Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program: **B. Tech.**
Branch: **Civil Engineering**
Subject: **Structural Engineering Design-IV**
Class Tests: **Two (Minimum)**
ESE Duration: **Four Hours**

Semester: **VIII**
Subject Code: **D020811(020)**
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 Engineering at IIT Kanpur, INDIA.

Course Outcomes:

1. Leaner 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. Leaner is able to analyse and design Cantilever and counter fort retaining wall as per the most recent BIS code of practices.
3. Leaner is able to analyse and design water tank and it's staggingas per the BIS code of practices.
4. Leaner is able to analyse and design bridges as per the BIS code of practices.
5. Leaner is able to analyse pre stressed concretes beam for flexure and losses.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program: **B. Tech.**	Semester: **VIII**
Branch: **Civil Engineering**	Code: **D020831(020)**
Subject: Professional Elective-IV (**Airport Planning and Design)**	Assignments: **Two (Minimum)**
Class Tests: **Two (Minimum)**	Maximum Marks: **100**
ESE Duration: **Three Hours**	Minimum Marks: **35**

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

Unit-2: Runway Design- Runway Orientation, Basic Runway Length, RunwayCapacity, 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 DrainageDesignand Sub-Surface Drainage Design

Text Books:

1. Airport Planning and Designby Khanna Sk.
2. Airport Engineering Planning and Designby SaxenaS.C.
3. Airport Engineeringby 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**
Subject: Professional Elective-IV (**Open Channel Flow)**
Class Tests: **Two (Minimum)**
ESE Duration: **Three Hours**

Semester: **VIII**
Code: **D020832(020)**
Assignments: **Two (Minimum)**
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. Mirajgaoker (NemChand & 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.** Semester: **VIII**
Branch: **Civil Engineering** Code: **D020833(020)**
Subject: Professional Elective-IV (**Construction Management)** Assignments: **Two (Minimum)**
Class Tests: **Two (Minimum)** Maximum Marks: **100**
ESE Duration: **Three Hours** 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 ofproject risks on organization-Organization of Project Participants-Traditional designer-Constructor sequence-Professionalconstruction 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, ValueManagement and Value Planning-Construction Planning-Industrialized Construction and Prefabrication-Computer –AidedEngineering.

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

Unit-5: Cost Estimation: Costs Associated with Construction Facilities-Approaches to cost estimation-Type of construction cost estimates- Effects of scaleon 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, conceptof pre and post construction cost management.

Text Books:

1. Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill PublishingCo., 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 – ChrisHendrickson and Tung Au, (Prentice Hall, Pitsburgh, 2000).
2. Construction Project Management – Frederick E. Gould (Wentworth Institute of Technology, Vary E. Joyce, Massachususetts 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., Houstan, 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**
Subject: **Structural Engineering Drawing (Lab)**
Minimum Marks: **20**

Semester: **VIII**
Subject Code: **D020821(020)**
Maximum Marks: **40**

Objectives of the Subject:

1. Learner is able to use modern tools for developing engineering solutions.

Outcomes of the Subject:

1. Leaner is able to prepare BIM for various elements of steel structure.
2. Leaner is able to prepare BIM for various joints used in steel structures.
3. Leaner is able to prepare BIM for steel Plate Girder (Welded / Bolted).
4. Leaner is able to prepare BIM for RCC structural elements like beam, slab, and footing.
5. Leaner is able to prepare BIM for RCC structures like retaining walls and water tanks.

Note:

The final evaluation will be based on Lab work, Lab Portfolio, Minor Project, and viva.

Lab Portfolio is a collection of lab work demonstrating skills acquired during the course.

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 a base plate.
4. Prepare BIM (Building Information Model) of a Bolted Plate girder.
5. Prepare BIM (Building Information Model) of a Welded Plate girder.
6. Prepare BIM (Building Information Model) of a simply supported RCC beam (Doubly Reinforced) with the given design data. Showing the bar bending schedule, size and number of bars, stirrups their size and spacing.
7. Prepare BIM (Building Information Model) of a one-way slab with the given design data. Showing the bar bending schedule, size, and spacing.
7. Prepare BIM (Building Information Model) of an RCC rectangular column with isolated footing with the given design data. Showing the bar bending schedule, size, and spacing.
9. Prepare BIM (Building Information Model) of an RCC Combined footings with the given design data. Showing the bar bending schedule, size, and spacing.

10. Prepare BIM (Building Information Model) of an RCC Retaining walls with the given design data. Showing the bar bending schedule, size, and spacing.
11. Prepare BIM (Building Information Model) of Water Tanks with the given design data. Showing the bar bending schedule, size, and spacing.

List of Equipment / Machine Required:

1. List of Equipment – Not Required.

Software Required:

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

Text and Reference Books:

1. Structural Steel Design: LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
2. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
3. Design of RCC Structures – Pillai &Menon (TMH)

Minor Project-I (Any One) Steel Design

a. Prepare BIM (Building Information Model) of an Industrial shed or a Truss Railway Bridge
b. Preparation of Fabrication drawings of the above.
c. Preparation of Erection drawings.

Minor Project-II (Any One) RCC Design

a. Prepare a complete BIM (Building Information Model) of a Double storey RCC residential building

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program: **B. Tech.** Semester: **VIII**
Branch: **Civil Engineering** Code: **D020822(020)**
Subject: **Computer Applications in Civil Engineering (Lab)** Minimum Marks: **20**
Maximum Marks: **40**

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)