

Govt. Polytechnic Talwar (H.P.)

Lesson Planning (Theory)

Branch : CIVIL ENGG

Semester: 5th

Subject : Design of RCC Structures

Session : AUG- DEC 2024

Teacher: NAVEEN BHARTI

Class Room: A-201

| S.No. | No. of Lectures | Chapter/ Unit Description | Detail of Contents | Reference Resources | Remarks |
|-------|-----------------|---|--|---------------------|---------|
| 1 | 6 | Introduction to R.C.C Designing using Limit State Method | 1.1 Design Philosophies: Working Stress Theory, Ultimate Design Theory, Limit State Theory Concept of Reinforced Cement Concrete (RCC) Reinforcement Materials: 1.2 Suitability of Steel as reinforcing material 1.3 Properties of mild steel and HYSD steel 1.4 Loading on structure as per I.S 875. 1.5 Study of BIS:456-2000-clause5, clause6, clause9, Clause18, clause19, clause22, clause 23.0, 23.2, 23.3, Clause25, clause26, clause35, clause36, clause37, clause 38, clause 39, clause 40, clause 41, clause42, clause 43, Annexure–B, C, D, E, G □ | R1 | |
| 2 | 8 | Shear, Bond, and Development Length (LSM) | 2.1 Nominal Shear stress in R.C. Section, Design shear strength of concrete, maximum shear stress, Design of shear reinforcement, Minimum shear reinforcement, Forms of shear reinforcement with numerical problems. 2.2 Bond and types of bonds, Bond Stress, check for bond stress, Development length in tension and compression, anchorage value for hooks 90° bend and 45° bend. Standard Lapping of bars, check for development length. 2.3 Determination of development length required for tension reinforcement of cantilevers beam and slab, check for development length. | R1 | |
| 3 | 10 | Analysis and Design of Singly Reinforced Sections | 3.1 Limit State of collapse (Flexure), Assumption stress. Strain relationship for concrete and steel, neutral axis, Stress block diagram and Strain diagram for singly reinforced section. □ 3.2 Concept of under- reinforced, over-reinforced and balanced section, neutral axis, limiting value of moment of resistance and limiting percentage of steel required for balanced singly R.C. Section. □ 3.3 Simple numerical problems on determining design constants, moment of resistance and area of steel. 3.4 Design of Singly reinforced simply supported beam and cantilever beam. | R1 | |
| 4 | 6 | Analysis and Design of Doubly Reinforced Sections (LSM) | 4.1 General features, necessity of providing doubly reinforced reinforcement, limitations. 4.2 Analysis of doubly reinforced section, strain diagram, stress diagram, depth of neutral axis, moment of resistance of the section. 4.3 Numerical problems on finding moment of resistance. | R2 | |
| 5 | 6 | Design of One-Way Slab (LSM) | 5.1 Analysis & Design of simply supported one-way slab. | R2 | |
| 6 | 10 | Two Way Slab | 6.1 Design of two-way simply supported slab with corners free & no | | |

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| | | (LSM) | provision for torsion reinforcement | | |
| 7 | 10 | Design of Axially Loaded Column (LSM) | <p>7.1 Assumptions in limit state of collapse–compression</p> <p>7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square, and circular sections, diameter and spacing of lateral ties. (No numerical on helical ties).</p> <p>7.3 Analysis and Design of axially loaded: Uniaxial & Biaxial Bending along with axial loading: short, square, rectangular, and circular columns with lateral ties only; check for short column and check for minimum eccentricity may be applied. □</p> | R2 | |

REFERENCE RESOURCES

- R1- Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune.
- R2- . Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co.,

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Govt. Polytechnic Talwar (H.P.)

Lesson Planning (Theory)

Branch : CIVIL ENGG

Semester: 5th

Subject : Estimating and Costing

Session : AUG- DEC 2024

Teacher: NAVEEN BHARTI

Class Room: A-201

| S.No. | No. of Lectures | Chapter/ Unit Description | Detail of Contents | Reference Resources | Remarks |
|-------|-----------------|---|---|---------------------|---------|
| 1 | 8 | introduction | 1.1 Meaning of the terms estimating & costing. Purpose of estimating and costing Types of Estimates 1.2 Approximate and Detailed Approximate estimate Types Plinth area rate method Cubic Content method 1.3 Approximate Quantity method Types of detailed estimate Detailed estimate for new work Revised estimate Supplementary estimate Repair & Maintenance estimate | R1 | |
| 2 | 10 | Measurement | 2.1 Units of measurement for various items of work as per BIS: 1200 Rules for measurements. 2.2 Different methods of taking out quantities—centre line method and long wall and short wall method | R1 | |
| 3 | 10 | Preparation of Detailed Estimates and Abstract of Cost for | 3.1 One & two room residential building with flat roof • Septic tank for 10 users | R1 | |
| 4 | 10 | Road Estimation: Preparation of Detailed Estimates and Abstract of Cost for | 4.1 Plain road with mid section area method, mean sectional area method, prismatic formula. • Earth work in hill road. | R1 | |
| 5 | 8 | Analysis of Rates | 5.1 Cement mortars of different proportion Cement concrete of different proportion RCC work in different proportions Brick/stone masonry in cement mortar Plastering and pointing Whitewashing, painting 5.2 Preparation of Detailed Analysis of Rates for finished items with given labour and rate of material Earthwork Cement concrete of different proportion RCC work in different proportions | R1 | |

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| | | | Brick/stone masonry in cement mortar Plastering and pointing Whitewashing, painting | | |
| 6 | 10 | Contracts And Tendering | 6.1 Meaning of contract Qualities of a good contractor and their qualifications. Essentials of a contract 6.2 Types of contracts, their advantages, dis-advantages and suitability, system of payment. Single and two cover-bids 6.3 Tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period 6.4 Administrative approval, Technical sanction, Budget provision, Expenditure sanction. Methods for carrying out works- contract method. 6.5 Preparation of Tender Document based on Common Schedule Rates (CSR) 6.6 Introduction to CSR and calculation of cost based on premium on CSR. | R1 | |

REFERENCE RESOURCES

- R1- Dutta, B.N., Estimating and Costing in Civil engineering, UBS Publishers Distributors Pvt. Ltd. New Delhi

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Govt. Polytechnic Talwar (H.P.)

Lesson Planning (Theory)

Branch : CIVIL ENGG

Semester: 5th

Subject : Water Resource Engineering

Session : AUG- DEC 2024

Teacher:

Class Room: A-201

| S.No. | No. of Lectures | Chapter/ Unit Description | Detail of Contents | Reference Resources | Remarks |
|-------|-----------------|--|--|---------------------|---------|
| 1 | 10 | Introduction to Hydrology | 1.1 Hydrology: Definition and Hydrological cycle 1.2 Rain Gauge: Symons rain gauge, automatic rain gauge, 1.3 Methods of calculating average rainfall: Arithmetic mean, Iso-hyetal, and Thiessen polygon method. 1.4 Runoff, Factors affecting Runoff, Computation of run-off. | R1 | |
| 2 | 10 | Crop water requirement and Reservoir Planning | 2.1 Irrigation and its classification. 2.2 Crop Water requirement: Cropping seasons, Crop period, base period, Duty, Delta, CCA, GCA, intensity of irrigation, factors affecting duty, Problems on water requirement 2.3 Methods of application of irrigation water and its assessment. 2.4 Silting of reservoir, Rate of silting, factors affecting silting and control measures | R1 | |
| 3 | 10 | Dams and Spillways | 3.1 Dams and its classification: Earthen dams and Gravity dams (masonry and concrete). 3.2 Earthen Dams– Components with function, typical cross-section, seepage through embankment and foundation and its control. 3.3 Methods of construction of earthen dam, types of failure of earthen dam and preventive measures. 3.4 Gravity Dams– Forces acting on dam, Theoretical and practical profile, typical cross-section. (only theoretical concept) 3.5 Spillways-Definition, function & location | R1 | |
| 4 | 10 | Minor and Micro Irrigation | 4.1 Lift irrigation Scheme-Components and their functions, Layout. 4.2 Drip and Sprinkler Irrigation-Need, components, and Layout. 4.3 Well irrigation: types and yield of wells, advantages and disadvantages of well irrigation. | R2 | |

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| 5 | 10 | Diversion Head Works & Canals | <p>5.1 Weirs—components, parts, types of weirs</p> <p>5.2 Barrages—components and their functions. Difference between weir and Barrage. Canals— Classification according to alignment and position in the canal network, Cross section of canal in embankment and cutting, partial embankment and cutting.</p> <p>5.3 Canal lining-Purpose, material used and its properties, advantages.</p> <p>5.4 Cross Drainage Works-Aqueduct, siphon aqueduct, super passage, level crossing.</p> <p>5.5 Canal Regulators- Head regulator, Cross regulator, Escape, Falls and Outlets</p> | R2 | |
| 6 | 6 | Water logging | 6.1 Definition, Causes, Preventive & remedial measures, Reclamation of water- logged areas □ | | |

REFERENCE RESOURCES

- R1- Punmia, B.C., Pande, B.Lal, Irrigation and Water Power Engineering, Laxmi Publications
- R2- Subramanyam, Engineering Hydrology, McGraw Hill.

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Govt. Polytechnic Talwar (H.P.)

Lesson Planning (Theory)

Branch : CIVIL ENGG

Semester: 5th

Subject : Earthquake Resistant Building Design

Session : AUG- DEC 2024

Teacher: ANUJ RANA

Class Room: A-201

| S.No. | No. of Lectures | Chapter/ Unit Description | Detail of Contents | Reference Resources | Remarks |
|-------|-----------------|---|--|---------------------|---------|
| 1 | 5 | Elements of Engineering Seismology | 1.1 General features of tectonic of seismic regions 1.2 Causes of earthquakes 1.3 Seismic waves 1.4 Earth quake size (magnitude and intensity) 1.5 Epicenter 1.6 Seismograph 1.7 Classification of earthquakes 1.8 Seismic zoning map of India | R1 | |
| 2 | 5 | Seismic Behaviour of Traditionally-Built Constructions of India | 2.1 Earth quake effects 2.2 Traditionally built construction in India 2.3 Performance of building during earthquakes and Mode of failure (Out of plane failure, in plane failure, Diaphragm failure, Connection failure, Non-structural) | R1 | |
| 3 | 3 | Introduction to IS1893 (Part-I)-2016 | 3.1 Introduction 3.2 Assumptions 3.3 Design lateral forces and their calculation methods | R1 | |
| 4 | 7 | Ductile Detailing of Reinforced Concrete Buildings (IS 13920-2016) & IS 4326-2013) | 4.1 Common modes of failure in reinforced concrete buildings 4.2 General Principal for earthquake resistant buildings & Special construction features 4.3 Types of irregularities Vertical irregularities Plan irregularities Ductile detailing as per code Seismic strengthening arrangements Horizontal reinforcement Vertical reinforcement | R2 | |
| 5 | 7 | Introduction to IS13828-1993 & IS13827-1993 | 5.1 Advantages and disadvantages of masonry construction 5.2 Behaviour of masonry construction during earthquakes 5.3 Earthquake resistance features for burnt clay brick in weak morta 5.4 Codal Provisions for earthquake resistant earthen construction 5.5 Seismic strengthening features of earthen buildings | R2 | |

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| 6 | 8 | Retrofitting Measure for Traditionally Built Construction | 6.1 Introduction, need of retrofitting Retrofitting materials 6.2 Retrofitting measure of traditionally built construction Retrofitting of masonry buildings Retrofitting of concrete structure Retrofitting of low-cost buildings | | |
| 7 | 7 | Disaster Management | Disaster rescue 7.1 Psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment 7.2 Safeties in rescue operations 7.3 Debris clearance 7.4 Causality management | | |

REFERENCE RESOURCES

- R1- Earthquake resistant building construction by Neelam Sharma, Katson
- R2 Earthquake resistant building construction by Jagroop Singh, Rajiv Bhatia, Eagle Publication

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Govt. Polytechnic Talwar (H.P.)

Lesson Planning (Theory)

Branch : CIVIL ENGG

Semester: 5th

Subject : Precast and Pre-stressed Concrete

Session : AUG- DEC 2024

Teacher: ANUJ RANA

Class Room:A-201

| S.No. | No. of Lectures | Chapter/ Unit Description | Detail of Contents | Reference Resources | Remarks |
|-------|-----------------|---|---|---------------------|---------|
| 1 | 7 | Precast concrete Elements | 1.1 Advantages and disadvantages of precast concrete members 1.2 Non-structural Precast elements-Paver blocks, Fencing Poles, Transmission Poles, Manhole Covers, Hollow and Solid Blocks, kerb stones as per relevant BIS specifications 1.3 Structural Precast elements –tunnel linings, Canal lining, Box culvert, bridge panels, foundation, sheet piles | R1 | |
| 2 | 9 | Prefabricated building | 2.1 Precast Structural Building components such as slab panels, beams, columns, footings, walls, lintels and chajjas, staircase elements, 2.2 Prefabricated building using precast load bearing and non-load bearing wall panels, floor systems-Material characteristics, Plans & Standard specifications 2.3 Prefab systems and structural schemes and their classification 2.4 Joints–requirements of structural joints 2.5 Manufacturing, storage, curing, transportation and erection of above elements, equipment needed | R1 | |
| 3 | 6 | Introduction to Pre-Stressed Concrete | 3.1 Principles of pre-stressed concrete and basic terminology. 3.2 Applications, advantages and disadvantages of pre stressed concrete 3.3 Materials used and their properties, Necessity of high-grade materials 3.4 Types of Pre-stressing steel-Wire, Cable, tendon, Merits-demerits and applications | R1 | |
| 4 | 11 | Methods and systems of pre-stressing | 4.1 Methods of pre-stressing–Internal and External pre-stressing, Pre and Post tensioning applications 4.2 Systems for pre tensioning– process, applications, merits and demerits-Hoyer system 4.3 Systems for post-tensioning – process, applications, merits and demerits – Freyssinet system, Magnel Blaton system, Gifford Udall system. 4.4 Loss of pre-stress occurring subsequently: losses due to shrinkage of concrete, creep of concrete, elastic shortening, and creep in steel, (Simple Numerical problems to determine loss of pre-stress). 4.5 BIS recommendations for percentage loss in case of Pre and Post tensioning | R2 | |
| 5 | 9 | Analysis and design of pre-stressed rectangular beam section | 5.1 Basic assumptions in analysis of pre-stressed concrete beams. 5.2 Cable Profile in simply supported rectangular beam section– concentric, eccentric straight and parabolic 5.3 Effect of cable profile on maximum stresses at mid span and at support. 5.4 Numerical problems on determination of maximum stresses at mid spans with linear (con-centric and eccentric) cable profiles only. 5.5 Simple steps involved in Design of simply supported rectangular beam | R2 | |

REFERENCE RESOURCES

- R1- Krishna Raju, N., Pre-stressed Concrete, Tata McGraw Hill, New Delhi
 - R-2 – Shrikant B. Vanakudre, Pre-stressed Concrete, Khanna Publishing House, New Delhi
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Govt. Polytechnic Talwar (H.P.)

Lesson Planning (Practical)

Branch : CIVIL ENGG

Semester 5th

Subject : Design of RCC Structures Lab

Session : AUG- DEC 2024

Teacher: NAVEEN BHARTI

| S.No. | No. of Hours | Detail of Contents | Remarks |
|-------|--------------|--|---------|
| 1 | 6 | Rectangular beams – Singly reinforced | |
| 2 | 6 | Rectangular beams- Doubly reinforced | |
| 3 | 8 | One-way slabs | |
| 4 | 8 | Two-way slabs (Corner not held down) | |
| 5 | 8 | Square columns with isolated footing of uniform depth and varying depth (sloped footings) | |
| 6 | 8 | Circular column with isolated footing of uniform depth and varying depth (sloped footings). | |
| 7 | 4 | Interpret the actual RCC Structural Drawings used on site with reference to reinforcement details of various structural elements. | |
| 8 | 4 | Prepare a detailed report of site visit for reinforcement detailing of structural elements like beams, columns, staircase & footing. | |
| 9 | 4 | Prepare a checklist for reinforcement provided from actual drawings used on site for various structural elements. | |

Govt. Polytechnic Talwar (H.P.)

Lesson Planning (Practical)

Branch : CIVIL ENGG

Semester 5th

Subject : Computer Applications in Civil Engg.

Session: AUG- DEC 2024

Teacher: ANUJ RANA

| S.No. | No. of Hours | Detail of Contents | Remarks |
|-------|--------------|--|---------|
| 1 | 4 | Unit I: Introduction Starting up of Auto CAD, Auto CAD Window, Toolbar, drop down menu, Command window, saving the drawing. Introduction of Graphic screen. | |
| 2 | 22 | Unit II: Drawing, Editing, Dimensioning Commands Co-ordinates, drawing limits, grid, snap, orthographic features. Drawing commands, line, circle, poly-line, multiline, ellipse, polygon etc. Editing commands – Copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, array etc. Working with hatches, fills, dimensioning, text etc | |
| 3 | 26 | Unit III: Submission/ Working Drawing Drawing T, L, I, E, H with absolute, consecutive and polar coordinate system Preparation of line plan of a residential building Preparation of detailed plan of a two-room residential building, Elevation, Section, Site Plan (using different type of layers) Introduction to STAAD Pro, (Expert may be invited to demonstrate) Introduction to MS Project/Primavera | |
| 4 | 4 | Unit IV: Use of artificial Intelligence in Building Design | |