UNITII FORMWORK MATERIALS AND TYPES 9

Timber, Plywood, Steel, Aluminium, Plastic, and Accessories. Horizontal and Vertical Formwork Supports. Flying Formwork, Table Form, Tunnel Form, Slip Form, Formwork for Precast Concrete,

UNIT III FORMWORK DESIGN 9

Concepts, Formwork Systems and Design for Foundations, Walls, Columns, Slab and Beams.

UNIT IV FORMWORK DESIGN FOR SPECIAL STRUCTURES 9

Shells, Domes, Folded Plates, Overhead Water Tanks, Natural Draft Cooling Tower, Bridges.

UNIT V FORMWORK FAILURES 9

Formwork Management Issues – Pre- and Post-Award. Formwork Failures: Causes and Case studies in Formwork Failure, Formwork Issues in Multi story Building Construction.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Select proper formwork, accessories and material
CO2	Design the form work for Beams, Slabs, columns, Walls and Foundations
CO3	Design the form work for Special Structures
CO4	Describe the working of flying formwork.
CO5	Judge the formwork failures through case studies

REFERENCES:

1. Formwork for Concrete Structures, R.L.Peurifoy, McGraw Hill India, 2010.
2. Formwork for Concrete Structures, Kumar NeerajJha, Tata McGraw Hill Education, 2012.
3. IS 14687: 1999, False work for Concrete Structures - Guidelines, BIS.
4. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996
5. Michael P. Hurst, Construction Press, London and New York, 2003.

COs- PO's & PSO's MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	-	-	2	2	1
2	3	1	2	2	2	2
3	3	2	3	2	2	3
4	3	-	-	2	3	2
5	2	2	2	2	3	2
Avg	2.8	1.67	2.33	2	3	2

ST4073 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To study the damages, repair and rehabilitation of structures

UNIT I MAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, Repair and Rehabilitation, retrofit and strengthening, need for rehabilitation of structures- Service life behaviour - importance of Maintenance, causes and effects of deterioration. Non-destructive Testing Techniques

UNIT II STRENGTH AND DURABILITY OF CONCRETE 9

Quality assurance for concrete based on Strength, Durability and Microstructure of concrete - NDT techniques- Cracks- different types, causes – Effects due to Environment, Fire, Earthquake, Corrosion of steel in concrete, Mechanism, quantification of corrosion damage

UNIT III REPAIR MATERIALS AND SPECIAL CONCRETES 9

Repair materials-Various repair materials, Criteria for material selection, Methodology of selection, Special mortars and concretes- Polymer Concrete and Grouting materials- Bonding agents-Latex emulsions, Epoxy bonding agents, Protective coatings-Protective coatings for Concrete and Steel, FRP sheets

UNIT IV PROTECTION METHODS AND STRUCTURAL HEALTH MONITORING 9

Concrete protection methods – reinforcement protection methods- cathodic protection - Sacrificial anode - Corrosion protection techniques – Corrosion inhibitors, concrete coatings-Corrosion resistant steels, Coatings to reinforcement, Structural health monitoring.

UNIT V REPAIR, RETROFITTING AND DEMOLITION OF STRUCTURES 9

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Repair to active cracks, Repair to dormant cracks. Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Techniques, Strengthening Methods for Structural Elements. Engineered Demolition -Case studies

TOTAL: 45 PERIODS

REFERENCES:

1. Dodge Woodson, Concrete Structures, Protection, Repair and Rehabilitation, Butterworth-Heinemann, Elsevier, New Delhi 2012
2. DovKominetzky.M.S., - Design and Construction Failures, Galgotia Publications Pvt. Ltd., 2001
3. Ravishankar.K., Krishnamoorthy. T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Allied Publishers, 2004.
4. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.
5. Hand Book on “Repair and Rehabilitation of RCC Buildings” – Director General works CPWD, Govt of India, New Delhi – 2002
6. BS EN 1504 - Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Explain the importance of maintenance assessment and repair strategies
CO2	Acquire knowledge of strength and durability properties and their effects due to climate and temperature.
CO3	Gain knowledge of recent developments in repair
CO4	Explain the techniques for repair and protection methods
CO5	Explain the repair, rehabilitation and retrofitting of structures and demolition methods.

COs- PO’s & PSO’s MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	-	2	3	2	2
2	3	1	-	2	2	1
3	3	-	2	2	3	1
4	3	1	-	3	2	2
5	3	2	1	2	2	1
Avg	3	1.33	1.67	2.40	2.20	1.40

ST4161 ADVANCED CONSTRUCTION ENGINEERING AND EXPERIMENTAL TECHNIQUES LABORATORY

L	T	P	C
0	0	4	2

A) ADVANCED CONSTRUCTION ENGINEERING LABORATORY

OBJECTIVE:

- To provide a thorough knowledge of material selection through the material testing based on specification

LIST OF EXPERIMENTS

1. Mix design of concrete as per IS, ACI & BS methods for high performance concrete.
2. Flow Characteristics of Self Compacting concrete.
3. Effect of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.
4. NDT on hardened concrete - UPV, Rebound hammer and core test.
5. Permeability test on hardened concrete (RCPT) – Demonstration

TOTAL: 30 PERIODS

OUTCOMES:

On completion of the course, the student will be able to

CO1	Do the mix proportion using IS and ACI codal provisions.
CO2	Test the concrete in a non-destructive manner using rebound hammer.
CO3	Know the permeability characteristics of concrete.
CO4	Observe the effect of mineral and chemical admixture in concrete.
CO5	Study the flow characteristics of self-compacting concrete

B) EXPERIMENTAL TECHNIQUES LABORATORY

OBJECTIVE:

- To provide a detailed account of modern experimental techniques in construction Engineering research.
- To introduce the basic working principles, the operational know-how, and the strength and limitations of the techniques.

LIST OF EXPERIMENTS

1. Determination of elastic constants – Hyperbolic fringes
2. Determination of elastic constants – Elliptical fringes
3. Strain gauge meter – Determination of Young's modulus of a metallic wire
4. Ultrasonic interferometer – ultrasonic velocity in liquids
5. Electrical conductivity of metals and alloys with temperature-four probe method
6. Resistivity measurements
7. NDT – Ultrasonic flaw detector
8. Calibration of Proving Ring and LVDT

TOTAL: 30 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Gain practical knowledge by applying the experimental methods to correlate with the theory
CO2	Learn the usage of electrical and optical systems for various measurements.
CO3	Apply the analytical techniques and graphical analysis to interpret the experimental data
CO4	Gain practical knowledge of non-destructive testing
CO5	Learn to calibrate and use proving rings and LVDTs

COs- PO's & PSO's MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	2	2	3	3	3
2	3	1	-	2	1	1
3	2	-	2	3	2	3
4	3	1	2	3	2	2
5	3	-	1	2	1	1
Avg	**2.8**	**0.8**	**1.4**	**2.6**	**1.8**	**2**

ST4111 **TECHNICAL SEMINAR** **L T P C**
0 0 2 1

OBJECTIVE:

- To work on a specific technical topic in Structural Engineering in order to acquire the skills of oral presentation and to acquire technical writing abilities for seminars and conferences.

SYLLABUS: The students will work for two hours per week guided by a group of staff members. They will be asked to talk on any topic of their choice related to Structural Engineering and to engage in dialogue with the audience. A brief copy of their talk also should be submitted. Similarly, the students will have to present a seminar of not less than fifteen minutes and not more than thirty minutes on the technical topic. They will also answer the queries on the topic. The students as the audience also should interact. Evaluation will be based on the technical presentation and the report and also on the interaction during the seminar.

TOTAL: 30 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Identify the latest developments in the field of Structural Engineering
CO2	Acquire technical writing abilities for seminars, conferences and journal publications
CO3	Use modern tools to present the technical details
CO4	Conduct brainstorming sessions on technical concepts
CO5	Gain insight on upcoming trends in Structural Engineering

COs- PO's & PSO's MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	2	2	3	1	1
2	3	1	-	3	-	3
3	2	-	2	2	1	2
4	2	1	3	3	3	3
5	3	2	2	3	1	2
Avg	2.6	1.2	1.8	2.8	1.2	2.2

ST4201 ADVANCED STEEL STRUCTURES L T P C
3 1 0 4

OBJECTIVE:

- To study the behaviour of members, connections and industrial buildings

UNIT I GENERAL 12

Design Philosophies and Design Codes (IS, EC, AISC) – Stability Criteria –Beam- Columns and Frames (Sway and Non-Sway) – Design of members subjected to combined forces – Design of Purlins, Louver rails, Gable column and Gable wind girder.

UNIT II DESIGN OF CONNECTIONS 12

Types of connections – Welded and Bolted – Design of simple base, Gusseted base and Moment Resisting Base – Flexible Connections - Seated Connections – Unstiffened and Stiffened Seated Connections – Moment Resistant Connections– Clip angle Connections – Split beam Connections.

UNIT III ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS 12

Structural Configurations - Functional and Serviceability Requirements- Analysis and design of different types of trusses – Analysis and design of industrial buildings – Sway and non-sway frames –Gantry Girders –Earthquake resistant design of steel buildings.

UNIT IV PLASTIC ANALYSIS OF STRUCTURES 12

Introduction, Shape factor - Moment redistribution - Beam, Sway, Joint and Gable mechanisms - Combined mechanisms– Analysis of portal frames, Effect of axial force and shear force on plastic moment capacity, Connection Requirements– Moment resisting connections - Design of Straight Corner Connections –Design of continuous beams.

UNIT V DESIGN OF LIGHT GAUGE STEEL STRUCTURES 12

Introduction to Direct Strength Method - Behaviour of Compression Elements - Effective width for load and deflection determination – Behaviour of Unstiffened and Stiffened Elements – Design of webs of beams – Flexural members – Lateral buckling of beams – Shear Lag – Flange Curling – Design of Compression Members – Wall Studs.

TOTAL: 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Design the steel members such as purlins, gable wind girders subjected to combined forces
CO2	Explain and design different types of steel connections such as welded and bolted flexible as well as moment resisting connections
CO3	Analyze and design industrial structures such as trusses and portal frames subjected to wind and seismic forces
CO4	Explain the effect of axial force and shear force on steel structures and analyse continuous beams and frames using plastic theory
CO5	Evaluate the behaviour and design of compression and flexural Cold-formed Steel members

REFERENCES:

1. Lynn S. Beedle, Plastic Design of Steel Frames, John Wiley and Sons, 1997.
2. Narayanan.R.et.al., Teaching Resource on Structural steel Design, INSDAG, Ministry of Steel Publishing, 2000.
3. Subramanian. N, Design of Steel Structures, Oxford University Press, 2016.
4. Wie Wen Yu, Design of Cold-Formed Steel Structures, McGraw Hill Book Company, 2019
5. S.K. Duggal, Limit State Design of Steel Structures, McGraw Hill Book Company, 2017

COs- PO's & PSO's MAPPING

CO	PO			PSO		
	1	2	3	1	2	3
1	3	2	3	3	3	3
2	3	2	3	3	3	2
3	3	3	2	3	3	2
4	3	2	2	3	2	3
5	3	2	2	3	2	3
Avg	3	2.2	2.4	3	2.6	2.6

ST4202 ADVANCED CONCRETE STRUCTURES L T P C
3 1 0 4

OBJECTIVE:

- To make the students familiar with the behaviour of RCC beams and columns and to design special structural members with proper detailing

UNIT I BEHAVIOUR AND DESIGN OF R.C. BEAMS 12

Properties and behaviour of concrete and steel – Behaviour and design of R.C. beams in flexure, shear and torsion - modes of failure - calculations of deflections and crack width as per IS 456.

UNIT II BEHAVIOUR AND DESIGN OF R.C. COLUMNS 12

Behaviour of short and long columns - behaviour of short column under axial load with uniaxial and bi-axial moments - construction of P_u - M_u interaction curves - Design of slender columns -

UNIT III DESIGN OF SPECIAL R.C. ELEMENTS 12

Design of RC walls - design of corbels - strut and tie method - design of simply supported and continuous deep beams - analysis and design of grid floors.

UNIT IV FLAT SLABS AND YIELD LINE BASED DESIGN 12

Design of flat slabs according to IS method – Check for shear - Design of spandrel beams - Yield line theory and design of slabs - virtual work method - equilibrium method.

UNIT V INELASTIC BEHAVIOUR OF CONCRETE STRUCTURES 12

Inelastic behaviour of concrete beams - Moment-curvature curves - moment redistribution - Concept of Ductility – Detailing for ductility – Design of beams, columns for ductility - Design of cast-in-situ joints in frames.

TOTAL: 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Explain the structural behaviour of flexural members and columns
CO2	Design the compression members and construct interaction diagrams
CO3	Design the special elements like corbels, deep beams and grid floors
CO4	Design flat slab and spandrel beams
CO5	Predict the moment curvature behavior and design and detail concrete elements based on ductility

REFERENCES:

1. Gambhir.M. L., “Design of Reinforced Concrete Structures”, Prentice Hall of India, 2012.
2. Purushothaman, P, “Reinforced Concrete Structural Elements: Behaviour Analysis and Design”, Tata McGraw Hill, 1986
3. Unnikrishna Pillai and Devdas Menon “Reinforced Concrete Design’, Third Edition, Tata McGraw Hill Publishers Company Ltd., New Delhi, 2017.
4. Varghese, P.C, “Advanced Reinforced Concrete Design”, Prentice Hall of India, 2020.
5. Sinha.S.N., Reinforced Concrete Design", Tata McGraw Hill publishing company Ltd.2017

COs- PO’s & PSO’s MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	-	-	3	2	2
2	3	2	2	3	2	2
3	3	2	2	3	2	2
4	3	2	2	2	3	2
5	3	2	2	2	3	2
Avg	**3**	**2**	**2**	**2.6**	**2.4**	**2**

ST4203 FINITE ELEMENT ANALYSIS IN STRUCTURAL ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- To make the students understand the basics of the Finite Element Technique, and to cover the analysis methodologies for 1-D, 2-D and 3-D Structural Engineering problems.

UNIT I INTRODUCTION 9

Introduction - Basic Concepts of Finite Element Analysis - Introduction to Elasticity- Steps in Finite Element Analysis - Finite Element Formulation Techniques - Virtual Work and Variational Principle - Galerkin Method - Finite Element Method: Displacement Approach - Stiffness Matrix and Boundary Conditions

UNIT II ELEMENT PROPERTIES 9

Natural Coordinates - Triangular Elements-Rectangular Elements - Lagrange and Serendipity Elements - Solid Elements - Isoparametric Formulation - Stiffness Matrix of Isoparametric Elements Numerical Integration: One, Two and Three Dimensional - Problems

UNIT III ANALYSIS OF FRAME STRUCTURES 9

Stiffness of Truss Members-Analysis of Truss-Stiffness of Beam Members-Finite Element Analysis of Continuous Beam-Plane Frame Analysis-Analysis of Grid and Space Frame

UNIT IV TWO AND THREE DIMENSIONAL SOLIDS 9

Constant Strain Triangle - Linear Strain Triangle - Rectangular Elements- Numerical Evaluation of Element Stiffness - Computation of Stresses, Geometric Nonlinearity and Static Condensation - Axisymmetric Element - Finite Element Formulation of Axisymmetric Element - Finite Element Formulation for 3 Dimensional Elements- Problems

UNIT V APPLICATIONS OF FEM 9

Introduction to Plate Bending Problems - Finite Element Analysis of Thin Plate - Finite Element Analysis of Thick Plate - Finite Element Analysis of Skew Plate -Introduction to Finite Strip Method - Finite Element Analysis of Shell -Finite Elements for Elastic Stability - Dynamic Analysis

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Formulate a finite element problem using basic mathematical principles
CO2	Explain the various types of elements and select the appropriate element for modelling
CO3	Analyse a frame using truss element
CO4	Formulate and analyse the two- and three-dimensional solid finite element problems
CO5	Analyse shells, thick and thin plates and explain the dynamic analysis using FEM

REFERENCES:

1. David Hutton, "Fundamentals of Finite Element Analysis", Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.
2. Logan D. L,A First Course in the Finite Element Method, Thomson- Engineering, 3rd edition, 2010.
3. Zienkiewicz, O.C. and Taylor, R.L., "The Finite Element Method", Seventh Edition, McGraw – Hill, 2013.
4. Chandrupatla, R.T. and Belegundu, A.D., "Introduction to Finite Elements in Engineering", Fourth Edition, Prentice Hall of India, 2015.
5. Moaveni, S., "Finite Element Analysis Theory and Application with ANSYS", Prentice Hall Inc., 2020.

COs- PO's & PSO's MAPPING

CO	**PO**			**PSO**		
	1	**2**	**3**	**1**	**2**	**3**
1	3	2	3	2	2	2
2	3	3	-	2	2	2
3	3	2	3	2	3	2
4	3	2	3	2	3	2
5	3	3	2	2	3	2
Avg	**3**	**2.4**	**2.75**	**2**	**2.6**	**2**

ST4211 NUMERICAL AND FINITE ELEMENT ANALYSIS LABORATORY L T P C
0 0 4 2

OBJECTIVE:

- To solve the mathematical equations and finite element analysis with computational methods like MATLAB and Finite element software using software like ANSYS, ABAQUS etc

EXPERIMENTS/ EXERCISES

1. Dynamic analysis of frame using mathematical computational software
2. Finite Element Analysis of 2D truss and 3D space trusses
3. Modelling and Finite Element Analysis of RC beams and slabs
4. Finite Element Analysis of thin and thick plates
5. Stability analysis using FEM

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student will be able to carry out

CO1	Thorough knowledge to handle FE software
CO2	Dynamic analysis of frames
CO3	Analysis of thin and thick plates
CO4	Stability Analysis
CO5	Learn to use MATLAB and import MATLAB codes for FE modelling

COs- PO's & PSO's MAPPING

CO	PO			PSO		
	1	2	3	1	2	3
1	3	-	3	3	3	3
2	3	2	3	3	3	2
3	3	3	2	2	3	2
4	3	3	2	2	3	3
5	3	1	3	2	3	3
Avg	3	1.8	2.6	2.4	3	2.6

ST4212 STRUCTURAL DESIGN STUDIO L T P C
0 0 4 2

OBJECTIVE:

- To design a structure using modern software tools available like ETABS, STAAD, STRAP, etc. and present it in the form of a complete detailed drawing. Students have to work individually with standard codes, computational tools and software packages for analyzing, designing and detailing a structure. A detailed report on the work done shall be submitted by individual students in the form of a report and presentation.

TOTAL: 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Understand the requirements of a structure and model it accordingly using computer software
CO2	Analyze the structure for various loads and load combinations according to the relevant IS codes
CO3	Design and detail structures using computer software/tools and check the correctness using manual approximate methods
CO4	Prepare the complete structural drawings using computer software
CO5	Observe the flow of forces in a structure and its response to it.

COs- PO's & PSO's MAPPING

CO	PO			PSO		
	1	2	3	1	2	3
1	3	-	2	3	3	3
2	3	3	1	2	3	2
3	2	-	3	2	3	2
4	3	3	2	3	-	1
5	3	1	3	3	3	3
Avg	2.8	1.4	2.2	2.6	2.4	2.2

ST4311 PRACTICAL TRAINING (4 Weeks) L T P C
0 0 0 2

OBJECTIVE:

- To train the students in the field work so as to have firsthand knowledge of practical problems related to Structural Engineering in carrying out engineering tasks.

SYLLABUS: The students individually undertake training in reputed engineering companies doing Structural Engineering during the summer vacation for a specified duration of four weeks. At the end of the training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal staff.

COs- PO's & PSO's MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	1	2	2	2	2
2	3	2	2	3	2	3
3	3	2	3	3	3	3
4	2	1	3	3	3	3
5	2	2	3	3	3	2
Avg	**2.6**	**1.60**	**2.60**	**2.80**	**2.60**	**2.60**

CN4071 ADVANCED CONCRETE TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:

- To study the properties of concrete making materials, tests, mix design, special concretes, and various methods for making concrete.

UNIT I CONCRETE MAKING MATERIALS 9

Aggregates classification IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates - Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, special cements - Water - Chemical admixtures, Mineral admixture.

UNIT II MIX DESIGN 9

Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Mix design for special concretes- changes in Mix design for special materials.

UNIT III CONCRETING METHODS 9

Process of manufacturing of concrete, methods of transportation, placing and curing, cracking, plastic shrinkage, Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete

UNIT IV SPECIAL CONCRETES 9

Light weight concrete Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting Concrete, Geo Polymer Concrete, Waste material-based concrete – Ready mixed concrete.

UNIT V TESTS ON CONCRETE 9

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete. Non-destructive Testing Techniques - microstructure of concrete

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Develop knowledge on various materials needed for concrete manufacture
CO2	Apply the rules to do mix designs for concrete by various methods
CO3	Develop the methods of manufacturing of concrete.
CO4	Explain about various special concrete
CO5	Explain various tests on fresh and hardened concrete

REFERENCES:

1. Gupta.B.L., Amit Gupta, “Concrete Technology, Jain Book Agency, 2017.
2. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2019.
3. Gambhir.M.L., Concrete Technology, McGraw Hill Education, 2006.
3. Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.
4. Job Thomas., Concrete Technology, Cencage learning India Private Ltd, New Delhi, 2015.

CO-PO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	1
CO2	2	2	2	2	2	2
CO3	3	2	3	3	1	2
CO4	3	2	3	2	2	1
CO5	2	2	2	2	2	2

ST4071 ADVANCED PRESTRESSED CONCRETE L T P C
3 0 0 3

OBJECTIVE:

- To develop an understanding of the philosophy of design of prestressed concrete
- To be able to design indeterminate prestressed concrete structure
- To design the prestressed concrete bridge and composite sections.

UNIT I INTRODUCTION 9

Concepts of Prestressing – Materials and methods of prestressing – Design philosophy- Analysis methods, Time-dependent deformation of concrete and losses of prestress.

UNIT II DESIGN FOR FLEXURE, SHEAR AND TORSION 9

Behaviour of flexural members, determination of ultimate flexural strength using various Codal provisions - Design for Flexure, Shear, torsion and bond of pre-stressed concrete elements – Transfer of prestress – Box girders - Camber, deflection and crack control.

UNIT III DESIGN OF CONTINUOUS AND COMPOSITE BEAMS 9

Statically indeterminate structures - Analysis and design of continuous beams and frames– Choice of cable profile - Methods of achieving continuity – concept of linear transformations, concordant cable profile and gap cables – Composite sections of prestressed concrete beam and cast in situ RC slab - Design of composite sections - Partial prestressing - Limit State design of partially prestressed concrete beams

UNIT IV DESIGN OF TENSION AND COMPRESSION MEMBERS 9

Pre-stressed concrete compression and tension members – application in the design of prestressed pipes and prestressed concrete cylindrical water tanks – Design of compression members with and without flexure – its application in the design of piles, flag masts and similar structures – Two way pre-stressed concrete floor systems – Connections for pre-stressed concrete elements

UNIT V DESIGN OF PRESTRESSED CONCRETE BRIDGES 9

Review of IRC and IRS loadings. Effect of concentrated loads on deck slabs, load distribution methods for concrete bridges. Analysis and Design of superstructures - Design of pre-stressed concrete bridges incorporating long-term effects like creep, shrinkage, relaxation, and temperature effects, Dynamic response of bridge decks.

TOTAL: 45 PERIODS