

**VSS UNIVERSITY OF TECHNOLOGY, BURLA, ODISHA**  
**CIVIL ENGINEERING DEPARTMENT**  
**CURRICULUM**  
**For**  
**B.TECH – 6<sup>TH</sup> SEM**

**THEORY**

**BCE 306 - STRUCTURAL ANALYSIS –II (3-1-0) CR-04**

**Module – I**

Introduction to Force and Displacement methods of structural analysis, Analysis of continuous beam and plane frame by slope deflection method and moment distribution method.

**Module –II**

Analysis of continuous beam and simple portals by Kani's method, Analysis of two pinned and fixed arches with dead and live loads, suspension cable with two pinned stiffening girders.

**Module – III**

Plastic Analysis: Plastic modulus, shear factor, plastic moment of resistance, load factor, plastic analysis of continuous beam and simple rectangular portals, Application of upper and lower bound theorems

**Module – IV**

Matrix method of analysis: flexibility and stiffness method, Application to simple trusses and beam

**Reference Books**

1. Indeterminate Structures by J.S. Kenney
2. Indeterminate Structures By C.K. Wang.
3. Matrix methods of Structural Analysis By Pandit and Gupta

## **BCE 307 - FLUID DYNAMICS (3-1-0) CR-04**

### **Module-I (15Hours)**

Dimensional Analysis: Introduction, Dimensional homogeneity, Methods of Dimensional Analysis, Model investigation, Similitude, Types of similarity, Model Laws, types of Models, Dimensionless numbers, Application of dynamic similarity to specific models.

Boundary Layer Theory: Introduction: Thickness of boundary layer, Boundary layer along a long thin plate and its characteristics, Boundary layer Equations, Momentum Integral Equations of boundary layer, separation of Boundary Layer, Methods of controlling Boundary layer.

Navier Stokes Equations of Motion: Significance of Body Force, Boundary Conditions, Viscous Force, Limiting cases of Navier – Stokes Equations, Applications of N-S Equations to Laminar flow between two straight parallel boundaries, and between concentric rotating cylinders.

Drag & Lift: Introduction; Types of Drag, Drag on a sphere, Cylinder, Flat plate & on an air foil, Polar diagram, Profile Drag, Lift on immersed bodies.

### **Module – II (10 Hours)**

Turbulent Flow in pipes: Reynolds observation on pipe flow, Causes and characteristics of turbulence. Reynolds stresses, Prandtl's Mixing length Theory, Velocity distribution in Rough pipes, Karman – Prandtl's Resistance Equations.

Non- uniform Flow in Open Channels: Specific energy, Critical flow, Discharge curve, Application of specific energy, Specific force, Classification of Surface profiles, Back water & draw down curves, Hydraulic jump. Flow transition in open channel.

### **Module – III (8 Hours)**

Impact of free jet: Introduction, force exerted by fluid jet on stationary flat plate, moving flat plate, Stationary curved vane, moving curved vane, Torque exerted on a wheel with radial curved vanes.

Turbines: Classification, reaction, impulse, outward flow, inward flow & mixed flow turbines, Francis & Kaplan turbines, Pelton Wheel, Physical description and principle of operation, Governing of turbine.

### **Module-IV (7 Hours)**

Centrifugal Pump: Principles of classification, Blade angles, Velocity triangle, Efficiency, Specific Speed, Characteristic curves.

Reciprocating Pump: Principle of Working, Slip, work done, effect of acceleration & Frictional resistance, Separation.

## **REFERENCE BOOKS**

1. Fluid Mechanics and Hydraulic Machines, Modi & Seth, Standard Publishers
2. Introduction to Fluid Mechanics and Fluid Machines, S.K. Som & G. Biswas,
3. Fluid Mechanics and Hydraulic Machines, A.K. Jain, Khanna Publishers

## **BCE308-TRANSPORTATION ENGINEERING-II (3-1-0) CR-04**

### **Module – I (10 Hours)**

History of Indian Railways, Component parts of railway track, Problems of multi gauge system, Wheel and axis arrangements, Coning of wheels, Various resistances and their evaluation, hauling capacity and tractive effort, stresses in rail, sleepers, ballast and formation.

Permanent way component parts : Types of rail section creep, wear and failure in rails, Rail joints, bearing plates, anti-creep devices, check and guard rails, Ballast requirements, Specifications, Formation, Cross-section, drainage.

### **Module – II (10 Hours)**

Geometric design : Alignment, horizontal curves, super elevation, equilibrium cant and cant deficiency, Length of transition curves, Gradients and grade compensation, vertical curves.

Point and Crossing : Design of simple turn out, various types of track junction and their configurations.

### **Module – III (10 Hours)**

Signaling and interlocking : Control of train movement and monitoring, types of signals, principles of interlocking.

Air Transport Development : Airport scenario in India – Stages of development, Aircraft characteristics, airport planning, site selection, Obstruction and zoning laws, Imaginary surfaces, Approach zones and turning zones.

### **Module – IV (10 Hours)**

Runways and Taxiway design : Elements of runway, orientation and configuration, Basic runway length and corrections, Geometric elements design, Taxiway design, Main and exit taxiway, Separation clearance, Holding aprons, Typical airport layouts, Terminal building, gate position.

Visual Aids and Air Traffic Control : Airport marking and lighting, Airway and airport traffic control, Instrumental landing systems and Air navigation aids.

### ***Text books :***

1. Railway Engineering, M.M. Agrawal, Prabha & Co., New Delhi
2. A Text Book of Railway Engineering, Dhanpat Rai & Sons
3. Railway Track Engineering, Tata McGraw Hill Book Co.
4. Airport Planning & design by S.K.Khanna, M.G. Arora & S.S.Jain- Nemchand & Bros.

## **BCE 309 - STEEL STRUCTURES (3-1-0) CR-04**

(IS: 800-2000 and Steel Tables are permitted in the examination)

### **Module – I**

Philosophy, concept and methods of design of steel structures. Structural elements, Structural steel sections, Rivetted and welded connections, Design of tension members.

### **Module – II**

Design of compression members, Design of columns, lacing and battening, Column base and foundation.

### **Module – III**

Design of beams, Plate girder and Gantry girder.

### **Module – IV**

Design of Roof trusses

### **Reference Books:**

1. Design of Steel Structures, Vol 1, By Ram Chandra and Virendra Gehlot. Scientific Publishers, Jodhpur.
2. Design of Steel Structures by L.S. Negi, Tata McGraw Hill Book Co.
3. Design of Steel Structures by B.C. Punmia, A.K. Jain and A.K. Jain. Laxmi Publishers.

## **BCE 310 - ADVANCED SURVEYING (3-1-0) CR-04**

### **Module – I**

Application of Theodolite Surveying – Tacheometry, Height & distance, Curve setting problems (Compound, Reverse & Transition), Traversing & Triangulation survey: Principle, Planning & Methods.

### **Module – II**

Photogrammetric Surveying – Principle, Scale, Number of Photographs, Deduction of distance & height, Elements of Astronomical survey, Solution of problems dealing with celestial triangle.

### **Module – II**

Principles of Remote Sensing & Geographic Information System, Application to Civil Engineering.

### **Module – IV**

Electronic distance measurement, Total Station, Global Positioning System.

### **Books for Reference:**

- (1) Surveying – Vol –II – By B.C. Punmia, A K Jain and A K Jain, Laxmi Publishers
- (2) Higher Surveying – Vol –II By B.C. Punmia, A K Jain and A K Jain, Laxmi Publishers
- (3) Surveying – Vol – I – By S.K.Duggal, Tata McGraw Hill Book Co.
- (4) Surveying – Vol – II – By S.K. Duggal, Tata McGraw Hill Book Co.

## **SESSIONAL**

### **BCE395-DESIGN OF CONCRETE STRUCTURES (0-0-3) CR-02**

Design of a Building with different structural elements like RCC Footings, Columns, Beams, Slabs, Staircases etc.

### **BCE 396 - TRANSPORTATION & GEOTECHNICAL ENGG. DESIGN (0-0-3) CR-02**

1. Design of earthen slope
2. Landfill Design
3. Design of retaining walls and bulkheads
4. Design of shallow foundation
5. Design of deep foundation
6. Design of machine foundation
7. Geometrical design of Highway
8. Design of flexible and rigid pavements by IRC method
9. Orientation and geometrical design of Runway.
10. Turn out design.
11. Earthwork calculation.

### **BCE397- STRUCTURAL ENGINEERING LAB (0-0-3) CR-02**

1. Determination of tensile strength and percentage of elongation of steel, Stress- strain curve of steel, Modulus of Elasticity.
2. Bend and rebend test of steel reinforcement.
3. Mix design of Concrete as per IS:10262-1982
4. Testing of RCC beam
5. Non-destructive tests of concrete
6. ILD for indeterminate structure
7. Finding reactions and forces for three hinged arch.

**BCE 398 - SURVEY PRACTICE – II (0-0-3) CR-02**

1. Sensitivity of bubble tube
2. Application of Tacheometry
  - (a) Determination of tacheometric constants.
  - (b) Solution of Height & distance problem.
  - (c) Traversing
3. Setting out
  - (a) Simple Circular Curve
  - (b) Transition Curve
4. Layout of a building
5. Demonstration of celestial sphere
6. Total Station
7. Trigonometric surveying