

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Subject: **Structural Engineering Design III**

Class Tests: **Two (Minimum)**

ESE Duration: **Four Hours**

Semester: **VII**

Code: **D020711(020)**

Assignments: **Two (Minimum)**

Maximum Marks: **100**

Minimum Marks: **35**

Note:

1. All designs should be as per latest version of code (IS:800-2007)
2. IS: 800-2007 and Steel Tables are permitted in Examination.
3. Theory Paper of Four Hours Duration.

Unit-1: Eccentric and Moment Connections: Concept of semi-rigid, rigid and moment resistant connections, Analysis of Bolt / Weld Group, Connection Configurations, Beam to Column connections, Beam to Beam connections. Web splice and its connections, column splice and its connections.

Unit-2: Plate Girders with solid webs: Components of a Plate Girder, Typical sections, proportioning of the section, Design bending strength, Design shear strength, Stiffened Web panels, minimum web thickness, bearing stiffeners, load carrying stiffeners, intermediate stiffeners, stiffener design. Design of beams and plate girders with solid webs.

Unit-3: Column Bases and Gantry Girders: Types of column bases, slab base, gusset base, moment resisting base plates. Loads and load combinations, Typical sections, Design of gantry girders. Introduction to Fabrication and erection of steel structures.

Unit-4: Members subjected to combined forces: Combined shear & bending, combined axial force & bending moment, section strength, over all member strength, Design of members subjected to combined forces.

Unit-5: Roof Trusses: Types of roof trusses, Loads - Dead, Imposed and wind loads, load combinations, Design of Purlins, Analysis & Design of roof trusses (with angle sections).

Text Books:

1. Design of Steel Structures - N. Subramanian (Oxford University Press)
2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill)

Reference Books:

1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS:800 – 2007)
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
3. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
4. *Basic Steel Design with LRFD*, Galambos, T.V., Lin, F.J., Johnston, B.G., , Prentice Hall, 1996
5. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)

6. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications) 6. Design Manual for Designing Steel Structures according to New IS:800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata
7. Teaching Resource for Structural Steel Design, Vol. I – III, Publication Number INS/PUB/051, Institute for Steel Development and Growth, Kolkata

Course Outcomes:

1. Learner is able to analyse and design eccentric and moment connections in steel structures.
2. Learner is able to analyse and design Plate Girder.
3. Learner is able to analyse and design column bases and gantry girders
4. Learner is able to analyse and design members subjected to combined forces.
5. Learner is able to analyse and design roof trusses under different loads.



Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Subject: **Design of Hydraulic Structures**

Class Tests: **Two (Minimum)**

ESE Duration: **Four Hours**

Semester: **VII**

Code: **D020712(020)**

Assignments: **Two (Minimum)**

Maximum Marks: **100**

Minimum Marks: **35**

Unit-1: Dams: Types of Dams, Suitability of a type of dam, Gravity dams – Forces acting on dams, failure of dams and criteria for structural stability, Overturning, Compression or crushing, tension, sliding, principal and shear stress, stability analysis, Elementary profile of a gravity dam, High and low gravity dams, Profile from practical considerations, Design considerations, Openings in dams, Functions and Effects of opening, Joints, Keys and Water stops in gravity dams, Foundation treatment.

Unit-2: Spillways and Energy Dissipaters: Introduction, essential requirements of a spillway, spillway capacity, components, Types of spillways, Design of Ogee Spillway, Energy Dissipation below spillways, Types of Energy dissipater, Hydraulic jump as energy dissipater, Stilling basins, design of stilling basin, USBR stilling basins, standard basins.

Unit-3: Diversion Headworks: Introduction, Types of diversion works, location and components, Weir and Barrage, Effect of construction of weir on the river regime, Causes of failures of Weirs on permeable foundations, their remedies, Bligh's creep theory, Lane's Theory, Theory of seepage flow, Khosla's theory, Design of Vertical drop Weir, Design of Glacis Weir.

Unit-4: Regulation Work: Introduction, Definition of falls, necessity and location of falls, Design and comparative study of the main types of falls, Design of Cross regulator and distributary regulators.

Unit-5: Cross Drainage Works: Introduction, types, suitability, design of various types of C-D Works, Aqueduct, Syphon Aqueduct, Super Passage, Syphon, level crossing, inlets and outlets. Design of channel transition-expansions and contractions, curves for sub-critical and super criticalflows.

Text Books:

1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications)

Reference Books:

1. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
2. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand Bros.)
3. Irrigation Engineering – Asawa G.L. (New Age International Publications)
4. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.)

Course Outcomes:

1. Students will be able to design the dams.
2. Students will be able to design the spillways.
3. Students will be able to design the weir and barrage.
4. Students will be able to design canal falls.
5. Students will be able to design different types of cross drainage works.



Chhattisgarh Swami Vivekanand Technical University, Bilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Subject: **Foundation Engineering**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VII**

Code: **D020713(020)**

Assignments: **Two (Minimum)**

Maximum Marks: **100**

Minimum Marks: **35**

Unit-1:Load bearing capacity of soil under shallow footings:Definitions, bearing capacity, ultimate bearing capacity, safe bearing capacity etc, types of shear failure, computation of ultimate bearing capacity by Terzagh's, effect of water table on bearing capacity, ultimate bearing capacity of square , circular and rectangular shallow footings.

Unit-2:Settlement of footings: Immediate settlement, consolidation settlement, permissible settlement as per IS code.**Field test:** plate load test, effect of the size of plate on settlement, basic numerical of plate load test

Unit-3:Pile Foundations:Types of piles,bearing capacity of piles (Individual, groups),computing bearing capacity of piles in sandy soils by using engineering new formula,negative friction on piles (individual,groups).

Unit-4: Well Foundations: Shapes, section, depth, grip length, ultimate safe bearing capacity, sinking of wells.**Retaining walls:** Types of earth retaining structures, design process.

Unit-5:Underground Structures: Methodology, vertical and horizontal excavation, management of ground water, excavate –support sequence, spoil removal, soil support method, basements, shafts.**Tunnels:** cut and cover tunnels, bored tunnels, immersed tube tunnel

Text Books:

1. Soil Mechanics and Foundation Engineering–Garg S.K. (KhannaPublishers)
2. Geotechnical Engineering- Shashi K Gulhati, Manoj Datta (McGraw Hil Education)
3. Soil Mechanics and Foundations–B.C. Punmia, A.K.Jain, A.K .Jain (Laxmi Publication)

ReferenceBooks:

1. Soil Mechanics and Foundation Engineering–S.N. Murthy (Dhanpat Rai Publications)
2. Basic and Applied Soil Mechanics –Gopal Ranjan and Rao A.S.R. (New Age International)
3. Soil Mechanics and Foundation Engineering–K.R.Arora (Standard Publisher Dist.)
4. Soil Mechanics and Foundation Engineering–Purushothama Raj (Pearson Education)
5. Text Book of Geotechnical Engineering –I.H. Khan(PHI Learning)

Course Outcomes:

1. Students should be able to evaluate and design of shallow foundation.
2. Students should be able to analyze settlement of foundation with field test.
3. Students should be able to analyze consolidation of soil and shear strength.
4. Students should be able to evaluate and design of pile foundation.
5. Students should be able to explore the underground structure and tunnel.



Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Subject: **Seismic Design of Structures (Professional Elective-III)**

Semester: **VII**

Code: **D020731(020)**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

Unit-1: Engineering seismology: Causes of earthquakes; seismic waves; magnitude, intensity and energy release, characteristics of strong earthquake groundmotions, Introduction to theory of vibrations - Flexibility of long and short period structures, concept of response spectrum, Seismic zones.

Unit-2: Seismic design concepts: Desirable features of earthquake resistant buildings, Building forms for earthquake resistance, Seismic design philosophy, Performance of buildings in past earthquakes, Lessons from structural damage during past earthquakes, Equivalent static lateralearthquake force, codal provisions.

Unit-3: Single degree of freedom systems: Response of single degree freedom system, free & forced vibrations.

Unit-4: Multi degree of freedom structures: Free vibrations of two and three degree of freedom systems.

Unit-5: Design of Buildings: Determination of Lateral forces due to earthquake in RCC & Steel framed structures.

Text Books:

1. Earthquake Resistant Design of Structures – S. K. Duggal, Oxford University Press
2. Dynamics of Structures: Theory and Application to Earthquake Engineering (2nd edition) – Anil K Chopra (Pearson Education Publication)
3. Earthquake Resistant Design of Structures – Pankaj Agrawal & Manish Shrikhande, PHI Learning Pvt. Ltd.
4. IS 1893, IS 13920, IS 4326, IS 13828, Bureau of Indian Standards, New Delhi

Reference Books:

1. Design of Earthquake Resistant Buildings – Minoru Wakabayashi (McGraw Hill Publication)
2. Vibration and Structural Dynamics – Timoshenko, S. (VanNostrand Co.)
3. Vibration and Structural Dynamics – Mukyopadhyaya (Oxford & IBH)
4. Structural Dynamics (Theory & computations)- Mario Paz (CBS Publishers & Distributions New Delhi)

Course Outcomes:

1. To be able to analyze, design and detail structures from seismic point of view.



Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Subject: **Prestressed Concrete Structures
(Professional Elective-III)**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VII**

Code: **D020732(020)**

Assignments: **Two (Minimum)**

Maximum Marks: **100**

Minimum Marks: **35**

Unit-1: Methods, Systems and Materials: Basic principles, methods and systems of prestressing, external, internal, full, partial, pre-tensioning and post-tensioning, quality of concrete and steel, I.S. Code provisions for allowable stresses, Advantages of prestressing and importance of high strength materials.

Unit-2: Analysis of Structures for Flexure:

Cases of axial and eccentric prestressing allowing suitable percentage loss of prestress. Stresses in concrete at various stages, lever arm concept and center of pressure, pressure line, kern distances, load balancing cable profiles, critical span (for solid slabs only), Efficiency of a section.

Unit-3: Losses of Prestressing: Various types of losses of prestress and their calculation, loss due to friction, I.S. Code provisions, Elastic shortening due to successive tensioning of cables.

Design of section for flexure: I.S. Code provisions for cover and spacing, standard Fressinet and Gifford Udall cables, Design of beams and slabs, cable zones and profiles.

Unit-4: Composite Beams: Different types, loading conditions, analysis for stresses, differential shrinkage. **Bond and Anchorage:** Bond stress and its significance in pre-tensioned beams, transmission length, determination of bursting force due to anchor zone stresses and provision of steel according to I.S. Code for prestressed concrete. **Shear:** Calculation of diagonal tension and its inclination (including vertical prestressing also) provision of steel according to elastic method and I.S. Code method, advantages of prestressing.

Unit-5: Limit State Design: Limit state of serviceability and strength, calculation of ultimate bending moment for given sections, advantages of limit state method over working stress method. **Miscellaneous uses:** Analysis and design of poles and circularly prestressed pipes and tanks.

Text Books:

1. Prestressed Concrete – Krishna Raju N. (New Age International)



Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Semester: **VII**

Subject: **Construction equipment and techniques** Code: **D020733(020)**

(Professional Elective-III)

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

Unit-1: Construction Equipment's: Fundamentals of earthwork operations - Earth moving operations -Types of Earthwork Equipment-Tractors, Motor Graders, Scrapers, Front end waders, Earth Movers. Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting- Equipment for compaction-Erection Equipment. Types of pumps used in construction - Equipment for Dewatering and Grouting -Foundation and Pile Driving Equipment. Forklifts and Related Equipment - Portable Material Bins – Conveyors - Hauling Equipment.

Unit-2:Equipment for Production of Aggregate and Concreting:Crushers-Feeders-Screening Equipment-Handling Equipment-Batching and Mixing Equipment-Hauling, Pouring and Pumping Equipment-Transporters.

Unit-3: Sub-structure Construction Techniques:Box jacking -Pipe Jacking-Under Water Construction of diaphragm walls and basement -Tunneling techniques piling techniques driving well and caisson-sinking cofferdam-cable anchoring and grouting-driving diaphragm walls, sheet piles-laying operations for built up offshore system-shoring for deep cutting-Large reservoir, construction with membranes and Earth system-well points-Dewatering and stand by Plant equipment for underground open excavation.

Unit-4: Super Structure Construction: Vacuum Dewatering of concrete flooring-Concrete paving technology-Techniques of construction for continuous concreting operation in Tall buildings of various shapes and Varying sections-Launching Techniques-Suspended from work-erection techniques of tall structures, Large span structures-Launching techniques for heavy decks in situ prestressing in high rise structures, aerial transporting handling erecting light weight components on tall structures-erection of lattice tower as and rigging of transmission line structures.

Unit-5: Repair Construction: Mud jacking grout through slab foundation-micropiling for strengthening floor and shallow profile-pipeline laying protecting sheet piles, screw anchors-sub grade water proofing under pinning advanced techniques and sequence in demolition and dismantling.

Text Books:

1. Construction Planning, Equipment and Methods (5th Edition), Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C. (McGraw Hill, Singapore, 1995).
2. Construction Equipment and Management, Sharma S.C. (Khanna Publishers New Delhi, 1988).

Course Outcomes:

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

1. Understand various construction equipment
2. Explain the equipment for production of concrete
3. Apply various sub structure construction techniques
4. Understand super structure construction techniques
5. Understand Repair Construction



Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Subject: **Advance Geotechnical Engineering lab**

Maximum Marks: **40**

Semester: **VII**

Code: **D018721(018)**

Minimum Marks: **20**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. CBR (soaked)
2. CBR (Un-soaked)
3. Plate load test study
4. Study of penetration test
5. Design and drawing of shallow foundation by Terzaghi's
6. Design and drawing of shallow foundation by BIS
7. Design and drawing of pile foundation (individual)
8. Design and drawing of pile foundation (individual)
9. Design and drawing of well foundation
10. Permeability test using Constant-head test method.
11. Permeability test using Falling-head method.

Equipment / Machines / Instruments / Tools / Software Required:

1. CBR Apparatus
2. Oven
3. Constant Head Permeability Test Apparatus
4. Falling Head Permeability Test Apparatus
5. Mechanical Sieve Analysis (Complete Set of Sieves)
6. Soil Sampling Tube, Piston Tube
7. Rammer for Compaction
8. Soil Extractor
9. Measuring Jar Cylinder (1000CC)
10. Light Compaction Mould
11. Heavy Compaction Mould
12. MS Excel
13. Auto cad

Recommended Books:

1. Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)
2. Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi)



Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **B. Tech.**

Branch: **Civil Engineering**

Subject: **Advanced Environmental Engineering Lab**

Maximum Marks: **40**

Semester: **VII**

Code: **D018722(018)**

Minimum Marks: **20**

List of Experiments: (At least Ten experiments are to be performed by each student)

Experiments to be performed

1. Determination of Fluoride content in Sewage / Industrial wastewater.
2. Determination of Nitrates in Sewage / Industrial wastewater.
3. Determination of Phosphates in Sewage / Industrial wastewater.
4. Determination of Iron in Sewage / Industrial wastewater.
5. Microbiological Examination of Sewage / Industrial wastewater.
6. Study of Determination of MPN.
7. Study and Report Making on Dairy W/W.
8. Study and Report Making on Textile Industry W/W.
9. Study and Report Making on Sugar Industry W/W.
10. Study of determination of particulates in air.
11. Study of Collection of particulate matter using Air sampler.
12. Study of air quality (SPM, Temperature).
13. Study of air samples for metals (using AA spectrometer).

List of Equipments / Machine Required:

1. BOD Incubar
2. Turbidity meter
3. Microscope
4. pH meter
5. Muffle Furnace
6. Hot Air Oven
7. Jar Test Apparatus
8. Spectrophotometer

Text and Reference Books:

1. Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar Publications).
2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).
3. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
4. Introduction to Environmental Engineering and Science – Masters, G.M. (Prentice Hall of India Pvt. Ltd., 1991).



Chhattisgarh Swami Vivekananda Technical University, Newai

Name of the Program: Bachelor of Technology

Semester: B. Tech – 7th

Subject: Universal Human values 2

Total Marks in End Semester Exam:

Branch: Civil Engg.

Course Code: D000701(046)

L: T: P: 2 Credits: 0

Course Objective(s):

- Development of a holistic perspective based on self- exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

UNIT-I Introduction- Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I.
- Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.
- Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT-II Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility.
- Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer).
- Understanding the characteristics and activities of ‘I’ and harmony in ‘I’.
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
- Programs to ensure Sanyam and Health.
- Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life.
- Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT-III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.
- Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

UNIT-IV Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space.
- Holistic perception of harmony at all levels of existence.
- Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT-V Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
 - At the level of individual: as socially and ecologically responsible engineers, technologists and managers
 - At the level of society: as mutually enriching institutions and organizations
- Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. to discuss the conduct as an engineer or scientist etc.

Text Books:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

Reference Books:

1. The Story of Stuff (Book).
2. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
3. Small is Beautiful - E. F Schumacher.

Course Outcome:

After completion of course, student should be able to

- To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to- day settings in real life, at least a beginning would be made in this direction.