

## Chhattisgarh Swami Vivekanand Technical University, Bilai

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

Branch: **Civil Engineering**

Subject: **Structural Engineering Design IV**

Class Tests: **Two (Minimum)**

ESE Duration: **Four Hours**

Semester: **VIII**

Code: \_\_\_\_\_

Assignments: **Two (Minimum)**

Maximum Marks: **100**

Minimum Marks: **35**

### Note:

1. All designs should be as per latest version of BIS code.
2. Relevant codes will be permitted in Examination.
3. Theory Paper of Four Hours Duration.

**Unit-1: Design of Building frames and Footing:** Planning and Design Process, Desirable features of earthquake resistant construction, Detailing for earthquake resistant construction – ductility criteria; Estimation of wind and seismic loads. **Moment redistribution:** Design of continuous beams and building frames, strap footing and Raft Foundation.

**Unit-2: Retaining walls:** Design of Cantilever retaining wall with horizontal and sloping backfill, Counterfort Retaining Wall with horizontal backfill.

**Unit-3: Water tank and staging:** Introduction, Design criteria, Design of rectangular and circular water tank, Design of Intze tank, Staging for overhead tank. **Circular tank:** with flexible / rigid joint between floor and wall (by approximate method), Design of Circular overhead tank with domed bottom and top (membrane analysis), **Intze Tank (Membrane Analysis):** Dimensions, Design of top dome, Top ring beam, cylindrical wall, middle ring beam, conical dome, bottom dome.

**Unit-4: Bridges:** Introduction to bridge engineering, types of Bridges, Investigation for bridges, IRC loadings, Design of slab culvert, Design of super structure for solid slab bridge, Design of cantilever slab for T-Beam bridge. Introduction to design of interior panels and girders of a T-Beam Bridge.

**Unit-5: Prestressed Concrete:** Basic concepts, classification and types of prestressing, Prestressing systems, Losses in Prestress, Properties of materials, merits and demerits of prestressed concrete, Analysis of beam for flexure, Kern distances and efficiency of Sections. Design of simple span girders

### Text Books:

1. Reinforced Concrete Structures – B.C. Punmia (Laxmi Publications)
2. Prestressed Concrete – N. Krishna Raju (New Age Publications)
3. RCC Design – Sinha & Roy (S. Chand & Co.)

**Reference Books:**

1. RCC Structures – N. Krishna Raju (New Age Publications)
2. Bridge Engineering – R.K. Raina
3. IS codes: 875, 456, 1893, IRC Loads
4. Earth quake tips National Information Centre of Earthquake Engineeringat IIT Kanpur, INDIA

**Course Outcomes:**

1. Learner is able to analyse and design continuous beam, building frames, strap beam and raft footings as per the most recent BIS code of practices.
2. Learner is able to analyse and design Cantilever and counter fort retaining wall as per the most recent BIS code of practices.
3. Learner is able to analyse and design water tank and it's staging as per the BIS code of practices.
4. Learner is able to analyse and design bridges as per the BIS code of practices.
5. Learner is able to analyse pre stressed concretes beam for flexure and losses.



## Chhattisgarh Swami Vivekanand Technical University, Bilai

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

Branch: **Civil Engineering**

Semester: **VIII**

Subject: Professional Elective-IV (**Airport Planning and Design**) Code: \_\_\_\_\_

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

**Unit-1:** Growth of International Traffic and Air India's Performance Airport Characteristics; **Aircraft characteristics:** Airport planning, Airport Obstructions, and air travel demand forecasting; Airport Site Selection;

**Unit-2:** Runway Design- Runway Orientation, Basic Runway Length, Runway Capacity, Runway Configuration. **Taxiway Design-** Factors Controlling Taxiway Layout, Design Standards, Exit Taxiways, Holding Apron

**Unit-3: Structural Design of Airport Pavements:** Classification of Pavements, Design factors, design of flexible pavements, design of Rigid Pavements, LCN Method of Pavement Design, Joints in Cement Concrete Pavements

**Unit-4: Planning and design of Terminal Area:** Terminal Building ,Passenger Flow, Vehicular circulation and parking areas, Apron, Hangar, Typical Airport Layout.

**Unit-5: Visual Aids for Air Traffic:** Necessity for Visual Aids, Airport Marking, Airport Lighting Day time Aids. **Airport Drainage:** Necessity for Airport Drainage, Functions of Airport Drainage System, Surface Drainage Design and Sub-Surface Drainage Design

### Text Books:

1. Airport Planning and Design by Khanna Sk
2. Airport Engineering Planning and Design by Saxena S.C.
3. Airport Engineering by Ashford N J, John Wiley
4. Planning and Design of Airports, Fifth Edition (P/L Custom Scoring Survey) by Robert M. Horonjeff (Author), Francis X. McKelvey (Author), William J. Sproule (Author)

### Course Outcomes:

1. The students will be able to plan Airport.
2. The students will be able to design runway and taxiway.
3. Student will be able to design airport pavement.
4. The student will be able to plan and design of terminal area.
5. The student will be able to plan lighting pattern for a major Airport.



## Chhattisgarh Swami Vivekanand Technical University, Bhilai

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

Branch: **Civil Engineering**

Semester: **VIII**

Subject: Professional Elective-IV (**Open channel flow**)      Code: \_\_\_\_\_

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

**Unit-1: Introduction:** Difference between open channel flow and pipe flow, geometrical parameters of a channel, continuity equation. **Uniform flow:** Chezy's and Manning's equations for uniform flow in open channel, velocity distribution, most efficient channel section.

**Unit-2: Energy and Momentum Principles:** Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions.

**Unit-3: Non-Uniform Flow in Open Channel:** Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, flow in curved channels.

**Unit-4: Hydraulic Jump, Surges, Water Waves:** Classical hydraulic jump, evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, equation of motion for unsteady flow, open channel surge, celerity of the gravity wave, deep and shallow water waves.

**Unit-5: Spatially-varied flow:** Introduction, SVF with increasing discharge, differential equation of SVF with increasing discharges, control point, classification and solutions, profile computation, SVF with decreasing discharge, differential equation for SVF with decreasing discharge, computations.

### Text Books:

1. Fluid Mechanics – A.K. Jain (Khanna Publication)
2. Open Channel Flow – Subramanya (Tata McGraw Hill, New Delhi)

### Reference Books:

1. Engineering Fluid Mechanics (including Hydraulic Mechanics) (2nd Edition) – Garde, R.J., and A.G. Mirajgaoaker (Nem Chand & Bros., Roorkee, 1983)
2. Flow Through Open Channels – Ranga Raju, K.G. (Tata McGraw Hill, New Delhi, 1993)
3. Experimental Fluid Mechanics (Vol. 2) – Asawa, G.L. (Nem Chand and Bros., 1992)
4. Open Channel Flow – VenTe. Chow (McGraw Hill)



## **Chhattisgarh Swami Vivekanand Technical University, Bhilai**

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

Branch: **Civil Engineering**

Semester: **VIII**

Subject: Professional Elective-IV (**Construction Management**) Code: \_\_\_\_\_

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

**Unit-1: The Owner's Perspective:** Introduction-The project life cycle-Major Types of Construction-Selection of Professional Services-Construction contractors-Financing of constructed facilities-Legal and regulatory Requirements-The changing Environment of the construction Industry-The Role Project Managers.

**Unit-2: Organizing for Project Management:** Definition of project management, Trends in Modern Management-Strategic planning and project programming- Effects of project risks on organization-Organization of Project Participants-Traditional designer-Constructor sequence-Professional construction management-Owner-Builder-Operation-Turnkey operation-Leadership and Motivation for the Project team-Interpersonal behaviour in project organization-perceptions of Owners and Contractors.

**Unit-3: The Design and Construction Process:** Design and construction as an integrated system-Innovation and technological Feasibility-Innovation and technological feasibility-Design Methodology-Functional Design-Physical Structures-Construction Site Environment-Value engineering, Value Management and Value Planning-Construction Planning-Industrialized Construction and Prefabrication-Computer –Aided Engineering.

**Unit-4: Labour, Material and Equipment Utilization:** Historical Perspective – Labour Productivity-Factors Affecting Job-Site Productivity-Labor Relations in construction-Problems in collective bargaining-Materials Management-Materials Procurement and Delivery- Inventory control-Tradeoffs of cost in Material Management-Construction Equipment-Choice of Equipment and Standard production Rates-Construction Processes Queues and Resource Bottlenecks

**Unit-5: Cost Estimation:** Costs Associated with Construction Facilities-Approaches to cost estimation-Type of construction cost estimates- Effects of scale on construction cost-Unit cost-Method of estimation-Historical cost data-Cost indices-Applications of cost Indices to Estimating-Estimate based on Engineers List of Quantities-Allocation of Construction costs over time-Estimation of operating costs, concept of pre and post construction cost management.

### **Text Books:**

1. Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill Publishing Co., New Delhi, 1998)
2. Project Management: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi, 1988)

**Reference Books:**

1. Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pittsburgh, 2000).
2. Construction Project Management – Frederick E. Gould (Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000).
3. Project Management – Choudhury, S. (Tata McGraw Hill Publishing Co., New Delhi, 1988).
4. Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houston, Texas, 1988).
5. Construction cost management, learning from case studies – Keith Potts, Taylor and Francis, London and New York.

**Course Outcomes:**

1. Students should be able to identify owner's perspective / perspective of project participants towards construction projects.
2. Students are expected to identify the structure of project participant's organization and effect of project risks.
3. Students are expected to know design methodology, feasibility aspect and value engineering in design and construction.
4. Students are expected to know importance of labour productivity, material and equipment utilization.
5. Students are expected to know the different approaches of cost estimation of construction project.



## Chhattisgarh Swami Vivekanand Technical University, Bhilai

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

Branch: **Civil Engineering**

Semester: **VIII**

Subject: Open Elective-III (**Air Pollution and Control Measures**)

Code: \_\_\_\_\_

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

**Unit-1: Air Pollution:** Problem, Definitions, Classification of pollutants, characteristics and sources. **A.P. Monitoring:** Measurement of stack gases, Sampling methods, Difficulties in sampling, sampling of SPM, stack sampling techniques.

**Unit-2:** Air pollution meteorology, stability class condition, plume behaviour, topographical effects on air pollution, wind profiles, wind roses. Gaussian plume models, assumptions and limitations of GPM, problem on modelling.

**Unit-3:** SOX sources, ambient concentrations, test methods, SOX control techniques, effects of SOX on human, animal health, plants and on materials. NOX sources, ambient concentrations, test method control techniques, effects of NOX on human health, animal health, plants and on materials. Particulate size distribution, collection and removal mechanics.

**Unit-4:** Major air pollution disaster episodes, special diseases caused by air pollution, symptoms of chronic air pollution. Mechanisms of deterioration in polluted atmospheres, effect of air pollution on art treasures in India.

**Unit-5:** Air quality criteria and emission standards, US and Indian standards, air pollution act, constitution, power and functions of the boards. Global effects of air pollution – Green house effect, acid rains, ozone layer depletion, etc.

### Text Books:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).

### Reference Books:

1. Air Pollution – Henry C. Perkins, (McGraw Hill Kogakusha Ltd., Tokyo, Japan, 1974)
2. Air Pollution – Stern, Arthur C. (Academic Press, New York, USA, 1977)
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
4. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).



## **Chhattisgarh Swami Vivekanand Technical University, Bhilai**

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

Branch: **Civil Engineering**

Semester: **VIII**

Subject: Open Elective-III (**Project Planning Management and Evaluation**)

Code: \_\_\_\_\_

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

**Unit-1: Project Identification Analysis:** Socio – economic consideration in Project formulation, Social Infrastructure Projects for sustainable Development, Investment Opportunities, Project screening and presentation of projects of decision making, expansion of capacity, Diversification.

**Unit-2: Market and Technical Analysis:** Market and Demand Analysis – Market survey , Demand forecasting , Uncertainties in Demand Forecasting , Technical Analysis – Product mix , Plant Capacity , materials and Inputs , Machinery and Equipment .

**Unit-3: Project Costing and Financing:** Cost of project , Cost of Production , Break even Analysis , Means of financing project , Tax aspects in Project finance , Role of Financial Institution in Project Finance.

**Unit-4: Project Appraisal:** Time value of money, Project Appraisal Techniques – Playback period, Accounting Rate of return, Net present value, Internal Rate of return, Benefit Cost ratio, Social cost benefit analysis, Effective rate of Protection. **Risk Analysis:** Measures of Risk, Sensitivity analysis, Stimulation Analysis, Decision tree Analysis.

**Unit-5: Project scheduling / Network Techniques in Project Management:** CPM and PERT Analysis , Float Times , Crashing of Activities , Contraction of Network for cost optimization , Updating , Cost Analysis of Resources Allocation , Basic knowledge of Leading softwares for Project Planning and Analysis .

### **Text Books:**

1. Khatua, Project Management and Appraisal, ISBN: 9780198066903, Oxford University Press.
2. Bhavesh, M. Patel (2000): Project Management – strategic financial planning evaluation and control, Vikas publishing House Pvt. Ltd.
3. Chandra, P. (6<sup>th</sup> ed., 2007) : Projects . Tata Mc GrawHill.



**Course Outcomes:**

1. To analyse the infrastructure project development and project formulation also compute the project presentation and decision making regarding the projects.
2. To analyse market survey and look over the uncertainties in Demand Forecasting.
3. To explore the terms with respect to project appraisal techniques and look over of the risk during project management and planning.
4. To apply project appraisal techniques and measure the risk analysis.
5. To apply the different techniques in project management, analysis of resource allocation for cost analysis and basic knowledge of softwares for project planning.



## **Chhattisgarh Swami Vivekanand Technical University, Bhilai**

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

Branch: **Civil Engineering**

Semester: **VIII**

Subject: Open Elective-III (**Solid and Hazardous waste management**)

Code: \_\_\_\_\_

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: **100**

Minimum Marks: **35**

**Unit-1: Sources of Solid and Hazardous Wastes:** Sources of solid and hazardous wastes - Need for solid and hazardous waste management - Legislations on management and handling of municipal solid wastes, hazardous wastes, and biomedical wastes.

**Unit-2: Waste Generation:** Waste generation rates - Composition - Hazardous Characteristics - TCLP tests - waste sampling- Source reduction of wastes - Recycling and reuse.

**Unit-3: Municipal Solid Wastes Collection:** Handling and segregation of wastes at source - storage and collection of municipal solid wastes - Analysis of Collection systems - Need for transfer and transport - Transfer stations.

**Unit-4: Labeling and Handling of Hazardous Wastes:** Waste processing - processing technologies - biological and chemical conversion technologies – Composting, thermal conversion technologies - energy recovery-incineration - solidification and stabilization of hazardous wastes - treatment of biomedical wastes.

**Unit-5: Solid Wastes Disposal in Landfills:** Site selection - design and operation of sanitary landfills- secure landfills and landfill bioreactors - leachate and landfill gas management - landfill closure and environmental monitoring - landfill remediation, Elements of integrated waste management.

### **Text Books:**

1. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, Integrated Solid Waste Management, McGraw- Hill, New York, 1993
2. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000.

### **Reference Books:**

1. Solid Waste Management, Van Nostrand Reinhold Co. 1975.
2. **C.L. ell, Solid Waste** Management, John Wiley, 1975.
3. P.W. Powers. How to dispose of toxic substances and industrial Waste, Noyes Data Corporation, England, 1976.

**Course Outcomes:**

1. The students will describe the solid and hazardous wastes.
2. The students will explain generation rates of solid and hazardous wastes.
3. The students will describe handling and segregation of waste at source.
4. The students will discuss various regulations about the management and handling of hazardous waste.
5. The students will design and monitor a SWM Landfill.



## **Chhattisgarh Swami Vivekanand Technical University, Bhilai**

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

Branch: **Civil Engineering**

Subject: **Structural Engineering Drawing Lab**

Maximum Marks: **40**

Semester: **VIII**

Code: \_\_\_\_\_

Minimum Marks: **20**

### **Note:**

1. Final evaluation will be based on Lab work, Lab Portfolio, Minor Project and viva.
2. **Lab Portfolio** is a collection of lab work demonstrating skills acquired during course.
3. **Page Size:** standard A3, with professional style page layout setting and setup, each lab task should have all relevant drawings (2D and 3D) colored printed and submitted with proper labeling and presentation (Min 8):

### **Lab work:**

1. Prepare BIM (Building Information Model) of various types of bolted and welded joints 2D and 3D.
2. Prepare BIM (Building Information Model) of an Axially Loaded angle Tension Member
3. Prepare BIM (Building Information Model) of an Axially Loaded Compression Member with base plate.
4. Prepare BIM (Building Information Model) of an Axially Loaded Built up Laced Compression Member.
5. Prepare BIM (Building Information Model) of an Axially Loaded Built up Battened Compression Member.
6. Prepare BIM (Building Information Model) of a Riveted / Bolted Plate girder.
7. Prepare BIM (Building Information Model) of a Welded Plate girder.
8. Prepare BIM (Building Information Model) of flexible connections
9. Prepare BIM (Building Information Model) of Semi – Rigid Connections
10. Prepare BIM (Building Information Model) of Rigid Connections

### **Minor Project-I (Any One)**

11. Prepare BIM (Building Information Model) of an Industrial shed
12. Prepare BIM (Building Information Model) of a Truss Bridge Railway Bridge.

### **Minor Project- II (Any One)**

13. Preparation of Bill of Materials
14. Preparation of Fabrication drawings.
15. Preparation of Erection drawings.

### **List of Equipment / Machine Required:**

1. List of Equipment – Not Required.

### **Software required:**

1. AUTO CAD / REVIT or Open-source software/ package.

**Text Books:**

1. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
2. Structural Steel Design: LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
3. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
4. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)

**Course Outcomes:**

1. Learner is able to prepare BIM for various elements of steel structure.
2. Learner is able to prepare BIM for various joints used in steel structure.
3. Learner is able to prepare BIM for steel Plate Girder (welded/Bolted).
4. Learner is able to prepare BIM for steel Industrial shed / Railway Bridge.
5. Learner is able to prepare BIM for fabrication/ Erection.



**Chhattisgarh Swami Vivekanand Technical University, Bhilai**

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

Branch: **Civil Engineering**

Subject: **Computer Applications in Civil Engineering Lab**

Maximum Marks: **40**

Semester: **VIII**

Code: \_\_\_\_\_

Minimum Marks: **20**

**Experiments to be performed (Min 10 experiments):**

1. Computer Programs / Design in Civil Engineering Software Packages.

**List of Equipments / Machine Required:**

1. PC system.
2. Turbo C++ compiler.

**Text Books:**

1. Let us C++ – Yeshwant Kanitkar (BPB Publications)
2. Problem Solving with C++ – Savitch (Addison Wesley Publication)

