RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, VII-Semester

Departmental Elective CE 702(A) Prestressed Concrete Structures

Unit I

Introduction – Theory and Behaviour: Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections – Losses of prestress – Estimation of crack width.

Unit II

Design for Flexure and Shear: Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S.1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

Unit III

Deflection and Design of Anchorage Zone: Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

Unit IV

Composite and Continuous Beams and Slabs: Analysis and design of composite beams – Methods of achieving continuity in continuous beams – One and two way slabs, flat slab. Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

Unit V

Miscellaneous Structures: Design of tension and compression members – Tanks, pipes, sleepers and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

References Books:

1. Krishna Raju N., Prestressd Concrete, Tata Mc Graw Hill Book Co.Ltd. New Delhi.
2. Pandit.G.S. and Gupta.S.P., Prestressed Concrete, CBS Publishers and Distributers Pvt. Ltd.
3. Lin T. Y. and Ned H Burns., Design of Prestressed Concrete Structures, Wiley India Pvt. Ltd.
4. Dayaratran P., Prestressed Concrete Structures, Oxford & IBH Co., Delhi.

5. Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House.
6. IS: 1343, Indian Standard code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi.
7. IS: 784, Indian Standard Specification for Prestressed Concrete Pipes, Bureau of Indian Standards, New Delhi.
8. IS: 3935 - Code of Practice for Composite Construction, Bureau of Indian Standards, New Delhi.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, VII-Semester

Departmental Elective CE 702(B) Environmental Engg-II

(L-T-P: 3-1-0, Credit: 4)

Course Objectives:

O1:To design waste-watertreatment units by giving fundamental knowledge of primary, secondary and advanced wastewater treatment technologies.

O2**:** To learn fundamental concept of Air pollution, its behavior in atmosphere and introduction of Air-pollution chemistry.

Unit –I: Unit operations for waste-water treatment

Theory and design of preliminary treatment such as screens, grit chamber, sedimentation and chemical clarification, role of micro-organism in biological treatment.

Unit - II: Biological Treatment of waste-water

Methods of Biological Treatment (Theory & Design) –Trickling Filter, Activated Sludge process (ASP), Oxidation ditch, Septic tank &imhoff tank,theory of sludge.

Unit – III: Advanced Waste-water treatment

Diatomaceous earth filters, Ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal.

UNIT IV: Introduction of Air pollution

Definition, Sources, classification and characterization of air pollutants. Effects of air pollution on health, vegetation & materials, photochemical smog.

UNIT V: Air pollution chemistry

meteorological aspects of air pollution dispersion; temperature lapse rate and stability, wind velocity and turbulence, plume behaviour, dispersion of air pollutants, the Gaussian Plume Model.

Course Outcomes:
At the end of the course, students would be able to

CO1: Carry out municipal wastewater treatment system design and operation.
CO2: Analyze and design of biological treatment plant, ponds, and various tanks.
CO3: Apply knowledge of environmental treatment technologies and design processes.

CO4: Apply knowledge of Air pollution and Air-pollution chemistry.

Reference Books:

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, 2. (P) Ltd. New Delhi
3. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
4. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company

5. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi
6. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
7. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi

Departmental Elective CE 702(C) Structural Dynamics

Course Objective
The objective of the course is to understand the behavior of structure to various dynamic loads.

Course
Contents

Unit 1
Undamped Single Degree of Freedom System

Degree of freedom, undamped system, Force displacement relation, damping force, Equation of motion, mass-spring damper system, D'Alembert's Principle, Solution of differential equation of motion, frequency, period and amplitude of motion.

Unit-2
Damped Single Degree of Freedom System
Viscous damping, equation of motion, critically damped systems, over and under damped systems, logarithmic decrement.

Unit-3
Response to harmonic and periodic vibrations
Harmonic vibration of undamped and viscously damped systems, natural frequency and damping, force transmission and vibration isolation, Fourier series representation, response to periodic force.

Unit-4
Response to Arbitrary, Step, and Pulse Excitation
Response to unit impulse, arbitrary force, Duhamel's Integral, step force, rectangular pulse force, half cycle sinusoidal pulse force, triangular pulse force.

Unit-5
Multi Degree of Freedom System:

Matrix formulation, stiffness and flexibility influence coefficients, eigen value problem, normal modes and their properties. Matrix iteration technique for eigen value, and eigen vectors, Free and forced vibration by modal analysis.

Course Outcome
The students will learn the effect of dynamic loading on the structure and its analysis.

Evaluation: Evaluation will be continuous and integral part of the class followed by final

examination. **Reference Books:**
1. Chopra A. K., Dynamics of Structures, Prentice Hall of India, NewDelhi,
2. Clough R.W., Penzien J., Dynamics of structures,McGraw-Hill
3. Biggs J M, Introduction to StructuralDynamics
4. Mario Paz, Structural Dynamics, CBS publishers NewDelhi

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New Scheme Based On AICTE Flexible Curricula

Civil Engineering, VII-Semester

Departmental Elective CE 702(D) Structural Design and Drawing (RCC-II)

Unit – I

Design of Multistory Buildings - Sway and nonsway buildings, Shear walls and other bracing elements.

Unit II

Design of Earth Retaining Structures: Cantilever and counter fort types retaining walls.

Unit - III

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

Unit – IV

Design of Silos and Bunkers

Unit - V

T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.

Suggested Books: - 1. R.C.C. by O.P. Jain Vol. II

2. R.C.C. by B.C. Punmia

3. Essentials of Bridge engineering – D.J. Victor

4. Bridge Engineering – Ponnuswamy

5. Advanced R.C.C. Design by N.K. RAJU

6. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.

7. Pre stresses concrete – T.Y. Lin