Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - VII
[CE4201T]: Dams and Hydraulics Structures

Teaching Scheme: Theory 2Hours/ Week	Exam Scheme Total Marks: **100**	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 02

Course Prerequisites:
Engineering Mechanics, Fluid mechanics. water resource engineering, Geotechnical engineering

Course Objective:
To study different types of dams, instrumentation, gravity dam , earthen dam and spillway
To study and design of canals and canal structures and analysis of diversion headwork and Cross drainage work

Course Outcome:
01 -Demonstrate types of dams and instrumentation
02- Check stability analysis of Gravity Dam
03- Select type of spillways & design Ogee spillway with energy dissipator
04- Illustrate the failures and analyze stability of earthen dam

Course Content

Unit I	**Introduction to dam**	**7 Hours**

Introduction, historical development of dams, different terms related to dams, selection of site of dam, factors governing selection of type of dam, classifications of dam, classification based on purpose, classification based on material, classification based on size of project, classification based on hydraulic action, classification based on structural action, introduction of arch dam and buttress dam including classification, advantages and limitations. Significance of Instrumentation: introduction, objectives of dam safety and instrumentation. Working principles and functions of instruments:piezometer, porous tube piezometer, pneumatic piezometer, vibrating wire piezometer, vibrating wire settlement cell, inclinometer, joint meter, pendulums, inverted pendulum, hanging pendulum, automatic pendulum coordinator, vibrating wire pressure cell, extensometer, embedment strain gauge, temperature gauge, distributed fiber optics temperature tool, seismograph.

Unit II	**Gravity Dam**	**7 Hours**

Introduction, components of gravity dam, conditions favoring gravity dam, forces acting on gravity dam, combination of loading for design, seismic analysis of dam, terms related to seismic analysis, determination of seismic forces (Zangger's method), effect of horizontal earthquake acceleration, effect of vertical earthquake acceleration, stress analysis in gravity

dam (only concept no derivation),vertical or normal stress, principal stresses, shear stresses, middle third rule, modes of failure of gravity dam, elementary profile of gravity dam, concept of high and low gravity dam,various design methods of gravity dam (introduction only), details of gravity method or 2 D method, construction of gravity dam, colgrout masonry, roller compacted concrete (R.C.C), temperature controlling in mass concreting, crack formation in gravity dam, control of crack formation in dam, construction joints, keys, water seal, retrofitting.

Unit III	Spillway and energy dissipator	7 Hours

Introduction, location of spillway, different key levels and heads in spillway, spillway capacity, components of spillway, approach channel, control structure, discharge channel, energy dissipation,energy dissipation device, tail channel, classification of spillway, classification based on operation, main or service spillway, auxiliary spillway, emergency spillway, classification based on gates, gated spillway, ungated spillway, classification based on features, straight drop spillway (free overflow spillway), saddle spillway, side channel spillway, overflow or ogee spillway, chute or open channel or trough spillway, shaft or morning glory spillway, siphon spillway, conduit or tunnel spillway, stepped spillway. Design of ogee spillway or overflow spillway, shape of crest, equations for spillway profile on upstream and downstream,

energy dissipation below spillway, classification of energy dissipation devices, stilling basin, components of stilling basin, types of stilling basins, Indian Standard stilling basin, correlation between jump height and tail water depth, methods of energy dissipation for stilling basin, design of roller bucket and ski-jump bucket, introduction to orifice type of spillway and spillway gates

Unit IV	Earthen dam	7 Hours

Introduction, conditions favoring on earth dam, limitations of earth dam, classification of earth termination of seepage discharge using flow net. Composite earth dam with casing and hearting, roperties of components of earth dam, requirements for safe design of earth dam, hydraulic (seepage) analysis, plotting of phreatic (seepage) line, homogeneous earth dam with horizontal drainage blanket, phreatic line, determination of seepage discharge through earth dam using flow net, structural stability analysis of homogeneous and zoned earth dam, forces acting on earth dam, method of stability analysis of an earth dam, procedure of analysis by Swedish slip circle method, fellenius method of locating center of critical slip circle, stability analysis for foundation, failure of earth dam, classification of failure of earth dams, hydraulic failure, seepage failure, structural failure, seepage control in earth dams, causes of seepage, seepage control measures, construction of earth dam.

Reference Books:

1)Irrigation, Water Resources and Water Power Engineering, Modi P. N., Standard Book House, New Delhi

2)Irrigation and Water Resources Engineering, Asawa G. L., New Age International (P) Ltd.

3)Irrigation Engineering and Hydraulic Structures, Garg S. K, Khanna Publication.

4) Irrigation Water Power Engineering, Punmia B. C., Laxmi Publication

IS Codes: •

- IS 8605: 1977 (Reaffirmed 1998), Code of practice for construction of masonry in dams, Third reprint, July 1999, Bureau of Indian Standards, New Delhi.
- IS 6512: 1984 (Reaffirmed 1998), Criteria for design of solid gravity dams, first revision, First reprint, September, 1998, Bureau of Indian Standards, New Delhi.
- IS 457: 1957 (Reaffirmed 2005), Code of practice for general construction of plain and Reinforcement concrete for dam and other massive structures, sixth reprint, January 1987, Bureau of Indian Standards, New Delhi.
- IS 1013: 1985, Code of practice for drainage system for gravity dams, their foundations and abutments, first revision, Bureau of Indian Standards, New Delhi.
- IS 14591: 1999, Temperature control mass concrete for dams - guidelines, Bureau of Indian Standards, New Delhi.
- IS 11223: 1985, (Reaffirmed 2004), Guidelines for fixing Spillway capacity, edition 1.2 (1991-09), Bureau of Indian Standards, New Delhi.
- IS 6934: 1998 (Reaffirmed 2003), Hydraulic design of high ogee overflow spillways Recommendation, First revision, Bureau of Indian Standards, New Delhi.
- IS 11155: 1994, Construction of spillways and similar overflow structures- Code of practice, Bureau of Indian Standards, New Delhi.
- IS 5186: 1994, Design of Chute and side channel spillway-criteria, first revision, Bureau of Indian Standards, New Delhi.
- IS 5186: 1994, Design of Chute and side channel spillway-criteria, first revision, Bureau of Indian Standards, New Delhi.
- IS 10317: 1982 (Reaffirmed 2004), Guidelines for selection of spillways and energy dissipaters, Bureau of Indian Standards, New Delhi.

Special Instructions if Any:
Compulsory gravity and earthen dam visit

ISE: In Semester Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation

Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[CE4202T]: Quantity Surveying Contracts and Tenders

Teaching Scheme: Theory 2Hours/ Week	Exam Scheme Total Marks: 100	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 02

Course Prerequisites: Knowledge of building planning, roads and its structural components, construction materials

Course Objective:

To provide the student with the ability to estimate the quantities of items of work involved in building, water supply and sanitary works, road works and irrigation works, and also to equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items

Course Outcome:

On successful completion of this course, the learner will be able to,

1. Explain concept of estimates and prepare approximate estimate for various for Civil Engineering works.
2. Compute quantities of various items of works from drawings and prepare abstract sheet.
3. Calculate valuation of property using different methods and assess the value of it
4. Prepare suitable specifications and rate analysis of various items of work
5. Interpret working of PWD & prepare documents required for tender.
6. Design contract document for various civil engineering projects.

Course Content

Unit I	**Introduction and Approximate Estimates**	**7 Hours**

Introduction: Definition of estimation, valuation, purpose, and data required for estimation, types, concept of item of work, different items of work of buildings, units and mode of measurement for different items of work, measurement Sheet and abstract Sheet (Bill of Quantities). Administrative approval and technical sanction, prime cost, provisional sum and provisional quantities, contingencies, lead statement, work charge establishment, centage charges, contents of S. S. R.

Approximate estimate: Methods of approximate estimate of Civil Engineering works: like building, roads, irrigation, water supply & sanitary works with numerical.

Unit II	**Detailed estimate**	**7 Hours**

Detailed estimates: Factors to be considered while Preparing Detailed Estimate, Detailed estimate of R.C.C framed structures using IS 1200, Concept of Estimation of Load Bearing Structure (PWD & Centre Line Method). Bar Bending Schedule: Preparing Bar Bending Schedule for all RCC members of building.

Work out G+ 3 RCC building estimate with Bar Bending Schedule of RCC items such as footings, columns, beams and slabs.

Unit III	Valuation	7 Hours

Valuation: Purpose of valuation, Scope of valuation, meaning of price, cost and value. Factors affecting value'. Types of values: Only Fair Market Value, Book Value, Salvage/Scrap Value, Distresses Value and Sentimental Value. Concept of free hold and lease hold property. Estimation versus Valuation. Meaning of depreciation & obsolescence. Workout on O-1 Form for building project.

Unit IV	Specifications and Rate Analysis	7 Hours

Specifications: Meaning & purpose, types. Drafting detailed specifications for materials, quality, workmanship, method of execution, mode of measurement and payment for major items like excavation, stone/brick masonry, plastering, ceramic tile flooring, and R.C.C. work. Draft on major four specifications of building or road as per SSR.

Rate Analysis: Meaning and factors affecting of an item of work, materials, labours, tools and plant, overhead & profit. Task work or out turn, factors effecting task work. Work out on rate analysis of RCC items, Brickwork and plastering.

Unit V	Tendering and Execution of Works	7 Hours

Tenders: Definition, methods of inviting tenders, e-tendering, tender notice, tendering procedure, pre and post qualification of Contractors, tender documents. 3 bid/2 bid or single bid system.

Methods of Executing Works: PWD procedure of work execution, administrative approval, budget provision, technical sanction. Methods of execution of minor works in PWD: Piecework, Rate List, Daily Labour. Introduction to registration as a contractor in PWD. Work out on tender notice of G +3 Building with Schedule A and B

Unit VI	Contracts and Arbitration	7 Hours

Contracts: Definition, objectives & essentials of a valid contract as per Indian Contract Act (1872), termination of contract. Types of contracts: only lump sum, item rate, cost plus.

Conditions of contracts: Defect liability period, liquidated damages, retention money, interim payment or running account bill, advance payment, secured advance, final bill. Essentials of legally valid contract, Contract between Engineer & Employers, Contract between Employer & Contractor, Appointment & authority of Engineer for execution of civil construction works, Category of contractor.

Introduction to non - conventional contract such as B.O.T, B.O.O.T, B.O.L.T., Arbitration: Introduction to Arbitration as per Indian Arbitration & Conciliation Act (2015), Meaning and need of Arbitration, qualities and powers of an Arbitrator.

Reference Books:

1. Estimating and Costing in Civil Engineering: Theory and Practice: B. N. Dutta – S. Dutta& Company, Lucknow.
2. Estimating, Costing Specifications & Valuation in Civil Engineering: M. Chakraborty.
3. Estimating and Costing: R. C. Rangwala – Charotor Publications House.
4. Theory of Practices of Valuation: Dr. RoshanNamavati- Lakani Publications.
5. Valuation Principles and Procedure: Ashok Nain, Dewpoint Publications

6. Laws for Engineers: Dr. VandanaBhat and PriyankaVyas – Published by PRO-CARE, 5/B/Sagarika Society, Juhu TaraRoad, Juhu Santacruz (W) , Mumbai-400049.(procure@technolegal.org)

Handbooks:

1. Standard Contract for Clauses for Domestic Bidding Contracts: Ministry of Statics and Programme Implementation, Government of India
2. FIDIC Document: Federation International Des Ingenieurs Counseils i.e. International Federation of Consulting Civil Engineers, Geneva, Switzerland.
3. Indian Practical Civil Engineers- Handbook : P.N. Khanna, UBS publ.Distr. Pvt. Ltd. (UBSDP)

IS Codes:

1. IS 1200 (Part 1 to 25): Methods of Measurement of Building &Civil Engg. works.
2. IS 3861-1966: Method of Measurement of areas and Cubical Contents of buildings.
3. S.S.R. (State Schedule rates) for current year.
4. PWD Redbooks, vol 1&2.

Special Instructions if Any: NA

ISE: In Semester Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation, TW: Term Work

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Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[CE4203T]: Name of Course: Transportation Engineering

Teaching Scheme: Theory 3Hours/ Week	Exam Scheme Total Marks: 100	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 03

Course Prerequisites: Surveying, Concrete Technology and Infrastructure Engineering

Course Objective: To provide fundamental and applied knowledge of transportation systems.

Course Outcome:
After successful completion of the course, students will be able to –
CO1: compute the lengths of different category roads.
CO2: design the geometric elements of a roadway.
CO3: analyze traffic characteristics by conducting various traffic studies.
CO4: perform various tests on aggregate, bitumen to access the suitability for road works.
CO5: design the flexible and rigid pavements.
CO6: analyze the impacts of urbanization on mobility patterns

Course Content

Unit I	**Highway Development**	**4 Hours**
Highway Development in India, Road Development Plans – Nagpur, Bombay, Lucknow, Bharatmala Pariyojana, Vision 2021, Rural Road Development Vision 2025, Gati Shakti Master Plan, Classification of roads, Road Patterns		
Unit II	**Geometric design of highways**	**9 Hours**
Highway Cross section Elements, Sight distances, Design of horizontal alignment; Design of vertical alignment		
Unit III	**Traffic engineering & Control**	**8 Hours**
Traffic characteristics, Traffic engineering studies, Parameters characterizing traffic flow, traffic regulation and control devices (signs, signals, islands, road markings), Signal design by Webster's method.		
Unit IV	**Pavement Materials and Construction**	**7 Hours**

Introduction to Materials used in Highway Construction and related tests, Modified Bitumen (Cutbacks, Emulsions, Crumbed Rubber Modified Bitumen, Polymer modified bitumen, Foamed Bitumen), Cold Mix Asphalt Technology, Warm Mix Asphalt Technology. Construction process of Granular Subbase, Water Bound Macadam, Wet Mix Macadam, Cemented base, Bituminous Binders, Asphaltic Concrete (AC) or Bituminous Concrete (BC), Bituminous Macadam (BM), Dense Bituminous Macadam (DBM) and premix carpet, Dry lean Concrete (DLC), Pavement Quality Concrete (PQC).		
Unit V	**Pavement Design**	**8 Hours**
Flexible pavements – Computation of design traffic (Vehicle Damage Factor VDF, Lane distribution factor LDF, Traffic growth rate); stresses in flexible pavements; design guidelines for flexible pavements as per IRC 37-2018; rigid pavements- components and functions; factors affecting design; design guidelines for concrete pavements as per IRC 58-2015		
Unit VI	**Transportation System Management**	**6 Hours**
Quick response travel evaluation procedure, TSM actions: traffic management techniques for improving vehicular flow, preferential treatment for high occupancy modes, bus priority measures, demand management techniques for reducing traffic demand, staggered hours, and vehicle restrictions; telemetries in travel planning.		
Text Books: 1.Highway Engineering – S.K.Khanna, C.E.G. Justo and A. Veeraragavan, 2013, 10th Edition, Nemchand Publisher. 2. Traffic Engineering and Transport Planning – L.R Kadiyali, 1999, 9th (Second Reprint 2025, Khanna Publishers. 3. Urban Transport Planning by M. Khisty & B. Kent Lall,2016, Pearson Education India.		
Reference Books: 1. Principles of Transportation Engineering, Partha Chakroborty, Animesh Das, 2002,PHI Learning Pvt. Ltd. 2. Fundamentals of Transportation Engineering - C. S. Papacostas. 2011, Prentice-Hall. 3. Principles of Pavement Design - E.F. Yoder ,2010, John Wiley & Sons, lnc USA. 4. Principles of Transportation Engineering, Partha Chakroborty, Animesh Das, 2022, PHI Learning Pvt. Ltd 5. Transportation Demand Management (TDM) Encyclopedia, Victoria Transport Policy Institute Canada,2006		
IS Codes: 1. IRC 37-2018, Design of Flexible Pavement 2. I.R.C. 58- 2015, Design of Rigid Pavement 3. Specifications for Road and Bridge Work (MORTH) 5th Revision, New Delhi. 4. IRC SP: 88 - 2019, Manual on Road Safety Audit		

ISE: In Semester Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation

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Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[CE4203L]: Name of Course: Transportation Engineering laboratory

Teaching Scheme: PR 2Hours/ Week	Exam Scheme Total Marks: 50	**Exam**	**Marks**
		ISCE	**30**
		ESE	**20**

Credit: 01

Course Prerequisites: Concrete Technology

Course Objective: To enable students to understand material properties and their application in designing safe, efficient transportation infrastructure.

Course Outcome:

After successful completion of the course, students will be able to –

CO1: determine the suitability of aggregates for road construction works.

CO2: characterize the properties of bitumen used as a binder in road surfacing.

CO3: analyze traffic characteristics by conducting various traffic studies.

List of Experiments

1. Aggregate Crushing Value Test
2. Aggregate Impact Value Test
3. Aggregate Abrasion Value test
4. Aggregate Shape test
5. Bitumen Ductility Test
6. Bitumen Softening Point Test
7. Bitumen Flash and Fire point test
8. Traffic Volume Study
9. Spot Speed Studies
10. Traffic Noise Measurement and Interpretation

Reference Books and Codes:

1. S.K. Khanna, C.E.G. Justo, Highway Material Testing Laboratory Manual, Nem Chand. & Bros., Roorkee. Department of Civil Engineering.
2. Indian Standard Specification for Paving Bitumen, IS: 73
3. Indian Standard Methods of Test for Aggregate for concrete IS: 2386 Part-IV, Indian Standards Institution
4. IRC:64 (1990) & IRC:106 (1990**)** for converting vehicle types to Passenger Car Units (PCU)
5. IRC:SP:19-2001: "Manual for Survey, Investigation and Preparation of Road Projects

ISCE: In Semester Continuous Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation

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Final Year B. Tech Civil (Regular Track)

Academic Year – 2026-2027 Semester - I

[CE4204T-A]: Name of Course: Environmental Impact Assessment

Teaching Scheme: TH: - 3 Hours/Week	Exam Scheme Total Marks: 100	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 03

Course Prerequisites: Environmental Science, Environmental Engineering

Course Objective:

To provide students with a comprehensive understanding of Environmental Impact Assessment (EIA) processes, methodologies, and legal frameworks, while emphasizing public involvement, impact management, and effective project implementation. Through case studies and practical examples, students will learn to analyze, report, and manage environmental impacts in various projects.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Explain the components of environment management and the Environmental Impact Assessment (EIA) process, along with the legal, policy, and regulatory frameworks.

CO2: Describe the EIA procedure including scoping, screening, and establishing baseline conditions, as well as various EIA methodologies.

CO3: Discuss the concepts of connected spaces and subspaces, connectedness of the real line, and the Intermediate Value Theorem.

CO4: Summarize the importance of public involvement in the EIA process and the strategies for impact management, including mitigation and preparation of Environment Management Plans (EMP).

CO5: Outline the key components of EIA reporting and the criteria for reviewing the quality of EIA

CO6: Clarify the steps involved in the implementation and follow-up of EIA processes.

Course Contents

UNIT-I	**Introduction to Environment Management**	**06 Hours**
Introduction to Environment Management & Environmental Impact Assessment, Legal, Policy & Regulatory Framework		
UNIT-II	**EIA Methodologies**	**06 Hours**
Environmental Impact Assessment Procedure - Scoping & Screening and Establishing Baseline Conditions, Environmental Impact Assessment Methodologies		
UNIT-III	**Connectedness**	**06 Hours**
Connectedness: connected spaces and subspaces, Connectedness of the real line, Intermediate value theorem Environmental Impact Assessment Methods, Tools and Techniques		
UNIT-IV	**Public Involvement in EIA**	**06 Hours**
Public Involvement in Environmental Impact Assessment, Impact Management - Mitigation & Preparation of Environment Management Plans (EMP)		
UNIT-V	**EIA Reporting**	**06 Hours**
Environmental Impact Assessment Reporting & Review of Environmental Impact Assessment Quality, Decision Making & Project Management		

UNIT-VI	Implementation & Follow up	06 Hours
Implementation & Follow up, Environmental Impact Assessment Case Examples		

Text Books:

T1 Wathern P., "Environmental Impact Assessment: Theory and Practice",Routledge Publishers,1990

T2 Marriott B., "Environmental Impact Assessment: A Practical Guide",McGraw-Hill Publication,1997

Reference Books:

R1. Shrivastava A.K., Baxter Nicola, Grimm Jacob, "Environmental Impact Assessment", APH Publishers, 2003

R2. Anjaneyulu Y., Manickam Valli, "Environmental Impact Assessment Methodologies", CRC Press 2011

R3. Glasson J., Therivel Riki, Chadwick Andrew, "Introduction to Environmental Impact Assessment", Oxford Brookes University 2012/ 4th edition

e-Resources:

1. **http://www.environsoftware.com/Studies.aspx**
2. **http://envfor.nic.in/division/introduction-8**

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Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[CE4204T-B]: Advanced Design of Concrete Structures

Teaching Scheme: Theory 3Hours/ Week	Exam Scheme Total Marks: 100	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 03

Course Prerequisites: Behavior of reinforced concrete structure, limit state method, working stress method, design of basic reinforced concrete structural elements.

Course Objective:
To apply advanced design concept to special structures, ESR, Bunkers, Silos, raft foundation and utilize the knowledge of analysis and design of these different concrete structures in practical life.

Course Outcome:
On completion of the course, the student will be able to:
CO1: Design combined shallow foundations.
CO2: Design pile foundations and pile caps.
CO3: Design raft foundations.
CO4: Design RCC retaining walls.
CO5: Design RCC water tanks using WSM.
CO6: Design RCC flat slabs.

Course Content

Unit I	**Design of Shallow Foundation**	7 Hours

Design of rectangular and trapezoidal combined footings. Calculation of footing area, soil pressure, bending moment, shear, and punching shear. Design of reinforcement and detailing as per IS 456 and IS 6403.

Unit II	**Design of Deep Foundation**	7 Hours

Design of pile foundations under axial load. Design of single pile, pile group, and pile cap. Load carrying capacity of piles and reinforcement detailing as per IS 2911.

Unit III	**Design of Raft Foundation**	7 Hours

Design of raft foundation considering soil pressure. Analysis for bending moment and shear. Design for flexure, punching shear, and reinforcement detailing.

Unit IV	**Design of Retaining Wall**	7 Hours

Design of RCC cantilever, counterfort, and buttress retaining walls. Calculation of earth pressure. Stability checks and structural design of wall components.		
Unit V	**Design of Water Tank (WSM)**	7 Hours
Design of RCC rectangular and circular water tanks (ground supported only) using Working Stress Method. Design of walls and base slab with crack control and detailing as per IS 3370.		
Unit VI	**Design of Flat Slab**	7 Hours
Design of flat slabs using Direct Design Method. Calculation and distribution of moments. Design for flexure and punching shear. Reinforcement detailing as per IS 456.		
Reference Books: R1: H. J. Shah, "Reinforced Concrete design", Charotar publishing house. R2: B. C. Punmia, A. K. Jain and Arun K. Jain, "Reinforced Concrete Structures Vol. II", Laxmi Publications, New Delhi. R3: N. C. Sinha, S.K. Roy, "Fundamentals of Reinforced Concrete", S. Chand & Co. Ltd, New Delhi. R4: S. S. Bhavikatti, "Advance R. C. C. Design", New Age International Publishers. R5: S. Ramaamruthum, "Design of RCC Structures" Dhanpat Rai publications. R6:P. C. Varghese, "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd., New Delhi. R7: IS: 456-2000, "Indian Standard Code of Practice for Plain and Reinforced Concrete", Bureau of Indian Standards, New Delhi. R8: IS: 1893, "Indian Standard Code of practice for criteria for Earthquake resistant design of Structures", Bureau of Indian Standards, New Delhi.		
IS Codes: **Bureau of Indian Standards**: IS 456:2000, IS 2911, IS 3370, IS 6403		
Special Instructions if Any: NA		

ISE: In Semester Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation

Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[CE4204T-C]: Integrated Water Resources Planning & Management

Teaching Scheme: Theory 3Hours/ Week	Exam Scheme Total Marks: 100	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 03

Course Prerequisites:
Basics of fluid mechanics, geology, geotechnical engineering, hydrology and surveying

Course Objective:
1. To introduce connection of agriculture and water with IWRP & M and to make students aware about organizations like WALMI
2. To introduce the connection of IWRP & M with water
3. To impart knowledge of legal aspects

Course Outcome:
After successful completion of the course, students will able to:

Explain concerned organizations, IWRP & M objectives, principles, challenges, application & analysis of IWRP&M approaches & principles in a case study.

Apply and analyse water requirements for food production.

Analyse planning for a sustainable water future.

Analyse of inter-basin water transfers and IWRP & M

Discuss flood control, application QIGIS for analysis of a basin for IWRP & M

Course Content

Unit I	**Introduction And Water Laws**	7 Hours

a) Introduction :World water resources, water resources in India, water as finite resource, variability of water in time & space, history of water resources development, water infrastructure-problems and perspectives, present institutional framework for water management.

b) Water laws: Constitutional provisions, National Water Policy, riparian rights / ground water owner ship, prior appropriation, permit systems, acquisition and use of rights, scope for privatization.

Unit II	**Economics & Paradigm shift in water management**	7 Hours

a) Economics of water: Water as economic good, intrinsic value, principles of water pricing &water allocation, capital cost, opportunity cost, internal rate of return, benefit cost analysis, principles of planning and financing of water resources project
b) Paradigm shift in water management: Global and national perspectives of water crisis, water scarcity, water availability and requirements for human and nature, concepts of 'blue water', 'Green water', and 'virtual water', and their roles in water management. Sustainability principles for water management, framework for planning a sustainable water future.

Unit III	**Basin scale hydrology**	7 Hours

a) Estimation of surface water, estimation of ground water draft/recharge import/export of water(inter basin water transfer), recycling and reuse and storage, control of water logging, salinity, &siltation of storages.
b) Flood & Drought management: causes of floods, structural and non-structural measures, mitigation plan, flood damage assessment, use of geoinformatics for flood management. Types of droughts, severity index, drought forecasting, damage assessment, mitigation plan, use of geoinformatics for drought management

Unit IV	**water demand and supply based management**	7 Hours

a) Consumptive & non consumptive demands, irrigation demand estimation, water utilization, Irrigation efficiency, water management in irrigation sector,
b) Demand estimation in hydro/thermal/nuclear power sector, estimation & forecasting of water demands of domestic & industrial sector, navigation and recreational water demands

Unit V	**Environmental and social aspects**	7 Hours

a) Environmental management: protection of vital ecosystem, water requirements for Environmental management, aquaculture, minimum flows, water quality management for various uses.
b) Social impact of water resources development: direct/ indirect benefits- employment generation, industrial growth, agro-industry, enhanced living standards, education & health, cooperative movement, management of rehabilitation & resettlement

Unit VI	**Watershed Management**	7 Hours

Watershed definition, classification of watersheds, integrated approach for watershed management, role of RS & GIS in watershed management, soil and water conservation necessity- soil erosion- causes- effects-remedial measures, and contour bunding- strip cropping bench terracing-check dams. gabion wall,farm ponds ,percolation tank

Reference Books:

1. Water Resources Systems Engg, D. P. Loucks, Prentice Hall
2. Economics of Water Resources Planning, James L.D and Lee R.R, McGraw Hill
3. Water resources hand book; Larry W. Mays, McGraw International Edition
4. Design of Water Resources Systems, Arthur Mass, MacMillan 1962
5. Water Resources Systems Engineering, W. A. Hill & J. A. Dracup.
6. Water shed Management – B.M. Tideman
7. Watershed management –J. V. S. MURTY, new Age International Publisher.

IS Codes:

Special Instructions if Any: NA

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Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[CE4204T-D]: Name of Course: Advanced Construction Management

Teaching Scheme: Theory 3Hours/ Week	Exam Scheme Total Marks: 100	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 03

Course Prerequisites: Basic Civil Engineering, Project Management

Course Objective: To provide knowledge of modern construction practices.

Course Outcome:

After successful completion of the course, students will be able to –

CO1: illustrate concept of work study, work measurement

CO2: analyze the human resource strategies

CO3: express concept of risk management

CO4: to analyze project performance by modern construction practices

CO5: discuss concept, principles of quality management

CO6: explain basics of artificial intelligence techniques in civil engineering

Course Content

UNIT-I	**Work Study, Work Measurement**	**06 Hours**

Work study (time and motion study): definition, objectives, process of method study, symbols, multiple activity charts, two handed process chart, string diagram, work measurement

UNIT-II	**Human Resource Management**	**06 Hours**

Human Resources: introduction, nature and scope of human resource management, human resource development process, recruitment & selection, performance evaluation and appraisal, training & development, succession planning, compensation and benefits, career planning, human resources information systems, HR data and analytics, role of ERP in human resource management and human resource information system

UNIT-III	**Risk Management**	**06 Hours**

Risk Management: introduction, principles, steps in risk management, risk in construction, origin, use of mathematical models: sensitivity analysis, simulation analysis (examples), decision tree analysis, risk identification, mitigation of project risks, role of insurance in risk management, use of correlation analysis and regression analysis

UNIT-IV	**Modern Construction Practices**	**06 Hours**

Building Information Modelling (BIM) concepts and applications, Lean construction principles, Earned Value Management (EVM), Value Engineering in construction projects, Productivity measurement and improvement, Construction automation and digitalization		
UNIT-V	**Quality Management System for Construction Organization**	**06 Hours**
Evolution of quality management, Traditional and new approaches, Definition of quality, Basics of quality, Dimensions of quality and cost of quality (COQ), Quality management gurus, Total quality management (TQM) - Objectives, principles, key elements and implementation method, Quality Management System (QMS) - ISO 9001, Quality manual, Quality audit, Quality improvement tools - PDCA approach, Failure mode and effects analysis (FMEA), Six sigma; Advanced quality management practices, Benchmarking quality, Quality Function Deployment (QFD).		
UNIT-VI	**Artificial Intelligence in Civil Engineering**	**06 Hours**
Introduction to artificial intelligence technique, basic terminologies and applications in civil engineering: artificial neural network, fuzzy logic and genetic algorithm, 3D printing technology.		
Text Books: 1. Projects planning, Analysis Selection, Implementation and Review, Prasanna Chandra - Tata McGraw Hill, New Delhi, 2005 2. Construction Project Management Planning, Scheduling and Controlling- Chitakara - Tata McGraw Hill, New Delhi 3. Human Resource Management: Concepts, Practices and New Paradigms – Amitabha Sengupta 4. Materials Management an integrated approach by Gopal krishnan and M. Sundaresan, Delhi 2014 5. Project Planning and Control with PERT and CPM by Dr. B. C. Punmia and K. K. Khandelwal, New Delhi. 4th edition-2002, reprint- 2012T6. Project Management by Nagarajan		
Reference Books: 1.Construction Project Management Theory & practice --- Kumar Neeraj Jha,Pearson,2012 2. Construction project scheduling and control ----Mubarak, Wiley India. 3. A Guide to the Project Management Body of Knowledge (PMBOK Guide) 4. Construction Management and Planning by Sengupta and H Guha, Tata McGraw Hill Publishing Company, New Delhi 5. Construction Engineering and Management by Seetharaman, Umesh publication, New Delhi.2012 6. Human Resource Management, Biswajeet Pattanayak, Prentice Hall Publishers 7. Artificial Neural Network, Veganarayanan, Prentice Hall		

ISE: In Semester Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation

Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[HS4201T]: Industrial Psychology

Teaching Scheme: Theory 2Hours/ Week	Exam Scheme Total Marks: 100	**Exam**	**Marks**
		ISE	**20**
		MSE	**30**
		ESE	**50**

Credit: 02		
Course Prerequisites:		
Course Objective:		
Course Outcome:		
Course Content		
Uinit I	**Introduction**	7 Hours
Psychology: A Science and a Perspective; Biology, Culture, and Human Behavior.		
Uinit II	**Sensation, Perception and Consciousness**	7 Hours
Sensation and Perception: Making Contact with the World around Us; States of Consciousness		
Uinit III	**Learning, Memory and Cognition**	7 Hours
Learning: How We're Changed by Experience; Memory: Of Things Remembered…. and Forgotten; Cognition: Thinking, Deciding, Communicating		
Uinit IV	**Human Development**	7 Hours
Human Development I: The Childhood Years; Human Development II: Adolescence, Adulthood, and Aging		
Uinit V	**Motivation, Emotion, Intelligence and Personality**	7 Hours
Motivation and Emotion; Intelligence: Cognitive, Practical, and Emotional; Personality: Uniqueness and Consistency in the Behavior of Individuals		
Uinit VI	**Health and Social Psychology**	7 Hours
Health, Stress, and Coping; Social Thought and Social Behavior		

Reference Books:

1. Psychology: Robert A Baron, Girishwar Misra; Indian Subcontinent Edition, Pearson, 5th edition.
2. Essentials of Understanding Psychology: Robert Feldman; McGraw-Hill Education; 11th edition

IS Codes:

Special Instructions if Any:

ISE: In Semester Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation

JSPM's
RAJARSHI SHAHU COLLEGE OF ENGINEERING
TATHAWADE, PUNE-33
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

Final Year B. Tech Civil (Regular Track)
Academic Year – 2026-2027 Semester - I
[CE4205L]: Engineering Innovation and society II

Teaching Scheme: Theory 4Hours/ Week	Exam Scheme Total Marks: 300	**Exam**	**Marks**
		ISCE	**150**
		MSE	**-**
		ESE	**150**
Credit: 06			

Course Prerequisites:
Successful completion of Engineering Innovation and Society – I (Project Phase – I)
Approved project proposal from Phase – I
Basic proficiency in relevant engineering tools, software, or laboratory practices

Course Objective:
The objective of Engineering Innovation and Society – II is to implement the approved solution developed in Phase – I by applying engineering knowledge, tools, and teamwork. This phase emphasizes design, development, testing, validation, and evaluation of the solution, along with assessment of its societal impact and sustainability.

Course Outcome:

After successful completion of Project Phase – II, students will be able to:

CO1: Design and develop an engineering solution or prototype based on the approved project proposal.
CO2: Apply appropriate engineering tools, techniques, and domain knowledge for implementation and testing.
CO3: Analyze and interpret test results to validate performance, safety, and reliability of the solution.
CO4: Assess societal, environmental, economic, and ethical impacts of the developed solution.
CO5: Demonstrate teamwork, project management, and professional responsibility during project execution.
CO6: Document and present the project outcomes effectively through reports, demonstrations, and viva-voce.

Course Content

1. **Detailed Design and Development**
- System design / modeling / algorithm development
- Material selection and design calculations
- Software / hardware / prototype development (as applicable)

2. **Implementation and Fabrication**

- Prototype development or system implementation
- Integration of components
- Iterative improvements

3. **Testing and Validation**

- Functional testing and performance evaluation
- Validation against design objectives
- Safety, reliability, and quality assessment

4. **Societal Impact and Sustainability Analysis**

- Assessment of social, economic, and environmental impact
- Ethical and regulatory considerations
- Alignment with Sustainable Development Goals (SDGs)

5. **Cost Analysis and Scalability**

- Cost estimation and benefit analysis
- Scalability and real-world implementation potential

6. **Documentation and Reporting**

- Preparation of final project report
- User manual / design documentation

7. **Presentation and Demonstration**

- Project demonstration
- Final viva-voce and evaluation

Reference Books:
IS Codes:
Special Instructions if Any: One research paper to be published.

ISE: In Semester Continuous Evaluation, MSE: Mid Semester Evaluation, ESE: End Semester Evaluation