principal axes and principal moment of inertia.  **Plane trusses :**Simple pin jointed trusses and their analysis: method of joints, method of section and introduction to computer methods. | 8 |
| **IV** | **Bending of Beams :** 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 o various types of loads and moments. | 7 |
| **V** | **Theory of simple bending**: Distribution of bending and shear stresses for simple and composite sections; Shear center and its location in flanged sections. Introduction to unsymmetrical bending. | 7 |

**Reference Books:**

1. Gere, James M., "Mechanics of Materials," 6th Edition.
2. Dowling, Norman E., "Mechanical Behavior of Material
3. Strength Of Material-B.C. Punmia
4. Strength Of Material-S. Chand
5. Strength Of Material-R.S. Khurmi

**CE 203 FLUID MECHANICS C(L,T,P)=4(3,1,0)**

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| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Fluids**: Definition, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids.  **Properties of Fluids:** Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity | 7 |
| **II** | **Hydrostatics :** Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure gauge.  **Buoyancy**: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and metacentric height experimental and analytical determination of metacentric height | 8 |
| **III** | **Equilibrium of Fluid particles and flow**: Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.  **Hydro-kinematics :** Types of Flows : Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrational motions, free and forced vortex, circulation and voracity velocity potential and stream function, elementary treatment of flow net. Euler’s equations of motion and integration of Euler’s equations, Bernoulli’s equation for incompressible Fluids, assumptions in Bernoulli's  equation, Energy correction factor | 8 |
| **IV** | **Applications of Bernoulli's equation** :Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula. Velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs.  **Momentum Equation and its Application :** Development of momentum equation by control volume concept, Momentum correction factor, applications – Boarda’s mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles | 8 |
| **V** | **Flow through Pipes** : Laminar flow, Reynolds experiment, transition from laminar to turbulent flow.  **Turbulent Flow** : Laws of fluid friction, friction factor Moodys diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy’s, Darcys and Mannings formula, flow through parallel pipes and pipes in series, flow through branched pipes. Flow along a by pass. Power transmission through pipe, condition for maximum power. Elementary water hammer concept | 8 |

Reference Books-:

1. Fluid Mechanics-F. M. White, McGraw-Hill

2. Fluid Mechanics and Hydraulic Machines-R. K. Bansal

# 3. Fluid Mechanics and Hydraulic Machines-Modi& Seth

**CE 205 ENVIRONMENTAL ENGG. -I C(L,T,P)= 3(3,0,0)**

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| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **General:** Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview.  **Water Demand:** Design flow, design periods, design population, factors affecting water  consumption, variation in water demand, design capacities for various water supply components. | 7 |
| **II** | **Source of water and collection works:** Alternative sources i.e. rain, surface and ground water, Assessment of yield and development of the source.  **Quality of water:** The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards | 7 |
| **III** | **Transmission of water:** 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, | 7 |
| **IV** | **Advanced Treatment of Water:** filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles. | 7 |
| **V** | **Distribution of water:** 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.  **Plumbing of Building for water supply:** Service connections, fixture units, simultaneous flow, design of plumbing system. | 7 |

**Reference books :-**

1. Environmental Engineering - by Howard S. Peavy, Donald R. Rowe and George Tchobanoglous
2. Environmental Engineering- B.C. Punmia
3. Environmental Engineering- S.K. Garg

**CE 207 SURVEYING-I C(L,T,P)=3(3,0,0)**

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| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Introduction :**Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs. **Measurement of Distances :**Different types of chains, tapes and their uses. Sources of error and precautions, corrections to tape measurements. Field problems in distance measurement. | 7 |
| **II** | **Measurement of Angles &Direction :**Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass. Venire and micro-optic theodolite, temporary and permanent adjustment of vernier theodolite. Measurement of horizontal and vertical angle by different methods. Application of theodolite in field problems. | 8 |
| **III** | **Traversing :**Different methods of traversing; chain traverse, chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bowditch rule, graphical method, axis method. Gales traverse table. | 7 |
| **IV** | **Leveling :**Definitions of various terms in leveling. Different types of leveling, sources of errors in leveling curvature and refraction corrections. Temporary and permanent adjustment of dumpy and tilting levels. Computation and adjustment of levels. Profile leveling; L-Section and cross-sections | 7 |
| **V** | **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.  **Contouring :** Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps | 7 |

**Reference books:-**

1. Surveying” by Bannister A and Raymond S
2. Engineering Survey” by Schofield W
3. Suryeving:- B.C. Punmia

**CE 209 SOLAR ARCHITECTURE C(L,T,P)=4(3,1,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Solar energy, geometry and measurement:** Energy and Dependence on External Sources and Sun, Physical, Descriptions and Reactions, Sun - Earth Geometry, Terminology Extra - Terrestrial Radiation Terrestrial Radiation, Measuring Instruments. | 8 |
| **II** | **Estimation and evaluation: Estimation of Solar Radiation or Details. Radiation Processing -** Long Term, Evaluation of the Apparent Sunrise and Sunset Angles, Estimation of Daily/Monthly Average daily Tilt Factor Under Terrestrial, Conditions, Solar Colector Basics, Transmission - Absorptance Product, Daily (Or Monthly Average Daily) Transmittance - Absorptance Product , Analytical Evaluation. | 8 |
| **III** | **Collector theories and devices: Theory of Flat Plate Collectors -** Liquid Based , Mean temperature and Heat Capacity Effects, Theory of Air Based Solar Flat Plate Collectors, Other Collector Geometries Concentrating Collectors, Compound Parabolic Collectors, Device and System Performance, Long Term Solar Energy System Performance | 8 |
| **IV** | **Design and performance :** Long Term Solar Energy System Performance Simplified Design Methods, Monthly Average Daily Utilizability, The phi(bar) - f chart method (Contd.), The phi(bar) - f chart method Tank Losses and Finite Heat Exchanger | 7 |
| **V** | **Economic analysis, life cycle savings:** The P1 and P2 Method, Passive Devices, Passive Architecture, Overhangs and Wing Walls, Passive Architecture, Overhangs and Wing Walls. | 7 |

**Reference Books:**

1. Passive Solar Architecture by David Bainbridge, Ken Haggard.
2. Solar Architecture by Christian Schittich.

**CE 211 MODERN CONCRETE TECHNOLOGY & PRACTICE C(L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Strength of Concrete:** Strength‐ porosity relationship, factors affecting compressive strength, behavior of concrete under uniaxial, biaxial and triaxial stress states, Split Tensile strength and modulus of rupture ‐test methods and empirical formulae for their estimation. Mineral and Chemical admixtures in Concrete: types and their uses. | **7** |
| **II** | **Concrete Production:** Vibrator compacted concrete in buildings, pavements and infrastructure projects etc., pumpable concrete, roller compacted concrete and Ready Mixed Concrete‐ methods, specific features and uses etc.  **Rheology of Concrete**: Flow ability, Segregation, Bleeding and Viscosity etc. ‐ Factors  affecting, methods of determination, related standards etc. | **7** |
| **III** | **Elasticity, Creep and Shrinkage of Concrete:** Elastic behaviour, Method of determination of Elastic modulus, factors affecting modulus of elasticity, early volumechange in concrete due to plastic shrinkage, autogeneous shrinkage and drying shrinkage‐ factors affecting them, typical values and their methods of determination.  Creep of concrete‐ specific creep, typical values, creep recovery, factors affecting creep and its determination with available standard. | 7 |
| **IV** | **Microstructure of Concrete:** Interfacial transition zone, hydration kinetics, hydrated cement paste (hcp), calcium hydroxide, presence of micro‐cracks in concrete mass ‐ thei characteristics and significance on performance of concrete  **Penetrability of Concrete**: Permeability, sorptivity and diffusion in concrete‐ test methods and significance.  **Durability of Concrete**: Physical and chemical processes, recently employed methods of tests for ensuring longer and durable concrete structures‐ case studies. | 7 |
| **V** | **Special Aggregates:** Light weight, heavy weight‐ their characteristics and uses in concrete. Specific purpose Concretes and Cement based composites: Self Compacting Concrete, Fiber cements and fiber reinforced cement based composites, Mass Concrete and Polymer Concrete etc.‐ materials, production and application areas.  **High performance concrete**‐ performance characteristics in fresh and hardened states, production precautions ‐ some case studies of specific tailored HPC in India. | 7 |

**REFERENCE BOOKS:-**

1. MCTP:- B.C. Punmia
2. Aggregates in Concrete (Modern Concrete Technology) 1st Edition by [M. G. Alexander](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&text=M.+G.+Alexander&search-alias=books&field-author=M.+G.+Alexander&sort=relevancerank) (Author), [S. Mindess](https://www.amazon.com/s/ref=dp_byline_sr_book_2?ie=UTF8&text=S.+Mindess&search-alias=books&field-author=S.+Mindess&sort=relevancerank)

**CE 213 DESIGN OF PRESTRESS CONCRETE & INDUSTRIAL STRUCTUREC (L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| I | **Introduction:** Systems of pre‐stressing in detail, pre‐stressing techniques, transfer of pre‐stress, types of commercially available jacks, computation of losses of pre‐stress.  **Anchorage Zone:** end block stresses, design | 6 |
| **II** | **Cable profiles:** Concordant and non‐concordant cable profile and associated factors in  continuous members. Modern cable laying: materials & practices, precautions etc. Computation of deflection in pre‐stressed concrete members. | 6 |
| **III** | **Design of Pre‐stressed Concrete Sections:** Flexural, shear and torsion resistance of members, preliminary and final design of sections, design of pre and post tensioned  flexural members; simply supported and continuous members. | 7 |
| **IV** | **Pre‐stressed Slab:** Design of slabs, tendon layout, precast slab, production and their  applications.  **Partial Prestressing:** Principles and advantages, methods, practices and design | 10 |
| **V** | Design of circular pipes and circular water retaining structures etc. Case study of one bridge girder with design and constructional features | 8 |

**REFERENCE BOOKS:-**

1. Design of Prestressed Concrete Structures” by T Y Lin and Ned H Burns
2. “Prestressed Concrete and Advance Design of Structure” by Asheesh Kumar “Design of Prestressed Concrete” by Arthur H Nilson

**CE 251 ENGINEERING MECHANICS & EXPERIMENTAL TECHNIQUES LAB. C(L,T,P)=1(0,0,2)**

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| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Law of Parallelogram of Forces |  |
| **2** | Polygon Law of Forces |  |
| **3** | Efficiency of Compound Lever |  |
| **4** | Efficiency Bell Crank Lever |  |
| **5** | Efficiency of Worm and Worm Wheel |  |
| **6** | Theorem of Super Position |  |
| **7** | Efficiency of Screw Jack |  |
| **8** | Efficiency of Double Purchase Crab Winch |  |
| **9** | Efficiency of Differential Wheel & Axle |  |
| **10** | Study of System of Pulleys |  |
| **11** | Study of Behavior of Struts |  |
| **12** | Support Reactions of a Simply Supported Beam |  |
| **13** | Coefficient of Static Friction |  |

**CE 253 FLUID MECHANICS LAB C(L,T,P)=1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | To verify the Bernoulli’s theorem. |  |
| **2** | To calibrate the Venturimeter |  |
| **3** | To calibrate the Orificmeter |  |
| **4** | To determine Metacentrie Height |  |
| **5** | To determine Cc, Cv, Cd of an orifice |  |
| **6** | To determine Cd of a mouthpiece |  |
| **7** | To determine Cd of a V-notch |  |
| **8** | To determine viscosity of a given fluid. |  |
| **9** | Bye Pass |  |

**CE 255 ENVIRONMENTAL ENGG. LAB-I C(L,T,P)=1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **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 |  |

**CE 257 SURVEY LAB-I s C(L,T,P)=2(0,0,3)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Ranging and Fixing of Survey Station. |  |
| **2** | Plotting Building Block by offset with the help of cross staff |  |
| **3** | To determine the magnetic bearing of a line  a. Using surveyor's compass  b. Using prismatic compass |  |
| **4** | Measurement and adjustment of included angles of traverse using prismatic compass |  |
| **5** | To determine the reduced levels using Tilting Level |  |
| **6** | **To** determine the reduce levels in closed circuit using Dumpy Level |  |
| **7** | To carry out profile leveling and plot longitudinal and cross sections for road |  |
| **8** | To carryout temporary adjustment of Theodolite |  |
| **9** | Measurement of horizontal angle.  a. By method of repetition.  **b.** By method of Reiteration. |  |
| **10** | To determine the tachometric constant. |  |
| **11** | To determine the horizontal and vertical distance by tachometric survey |  |
| **12** | To study the various minor instruments |  |
| **13** | To determine the area of a figure using a planimeter |  |

**CE 259 ROAD MATERIAL TESTING LAB C(L,T,P)=2(0,0,3)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Aggregate impact test |  |
| **2** | Angularity number test |  |
| **3** | To determine fineness modulus of a given sample of coarse aggregate. |  |
| **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 sample of bitumen. |  |
| **12** | Marshell stability test |  |
| **13** | Float test |  |

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| **SURESH GYAN VIHAR UNIVERSITY** | | | | | | | | | |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **II YEAR IV SEM** | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |
| S.NO | Course Code | Course Name | Credit | Contact Hours/Week | | | Exam Hours | Weightage (%) | |
| L | T | P | CE | ESE |
| **A. THEOY PART** | | | | | | | | | |
| 1 | CE 202 | Strength of Material-II | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 2 | CE 204 | Hydrology & Hydraulics | 3 | 3 |  |  | 3 | 30 | 70 |
| 3 | CE 206 | Engineering Geology | 3 | 3 |  |  | 3 | 30 | 70 |
| 4 | CE 208 | Surveying-II | 3 | 3 |  |  | 3 | 30 | 70 |
| 5 | CE 210 | Building Material & Construction | 3 | 3 |  |  | 3 | 30 | 70 |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **ELECTIVE** | 3 | 3 |  |  | 3 | 30 | 70 |
| 6.1 | CE 212 | Construction Equipment & Material Management |  |  |  |  |  |  |  |
| 6.2 | CE 214 | Green Building Technology |  |  |  |  |  |  |  |
| 6.3 | CE 216 | Solid Waste Management |  |  |  |  |  |  |  |
| **B. PRACTICALS** | | | | | | | | | |
| 7 | CE 252 | Material Testing Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| 8 | CE 254 | Hydraulics & Hydraulics Machine | 2 |  |  | 3 | 3 | 60 | 40 |
| 9 | CE 256 | Auto CAD | 1 |  |  | 2 | 3 | 60 | 40 |
| 10 | CE 258 | Survey Lab-II | 2 |  |  | 3 | 3 | 60 | 40 |
| 11 | CE 260 | Eng. Material & Geology Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| **C. DISCIPLINE & CO-CURRICULAR ACTIVITES** | | | | | | | | | |
| 12 | DE 202 | Discipline& Co-curricular activities | 2 |  |  |  |  | 100 |  |
|  |  | TOTAL | 28 | 18 | 1 | 12 |  |  |  |
|  |  | GRAND TOTAL |  | 31 |  |  |  |  |  |

**CE 202 STRENGTH OF MATERIAL & MECHANICS OF STRUCTURES II C(L,T,P)=4(3,1,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Deflection of Beams: 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. | 7 |
| **II** | **Fixed Beams & Continuous Beams :**Analysis of fixed beams & continuous beams by three moment theorem and area moment method. | 7 |
| **III** | **Torsion :** Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion; Springs: stiffness of springs, close coiled helical springs, springs in series and parallel, laminated plate springs.  **Membrane Analysis :**Stress and strain in thin cylindrical & spherical shells under internal pressures. | 8 |
| **IV** | **Introduction to Energy Methods :** Strain energy due to bending, shear and torsion; Castigleno’s theorems, unit load method & their applications in analysis of redundant frames upto 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 | 8 |
| **V** | **Vibrations :**Stress tensor and failure criterion. Elementary concepts of structural vibration, degree of freedom, free vibration of undamped single degree of freedom systems. Newton’s law of motion, D’Almbert’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. | 8 |

**Reference Books-:**

1. Strength Of Material-B.C. Punmia
2. Strength Of Material-S. Chand
3. Strength Of Material-R.S. Khurmi
4. Gere, James M., "Mechanics of Materials," 6th Edition.
5. Dowling, Norman E., "Mechanical Behavior of Material

**CE 204 HYDROLOGY & HYDRAULICS C(L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Dimensional Analysis &Models:** Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynolds’s, Froude’s, 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. | 7 |
| **II** | **Laminar Flow** : Relation betweens shear & pressure gradient. Flow between plates & pipes. Equations for velocity distribution, pressure difference.  **Turbulent Flow in pipes:** Theories of Turbulence, Nikuradse’s Experiments. Hydrodynamically smooth & rough boundaries. Laminar, Sub layer, Equations of velocity distribution and friction coefficient. Stanton Diagram, Moody’s diagram | 7 |
| **III** | **Flow through channels** : Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Manning’s and Bazin. Section factor for uniform flow. 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. 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 | 8 |
| **IV** | **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, parshall flume.  **Impact of free Jets :** Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes | 7 |
| **V** | **Centrifugal pumps and turbines :**Vulute and whirlpool chambers, Loses 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. | 9 |

**Reference Books:-**

1. Fluid Mechanics-F. M. White, McGraw-Hill
2. Fluid Mechanics and Hydraulic Machines-R. K. Bansal
3. Fluid Mechanics and Hydraulic Machines-Modi & Seth
4. Urban Hydrology and Hydraulic Design -By James Chwen-Yuan Guo
5. Engineering Hydrology - By K. Subramanya

**CE 206 ENGINEERING GEOLOGY C(L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **General Geology :** Subdivision of Geology; Importance of Geology in Civil Engg.; Internal Structure of the Earth; Physical properties of Minerals; Weathering and Work of Wind & River ; Geological Time Scale. | 8 |
| **II** | **Petrology: Origin**, Classification, Texture & Structures of Igneous, Sedimentary and Metamorphic Rocks; Engineering Properties of Rocks. | 7 |
| **III** | **Structural Geology:** Causes & Classification of Fold, Fault, Joints & Unconformities.  **Geophysical Methods:** Electrical resistivity & Seismic refraction method for civil engineering importance. | 8 |
| **IV** | **Engineering Geology:** Geological investigation for site selection of site for Dams, Tunnels, Reservoirs and Bridges. Site improvement for different engineering projects. | 7 |
| **V** | **Remote Sensing:** Introduction and applications in Civil Engineering. | 7 |

**Reference Books:-**

1. Engineering Geology: Principles and Practice -By David George Price
2. Fundamentals of Engineering Geology- By F. G. Bell
3. Textbook of Engineering Geology- By Kesavulu

**CE 208 SURVEYING-II C(L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Trigonometric Leveling:** Methods of trigonometric leveling direct method and reciprocal method, axis Signal corrections. Determination of difference in elevations of points | 7 |
| **II** | **Curve Surveying:** Elements of circular (Simple, compound and reverse) curves, transition curves, degrees of curves Methods of setting out circular and transition curves | 7 |
| **III** | **Triangulation:** Merits and demerits of traversing, triangulation and trilateration. Grades of triangulation, Strength of figure, field procedure of triangulation. Reconnaissance and selection of triangulation stations. Intervisibility of stations and calculation of the heights of towers. Equipment needed for base line measurement, corrections to base line. Satellite station and base line extension | 7 |
| **IV** | **Errors in Surveying: Classification** of errors in surveying. The probability curve, its equation and properties, theory of least squares, weight, most probable valve, probable errors, standard errors. Normal equation correlates.  **Adjustment of Triangulation Figures:** Adjustment of levels. Adjustment of triangulations figures, Braced quadrilateral Triangle with central, station. Approximate and method of least squares for figure adjustment, Trilateration. | 7 |
| **V** | **Field Astronomy:** Definitions of terminology used in Astronomy, Co‐ordinate Systems. Relationships between different Co‐ordinate systems. Astronomical Triangle, Napier’s Rule. Different methods of determination of Azimuth. **Electronic distance measurement and use of Total station.**  **Survey camp:** (including exercise on triangulation, topographic, or project survey) with duration of maximum 10 days. | 7 |

**Reference Books:-**

1. Adv. Survey:- B.C. Punmia
2. Surveying & Levelling By R. Agor

**CE 210 BUILDING MATERIAL & CONSTRUCTION C(L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours.** |
| **I** | **Stones : C**lassification, quarrying of stones, Dressing of stones, various standard test on building stores including compressive strength, water absorption, durability, impact value, tensile strength, identification, selection criteria and uses of common building stones.  **Clay Products** : Bricks such as water absorption, compressive strength, effloresces, dimension and tolerance test– Manufacture process, properties, Classification, standard tests as per IS code, Types of Tiles, standard tests for tiles as per IS code such as water absorption, tolerance, impact value, glazing. | 7 |
| **II** | **Cement and Lime :** Raw materials, constituents of cement and their role, type of cement, manufacture of OPC, Chemistry of setting and hardening, Various standard tests on Portland cements, as per IS code including consistency, setting time, fineness, soundness and strength. Lime: Classification, Manufacture, properties, tests for lime.  **Mortar and Plaster:** Functions and types of sand, bulking of sand, tests for sand, classification, preparation method, tests, uses and properties of mortar and plaster. | 8 |
| **III** | **Timber:** Definitions of related terms, classifications and properties, conversion of wood, seasoning, preservation, fire proofing, Ply woods, fiber boards, defects in wood.  **Plastics :**Introduction, properties, classification, uses.  **Miscellaneous:** Properties and uses of glass, steel, aluminum, Asbestos, G.I., various types of paints and Varnishes, Prestressed and precast concrete. | 8 |
| **IV** | **Building Requirements:** Building components, their functions and requirements, classification, of building by occupancy and by types of construction, load bearing construction and framed structure construction.  **Foundation: Purpose**, types of foundation, bearing capacity of soil, depth of footing, foundation for black cotton soil, causes of failure of foundation and remedial measure. | 7 |
| **V** | **Brick and Stone Masonry**: Basic principle of sound masonry work, different types of bonds, relative merits merit and demerits of English, single Flemish and double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry.  **Pointing &Plastering:** Definition uses and Relative merits, types of panting, types of plastering.  **Partition Wall:** Types, purpose and use of partition wall. | 7 |

**Reference Books:-**

1. Building Material and Construction- By S.S. Bhavikatti
2. Building Materials- By S. K. Duggal
3. Fundamentals of Building Construction(Materials and Methods)- By Edward Allen, Joseph Iano

**CE 212 CONSTRUCTION EQUIPMENTS & MATERIAL MANAGEMENT C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours.** |
| **I** | **Advance Construction Equipments**  Different types of construction equipments viz. Earth moving equipments& their outputs, Dewatering equipments, Pumping equipments, Grouting equipments, Pile Driving equipments, Compaction equipments, Concreting equipments. | 7 |
| **II** | **Equipment Management**  Planning of construction equipments, Forecasting equipment requirement, Operation & Utilization, Equipment replacement, Manpower planning & Maintenance of equipments | 7 |
| **III** | **Economics of Construction Equipments**  Operation Cost & Its types. Investment Cost, Cost of Repairs, Overheads Cost accounting, Break-even point theory, Replacement of equipment | 7 |
| **IV** | **Materials Management**  Scope, objectives & importance of materials management, Selective control techniques, Disposal of surplus material. | 7 |
| **V** | **Inventory Control & Spare Part Management**  Need, function, steps in inventory control. Advantages, Economic order quantity, Inspection & procurement of spares, stores & stock management | 7 |

**Reference Books:-**

1. Construction Materials Management - George Stukhart
2. Construction Equipment Management for Engineers, Estimators, and Owners- By Douglas D. Gransberg, Calin M. Popescu, Richard Ryan
3. Construction Project Management: - By S. Keoki Sears, Glenn A. Sears, Richard H. Clough

**CE 214 GREEN BUILDING TECHNOLOGY C(L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **CONTENTS** | **Total Contact Hrs.** |
| **I** | **Concept of green buildings:** objectives of green buildings, Sustainable site, water, energy, material and indoor environment issues for green buildings, Goals of green building, Energy efficiency, Water efficiency, Materials efficiency, Indoor environmental quality enhancement. | 8 |
| **II** | **Principles of energy conscious design of buildings**: Building Envelope, Orientation, Building Configuration, Basic Principles of Day-lighting, Embodied Energy of Building Materials, design guidelines, integration of emerging technologies. | 8 |
| **III** | **Heating and cooling load of buildings**: elements of heating and cooling load, load reduction approaches, thermal mass, Solar geometry and exposure: sun path diagram, shading analysis. Passive heating: Direct and indirect solar passive heating systems, solarium, trombe wall, trans-wall.  **Passive cooling systems:** thermal mass, courtyard effect, wind tower design, earth air tunnel system, evaporative cooling, radiative cooling, Solar ventilation: stack effect, solar chimney for ventilation, absorber design, stack design, issues in opening design | 8 |
| **IV** | **Solar Radiation:** Basics of Solar Radiation, instruments for measuring solar radiation, solar radiation geometry, empirical equations, solar radiation on tilted surfaces.  **Thermal mass Solar geometry and exposure**: sun path diagram, shading analysis, graphical design tools, solar control issues. | 7 |
| **V** | **Energy Conservation Building Code:** requirements of code, applicability, compliance options: prescriptive, trade-off, whole building performance routes for compliance, features of green building rating systems in India: LEED, GRIHA, ECBC. Concept of Net zero energy building, net zero community, building analysis professional software- ENERGY PLUS, case studies. | 7 |

**Reference Books:**

1. Energy Efficient building in India, MiliMajumdar, TERI, 2009

2. Handbook on Energy Conscious Buildings, J.K. Nayak& J.A. Prajapati, Ministry Of Non-Conventional Energy Sources, 2006

3. Active Solar Collectors and Their Applications, Ari Rabl (Center for Energy and Environmental Studies Princeton Universitv), Oxford University Press, 1985

4. Solar passive buildings, science and design, M.S. Sodha et.al., Pergamon Press, 1986

5. GRIHA manual, TERI, 2017

6. ECBC code, Bureau of Energy Efficiency, 2017

**CE 216 SOLID WASTE MANAGEMENT C(L,T,P)=3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | **General:** Problems associated with Solid Waste Disposal.  **Generation of Solid Waste:** Goals and objectives of solid waste management, Classification of Solid Waste. Solid Waste Generation, Factors Influencing Generation of Solid Waste, Characteristics of Solid Waste, Analysis of Solid Waste. | 8 |
| **II** | **Onsite Handling, Storage and Processing:** Public Health and Aesthetics, Onsite Handling, Onsite, Storage, Dust bins, Community Containers, Container Locations, On-site Processing Methods | **7** |
| **III** | **Solid Waste Collections, Transfer and Transport:** Collection Systems, Equipment and Labor requirement, Collection Routes, Options for Transfer and Transport Systems | **7** |
| **IV** | **Processing and Disposal Methods:** Processing Techniques and Methods of Disposal, Sanitary land filling, Composting and Incineration, Bioremediation. | **7** |
| **V** | **Recovery of Resources, Conversion, Products and Energy:** Material Recovery, Energy Generation and Recovery Operation, Reuse in other industry  **Industrial Solid Waste:** Nature, Treatment and Disposal Methods | **7** |
|  | **Total** | **36** |

**Reference Books:**

1. Solid waste management - Sanjeev Sipani
2. Solid Waste Management: Principles and Practice-By Ramesha Chandrappa, Diganta Bhusan Das
3. Sustainable Solid Waste Management- Jonathan W. C. Wong, Rao Y. Surampalli,
4. Solid and Hazardous Waste Management: Science and Engineering- By M.N. Rao, Razia Sultana, Sri Harsha Kota

**CE 252 MATERIAL TESTING LAB C(L,T,P)=2(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Tensile Strength Test – Mild Steel and HYSD bar |  |
| **2** | Compressive Strength Test – Mild Steel and Cast Iron |  |
| **3** | Compressive Strength Test – Cement Cubes and Concrete Cubes |  |
| **4** | Compressive Strength Test – Bricks |  |
| **5** | Compressive Strength Test – Wooden Blocks |  |
| **6** | Hardness Test – Rockwell Hardness and Brinell Hardness |  |
| **7** | Impact Test – Izod and Charpy |  |
| **8** | Modulus of Rupture of Wooden Beam |  |
| **9** | Fatigue Test |  |
| **10** | Spring Test |  |
| **11** | Torsion Test |  |

**CE 254 HYDRAULICS & HYDRAULICS MACHINE LAB C(L,T,P)=1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | To determine the minor losses. |  |
| **2** | To determine the friction factor. |  |
| **3** | To determine Cd of Broad crested wier. |  |
| **4** | To verify the momentum equation. |  |
| **5** | To determine the discharge of venturimeter. |  |
| **6** | To determine Manning’s & Chezy's coefficient of roughness for the bed of a given flume. |  |
| **7** | To plot characteristics curve of hydraulic jump. |  |
| **8** | To plot characteristics curve of Pelton Wheel. |  |
| **9** | To plot characteristics curve of Centrifugal Pump. |  |

**CE 256 COMPUTER AIDED DESIGN LAB C (L,T,P) = 1 ( 0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| 1 | Conventional signs |  |
| 2 | Plan, Section and Elevation of a single storied residential building -2No |  |
|  | (Using CAD softwares) |  |
| 3 | Learning Basic commands of CAD software |  |
| 4 | Drawing conventional signs |  |
| 5 | Drawing basic building components like door, windows, foundations, Pitched roof like king post truss – 4No |  |
| 6 | Using Blocks and W blocking |  |
| 7 | Using layers in drawing |  |
| 8 | Drawing Plan of a single storied residential building -2No |  |
| 9 | Drawing Plan of a Two storied residential building using layers |  |
| 10 | Generating Plan, section and Elevation of a single storied residential building |  |
| 11 | Generating Plan, section and Elevation of a Two storied residential building |  |

**CE 258 SURVEY LAB II C(L,T,P)=2(0,0,3)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | To measure the horizontal and vertical angles by Theodolite. |  |
| **2** | To determine the Height of an object by trigonometrical leveling (single plane method). |  |
| **3** | To determine the Height of an object by trigonometrical leveling (two plane method). |  |
| **4** | To shift the R.L. of known point by double leveling. |  |
| **5** | To measure and adjust the angles of a braced quadrilateral. |  |
| **6** | To prepare a contour map by indirect contouring. |  |
| **7** | To prepare the map of given area by Auto Level |  |
| **8** | To determine the Azimuth of a given line by ex‐meridian observations of Sun. |  |
| **9** | Survey Camp |  |

**CE 260 ENG. MATERIAL & GEOLOGY LAB C(L,T,P)=1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
|  | **Part I** |  |
| **1** | Identification of Materials by Visual Inspection |  |
| **2** | To Study the Procedure for Testing of Portland Cement (IS: 269-1967) |  |
| **3** | To Study the Utilization of Fly Ash |  |
| **4** | To Study the Procedure for Testing of Stone |  |
| **5** | To Study the Fiber Reinforced Concrete |  |
| **6** | To Study the Properties and Use Of Different Glasses |  |
| **7** | To Study the Different Aluminum and Steel Sections |  |
| **8** | To Study the Manufacture and Use of Concrete Hollow Blocks |  |
| **9** | To Determine Compressive and Tensile Strength of Timber Parallel and Perpendicular To Grain |  |
| **10** | To Study the Properties and Uses of Kota Stone |  |
| **11** | To Find out the Water Absorption and Tolerance Limit of Bricks |  |
|  | **Part II** |  |
| **1** | Physical Properties of Minerals |  |
| **2** | Physical Properties of Rocks |  |
| **3** | Identification of Minerals in Hand Specimen |  |
| **4** | Identification of Rocks in Hand Specimen |  |
| **5** | Identification of Geological features through wooden Models |  |
| **6** | Structural Geological Diagrams |  |
| **7** | Petrological Diagrams |  |
| **8** | Engineering Geological Diagrams |  |
| **9** | Interpretation of Geological Map (10 Nos.) |  |
| **10** | Dip & Strike Problems (8 Nos.) |  |

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| **SURESH GYAN VIHAR UNIVERSITY.** |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **III YEAR V SEM** |
|  |
| |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **S.No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **(Hours)** | **Weightage(%)** | | | **CE** | **ESE** | | L | T | P | |  |  | **A: Theory Papers** |  |  |  |  |  |  |  | | 1 | CE 301 | Theory of Structures – I | 4 | 3 | 1 |  | 3 | 30 | 70 | | 2 | CE 303 | Concrete Structures-I | 3 | 3 |  |  | 3 | 30 | 70 | | 3 | CE 305 | Steel Structures-I | 3 | 3 |  |  | 3 | 30 | 70 | | 4 | CE 307 | Building information Modeling(BIM) | 3 | 3 |  |  | 3 | 30 | 70 | | 5 | CE 309 | Quantity Surveying & Valuation | 3 | 3 |  |  | 3 | 30 | 70 | | 6 |  | **Elective** | 3 | 3 |  |  | 3 | 30 | 70 | | 6.1 | CE 311 | Repair And Rehabilitation of Structures |  |  |  |  |  |  |  | | 6.2 | CE 313 | Remote Sensing and GIS |  |  |  |  |  |  |  | | 6.3 | CE 315 | Theory of Pre-stressed |  |  |  |  |  |  |  | |  |  | **B. Practicals And Sessionals** |  |  |  |  |  |  |  | | 7 | CE 351 | Design of Steel Structures I | 2 |  |  | 3 | 3 | 60 | 40 | | 8 | CE 353 | Structural Engineering Lab | 1 |  |  | 2 | 3 | 60 | 40 | | 9 | CE 355 | Design of Concrete Structures I | 2 |  |  | 3 | 3 | 60 | 40 | | 10 | CE 357 | STAAD Pro. | 1 |  |  | 2 | 3 | 60 | 40 | | 11 | CE 359 | BIM lab (elective industry sponsored) | 1 |  |  | 2 | 3 | 60 | 40 | |  |  | **C. Discipline & co curricular activities** |  |  |  |  |  |  |  | | 12 | DE 301 | Discipline & co curricular activities | 2 |  |  |  |  | 100 |  | |  |  | Total | 27 | 18 | 1 | 12 |  |  |  | |  |  | Grand total |  | 31 |  |  |  |  |  | |

**CE 301 THEORY OF STRUCTURES –I C (L,T,P)= 4 (3,1,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), releases in structures Maxwell’s reciprocal theorem and Bettiʹs theorem. Analysis of Indeterminate Structures using Moment Area method. | 8 |
| **II** | Analysis of Statically Indeterminate Structures using Slope‐deflection method and Moment‐distribution methods | **7** |
| **III** | Column Analogy method for indeterminate structures, determination of carry over factor for non‐prismatic section. Conjugate beam method for analysis of indeterminate structures | 7 |
| **IV** | Energy methods and related theorems, solution of determinate & indeterminate structures using energy methods (i.e. determination of deflection and forces in structures) | 7 |
| **V** | Approximate methods for lateral loads: Analysis of multistory frames by portal method, cantilever method & factor method. Analysis of determinate space trusses by tension coefficient method. | 7 |

**Reference Books:**

1. Strength of Material & Theory of Structures. Vol – I & II - B.C. Punmia

2. Mechanics of Structure - S.B. Junarkar.

3. Strength of Material - S. Ramamurtham

4. Strength of Material & Theory of Structures. Vol – I & II - R.S. Khurmi

**CE 303 CONCRETE STRUCTURES – I C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Design Philosophies: Working stress, ultimate strength and limit states of design. Introduction to working stress method. Analysis and Design of prismatic Sections in flexure using limit state methods: singly and doubly reinforced prismatic sections and lintels | 8 |
| **II** | Design of one way slabs. Shear and Bond: Behavior of beams in shear and bond, design for shear, anchorage, curtailment and splicing of reinforcement, detailing of reinforcement. serviceability Conditions: Limit states of deflection and cracking, calculation of deflections & crack width as per codal provisions | 8 |
| **III** | Design of two way slabs and flat slabs by direct design method. | 7 |
| **IV** | Design of Columns: Short and long rectangular and circular columns, eccentrically loaded columns. | 7 |
| **V** | Design of Column Footings: Isolated and combined column footings and circular raft foundations | 7 |

**Reference Books:**

1. Design of R.C.C. Structures B.C. Punmia

2. Design of R.C.C. Structures H.J. Shah

3. Design of R.C.C. Structures A.K. Jain

**CE 305 STEEL STRUCTURES – I C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Introduction:** Types of steels and their permissible stresses  **Connections:** Design of riveted, bolted and welded connections under axial and eccentric loadings | 7 |
| **II** | **Compression Member**: Design of compression member; Axially and eccentrically loaded compression members, built up columns, design of lacings and battens. | 7 |
| **III** | **Beams**: Design of beams; simple and compound sections, main and subsidiary beams and their connections, grillage foundation | 7 |
| **IV** | **Tension Members**: Design of axially and eccentrically loaded tension members.  **Column Bases**: Design of column bases, Slab base, gusseted base. | **7** |
| **V** | Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor, design of simply supported beams, fixed beams, continuous beams and single span rectangular  Frames | 8 |

**REFERECE BOOKS:**

1. Limit state Design of Steel Structure Dr.V.L. Shah & Prof. Veena Gore

2. Limit state Design of Steel Structure Subramanian

**CE 307 BUILDING INFORMATION MODELING (BIM) C(L,T,P)=4(3,1,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **CONTENTS** | **Total Contact Hrs.** |
| **I** | **Introduction to BIM:** Definition of BIM, its need and evolution with modern technique, Basic components of BIM, 3D modeling, materials, costing, time management and project scheduling. | 8 |
| **II** | **Model-based Cost Estimating**: making data base model for materials and costing with various specifications. Importing/ linking the estimation to the 3D Model. | 8 |
| **III** | **Construction Scheduling and 4D Simulation:** planning and scheduling various stages for any construction project. linking the scheduling to the real time progress and linking the scheduling to the 3D model | 8 |
| **IV** | **Design Coordination:** setting up the information data base model form IS code to simplify the design and 3D model design verification and | 7 |
| **V** | **Viewing of the Building Model:** Managing Views, Controlling Object Visibility, Working with Section and Elevation Views , Creating and Modifying 3D Views, Using Dimensions and Constraints, Working with Dimensions, Applying and Removing Constraints | 7 |

**Reference Books:**

1. BIM Handbook: A Guide to Building Information Modeling
2. Building Information Modeling– Willem Kymmell

**CE 309 QUANTITY SURVEYING & VALUATION C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **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. Types of estimate, plinth area rate, cubical content ate, preliminary, original, revised and supplementary estimates for different projects. | 7 |
| **II** | **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.) | 7 |
| **III** | **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. | 7 |
| **IV** | **Cost of Works:** Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. | 7 |
| **V** | **Valuation:** Purposes, depreciation, sinking fund, scrap value, year’s purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings**.** | 7 |

**Reference Books:**

1. Estimating & Costing - Chakerborty
2. Estimating & Costing - Vazirani&Chandola
3. Civil Engg. Estimating & Costing – Mahajan
4. Civil Engg. Estimating & Costing G.S. Birdie

**CE 311 REPAIR AND REHABILITATION OF STRUCTURES C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | **Deterioration of concrete in structures:** physical processes of deterioration like F & T abrasion, erosion, pitting, chemical processes like carbonation, chloride ingress, corrosion, alkali aggregate reaction, sulphate attack; their causes, mechanism, effect, preventive measures. **Cracks:** Cracks in concrete, type, pattern, quantification, measurement & preventive measures etc. | 8 |
| **II** | **N.D.T.:** Non destructive test methods for concrete including rebound hammer, ultrasonic pulse velocity, rebar locator, corrosion meter, penetration resistance and pull out test, core cutting etc. **Corrosion:** Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data | 7 |
| **III** | **Materials for repair**: polymers and resins, self curing compound, FRP, Ferro cement etc; properties, selection criterion, bonding aspect | 7 |
| **IV** | **Repair Techniques**: grouting, jacketing, shotcrete, externally bonded plates and under water repair; materials, equipments, precautions process etc | 7 |
| **V** | **Investigation for structures**: Distress, observation and preliminary test methods. **Case studies:** related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion damaged structures | 7 |
|  | **Total** | **36** |

**Reference books-:**

1. RRS :- V. M. Malhotra

**CE 313 REMOTE SENSING & GIS C(L,T,P) = 3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Deterioration of concrete in structures:** physical processes of deterioration like F & T abrasion, erosion, pitting, chemical processes like carbonation, chloride ingress, corrosion, alkali aggregate reaction, sulphate attack; their causes, mechanism, effect, preventive measures.  **Cracks:** Cracks in concrete, type, pattern, quantification, measurement & preventive measures etc. | 8 |
| **II** | **N.D.T.:** Non destructive test methods for concrete including rebound hammer, ultrasonic pulse velocity, rebar locator, corrosion meter, penetration resistance and pull out test, core cutting etc.  **Corrosion:** Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data. | 7 |
| **III** | **Materials for repair**: polymers and resins, self curing compound, FRP, Ferro cement etc; properties, selection criterion, bonding aspect. | 7 |
| **IV** | . **Repair Techniques**: grouting, jacketing, concrete, externally bonded plates and under water repair; materials, equipments, precautions process etc. | 7 |
| **V** | . **Investigation for structures**: Distress, observation and preliminary test methods.  **Case studies:** related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion damaged structures. | 7 |

**REFERENCE BOOK:-**

1. Remote sensing & GIS :- [Kali CharanSahu](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Kali+Charan+Sahu%22)

**CE 315 THEORY OF PRE STRESSED ` C(L,T,P)=3(3,0,0)**

|  |  |  |
| --- | --- | --- |
|  | **Course Contents** | **Total Contact Hrs.** |
| I | **Introduction:** Systems of pre‐stressing in detail, pre‐stressing techniques, transfer of  pre‐stress, types of commercially available jacks, computation of losses of pre‐stress.  **Anchorage Zone:** end block stresses, design | 6 |
| **II** | **Cable profiles:** Concordant and non‐concordant cable profile and associated factors in  continuous members. Modern cable laying: materials & practices, precautions etc.  Computation of deflection in pre‐stressed concrete members. | 6 |
| **III** | **Design of Pre‐stressed Concrete Sections:** Flexural, shear and torsion resistance of  members, preliminary and final design of sections, design of pre and post tensioned  flexural members; simply supported and continuous members. | 7 |
| **IV** | **Pre‐stressed Slab:** Design of slabs, tendon layout, precast slab, production and their  applications.  **Partial Prestressing:** Principles and advantages, methods, practices and design | 10 |
| **V** | Design of circular pipes and circular water retaining structures etc.  Case study of one bridge girder with design and constructional features | 8 |

**Reference Books:-**

1. Theory of Pre-stress:-RAMAMURTHAM

**CE 351 DESIGN OF STEEL STRUCTURES I C (L,T,P) =2(0,0,3)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Design as per syllabus of theory. |  |

**CE 353 STRUCTURAL ENGINEERING LAB C (L,T,P) = 1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Deflection of a truss |  |
| **2** | Clark‐Maxwell reciprocal theorem with truss |  |
| **3** | Funicular polygon for flexible cable |  |
| **4** | Analysis of redundant frame |  |
| **5** | Deflection of curved members |  |
| **6** | Buckling of columns |  |
| **7** | Clark‐Maxwell reciprocal theorem with simply supported beam |  |
| **8** | ILD for deflection in a steel beam using unit load method |  |
| **9** | ILD for support reaction using Muller‐Breslau Principle |  |
| **10** | Unsymmetrical bending |  |

**CE 353 DESIGN OF CONCRETE STRUCTURES I C(L,T,P) =2(0,0,3)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |

|  |
| --- |
| **SURESH GYAN VIHAR UNIVERSITY** |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **III YEAR VI SEM** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **Hours** | **Weightage(%)** | |
| **CE** | **CE** |
| **L** | **T** | **P** |
| **A: Theory Papers** | | | | | | | | | |
| 1 | CE 302 | Theory of Structures – II | 4 | 3 | 1 | - | 3 | 30 | 70 |
| 2 | CE 304 | Concrete Structures-II | 3 | 3 | - | - | 3 | 30 | 70 |
| 3 | CE 306 | Steel Structures-II | 3 | 3 | - | - | 3 | 30 | 70 |
| 4 | CE 308 | Environmental Engineering– I | 3 | 3 | - | - | 3 | 30 | 70 |
| 5 | CE 310 | Transportation Engineering-I | 3 | 3 | - | - | 3 | 30 | 70 |
|  |  | **Elective – IV** | 3 | 3 | - | - | 3 | 30 | 70 |
| 6.1 | CE 312 | Modern concrete technology and practice |  |  |  |  |  |  |  |
| 6.2 | CE 314 | Construction Equipments and Material Management |  |  |  |  |  |  |  |
| 6.3 | CE 316 | Solid Waste Management |  |  |  |  |  |  |  |
| 6.4 | CE318 | High Rise Bulding |  |  |  |  |  |  |  |
| **B. Practicals And Sessionals** | | | | | | | | | |
| 7 | CE 352 | Matrix Methods of Structural Analysis (industry collaboration) | 1 | - | - | 2 | 3 | 60 | 40 |
| 8 | CE 354 | Design of Concrete Structures II | 1 | - | - | 2 | 3 | 60 | 40 |
| 9 | CE 356 | Design of Steel Structures II | 1 | - | - | 2 | 3 | 60 | 40 |
| 10 | CE 358 | Environmental Engg. Design & Lab. I | 1 | - | - | 2 | 3 | 60 | 40 |
| 11 | CE 360 | Road Materials Testing Lab. | 1 | - | - | 2 | 3 | 60 | 40 |
| 12 | CE 362 | **PROJECT STAGE 1** | 2 |  |  | 3 |  | 60 | 40 |
| **C. Discipline & Co- curricular activities** | | | | | | | | | |
| 13 | DE 302 | Discipline & Co- Curricular Activities | 2 | - | - | - | - | 100 | - |
|  |  | **Total** | **28** | **18** | **1** | **13** |  |  |  |
|  |  | **Grand total** |  | **32** |  |  |  |  |  |

**CE 302 THEORY OF STRUCTURES – II C (L,T,P) = 4 (3,1,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Influence line diagram & Rolling load:** ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure | 7 |
| **II** | **Arches**: analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels | **7** |
| **III** | **Cable and Suspension bridges**: Analysis of cables with concentrated and continuous loading, analysis of two & three hinged stiffening girder. | **7** |
| **IV** | **Kani’s Method**: Analysis of beams and frames with & without sway by Kani’s method | **7** |
| **V** | **Unsymmetrical bending**: Definition, location of NA, computation of stresses and deflection, shear center and its location. **Composite Sections:** Flexural analysis of composite sections. | **7** |
|  | **Total** | **35** |

**Reference Books:**

1. Strength of Material & Theory of Structures. Vol – I & II - B.C. Punmia

2. Mechanics of Structure - S.B. Junarkar.

3. Strength of Material - S. Ramamurtham

4. Strength of Material & Theory of Structures. Vol – I & II - R.S. Khurmi

**CE 304 CONCRETE STRUCTURES-II C (L,T,P) = 3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Elements of Pre-stressed Concrete:** Principles and systems, material properties, losses of pre-stress, I.S. specifications, analysis and design of sections for flexure and shear, Introduction to continuous beams. | **7** |
| **II** | **Torsion:** Design of beams for torsion.  **Continuous and Curved Beams:** Design of continuous R.C. beams, moment redistribution, beams curved in plan | **7** |
| **III** | **Circular Domes:** Circular domes with u.d.l. & concentrated load at crown. **Yield Line Theory:** Application of Y.L.T. to slabs with simple support conditions. | **7** |
| **IV** | **Water Tanks and Towers:** Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging. | **7** |
| **V** | **Culverts and Bridges:** Design of slab culverts for I.R.C. loading. Cantilever Retaining Walls: Design of cantilever type retaining walls & introduction and stability analysis of counter-fort and buttress type retaining walls | **7** |
|  | **Total** | **35** |

**Reference Books:**

1. Design of R.C.C. Structures B.C. Punmia

2. Design of R.C.C. Structures H.J. Shah

3. Design of R.C.C. Structures A.K. Jain

4. Design of R.C.C. Structures N. Krishna Raju

**CE 306 STEEL STRUCTURES–II C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | Design of gantry girder, Design of roof trusses | **7** |
| **II** | **Design of plate girder**: design of section, connections for flange plate to flange angles & flange angles to web, web and flange splicing. Vertical, Horizontal, Intermediate and Bearing stiffeners. Curtailment of plates. | **7** |
| **III** | **Bridges**: Standard loading for railway bridges, design of Deck type plate-girder bridges, design of bracings and frames. Application of ILD to the design of bridges, design of through type truss bridges, design of members and joints, design of stringers, cross girder, lateral, sway and portal bracings | 8 |
| **IV** | Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging. | **7** |
|  | **Total** | **29** |

**REFERECE BOOKS:**

1. Limit state Design of Steel Structure Dr.V.L. Shah & Prof. Veena Gore

2. Limit state Design of Steel Structure Subramanian

**CE 308 ENVIRONMENTAL ENGINEERING-I C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **General:** Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview. **Water Demand:** Design flow, design periods, design population, factors affecting water  consumption, variation in water demand, design capacities for various water supply components. | 7 |
| **II** | **Source of water and collection works:** Alternative sources i.e. rain, surface and ground water, Assessment of yield and development of the source. **Quality of water:** The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards | 7 |
| **III** | **Transmission of water:** 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, | 7 |
| **IV** | **Advanced Treatment of Water:** filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles. | 7 |
| **V** | **Distribution of water:** 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. **Plumbing of Building for water supply:** Service connections, fixture units, simultaneous flow, design of plumbing system. | 7 |
|  | **Total** | **35** |

**Reference Books:**

1. Environmental engineering I – Sanjeevsipani (Jain publications)
2. Environmental engineering & management – Dr. Suresh k. Dhameja

**CE 310 TRANSPORTATION ENGINEERING–I C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **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. **Highway Planing**: 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. | 8 |
| **II** | **Highway Materials and Construction**: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash. Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM roads, fly ash embankments, Bituminous roads and Concrete roads. Specific features of rural roads | 7 |
| **III** | **Highway Geometric Design**: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, transition curves. Design of Vertical Alignment – Gradients, Vertical curves. | 7 |
| **IV** | **Elementary Traffic Engineering**: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident’s Study. Importance and types of Traffic Signs, Signals, Road Markings and Road Intersections. | 7 |
| **V** | **Structural design of Highway Pavements**: Design of Flexible Pavements by G. I. and CBR methods. Design of Rigid Pavements by Westergard 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. | **7** |
|  | **Total** | **36** |

**Reference Books:**

1. Transportation engineering -S.P. Chandola
2. Transportation engineering- Sanjeevsipani, Rajeev sipani

**CE 312 MODERN CONCRETE TECHNOLOGY AND PRACTICE C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Total Contact Hrs.** |
| **I** | **Strength of Concrete:** Strength‐ porosity relationship, factors affecting compressivestrength, behaviour of concrete under uniaxial, biaxial and triaxial stress states, SplitTensile strength and modulus of rupture ‐test methods and empirical formulae for theirestimation. Mineral and Chemical admixtures in Concrete: types and their uses. | 7 |
| **II** | **Concrete Production:** Vibrator compacted concrete in buildings, pavements andinfrastructure projects etc., pumpable concrete, roller compacted concrete and ReadyMixed Concrete‐ methods, specific features and uses etc.  **Rheology of Concrete**: Flow ability, Segregation, Bleeding and Viscosity etc. ‐ Factors affecting, methods of determination, related standards etc. | 7 |
| **III** | **Elasticity, Creep and Shrinkage of Concrete:** Elastic behaviour, Method of determination of Elastic modulus, factors affecting modulus of elasticity, early volume change in concrete due to plastic shrinkage, autogeneous shrinkage and drying shrinkage‐ factors affecting them, typical values and their methods of determination.  Creep of concrete‐ specific creep, typical values, creep recovery, factors affecting creep and its determination with available standard. | 8 |
| **IV** | **Microstructure of Concrete:** Interfacial transition zone, hydration kinetics, hydrated cement paste (hcp), calcium hydroxide, presence of micro‐cracks in concrete mass ‐ their characteristics and significance on performance of concrete  **Penetrability of Concrete**: Permeability, sorptivity and diffusion in concrete‐ test methods and significance.  **Durability of Concrete**: Physical and chemical processes, recently employed methods of tests for ensuring longer and durable concrete structures‐ case studies. | 7 |
| **V** | **Special Aggregates:** Light weight, heavy weight‐ their characteristics and uses in concrete.Specific purpose Concretes and Cement based composites: Self Compacting Concrete,Fiber cements and fiber reinforced cement based composites, Mass Concrete andPolymer Concrete etc.‐ materials, production and application areas.  **High performance concrete**‐ performance characteristics in fresh and hardened states, production precautions ‐ some case studies of specific tailored HPC in India | 7 |

**Reference Books**

1.MCTP:- P. KUMAR MEHTA

**CE 314 CONSTRUCTION EQUIPMENTS & MATERIAL MANAGEMENT C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours.** |
| **I** | **Advance Construction Equipments**  Different types of construction equipments viz. Earth moving equipments& their outputs, Dewatering equipments, Pumping equipments, Grouting equipments, Pile Driving equipments, Compaction equipments, Concreting equipments. | 7 |
| **II** | **Equipment Management**  Planning of construction equipments, Forecasting equipment requirement, Operation & Utilization, Equipment replacement, Manpower planning & Maintenance of equipments | 7 |
| **III** | **Economics of Construction Equipments**  Operation Cost & Its types. Investment Cost, Cost of Repairs, Overheads Cost accounting, Break-even point theory, Replacement of equipment | 7 |
| **IV** | **Materials Management**  Scope, objectives & importance of materials management, Selective control techniques, Disposal of surplus material. | 7 |
| **V** | **Inventory Control & Spare Part Management**  Need, function, steps in inventory control. Advantages, Economic order quantity, Inspection & procurement of spares, stores & stock management | 7 |

**Reference Books:-**

1. Construction Materials Management - George Stukhart
2. Construction Equipment Management for Engineers, Estimators, and Owners- By Douglas D. Gransberg, Calin M. Popescu, Richard Ryan
3. Construction Project Management: - By S. Keoki Sears, Glenn A. Sears, Richard H. Clough

**CE 316 SOLID WASTE MANAGEMENT C(L,T,P)=3 (3,0,0)**

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| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | **General:** Problems associated with Solid Waste Disposal.  **Generation of Solid Waste:** Goals and objectives of solid waste management, Classification of Solid Waste. Solid Waste Generation, Factors Influencing Generation of Solid Waste, Characteristics of Solid Waste, Analysis of Solid Waste. | 8 |
| **II** | **Onsite Handling, Storage and Processing:** Public Health and Aesthetics, Onsite Handling, Onsite, Storage, Dust bins, Community Containers, Container Locations, On-site Processing Methods | **7** |
| **III** | **Solid Waste Collections, Transfer and Transport:** Collection Systems, Equipment and Labor requirement, Collection Routes, Options for Transfer and Transport Systems | **7** |
| **IV** | **Processing and Disposal Methods:** Processing Techniques and Methods of Disposal, Sanitary land filling, Composting and Incineration, Bioremediation. | **7** |
| **V** | **Recovery of Resources, Conversion, Products and Energy:** Material Recovery, Energy Generation and Recovery Operation, Reuse in other industry  **Industrial Solid Waste:** Nature, Treatment and Disposal Methods | **7** |
|  | **Total** | **36** |

**Reference Books:**

1. Solid waste management - Sanjeev Sipani
2. Solid Waste Management: Principles and Practice-By Ramesha Chandrappa, Diganta Bhusan Das
3. Sustainable Solid Waste Management- Jonathan W. C. Wong, Rao Y. Surampalli,
4. Solid and Hazardous Waste Management: Science and Engineering- By M.N. Rao, Razia Sultana, Sri Harsha Kota

**CE318 HIGH RISE BUILDINGS C(L,T,P)=2(2,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENT** | **Total Contact Hours** |
| I | **Design Criteria**: Design philosophy, Basic design considerations, static and dynamic approach, Loading and Vibrations, Structural systems for high rise buildings, Trussed tube & X bracing, Bundled tube Structural systems and concepts, Effect of openings, Large panel construction, and Foundation superstructure interaction.  **Gravity and lateral load resisting Structural Systems**: High rise behavior, Rigid frames, braced frames, in filled frames, shear walls, coupled shear walls, wall frames, tubular cores, Steel Concrete Composite Floor Systems, Aluminum Facades. | 8 |
| II | **Analysis and Design**: Modeling for approximate analysis, accurate analysis, subsystem interaction, differential movement, creep and shrinkage effects, temperature effects and fire.  **Evolution**: Evolution of Sky scrapers, Economic rationale, Environmental Impact, Services in Skyscrapers, Fire safety in Skyscrapers. | 7 |
| III | **Stability of tall Buildings**: Overall buckling analysis of frames, wall frames, approximate methods, second order effects of gravity loading and simultaneous first order analysis. Translational & Torsional instability.  **Foundations**: Design pile foundations. | 7 |
| IV | **Intelligent building automation**: Concepts, building automation system, Integration with building structures management system (fire, security, maintenance, energy). Characteristics and limitations of automation systems in buildings, Operation and maintenance of each system, installation and administration of structured cabling system, Structural design with flexibility, External skin systems, Intelligent flooring, Raised floor system. | 8 |
| V | **Telecommunication network management**: Various telecommunication systems, major trends, integrated voice/data telecommunications.  **Building wiring**: Transmission media, Distribution system, Electrical wiring management systems. | 7 |

**References:-**

1. “Structural Analysis and Design of Tall Buildings” - Taranath B.S, ( McGraw Hill, New York)
2. “Designing and installation of services in building complexes and high rise buildings” - Jain,V.K. (Khanna Publishers, New Delhi.)
3. “High rise structures ;design and constructions practices for middle level cities” - Gupta,Y.P. (New Age International Publishers, new Delhi)
4. “Tall building structures Analysis and Design” - Bryan Stafford Smith & Alexcoull (John Wiley)
5. “Control optimization and smart structures : high performance bridges and buildings of the future” -Hojjat Adeli and Amgad Saleh (John Wiley, New York.)

“Intelligent infrastructure: neural networks, wavelets and chaos theory for intelligent transportation systems and smart structures” -Hojjat Adeli and

**CE 352 MATRIX METHOD STRUCTURAL ANALYSIS C (L,T,P) = 1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Design as per syllabus of theory |  |

**CE 354 DESIGN OF CONCRETE STRUCTURES II C (L,T,P) = 1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Design as per syllabus of theory. |  |

**CE 356 DESIGN OF STEEL STRUCTURES II C (L,T,P) = 2 (0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Design as per syllabus of theory |  |

**CE 358 ENVIRONMENTAL ENGINEERING DESIGN & Lab. I C(L,T,P) = 1(0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **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 |  |

**CE 360 ROAD MATERIAL TESTING LAB C(L,T,P) =1 (0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Aggregate impact test |  |
| **2** | Angularity number test |  |
| **3** | To determine fineness modulus of a given sample of coarse aggregate. |  |
| **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** | determine the flakiness index of given sample of aggregate |  |
| **10** | Ductility test |  |
| **11** | To determine the softening point for give sample of bitumen |  |
| **12** | Marshell stability test |  |
| **13** | Float test |  |

**CE 362 Project Stage -I C(L,T,P) =2 (0,0,3)**

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| **SURESH GYAN VIHAR UNIVERSITY**  **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **IV YEAR VII SEM** | | | | | | | | | |
| **S.No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **Hours** | **Weightage (%)** | | |
| **CE** | **ESE** | |
| **L** | **T** | **P** |
|  |  | **A: Theory Papers** |  |  |  |  |  |  |  | |
| 1 | CE 401 | Geotechnical Engineering – I | 3 | 3 | - | - | 3 | 30 | 70 | |
| 2 | CE 403 | Water Resources Engineering –I | 3 | 3 | - | - | 3 | 30 | 70 | |
| 3 | CE 405 | Environmental Engineering– II | 3 | 3 | - | - | 3 | 30 | 70 | |
| 4 | CE 407 | Building Design | 3 | 3 | - | - | 3 | 30 | 70 | |
| 5 | CE 409 | Transportation Engineering – II | 4 | 3 | 1 | - | 3 | 30 | 70 | |
| 6 |  | **Elective – IV** | 3 | 3 | - | - | 3 | 30 | 70 | |
| 6.1 | CE 411 | Earthquake Resistant building Design | - | - | - | - | - | - | - | |
| 6.2 | CE 413 | Ground Improvement Techniques | - | - | - | - | - | - | - | |
| 6.3 | CE 415 | Smart cities and Automation | - | - | - | - | - | - | - | |
|  |  | **B. Practicals And Sessionals** |  |  |  |  |  |  |  | |
| 7 | CE 451 | Geotechnical Engg. Design & Lab.-I | 1 | - | - | 2 | 3 | 60 | 40 | |
| 8 | CE 453 | Water Resources Engineering Design-I | 1 | - | - | 2 | 3 | 60 | 40 | |
| 9 | CE 455 | Environmental Engg. Design & Lab. II | 1 | - | - | 2 | 3 | 60 | 40 | |
| 10 | CE 457 | Industrial Training & Seminar | 2 | - | - | 3 | 3 | 60 | 40 | |
| 11 | CE 459 | Project-Stage I | 2 | - | - | 3 | 3 | 60 | 40 | |
| **12** | DE 401 | Discipline & Co- Curricular Activities | **2** | **-** | **-** | **-** |  |  |  | |
|  |  | **Total** | **28** | **18** | **1** | **12** |  |  |  | |
|  |  | **Grand total** |  | **31** |  |  |  |  |  | |

**CE 401 GEOTECHNICAL ENGINEERING -I C (L,T,P) = 3 (3,0,0)**

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| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | 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. 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 | 8 |
| **II** | Clay mineralogy: 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, Darcy’s law of permeability of soil and its determination in laboratory. Field pumping out tests, factors affecting permeability, permeability of stratified soil masses. | 7 |
| **III** | 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, phriatic line, Flow net through earth dam | 6 |
| **IV** | 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 | 7 |
| **V** | 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. Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen | 7 |
|  | **Total** | **35** |

**Reference Books:**

1. **Soil mechanics :-GopalRanjan**
2. **Geotechnical engineering -B.C.P.,- Arunkumarjain, Ashok kumarjain**

**CE 403 WATER RESOURCES ENGINEERING – I C (L,T,P) = 3 (3,0,0)**

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| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | 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 and water requirements, multiple cropping, hybrid crops, water harvesting and conservation | 8 |
| **II** | Canal Irrigation: Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, 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. Water Distribution System: Rotational delivery (Warabandi, JamaBandi, KhasraBandi, Sajra Sheets), continuous delivery and delivery on demand, Role of command area development authority, Functions and organizational structures | 9 |
| **III** | Distribution of Canal Water: 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 | 7 |
| **IV** | Water Logging: Causes, preventive and curative measures, drainage of irrigated lands, saline and alkaline lands, types of channels lining and design of lined channel. Well Irrigation: Open wells and tube wells, types of tube wells, duty of tube well water | 7 |
| **V** | 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 and its determination, Estimation of run off | 7 |
|  | **Total** | **38** |

**Reference Books:**

1. **Water resources engineering – Murty, challasatya**
2. **Water supply and sanitary installations – Panchdhari, A.c.**

**CE 405 ENVIRONMENTAL ENGINEERING-II C (L,T,P) = 3 (3,0,0)**

|  |  |  |
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| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | General: Terms: sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmental engineer, historical overview. Sewage Characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards | 8 |
| **II** | Collection of Sewage: 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, Hydraulic design of sewers: 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 | 8 |
| **III** | Sewage Treatment: 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 | 8 |
| **IV** | Wastewater Disposal and Reuse: Disposal of sewage by dilution, self-purification of streams, sewage disposal by irrigation sewage farming, waste waters reuse. Plumbing for Design of Buildings: Various systems of plumbing – one pipe, two pipes, single stack, traps, layout of house drainage | 7 |
| **V** | 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, green house effect, acid rain etc | 7 |
|  | **Total** | **38** |

**Reference Books:**

1.Environmental engineering I – Sanjeevsipani (Jain publications)

2.Environmental engineering & management – Dr. Suresh k. Dhameja

**CE 407 BUILDING DESIGN C(L,T,P )= 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Design Loads: Design loads for different types of buildings. (IS-875 part 1 & 2). Load distribution & concept of load flow to different structural components. Structural Systems: Assumption of integrity aspect ratios & over turning resistance, strength & stiffness of buildings, symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations. | 8 |
| **II** | Lateral loads: Wind loads & calculation of wind load on structures (IS: 875-Part 3) | 7 |
| **III** | Lateral loads: Earthquake loads & calculations of earthquake loads on buildings masonry & framed structures. (IS: 1893 – Part 1) | 7 |
| **IV** | Masonry and Framed Buildings: Design of masonry buildings and framed buildings, Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326, IS-13827, IS-13828, IS-13920, IS-13935 | 7 |
| **V** | Mass Housing: Prefabricated construction for mass housing. Special Roofs: Introduction to folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors. | 7 |
|  | **Total** | **36** |

**Reference Books:**

1. Building planning & design of RCC structure – Kumarjitsingha
2. Construction planning &management – Dhir, B.M.
3. Engg. Drawing + Auto CAD – Venugopal, K.

**CE 409 TRANSPORTATION ENGINEERING – II C (L,T,P) = 4 (3,1,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Introduction and Permanent Way Components: Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings. Study of Specific Aspects: Coning of Wheels, Creep, Wear, failures in Rails, Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Yards and Sidings, Turn-Table, Signaling | 8 |
| **II** | Points and Crossings: Types of Turnouts, Points or Switches, layout Plans of different types of Crossings, Design calculations of turnouts. Railway Systems Specific to Urban Movements: Surface railways (sub urban railway system of Mumbai, Chennai and Delhi), Underground system (Metro of Kolkata/ Delhi), Elevated Systems (as Proposed for Jaipur, Delhi, Mumbai), Light Rail System (MRTS, Thane). Recent Developments in Railway Networking | 8 |
| **III** | Geometric Design: Gradient and Grade Compensation, Super elevation and cant, cant deficiency, Types of Curves, Transition curves, their designs, Widening of Gauges | 7 |
| **IV** | Airport Engineering:-Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size, Obstructions, Zoning. Planning and Design of Airport: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway Length, Geometric Design of Runways, Layout of Taxiways, Geometric Standards, Exit or Turnaround Taxiways, Apron and Hangers | 7 |
| **V** | Airport Pavement Design: Factors Affecting Pavement Design, Design methods of Flexible Pavements, Design methods of Rigid Pavements | 7 |
|  | **Total** | **37** |

**Reference Books:**

1. **Transportation engineering -S.P. Chandola**
2. **Transportation engineering- Sanjeevsipani, Rajeev sipani**

**CE 411 EARTHQUAKE RESISTANT DESIGN & CONSTRUCTION C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Introductory Seismology: Various terminology related with earthquake, Causes of earthquake, plate tectonics, Tsunami. Seismic wave propagation. Magnitude, intensity & energy of earthquake, magnitude & intensity scales, classifications of earthquakes, Seismic zoning case histories of earthquakes. Seismic hazards, induced hazards. | 8 |
| **II** | Earthquake recording, Seismic instruments, Seismographs & Seismograms. Basic concept of liquefaction and isolation. Introduction to various IS related codes. Structural systems, Effects of earthquake on buildings in general, structural and nonstructural failures. Dynamic characteristics of buildings, natural period of vibration, damping, stiffness etc. Seismic performance of traditionally built masonry constructions, typical failure mechanism of masonry buildings under earthquakes | 8 |
| **III** | IS 4326: 1993: Planning consideration & architectural concept, provisions for earthquake resistant construction/ seismic strengthening of masonry constructions | 7 |
| **IV** | Seismic performance of reinforced concrete buildings. Plan, elevation & stiffness irregularities & their effects. Typical earthquake damages of RC constructions, short column effect, soft storey effect, strong column-weak beam analogy. IS 13920: 1993: Ductile detailing of reinforced concrete buildings and shear wall concept | 7 |
| **V** | Seismic design philosophy, IS 1893 (part I):2002 codal provisions : Load combinations, Design lateral loads, response reduction factors, structural modeling of building frames, equivalent load method for earthquake analysis of multistory frames | 7 |
|  | **Total** | **37** |

**Reference Books:**

1. **Earthquake Geography – Srivastava, H.N.**
2. **Earthquake Resistant Design of Structures by**[**Aggarwal P**](https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Aggarwal+P&search-alias=stripbooks)

**CE 413 GROUND IMPROVEMENT TECHNIQUE C (L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Introduction: Formation of soil, major soil types, collapsible soil, expansive soil, reclaimed soil, sanitary land fill, ground improvements; objective, potential. General principles of compaction: Mechanics, field procedure, quality control in field | 7 |
| **II** | Ground Improvement in Granular soil: In-place densification by (a) Vibro floatation (b) Compaction piles in sand(c) Vibro compaction piles (d)Dynamic compaction (e) Blasting | 7 |
| **III** | Ground improvement in cohesive soil: Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate of consolidation, Preloading methods. Types of drains, Design of vertical drains, Construction techniques. Stone column: Function, Design principles, load carrying capacity, construction techniques, settlement of stone column foundation. | 8 |
| **IV** | Ground Improvement by Grouting & Soil Reinforcement : Grouting in soil: Types of grout, desirable characteristics, Grouting pressure, Grouting methods. Soil Reinforcement – Mechanism, Types of reinforcing elements, Reinforcement- Soil interaction, Reinforcement of soil beneath roads, foundation | 8 |
| **V** | Soil Stabilization: Lime Stabilization – Base Exchange mechanism, Pozzolonic reaction, lime-soil interaction, lime columns, Design of foundation on lime column. Cement stabilization-Mechanism, amount, Age and curing. Fly ash-Lime stabilization Soil bitumen stabilization | 7 |
|  | **Total** | **37** |

**Reference books-:**[Dr. P. Purushothama Raj](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Dr.+P.+Purushothama+Raj%22)

**CE 415 SMART CITIES AND AUTOMATION C(L,T,P)=4(3,1,0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **CONTENTS** | **Total Contact Hrs.** |
| **I** | **Smart Cities and the Data Revolution: Past, Present and Future**: Historical relationship between urbanization and information technology,  contemporary urbanization,  rise of ubiquitous computing ,  the “smart cities” movement ,  key stakeholders ,  model “smart cities” in Korea and Abu Dhabi ,  big urban data , emerging conflicts and precedents in 20th urban policy, planning and design. | 8 |
| **II** | **Technology and Local Government:** Local government emergent role as master integrator of smart city solutions, Application areas for technology-enabled infrastructure, service delivery and governance solutions, Leading cities, Open government movement and open data, Long-range technology strategy and digital master planning. | 8 |
| **III** | **Urban Automation & Predictive Analytics:** Origins of cybernetics and computer simulation of cities and urban policy,  the rise and fall of big urban models,  evolution of GIS and planning support systems, decision-support systems,  predictive urban analytics and big urban data,  role of technology companies, think tanks, and universities as technical advisors to city governments ,  NYC MoDA ,  IBM’s Portland system dynamics model. | 8 |
| **IV** | **Urban Innovation: New Leadership Roles:** Driving forces behind city government digital services and infrastructure innovation,  new innovation leadership roles,  responsibilities and initiatives they have pursued ,  emerging networks for harvesting, standardizing and cross-fertilizing good ideas for intelligent city policy, planning and design , City Mart and Code for America, the linkage between economic development policy and urban planning and local technology innovation clusters. | 7 |
| **V** | **Intelligent Cities of the Future: Science and Design**  Smart cities as enablers of data-driven urban research, the new urban science, institutions and implications, social physics, past and present, critiques, citizen urban science movement, emerging models for collaborative university-government-citizen research, Patrick Geddes and the Garden City movement, civic principles for smart-city making, forecasting urban futures and future-proofing intelligent systems and policy. | 7 |

**Reference Books:**

1. Smart Cities: Foundations, Principles, and Applications By Houbing Song, Ravi Srinivasan, Tamim .
2. Smart Cities: Development and Governance Frameworks by Zaigham Mahmood

**CE 451 GEOTECHNICAL ENGG.DESIGN AND LAB I- C(L,T,P)= 1 (0,0,2)**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **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-Ø values by Direct Shear Test Apparatus |  |
| **12** | Determination of unconfined compressive strength by unconfined compression Test .Apparatus  Design as per syllabus of theory. |  |

**CE 453 WATER RESOURCES ENGINEERING DESIGN – I C (L,T,P)=1(0,0,2)**

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| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Design as per syllabus of theory. |  |

**CE 455 ENVIRONMENTAL ENGG. LAB.& DESIGN – II C(L,T,P)=1(0,0,2)**

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| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **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 |  |
| **10** | Design as per syllabus of theory |  |

**CE 457 Industrial Training & Seminar C (L,T,P) = 2(0,0,3)**

**CE 459 Project Stage-I C (L,T,P) = 2(0,0,3)**

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| --- |
| **SURESH GYAN VIHAR UNIVERSITY** |
| **Department Of Civil Engineering**  **Teaching and Examination Scheme for B.Tech Civil Engg.**  **Session 2018-2019**  **IV YEAR VIII SEM**   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **S.No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/ Wk.** | | | **Exam.**  **Hours** | **Weightage (%)** | | | **CE** | **ESE** | | **L** | **T** | **P** | |  |  | **A: Theory Papers** |  |  |  |  |  |  |  | | 1 | CE 402 | Geotechnical Engineering–II | 3 | 3 | - | - | 3 | 30 | 70 | | 2 | CE 404 | Water Resources Engineering-II | 3 | 3 | - | - | 3 | 30 | 70 | | 3 | CE 406 | Project Planning & Construction  Management | 3 | 3 | - | - | 3 | 30 | 70 | | 4 |  | **Elective – V** | 3 | 3 | - | - | 3 | 30 | 70 | | 4.1 | CE 408 | Bridge Engineering | - | - | - | - | - | - | - | | 4.2 | CE 410 | Advance Foundation Engineering | - | - | - | - | - | - | - | | 4.3 | CE 412 | Advanced Transportation Engg. | - | - | - | - | - | - | - | |  |  | **B. Practicals And Sessionals** |  |  |  |  |  |  |  | | 5 | CE 452 | Geotechnical Engg. Design & Lab.-II | 1 | - | - | 2 | 3 | 60 | 40 | | 6 | CE 454 | Water Resources Engineering Design-II | 1 | - | - | 2 | 3 | 60 | 40 | | 7 | CE 456 | Professional Practice and Estimating | 1 | - | - | 2 | 3 | 60 | 40 | | 8 | CE 458 | Design of Foundations | 1 | - | - | 2 | 3 | 60 | 40 | | 9 | CE 460 | Revit Architecture | 1 | - | - | 2 | 3 | 60 | 40 | | 10 | CE 462 | Seminar | 1 | - | - | 2 | 3 | 60 | 40 | | 11 | CE 464 | Project-Stage II | 2 | - | - | 3 | 3 | 60 | 40 | |  |  |  |  |  |  |  |  |  |  | |  |  | **Total** | **22** | **12** | **0** | **15** |  |  |  | |  |  | **Grand total** |  | **27** |  |  |  |  |  | |

**CE 402 GEOTECHNICAL ENGINEERING – II C (L,T,P) = 3 (3,0,0)**

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| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Stresses in Soil under surface loading: Bossinesq’s and Westergaard’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. Newmark’s chart, Fensk’s Chart. Pressure bulb and its significance in Foundation exploration. Contact pressure below foundations | 8 |
| **II** | Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Preconsolidation pressure and its determination. Normally, over and under consolidated soils. Methods of predicting Settlement and its rate. Total and differential Settlement. | 7 |
| **III** | Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability of finite slopes by Swedish and Friction circle method. Taylor’s stability number curves. Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction. Bishop’s method of stability analysis. Site Investigations: 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 | 8 |
| **IV** | Earth Pressure: Active, passive and earth pressure at rest. Rankine’s and Coulomb’s theories. 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. Stability analysis of retaining walls. Earth pressure on cantilever sheet piles, rigid bulk heads | 8 |
| **V** | Bearing Capacity of Soils: 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. | 8 |
|  | **Total** | **39** |

**Reference Books:**

1. **Soil mechanics :-GopalRanjan**
2. **Geotechnical engineering -B.C.P.,- Arunkumarjain, Ashok kumarjain**

**CE 404 WATER RESOURCES ENGINEERING II C (L,T,P) = 3 3,0,0)**

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| --- | --- | --- |
| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Regulation of works: Falls, Classification of falls, Design of falls, Distributory head regulator and cross-head regulator, Escape, bed bars. Cross-Drainage Structure: Necessity of Cross-drainage structures, their types and selection, comparative merits and demerits, design of various types of cross-drainage structure-aqueducts, syphon aqueduct, superpassage syphon, level crossing and other types | 8 |
| **II** | Diversion Head works: Design for surface and subsurface flows, Bligh’s and Khosla’s methods. Selection of site and layout, different parts of diversion headworks, types of weirs and barrages, design of weirs on permeable foundation, silt excluders and different types of silt ejectors. Energy dissipation. | 8 |
| **III** | Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flownet, slope stability analysis, precautions of piping, principles of design of earth dams. Gravity Dams: Force acting on a gravity dam, stability requirements, Instrumentation. | 7 |
| **IV** | Spillways: Spillway capacity, flood routing through spillways, different types of spillways and gates, energy dissipation below spillways. Hydro Power Plant: General features of hydroelectric schemes, elements of power house structure, selection of turbines, draft tube and setting of turbine, cavitations | 7 |
| **V** | Reservoirs: Evaluation of impact of water projects on river regimes and environment. Reservoir sedimentation and water shed management. Optimization: Introduction to optimization techniques and system approach. Introduction to G.I.S. and Computer aided irrigation design | 7 |
|  | **Total** | **37** |

**Reference Books:**

1. **Water resources engineering – Murty, challasatya**
2. **Water supply and sanitary installations – Panchdhari, A.c.**

**CE 406 PROJECT PLANNING & CONSTRUCTION MANAGEMENT C (L,T,P) = 3 (3,0,0)**

|  |  |  |
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| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING: Capital investment proposals, criterions to judge the worth whileness 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. | 8 |
| **II** | PROJECT SCHEDULING: Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis | 7 |
| **III** | 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 | 8 |
| **IV** | 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 | 7 |
| **V** | 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. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects | 8 |
|  | **Total** | **38** |

**Reference book :- Dr. sanjeevsipani**

**CE 408 BRIDGE ENGINEERING C (L,T,P ) = 3 (3,0,0)**

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| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | 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 | 7 |
| **II** | Reinforced concrete culverts & bridges: Reinforced concrete slab culvert, T-beam bridges-courbons& Hendry-Jaegar methods. Design of balanced cantilever bridge | 7 |
| **III** | Prestressed Concrete bridges: Prestressed& Post stressed concrete bridges Design of deck slab & girder sections | 7 |
| **IV** | Bearings: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II) | 7 |
| **V** | Joints: Expansion joints | 7 |
|  | **Total** | **35** |

**Reference Books:**

**1. Bridge Engg. S.P. Bindra**

**2. Railway Bridges and Tunnels Vazirani and Chandola**

**3. Railway Bridges and Tunnels G.C. Singh**

**CE 410 ADVANCED FOUNDATION ENGINEERING C (L,T,P) = 3 (3,0,0 )**

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| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | 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, Meyerhof’s analysis, Bearing capacity of stratified soils, Methods of estimation of settlement of footings | 6 |
| **II** | 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 | 7 |
| **III** | Pile foundations: types of pile and their use, modes of failure. Bearing capacity and settlement of pile foundation. Types of piles, Allowable load, Pile load test, Dynamic and static formulae. Bearing Capacity factors. Pile group bearing capacity and settlement. Negative skin friction. Behavior of piles under lateral loading. Winkler’s assumption. Pile resistance and deflection under lateral loads, elastic method, Brooms method | 8 |
| **IV** | Foundation on difficult Soils: Collapsible soil; identification, Collapse settlement: foundation design. Sanitary land fills settlement of sanitary land fill. Expensive soils: Behaviour of expansive soil, foundation practices, under-reamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil. Provision of IS 2911 Part III-1980 for design of under-reamed pile foundations | 8 |
| **V** | Raft foundation: common types of raft, combined footing. Bearing capacity of raft, differential settlement of raft; semi empirical method of design of raft foundation. Well foundations: design and construction. Bearing capacity, settlement and lateral resistance. Tilts and shifts, IS and IRC codes methods | 7 |
|  | **Total** | **36** |

**Reference Books:**

1. **Advanced foundation Engineering by B.C Punamia**

**CE 412 ADVANCE TRANSPORTATION ENGINEERING C (L,T,P) = 3 (3,0,0)**

|  |  |  |
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| **UNIT** | **COURSE CONTENTS** | **Hours** |
| **I** | Traffic Studies: Road inventories, Traffic Volume Studies, Spot Speed Studies, Travel Time and delay Studies, Origin-Destination studies, Methodology and Analysis of O-D data, Traffic capacity, Parking studies and characteristics, Accident studies and characteristics, causes and preventive measures | 7 |
| **II** | Statistical Methods for Traffic Engineering: Elementary concepts and Probability, Mean, Standard Deviation and variance, Poisson and Binomial Distribution, Normal distribution, sampling Theory and Significance testing, Linear Regression and correlation | 7 |
| **III** | Traffic Characteristics: Macroscopic and Microscopic Characteristics related to Volume, Speed and Density, their relationships, Road User Characteristics – Human and vehicular Characteristics. Traffic Engineering Design: Principles of Road Junction design, Design of Roundabouts, Bus Stops and Parking Lots, Design of Signals | 8 |
| **IV** | Traffic Management: Traffic Laws, Regulations and Ordinances for Drivers, Pedestrians and Mixed Traffic. Traffic control Measures – One Way streets, Kerb Parking Control, Intersection Control, Speed Control, Access Control. Expressways. Traffic Control Devices – Traffic Markings, Signs, Signals, Traffic Islands, their Classification, types and Sketches, Street Lighting | 8 |
| **V** | Traffic and Environment: Detrimental Effects of Traffic on the environment – air pollution, noise pollution, visual intrusion, aesthetics etc. Road Safety: The identification of problem, causation and Prevention, Road layout and Improvements, Safety equipment | 7 |
|  | **Total** | **37** |

**Reference Books:**

1. **Transportation engineering -S.P. Chandola**
2. **Transportation engineering- Sanjeevsipani, Rajeev sipani**

**CE 452 GEOTECHNICAL ENGG. DESIGN AND LAB. – II C (L,T,P)= 1(0,0,2)**

|  |  |  |
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| **S.No.** | **List of Experiments** | **Hours** |
| **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. Design as per syllabus of theory. |  |

**CE 454 WATER RESOURCES ENGINEERING DESIGN – II C (L,T,P) = 2(0,0,2)**

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| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
|  | Design as per syllabus of theory. |  |

**CE 456 PROFESSIONAL PRACTICES AND ESTIMATING C(L,T,P) =1 (0,0,2)**

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| --- | --- | --- |
| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Estimates – Methods of building estimates, types; site plan, index plan, layout plan, plinth area, floor area; Technical sanction, Administrative approval; estimate of buildings, roads, earthwork and R.C.C. works. |  |
| **2** | Analysis of rates- for earthwork, concrete work, D.P.C., stone masonry,, plastering,  pointing and roadwork |  |
| **3** | Specifications- For different classes of building and Civil Engineering works |  |
| **4** | Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order. |  |
| **5** | Arbitration |  |
| **6** | Valuation of real estate |  |

**CE 458 DESIGN OF FOUNDATION C (L,T,P) = 1 (0,0,2)**

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| **S.No.** | **List of Experiments** | **Hours** |
| **1** | Design of isolated shallow footings, combined footings, raft foundations. |  |
| **2** | Design of pile foundations. |  |
| **3** | Design of wells and cessions |  |
| **4** | Design of machine foundation. |  |
| **5** | Design of retaining structures etc. |  |

**CE 460 REVIT ARCHITECTURE C (L,T,P) = 1(0,0,2)**

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| **S.No.** | **List of Experiments** | **Hours** |
|  | Design as per Revit Insight 360(latest Version ) |  |

**CE 462 SEMINAR C (L,T,P) = 1(0,0,2)**

**CE 464 Project Stage-II C (L,T,P) = 1(0,0,2)**