Birla Institute of Technology, Mesra, Patna Campus
Department of Civil Engineering
Syllabus of 5th Semester

CE 5001 **STRUCTURAL ANALYSIS-II** **Credits: 3**

I. Three-Moments Theorem:
Analysis of continuous beams, without or with support settlement

II. Influence lines for Continuous Beams:
Muller-Breslau principle, ILD for reaction, SF and BM of statically indeterminate beams using conjugate beam method

III. Principle of Least Work:
Analysis of statically indeterminate trusses and frames

IV. General Method:
Consistent deformation method, Flexibility method, Analysis of statically indeterminate beams, trusses and frames

V. Analysis of Arches:
Two-hinged arches: circular and parabolic

VI. Slope Deflection Method:
Analysis of continuous beams and portal frames without or with side sway, use of symmetric and anti-symmetric conditions

VII. Moment Distribution Method:
Analysis of continuous beams and portal frames without or with side sway, use of symmetric and anti-symmetric conditions

References:

1. TIMOSHENKO & YOUNG: Theory of Structures
2. KINNEY: Statically Indeterminate Structures

CE 5003 **FLUID MECHANICS-II** **Credits: 3**

I. Introduction:
Difference between open channel flow and pipe flow, geometrical   parameters of a channel; continuity equation

II. Uniform Flow:
Chezy's and Manning's equation for uniform flow in open channel, velocity distribution, most efficient channel section

III. Energy and Momentum principles:
Critical depth, concept of specific energy and specific force, application of specific energy principles for interpretation of open channel phenomena.

IV. Non-uniform flow in open channel:
Equation of gradually varied flow and its limitations, flow classification and surface profile, integration of varied flow by analytical, graphical and numerical methods

V. Hydraulics Jump, Surges, Water Waves:
Classical hydraulic jump, evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, open channel surge, celerity of gravity wave, deep and shallow water waves.

VI. Hydraulic pumps:
Introduction, Rotodynamic pumps classification on different basis, basic equations, velocity triangles, manometric head, efficiencies, cavitation in pumps, characteristic curves.

VII. Hydraulic Turbines:
Introduction, Rotodynamic machines, Pelton turbine, reaction turbine, Francis and Kaplan turbine, unit quantities, similarity laws and specific speed, cavitations, characteristic curves.

References:

i. Lal, Dr. Jagdish, Hydraulic Machines
ii. Garde, R.J. Fluid machines through problems, New Age International Pvt Ltd, 2nd Edition
iii. Streeter, V.L. and White, E.B., Fluid Mechanics, McGraw Hill, New York, 8th Edition
iv. Asawa, G.L. Experimental Fluid Mechanics, Vol 1., Nemchand and Bros, Roorkee
v. Ranga Raju, K.G., Flow through open channels, TMH, 2nd edition

CE 5005 **STRUCTURAL DESIGN-II** **Credits: 4**

I: Properties of Concrete and its Ingredients:

Types of cement and their characteristics; ingredients of concrete; Aggregates quality and grading – coarse and fine aggregates; Concrete types and their composition : use in different structural units; law of water-cement ratio; compaction requirement; additives and admixtures; Tests on cement and concrete; design of mix proportions by fineness modulus and trial mix methods Reinforcements – types of reinforcement and their properties;

II: Limit State Method of Design:

Design concepts, limit state of serviceability; characteristic strength of materials; characteristic loads; factored moment; partial safety factors; stress-strain relationship for concrete and steel; stress block parameters; limit state of collapse for flexure; singly and doubly reinforced rectangular and Tee beams

III: Limit state design for Shear, Bond and Torsion:

Shear reinforcement in form of vertical stirrups and bent-up bars; shear strength of concrete; minimum shear reinforcement; development length; design for torsion reinforcement

IV: Design of Slabs:

One way and two way slabs; circular slabs

V: Design of Columns:

Short axially loaded columns; helical reinforcement; columns with axial load and uniaxial/biaxial bending; interaction charts as per SP – 16

VI: Design of Foundations:

Isolated column footings of square, rectangular and circular shapes; combined footing; strip footing

VII: Design of Staircases:

Types of staircases; design of doglegged and open-well types

References:

i.   Reinforced Concrete by Dr. B.C. Punmia
ii.   Reinforced Concrete by Mallik and Gupta
iii.   Reinforced Concrete by Vazirani and Ratwani
iv.   Reinforced Concrete by S. Unikrishna Pillai and Devdas Menon

CE 5007   CONSTRUCTION PLANNING AND MANAGEMENT   Credits: 3

I. Introduction:
Indian construction Industry, Construction project management and its relevance. Stakeholders of a construction project. Project organization.

II. Construction Economics:
Introduction. Economic decision making. Cash-flow diagrams. Present worth comparison, Future worth comparison, Annual cost and worth comparison, Rate of return method. Project cost estimation-preliminary and revised estimates.

III. Construction Equipments:
Brief study of equipments required for earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting. Investment and operating costs, output of various equipments.

IV. Networks:
Elements of Networks and their definitions, events and Activities Rules of Network, partial situation and Fulkerson's rule. Development of Network. Forward planning, Backward planning event oriented, Activity oriented networks; Plan Breakdown; Sequencing example: House construction

V. Management techniques:
CTPM, PERT and BAR CHARTING with particular reference to Building Construction PERT - Time computations, Earliest expected time and its formulations, Latest allowable time and its computation; CPM - Network Analysis, Planning, scheduling and control; Start and finish times of activity EST, EFT, LST and LFT; Float and Total Floats, Free floats, Independent floats, Interfering floats; Per-critical, Sub-critical, Critical Activities, PERT network Analysis,
Slack positive, Negative, Zero slacks and Critical Paths in Network

VI. Management techniques (contd.):
CPM Cost Model, Resource allocation and Histograms; Project Management Software

VII. Public Works Accounts:
Various forms used in construction works, Measurement book, Cash book, Material at site account, Imprest account, Stock tools and plants, Various types of running bills, Secured advance, Final bills. Construction quality management.

Reference Books:
1. SHARMA S. C. : Construction Equipment and Management
2. PEURIFOY R. L. : Construction Planning, Equipments and Materials
3. PUNMIA B. C. : CPM and PERT Analysis

MSH 1131   **PRINCIPLES OF MANAGEMENT**   **Credits: 3**

Module-1:

Introduction of Management: Definition, Nature, Objective, Functions of Management, Managerial Skills, Managerial Role.

Module-2:

Evolution of Management Thought: Classical Theory- Max Weber's Beaurocratic Theory's, Taylor's Scientific Theory, Fayol's Functional Theory's.

Module-3:

Planning: Definition, Nature, Purpose, Importance, Types of planning, and Types of plan.

Module-4:

Organizing: Definition, Basic concepts of organization, Organizing process and its importance, Formal & Informal organization, Tall & Flat structure, Span of control.

Module-5:

Staffing: Recruitment, Selection, Placement, Training & Development, Performance Appraisal.

Module-6:

Directing: Meaning Leadership- Styles and Theories, Motivation, Maslow theory of motivation, Communication process.

Module-7:

Controlling : Nature, Purpose, Basic Elements of Control and Process.

Books Recommended

1. Elements of Management – Koontz and O'Donnell
2. Principles and Practices of Management – L.M.Prasad
3. Management Today – principles and Practices by Gene Burton & Manab Thakur
4. Management by Stoner & Freeman.