पुण्यश्लोक अहिल्यादेवी होळकर
सोलापूर विद्यापीठ
।। विद्यया संपन्नता ।।
NAAC Accredited-2022
'B++' Grade (CGPA-2.96)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum for Final Year B.Tech. Civil Engineering with effect from 2026-2027

Final Year B.TECH. (Civil Engineering)
Semester-VII

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum

With effect from 2026-2027

Semester -VII

Distribution	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*			*Total*
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	*OE/ POE*	
PCC	CIVPCC-13	Design of Concrete Structures-II	3			03	70	30			100
PCC	CIVPCC-14	Estimating Costing and Valuation	2		2	03	70	30	25		125
PEC	CIVPEC-04	Programme Elective Course –IV or MOOCS##	4			04	100				100
Project	CIVProject	Capstone Project			8*	04			100	100	200
RM	**RM**	**Research Methodology and IPR**	3		2	**04**	**70**	**30**	**25**		**125**
MD M	**MDM-05**	MD Minor-V	2			**02**	**70**	**30**			**100**
		Total	**14**		**12**	**20**	**380**	**120**	**150**	**100**	**750**

Students should attend MOOCs in that 4 hrs, if MOOCs is choosen,
Mini Project/ Assignment related to MOOCs and ICA marks to be given based on that.
List of MOOCs related to CIVPEC-04 will be provided by BOS time to time.
* Load Based on Project Groups

BSC- Basic Science Course
ESC- Engineering Science Course,
PCC- Programme Core Course,
AEC- Ability Enhancement Course,
IKS- Indian Knowledge System,
CC- Co-curricular Courses,
VSEC-Vocational and Skill Enhancement Course

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum

With effect from 2026-2027

Semester -VIII

Distribution	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*			*Total*
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	*OE/ POE*	
PCC	CIVPCC-15	Professional Practice, Law & Ethics	4#			04	100				100
PEC	CIVPEC-05	Programme Elective Course -V or MOOCs	4#			04	100				100
OJT	CIVOJT	On-Job Training			24	12			200	100	300
		Total	**8**		**24**	**20**	**200**		**200**	**100**	**500**

Students will practice or attend in Self-Learning mode.
PCC- Programme Core Course, PEC-Programme Elective Course
AEC- Ability Enhancement Course, IKS- Indian Knowledge System,
CC- Co-curricular Courses, VSEC-Vocational and Skill Enhancement Course
MDM-Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.

List of MOOCs related to CIVPEC-05 will be provided by BOS time to time.

Basket of Programme Elective Course (PEC)

PEC/Sem	Course code and name
CIVPEC - 01/ V	CIVPEC – 01A: Advanced Concrete Technology CIVPEC – 01B: Engineering Geology and Material Science CIVPEC – 01C: Water and Sanitation Infrastructure
CIVPEC - 02/ VI	CIVPEC – 02A: Foundation Engineering CIVPEC – 02B:Urban Transportation Planning CIVPEC – 02C:Air and Noise Pollution and Control
CIVPEC - 03/ VI	CIVPEC – 03A: Construction Productivity CIVPEC – 03B Planning for Sustainable Development CIVPEC – 03C Earthquake Engineering
CIVPEC - 04/ VII OR	CIVPEC – 04A: Hydraulic Structures and Water Power Engg. CIVPEC – 04B: Repair and Rehabilitation of Structure CIVPEC – 04C: Industrial Structures
CIVPEC - 04/ VII	MOOC Courses CIVPEC – 04D : <As per the list provided by BoS> CIVPEC – 04E : <As per the list provided by BoS>
CIVPEC - 05/ VIII OR	CIVPEC – 05A: Concrete Composites CIVPEC – 05B:TQM and MIS in Civil Engineering CIVPEC – 05C:Disaster Management
CIVPEC - 05/ VIII	MOOC Courses CIVPEC – 05D: <As per the list provided by BoS> CIVPEC – 05D: <As per the list provided by BoS>

A. Multidisciplinary Minor in "Product Design and Commercialization"

Semester	Course Code	Course Title
III	CIVMDM-01A	Design Thinking: Business Innovation Framework
IV	CIVMDM-02A	Entrepreneurship ,Leadership and Management
V	CIVMDM-03A	Design Optimization
VI	CIVMDM-04A	New Product Development
VII	CIVMDM-05A	Finance Management and Marketing

B. Multidisciplinary Minor in "Applied Civil Engineering"

Semester	Course Code	Course Title
III	CIVMDM-01B	Introduction to Geographic Information Systems
IV	CIVMDM-02B	Urban Planning and Design
V	CIVMDM-03B	Operation Research and Management
VI	CIVMDM-04B	Disaster Management and Mitigation
VII	CIVMDM-05B	Sustainable Engineering and Trends

A. Honors in **Innovation and Design Engineering**

Semester	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		**Total**
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	
III	CIVHON-01A	Design Thinking	3	1		4	70	30	25	125
IV	CIVHON-02A	Managing Innovation and Entrepreneurship	3		2	4	70	30	25	125
V	CIVHON-03A	Engineering Systems and Design Optimization	3		2	**4**	70	30	25	125
VI	CIVHON-04A	Civil Engineering System Analysis and Design	3		2	**4**	70	30	25	125
VII	CIVHON-05A	Mini Project			4*	**2**			50	50
		Total	12	1	10	**18**	280	120	150	550

* Indicates Contact Hours

B. Honors in **Infrastructure Engineering**

Semester	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		*Total*
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	
III	CIVHON-01B	Applications of Information Technology and Information Systems	3	1		4	70	30	25	125
IV	CIVHON-02B	Planning and Design of Rural Roads	3		2	4	70	30	25	125
V	CIVHON-03B	Roads and Highway Project Development	3		2	**4**	70	30	25	125
VI	CIVHON-04B	Bridge and Grade Separated Structures	3		2	**4**	70	30	25	125
VII	CIVHON-05B	Mini Project			4*	**2**			50	50
		Total	12	1	10	**18**	280	120	150	550

* Indicates Contact Hours

C. Honors in **Sustainability Engineering**

Semester	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		*Total*
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	
III	CIVHON-01C	Environmental Laws and Impact Assessment	3	1		4	70	30	25	125
IV	CIVHON-02C	Construction Materials: Sustainability and Usability	3		2	4	70	30	25	125
V	CIVHON-03C	Sustainable Materials and Green Buildings	3		2	**4**	70	30	25	125
VI	CIVHON-04C	Sustainable Engineering and Technology	3		2	**4**	70	30	25	125
VII	CIVHON-05C	Mini Project			4*	**2**			50	50
		Total	12	1	10	**18**	280	120	150	550

* Indicates Contact Hours

D. Honors in "Railway Infrastructure"

Semester	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		*Total*
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	
III	CIVHON-01D	Railway Track structure	3	1		4	70	30	25	125
IV	CIVHON-02D	Elevated structures in Railway	3		2	4	70	30	25	125
V	CIVHON-03D	Underground structures in Railway	3		2	4	70	30	25	125
VI	CIVHON-04D	High speed Railway infrastructure	3		2	4	70	30	25	125
VII	CIVHON-05D	Mini Project			4*	2			50	50
		Total	12	1	10	18	280	120	150	550

* Indicates Contact Hours

Honors with Research*

Semester	*Course Code*	*Name of the Course*	*Engagement Hours*	*Credits*	*SA*		*Total*
			P		*ICA*	*OE*	
VII	CIVRES-01	Research Project Phase-01	9 #	9	100	100	200
VIII	CIVRES-01	Research Project during OJT	9 ##	9	100	100	200
		Total	**18**	**18**	**200**	**200**	**400**

Along with 9 hours of engagement hours, 4.5 Hrs. activities for preparation for community engagement and service, preparation of reports, etc.

Along with 9 hours of engagement hours 4.5 Hrs. activities for preparation for community engagement and service, preparation of reports, etc. and independent reading during On Job Training and preferably related to On Job Training activities.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII
CIVPCC-13: DESIGN OF CONCRETE STRUCTURES-II

Teaching Scheme
Lectures – 3 Hrs/Week, 3 Credits

Examination Scheme
ISE – 30 Marks
ESE –70 Marks

Course outcomes:

Upon successful completion of course, the students will be able to:

1. Analyze and Design of Continuous beams and Continuous Slabs using Limit State Method.
2. Analyze and Design of RCC Retaining walls using Limit State Method.
3. Analyze and Design of RCC Water tanks using IS Code Method.
4. Analyze Pre-stress concrete sections.
5. Determine Loss of Pre-stress for Pre-tensioned & Post tensioned members
6. Analyze and Design of Pre-stress Beams & End Block of post tensioned PSC girder using different methods.

SECTION-I

Unit 1: Design of Continuous beams and Continuous Slab (8 Hrs)
Design of Continuous beams and Continuous Slabs by Limit State Method.

Unit 2: Analysis and design of retaining wall (8 Hrs)
Analysis and Design of cantilever and counter fort retaining walls

Unit 3: Design of water tank (8 Hrs)
Design criteria, permissible stresses, Design of circular, rectangular GSR by IS code method

SECTION-II

Unit 4: Introduction and analysis of symmetrical and unsymmetrical Prestressed Concrete sections (8 Hrs)
Introduction, concepts, systems and methods of pre-stressing. Analysis of Symmetrical and unsymmetrical sections, thrust line, cable profiles.

Unit 5: Losses in prestress (6 Hrs)
Losses in prestress for Pre-tensioned & Post tensioned members.

Unit 6: Design of Prestressed concrete beam and End Block (8 Hrs)
Design of rectangular and Symmetrical I section. Analysis and design of end blocks by various methods, Stress concentration.

NOTE:
Only IS: 456-2000 & IS 3370 (Part 4/Sec 2): 2021 shall be allowed in the University Exam.

ASSIGNMENTS:
At least one assignment on each topic.

TEXT BOOKS

[1] B. C. Punmia, *Reinforced Cement Concrete*. New Delhi, India: Laxmi Publications (P) Ltd.
[2] C. S. Jain and C. S. Jain, *Reinforced Cement Concrete*, Vol. I & Vol. II. Roorkee, India: Nem Chand & Bros.
[3] N. Krishnaraju, *Prestressed Concrete*. New Delhi, India: McGraw Hill Education (India).

[4] P. Dayaratnam, *Prestressed Concrete*. New Delhi, India: Oxford & IBH Publishing Co. Pvt. Ltd.
[5] S. Ramamrutham, *Prestressed Concrete*. New Delhi, India: Dhanpat Rai Publishing Company (P) Ltd.

REFERENCE BOOKS

[1] Bureau of Indian Standards, *IS 456:2000 – Plain and Reinforced Concrete – Code of Practice*. New Delhi, India.
[2] Bureau of Indian Standards, *IS 3370 (Part 1):2021 – Concrete Structures for Storage of Liquids – General Requirements*. New Delhi, India.
[3] Bureau of Indian Standards, *IS 3370 (Part 2):2021 – Concrete Structures for Storage of Liquids – Reinforced Concrete Structures*. New Delhi, India.
[4] Bureau of Indian Standards, *IS 3370 (Part 3):2021 – Concrete Structures for Storage of Liquids – Prestressed Concrete Structures*. New Delhi, India.
[5] Bureau of Indian Standards, *IS 3370 (Part 4):2021 – Concrete Structures for Storage of Liquids – Design Tables*. New Delhi, India.
[6] Bureau of Indian Standards, *IS 1343 – Prestressed Concrete – Code of Practice*. New Delhi, India.
[7] S. N. Sinha and S. K. Roy, *Fundamentals of Reinforced Concrete*. New Delhi, India: S. Chand & Company Ltd.
[8] P. C. Varghese, *Limit State Design of Reinforced Concrete*. New Delhi, India: Prentice Hall of India.
[9] N. Sharma, *Reinforced Cement Concrete Design*. New Delhi, India: Katson Books.
[10] T. Y. Lin and N. H. Burns, *Design of Prestressed Concrete Structures*. Hoboken, NJ, USA: John Wiley & Sons

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CIVPCC-14 ESTIMATING, COSTING & VALUATION

Teaching Scheme	**Examination Scheme**
Lectures: - 2 Hrs/Week, 2 Credits	**ISE:** 30 Marks
Practical: 2Hr/Week, 1Credits	**ICA:- 25** Marks
	ESE: 70 Marks

Course Outcomes:

Upon successful completion of course, the students will be able to:

1. Apply standard specifications, codes, and guidelines to prepare technical specifications for civil engineering works.
2. Apply estimation and costing principles to perform rate analysis using market rates, schedule of rates, and standard documents.
3. Apply costing principles to estimate equipment, labour, and material costs.
4. Explain tendering and contract procedures and apply them in the preparation of tender documents.
5. Understand & Explain the Principle of valuation.
6. Evaluate land and building values and prepare professional valuation reports.

SECTION –I

Unit 1: Specifications (4 Hrs)

Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures.

Estimation / Measurements for various items (8 Hrs)

Introduction to the process of Estimation; taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs

Unit 2: Rate analysis (5 Hrs)

Purpose, importance and necessity of the rate analysis, factors affecting, task work, daily output from different equipment/ productivity.

Unit 3: Costing (5 Hrs)

Adding equipment costs; labour costs; Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost sensitive index, and market survey of basic materials. Use of Computers in quantity surveying.

SECTION –II

Unit 4: Tender **(7 Hrs)**

Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions.

Unit 5: Principles of valuation **(8 Hrs)**

a) Definition of value, price and cost. Attributes of value, Different types of values- Book value, salvage value, scrap value, replacement value, reproduction value, earning value, Market value, Potential value, Distress value, Speculation value, Sentimental value. Accommodation value, Essential characteristics of market value.

b) Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties-tangible and intangible properties, Landed properties- free hold and leasehold properties, different types of leases.

Unit 6: Methods of Valuation **(8 Hrs)**

a) Rental method of valuation. Form of rent, different types of rent, standard rent.

b) Value of land, belting method of valuation, Valuation based on land and building- item wise, carpet area basis, unit basis, cubic content basis.

c) Development method of valuation for building estate.

d) Valuation on profit basis for lodges, cinema theatres, hotels, motels etc. valuation for compulsory acquisition of land, structure by the Government. Valuation for rating purpose, Methods for assessing ratable value of property, Rental method, Comparison method, fundamental principles of rating valuation.

e) Valuation from yield and from life, gross yield and net yield, outgoing, capitalized value, Year's Purchases-Single rate and dual rate, reversion value of land, annuity- perpetual, whole life, deferred, Sinking fund.

TEXT BOOKS

1. A Textbook of Estimating , Costing & Accounts (Civil), R.C.Kohli, S. ChandPublishing New Delhi
2. Civil Estimating and Costing, A. K. Upadhyay, S. K. Katuria and Sons
3. Elements of Estimating and Costing – S. C. Rangwala - Charotar Publication
4. Civil Engineering Contracts and Estimates – B. S. Patil- Orient Blackswan publication.
5. Professional Practice (Estimating and Valuation) – Roshan Nanavati –

Lakhani BookDepot.
6. Estimating and Costing – B. N. Dutta- UBS publishers

7. Estimating, Costing , Specification and valuation in civil engineering, ChakrobortyM, Khanna Publishers.
8. Valuation of real Properties – S. C. Rangwala- Charotar Publishing House Ltd.

REFERENCE BOOKS

1. Relevant Indian Standard Specifications (IS 1200)
2. World Bank Approved Contract Documents.
3. FIDIC Contract Conditions.
4. C.P.W.D. specifications
5. C.P.W.D. schedule of rates.
6. Standard specifications Volumes I & II (P. W. D. Maharashtra)

INTERNAL CONTINIUOS ASSESSMENT (ICA)

The ICA shall consist the following

1. Reading the Drawings (Plan and section) and prepare estimate for the following

   Minimum 3- drawings need to be given for (reading only) such as

   a) Watchman's cabin b) Compound wall. c) Septic tank / water tank. d) Building drainage system. e) Kitchen platform. f) Cement godown. g) Staircase block. h) A small culvert
2. Market survey of basic material rates and labour wages
3. Detailed specification for minimum five civil engineering items. (One each from Roads, Irrigation works, Water Supply & Sanitation & three from buildings)
4. Computer aided
   a) Detailed estimate for a two storied building
      Selecting the items from drawing.Preparing abstract as per DSR or standard building items.Take of quantities related to buildings (all items need to be taken)Preparing the bill of quantity (BOQ).

      Note: Estimate shall include compound wall with gate, sanitary schedule and Electrification schedule.
   b) Estimate for any one of the a) Structural steel sheds b) Retaining Wall c) Water Tank.
5. Rate Analysis: (Civil engineering items.)
   a) One each from (Road, Irrigation work, Water supply and sanitation) and five from buildings.
   b) 6)Schedule of reinforcement any two of the following
   c) Column and column footing.
   d) Beam and Slab
   e) Staircase.
6. Valuation reports for any two of the following:
   a) A building for residential purpose or commercial purpose.
   b) A hotel.
   c) A theater
   d) Any one construction machine.
   e) The report shall include valuation certificate also.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I Semester- VII
Programme Elective Course – IV
CIVPEC – 04 A : Hydraulic Structures and Water Power Engg.

Teaching Scheme	**Examination Scheme**
Lectures – 4 Hrs/Week, 4 Credits	**ESE –**100 Marks

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

1. Plan reservoirs and calculate storage capacity based on water resources potential.
2. Analyse and design Gravity dams based on stability and loading conditions.
3. Analyse and design Earthen dam, spillway based on hydraulic and structural requirements.
4. Apply seepage and silt theories to design weirs and canals, and select appropriate cross drainage works.
5. Select appropriate river training works and suggest remedial measures for water logging.
6. Estimate waterpower potential and demand for various hydropower layouts.

Section-I

Unit 1: Dams and Reservoir Planning (6 Hrs)
Dams – Necessity, types of dams, selection of site for dams, selection of type of dam, Introduction to dam instrumentation.
Reservoir: need, planning, storage calculations, control levels, sedimentation surveys, reservoir losses. Use of remote sensing for reservoir sedimentation surveys.

Unit 2: Gravity and Arch Dams (9 Hrs)
Gravity Dams - Forces acting on dam, design criteria, theoretical and practical profile, high and low dam, stability calculations and analysis, materials and methods of Construction, Galleries, joints, Dam Instrumentation, Computer Application for Design of Dam. Decommissioning of dams
Arch Dams – Types, Layout of Constant angle and Constant radius arch dam, Forces acting on arch dams.

Unit 3: Earth Dams, Spillways and Outlets (9 Hrs)
Earth Dams: Components and their functions, Design Criterions; Seepage through and below earth dam, Application of Slip circle method, Inverted Filters, Downstream Drainage, relief wells, Construction methods of earth dam.

Spillways: Necessity and different types, factors affecting choice and type of spillway, elementary hydraulic design, jump height and tail water rating curve, energy dissipation below spillway, gates for spillway. Spillway operations for different discharge values.
Outlets through Dams: types and energy dissipation in outlets transition.

Section-II

Unit 4: Weirs, Canals and Canal Structures (10 Hrs)
Weirs on Permeable Foundations: Theories of seepage, Bligh's creep theory, Khosla's theory exit gradient, Piping and undercutting, Concept of flow net etc. Kolhapur type weirs- working principles, suitability and construction.
Canals: Types, Alignment, Design – Kennedy's and Lacey's Silt theories, Canal losses, Typical canal sections, canal lining – Necessity and types, Economics of canal lining.

Canal Structures: Cross drainage works and canal regulatory works - Aqueduct, Culvert, Super passage, Level Crossing, Cross and Head regulator, Canal Siphon, Canal Escape, canal fall, canal outlets.

Unit 5: River Training Works and Water logging (6 Hrs)

River and River Training Works: Types of rivers, Meandering phenomenon, Types of river training works, river navigation.

Water Logging and Drainage: Causes, effects, preventive and curative measures, alkaline soils, soil efflorescence, drainage arrangements.

Unit 6: Hydropower Engineering (8 Hrs)

Elements of Hydropower Engineering: Power crisis and competing uses of water, need of Harnessing solar energy. Types of water power plants, small hydropower plants, layout and components of each type, Intakes, Conveyance system, Surge tanks, Power house types, components and layout, tail race. Managing power demand using various sources of power. Calculation of power demand.

TEXTBOOKS

1) Irrigation Engineering – S. K. Garg, Khanna Pub. Delhi
2) Irrigation and Water Power Engineering - Priyani, Charoter pub. House, Anand
3) Irrigation and Water Power Engineering – Punmia, B. C.
4) Irrigation – Bharat Singh, NEW CHAND & bros. Roorkee
5) Irrigation Engineering Vol. I – Varshhey and Gupta
6) Engineering Hydrology - K. Subramanya
7) Design of Canals – Circular of Government of Maharashtra, 18 February 1995
8) Irrigation Water Power & Water Resource Engineering, Arora, Standard Publishers

REFERENCE BOOKS

1) Design of Small Dam – U. S. B. R., OXFORD & IBH pub.co.
2) Engineering for Dam Vol. I, II, III – Justinn, Creager and Hinds
3) Design of Hydraulic Structures Vol. I & II – Leliavsky
4) River Behaviour, Management and Training - CBIP Publication

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I Semester- VII

PROFESSIONAL ELECTIVE COURSE-IV

CIVPEC-04B REPAIRS & REHABILITATION OF STRUCTURES

Teaching Scheme	**Examination Scheme**
Lectures:-4 Hrs/Week, 4 Credits	**ESE:** 100 Marks

Course Outcomes:

At the end of course, students will be able to

1. Explain the need, importance, and fundamentals of maintenance, repair, and rehabilitation of structures.
2. Describe serviceability and durability requirements of concrete structures.
3. Identify and classify special concretes, mortars, and chemical admixtures used for repair works.
4. Analyze structural deficiencies related to strength, deflection, cracking, and durability.
5. Identify common defects and repair methods in reinforced concrete structures.
6. Explain the principles and importance of long-term structural health monitoring.

SECTION I

Unit 1: Assessment and Maintenance of structures (8Hrs)

Repair and rehabilitation, facts of maintenance, importance of maintenance various aspects of inspection, assessment procedure for evaluating damaged structure, causes of deterioration. Repair Strategies: Causes of distress in concrete structures, construction and design failures, condition assessment and distress-diagnostic techniques, assessment procedure for inspection and evaluating a damaged structure.

Unit 2: Serviceability and Durability of Concrete (7Hrs)

Quality assurance for concrete construction, concrete properties – strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, corrosion.

Unit 3: Materials and Techniques for Repair (8 Hrs)

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, fibre reinforced concrete, bacterial concrete, rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, gunite and shotcrete, epoxy injection, mortar repair for cracks, shoring and underpinning

SECTION – II

Unit 4: Repair, Rehabilitation and Retrofitting Techniques (8 Hrs)

Repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

Unit 5: Repair of structure (7 Hrs)

Common types of repairs repair in concrete structures, repairs in under water structures. Strengthening of Structures: Strengthening Methods, retrofitting, jacketing.

Unit 6: Health Monitoring and Demolition Techniques (7 Hrs)

Long term health monitoring techniques, engineered demolition techniques for dilapidated structures, use of sensors for building instrumentation.

TEXT BOOK

1. Concrete Technology, Theory and Practice by M.S. Shetty, S, Chand Publications, New Delhi

REFERENCE BOOKS

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Defects and Deterioration in Buildings, E F & N Spon, London
3. Non-Destructive Evaluation of Concrete Structures by Bungey - Surrey University
4. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
5. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso, (1981)
6. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B .
7. Mehta, P.K and Montevic. P.J., Concrete- Microstructure, Properties and Materials, ICI, 997
8. Jackson, N., Civil Engineering Materials, ELBS, 1983.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I Semester- VII

PROFESSIONAL ELECTIVE COURSE-IV

CIVPEC-04C- Industrial Structures

Teaching Scheme
Lectures – 4 Hrs/Week, 4 Credits

Examination Scheme
ESE – 100 Marks

Course Outcomes:

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

1 Design gantry girders by evaluating crane loads, moments, shears, and detailing requirements as per codal provisions.

2 Design portal frames with hinged and fixed bases, including gable and lightweight structures, considering strength and stability requirements.

3 Apply Janssen's and Airy's theories and IS code provisions to design steel bunkers and silos, including plates, stiffeners, and ring girders.

4 Design steel chimneys by considering loading, stability, base plate, anchor bolts, and foundation requirements.

5 Design welded plate girders for industrial structures by proportioning web, flange, stiffeners, and connections with necessary strength and serviceability checks.

6 Design Pre-Engineered Building systems by selecting appropriate frames, secondary members, bracing, and connections while satisfying serviceability criteria.

Section-I

Unit 1: Gantry Girders **8 Hrs**

Introduction, loads acting on gantry girder, permissible stress, types of gantry girders and crane rails, crane data, maximum moments and shears, construction detail, design procedure.

Unit 2: Portal Frames **7 Hrs**

Design of portal frame with hinge base, design of portal frame with fixed base, Gable Structures, Lightweight Structures.

Unit 3: Steel Bunkers and Silos **7 Hrs**

Design of square bunker, Jansen's and Airy's theories , IS Code provisions, Design of side plates, Stiffeners, Hooper, Longitudinal beams Design of cylindrical silo, Side plates, Ring girder, stiffeners.

Section-II

Unit 4: Chimneys **7 Hrs**

Introduction, dimensions of steel stacks, chimney lining, breech openings and access ladder, loading and load combinations, design considerations, stability consideration, design of base plate, design of foundation bolts, design of foundation.

Unit 5: Plate girder **8 Hrs**

Introduction Design philosophy and assumptions; limit state design as per IS 800:2012, Web and Flange Design, Stiffeners and Connections, Checks for bending, shear, and deflection; numerical problems on design of welded plate girders used in industrial structures.

Unit 6: PEB **8 Hrs**

Concept, advantages, and applications of Pre-Engineered Buildings, Components of PEB: primary frames, secondary members, bracing, cladding, Design of PEB frames, purlins, girts, and bracing systems, Serviceability checks and basic connection and foundation concepts.

NOTE:

1. Unless otherwise mentioned separately, all the designs should be by Limit State method.
2. Assignments as homework - One assignment on each topic
3. Use of design aids, tables, charts are permitted with proper justification as per codal provisions.

TEXTBOOKS

1) Limit State Theory & Design by V.L. Karve and V.M. Shah, Structures Publications, Pune
2) Design of Steel Structures by S.K. Duggal, Tata McGraw-Hill Education, New Delhi
3) Structural Design of Steelwork by P. Dayaratnam, Oxford & IBH Publishing Co., New Delhi
4) Design of Steel Structures by N. Subramanian, Oxford University Press, New Delhi
5) Steel Structures: Design and Practice by S.C. Arora and S.P. Bindra, Dhanpat Rai & Co., New Delhi

REFERENCE BOOKS

1) Design of Steel Structures by E.H. Gaylord Jr., C.N. Gaylord and J.E. Stallmeyer, McGraw-Hill International
2) Advanced Steel Structures by R. Narayanan, Elsevier Science Publishing Co.
3) Handbook of Structural Engineering by S. Ramamrutham, Dhanpat Rai Publishing
4) Structural Steel Design by J.C. McCormac and S.F. Csernak, Pearson Education
5) Steel Chimneys by P. Srinivasulu, Tata McGraw-Hill Education

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII

CIVProject: Capstone Project

Teaching Scheme	**Examination Scheme**
Practicals – 8 Hrs/Week, 4 Credits	**ICA –** 100 Marks
	OE –100 Marks

Course Outcomes (COs)

Upon successful completion of this course, the student will be able to:

CO 1: Conduct a comprehensive literature review to identify complex engineering problems and formulate project goals that address societal, environmental, and sustainable development needs.

CO 2: Develop a detailed project roadmap, including task scheduling (timeline), resource allocation, and budget estimation, to ensure efficient project execution.

CO 3: Apply advanced engineering concepts and diverse design principles to architect and plan a technical solution tailored to the identified problem.

CO 4: Select and utilize appropriate engineering software, simulators, and modern computational tools to implement and execute the proposed project solution.

CO 5: Critically analyze the experimental or analytical results and evaluate the performance of the proposed solution against standard engineering benchmarks.

CO 6: Demonstrate professional ethics and leadership within a team while effectively communicating technical findings through formal reports and oral presentations to both the engineering community and the public.

The Capstone Project shall contain following

Part I: Project Identification and Planning

- **Literature Survey & Problem Formulation:** Identification of real-world challenges in Civil Engineering (Structural, Geotechnical, Transportation, Environmental, or Water Resources). Analysis of existing research and case studies.
- **Sustainability & Feasibility Study:** Assessing the societal, environmental, and economic impact of the project.
- **Project Proposal Development:** Defining scope, objectives, and methodology.
- **Resource Planning:** Creating a Work Breakdown Structure (WBS), Gantt charts for scheduling, and preliminary cost estimation/budgeting.

Part II: Design and Engineering Analysis

- **Design Methodology:** Application of IS Codes, Eurocodes, or relevant standards. Conceptual and detailed design of the system/structure.
- **Modelling & Simulation:** Use of industry-standard tools (e.g., AutoCAD, STAAD.Pro, ETABS, Revit, HEC-RAS, or ArcGIS) to model the solution.
- **Data Collection & Experimental Setup:** Conducting field surveys, laboratory testing of materials, or data mining for secondary analysis.

Part III: Evaluation and Professional Practice

- **Performance Analysis:** Comparative study of the results against theoretical values or existing benchmarks.

- **Ethics in Engineering:** Understanding intellectual property, plagiarism, and the safety responsibilities of a professional engineer.
- **Documentation & Reporting:** Compiling a formal technical project report including drawings, calculations, and conclusions.
- **Defence & Presentation:** Oral defence of the project work before a technical committee.

Suggested Evaluation Scheme

Assessment Component	Description	Weightage
Internal Review I	Problem identification, Literature survey, and Timeline.	20%
Internal Review II	Methodology, Design calculations, and Preliminary results.	30%
Project Report	Quality of documentation, references, and technical depth.	25%
Final Viva-Voce	Presentation skills, subject knowledge, and Q&A.	25%

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII

RM: Research Methodology and IPR

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs/Week, 3 Credits	**ISE –** 30 Marks
Practical :- 2 Hrs/Week	**ESE –**70 Marks
	ICA -25 Marks

Note: Syllabus for this course is provided separately, Approved by General Engineering Board.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII

CIVMDM-05A: Finance Management and Marketing

Teaching Scheme	**Examination Scheme**
Lectures – 2 Hrs/Week, 2 Credits	**ISE –** 30 Marks
	ESE –70 Marks

Course outcomes:

Upon successful completion of course, the students will be able to:

1. Understand financial management concepts, role of a finance manager and interpret basic financial statements.
2. Select appropriate long-term financing sources and determine the cost of capital for decision-making.
3. Evaluate investment proposals using capital budgeting techniques and apply them to construction projects.
4. Analyze marketing concepts, consumer behavior, and market segmentation to support marketing decisions in the engineering and construction sector.
5. Evaluate product life cycle and pricing strategies for marketing engineering and construction services.
6. Apply promotion, distribution, and contemporary marketing strategies in Indian and global business contexts.

SECTION-I

Unit 1: (06 Hrs)

Introduction: Nature and Scope of Financial Management; Financial goals - Profit vs. Wealth Maximization; Financial Management Decisions; System of organizational and informational support of financial management; Functions of Financial Manager, Changing Financial Environment, Emerging Challenges faced by the Finance Manager. Overview of financial statements (Balance Sheet, Profit and Loss Statement)

Unit 2: (08 Hrs)

Financing Decisions: Sources of Long Term Capital Equity, Debt, Term Loan, Preference share, Hybrid Securities, Internal Funds- Issues relating Financing Decisions. Cost of Capital: Computation of Cost of Equity-cost of Debt-Cost of Preference Capital- Cost of Internal Reserve Weighted Average Cost of Capital.

Unit 3: (06 Hrs)

Capital Budgeting – Nature of Investment Decisions – Investment Evaluation criteria – Net Presen Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), Payback Period, Accounting Rate of Return (ARR) – NPV and IRR comparison. Capital budgeting in construction projects.

SECTION-II

Unit 4: (06 Hrs)

Introduction to Marketing and Marketing Management, Marketing Concepts - Marketing Process Marketing mix - Marketing environment. Marketing and Economic Development Process; Marketing Organisation - Consumer Markets and buying behaviour - Market segmentation and targeting and positioning. Role of marketing in engineering and construction industry.

Unit 5: **(08 Hrs)**

Product Decisions - concept of a Product - Product mix decisions - Brand Decision – New Product Development – Sources of New Product idea - Steps in Product Development - Product Life Cycle strategies- Stages in Product Life Cycle. Marketing of engineering consultancy and construction services.

Price Decisions - Pricing objectives - Pricing policies and constraints - Different pricing method - New product pricing, Product Mix pricing strategies and Price adjustment strategy.

Unit 6: **(06 Hrs)**

Promotion & Placement Strategies: Meaning and Importance of Communication and Promotion, Elements of communication, Tools of Promotion, Objectives and Strategies of Promotion; Meaning and Importance of Distribution, Physical Distribution System, Wholesaling and Retailing Practices in India.

Marketing in Indian Practice: Rural & Agricultural Marketing; International Marketing; Cyber Marketing; Co-operative Marketing; Green Marketing.

ASSIGNMENTS:

At least one assignment on each topic.

REFERENCE BOOKS

1. Khan MY, Jain PK, BASIC FINANCIAL MANAGEMENT, Tata McGraw Hill, Delhi , 2005.
2. Chandra, Prasanna,. FINANCIAL MANAGEMENT, Tata McGraw Hill, Delhi.
3. Bhabatosh Banerjee, FUNDAMENTALS OF FINANCIAL MANAGEMENT, PHI, Delhi, 2010
4. Chandra Bose D, FUNDAMENTALS OF FINANCIAL MANAGEMENT, PHI, Delhi, 2010
5. K.S. Chandrasekar, MARKETING MANAGEMENT TEXT AND CASES, Tata McGraw-Hill Publication, New Delhi.2010.
6. Govindarajan, MARKETING MANAGEMENT CONCEPTS, CASES, CHHALLENGES AND TRENDS, Prentice Hall of India, New DelhI. 2009.
7. Ramaswamy. V S & Namakumari. S, MARKETING MANAGEMENT-PLANNING IMPLEMENTATION AND CONTROL, Macmillan Business Books, New Delihi, 2002,
8. Philip Kotler, MARKETING MANAGEMENT- ANALYSIS PLANNING AND CONTROL, Prentice Hall of India, New Delhi,

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII CIVMDM-

05B: Sustainable Engineering and Trends

Teaching Scheme	**Examination Scheme**
Lectures – 2 Hrs/Week, 2 Credits	**ISE –** 30 Marks
	ESE –70 Marks

Course outcomes:

Upon successful completion of course, the students will be able to:

1. Explain sustainability concepts and global sustainability frameworks.
2. Apply life-cycle and systems analysis to engineering problems.
3. Evaluate sustainable materials and energy technologies.
4. Assess environmental, economic, and social impacts of projects.
5. Identify emerging trends and future directions in sustainable engineering.
6. Evaluate future trends and emerging solutions for achieving climate-resilient and net-zero engineering systems

SECTION-I

Unit 1: Introduction to Sustainable Engineering (08 Hrs)

Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM).

Unit 2: Environmental Impact and Life-Cycle Thinking (06 Hrs)

Environmental impact assessment (EIA): basics and importance, Life Cycle Assessment (LCA): goal, scope, inventory, impact analysis, Carbon footprint, water footprint, and energy footprint, Circular economy and resource efficiency, Eco-design and sustainable product development

Unit 3: Sustainable Materials and Construction Practices (06 Hrs)

Green and sustainable materials (fly ash, GGBS, recycled aggregates, biopolymers), Low-carbon cement and concrete technologies, Sustainable manufacturing processes, Waste management, recycling, and reuse in engineering, Introduction Sustainable construction practices and rating systems (LEED, GRIHA, BREEAM)

SECTION-II

Unit 4: Sustainable Energy and Infrastructure Systems (08 Hrs)

Renewable energy sources: solar, wind, biomass, hydro, geothermal, oceans, Basic concept of sustainable habitat, Energy-efficient systems and buildings, Green Engineering, Sustainable transportation systems, Climate-resilient and disaster-resistant infrastructure, Sustainable Urbanization, Sustainable cities

Unit 5: Digitalization and Emerging Trends in Sustainability (06 Hrs)

Role of AI, IoT, and Big Data in sustainable engineering, Building Information Modeling (BIM) for sustainability, Smart cities and intelligent infrastructure, Digital twins and predictive maintenance, Industry 4.0 and sustainable manufacturing

Unit 6: Ethics, Policy, and Future Trends (06 Hrs)

Engineering ethics and sustainability, Environmental laws, regulations, and standards, ISO 14001:2015 frame work and benefits, Sustainable finance and green economics, Climate change adaptation and mitigation strategies, Future trends: net-zero engineering, nature- based solutions, hydrogen economy.

ASSIGNMENTS:
At least one assignment on each topic.

TEXT BOOKS

1. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
2. Bradley. A.S; Adebayo,A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning
3. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998

REFERENCE BOOKS

1. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
2. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System
3. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw- Hill Professional.
4. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS).
5. Purohit, S. S., Green Technology - An approach for sustainable environment, Agrobios Publication
6. Mihelcic, J. R. et al., Sustainability Science and Engineering
7. Graedel, T. E., & Allenby, B. R., Industrial Ecology
8. Relevant journals, standards, and government sustainability reports

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B.TECH. (Civil Engineering)
Semester-VII
CIVILHon – 05A: Mini Project

***Teaching Scheme**
Practical: 04 Hours/week, 02 Credits

***Examination Scheme**
ICA: 50 Marks

Course Introduction:

The mini-project is designed to help students develop practical skills and hands-on knowledge of tools and techniques required to solve real-life problems related to industry, academic institutions, and society. The course **Innovation and Design Engineering** in Civil Engineering focuses on developing creative, sustainable, and efficient solutions for modern infrastructure challenges.

This course enables final-year Civil Engineering students to integrate theoretical knowledge with practical applications through innovative design approaches, use of modern construction materials, and advanced analysis techniques. Students will gain exposure to planning, design, modelling, and evaluation of civil engineering systems with an emphasis on sustainability, cost-effectiveness, and functionality.

Course Objectives:

Upon completion of this course, students will be able to:

1. Identify real-world civil engineering problems and apply innovative thinking to develop practical solutions.
2. Apply fundamental engineering principles in planning, analysis, and design of civil engineering structures and systems.
3. Utilize modern tools and software (such as AutoCAD, STAAD, ETABS, etc.) for design and modelling.
4. Develop sustainable and cost-effective design solutions using eco-friendly materials and techniques.
5. Demonstrate teamwork, project management skills, technical documentation, and professional ethics during project execution.

Course Outcomes:

By the end of this course, students will be able to:

1. Explain concepts of innovation and design thinking in civil engineering applications.
2. Apply engineering design methods and calculations to solve practical infrastructure problems.
3. Analyse performance parameters such as strength, stability, cost efficiency, and environmental impact of designs.
4. Design and develop a mini-project (prototype/model/simulation) addressing real-world civil engineering challenges.
5. Propose feasible, sustainable, and technically sound engineering solutions.
6. Present project outcomes effectively through reports, drawings, and teamwork-based presentations.

Chapter 1: Fundamentals of Innovation in Civil Engineering

Introduction to Innovation - Definition and importance of innovation,Types of innovation (incremental, disruptive)

Role of Design Engineering- Principles of design engineering,Design process in civil engineering**,** Need for Innovation in Construction-Challenges in conventional construction, Sustainability and environmental concern

Modern Trends in Civil Engineering-Green buildings,Smart infrastructure,Prefabrication and modular construction

Chapter 2: Design Thinking and Methodologies

Design Thinking Process- Empathize, Define, Ideate, Prototype, Test

Problem Identification- Real-life civil engineering problems,Case study approach

Innovative Design Techniques- Use of eco-friendly materials,Cost-effective construction methods ,Structural optimization

Tools and Software- AutoCAD, STAAD Pro, ETABS ,Basic modeling and analysis techniques Project Planning and Methodology- Data collection methods ,Design development steps ,Evaluation criteria

Chapter 3: Application, Analysis, and Outcomes

Development of Innovative Design-Conceptual design of selected project ,Drawings and layout

Analysis and Evaluation-Structural performance ,Cost analysis,Environmental impact

Implementation Aspects-Feasibility study ,Construction techniques

Advantages and Limitations-Benefits of innovative design,Constraints and challenges

Conclusion and Future Scope-Summary of findings ,Scope for further innovation

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B.TECH. (Civil Engineering)
Semester-VII

CIVILHon – 05B: Mini Project

***Teaching Scheme**
Practical: 04 Hours/week, 02 Credits

***Examination Scheme**
ICA: 50 Marks

Course Introduction:

The mini-project is designed to help students develop practical skills and hands-on knowledge of tools and techniques required to solve real-life problems related to industry, academic institutions, and society. The course **Infrastructure Engineering** in Civil Engineering focuses on planning, design, development, and management of essential infrastructure systems such as transportation, water supply, drainage, and urban facilities.

This course enables final-year Civil Engineering students to integrate theoretical knowledge with practical applications in infrastructure planning and design. It emphasizes sustainable development, efficient resource utilization, and modern engineering practices. Students will gain exposure to analysis, modelling, and evaluation of infrastructure systems with a focus on safety, durability, cost-effectiveness, and environmental considerations.

Course Objectives:

Upon completion of this course, students will be able to:

1. Identify real-world infrastructure problems and propose suitable engineering solutions.
2. Apply fundamental civil engineering principles in planning, analysis, and design of infrastructure systems.
3. Utilize modern tools and software (such as AutoCAD, GIS, STAAD, etc.) for infrastructure planning and modelling.
4. Develop sustainable and efficient infrastructure solutions considering environmental and economic aspects.
5. Demonstrate teamwork, project planning, technical reporting skills, and professional ethics during project execution.

Course Outcomes:

By the end of this course, students will be able to:

1. Explain concepts of infrastructure engineering, including transportation, water systems, and urban development.
2. Apply design methods and calculations for various infrastructure components.
3. Analyse performance parameters such as capacity, efficiency, cost, and environmental impact.
4. Design and develop a mini-project (model/simulation/design) addressing real-world infrastructure problems.
5. Propose feasible, sustainable, and technically sound infrastructure solutions.
6. Present project outcomes effectively through reports, drawings, and teamwork-based presentations.

Chapter 1: Fundamentals of Infrastructure Engineering

Introduction to Infrastructure Engineering-Definition and importance of infrastructure ,Types of infrastructure (transportation, water supply, urban infrastructure)

Role of Infrastructure in Development-Economic and social impact ,Urbanization and infrastructure demand

Need for Infrastructure Development-Challenges in existing infrastructure systems,Sustainability and environmental concerns

Modern Trends in Infrastructure Engineering-Smart cities ,Green infrastructure ,Sustainable transportation systems

Chapter 2: Planning and Design Methodologies

Infrastructure Planning Process-Survey and data collection ,Demand forecasting,Feasibility studies

Problem Identification-Real-life infrastructure issues ,Case study approach

Design Techniques-Transportation system design ,Water supply and drainage design ,Structural considerations

Tools and Software-AutoCAD, GIS, STAAD ,Basic modelling and analysis techniques

Project Planning and Methodology-Design steps and procedures ,Evaluation criteria ,Cost estimation methods

Chapter 3: Application, Analysis, and Outcomes

Development of Infrastructure Design-Conceptual design of selected project ,Layout and planning

Analysis and Evaluation-Performance analysis (capacity, efficiency) ,Cost analysis ,Environmental impact assessment

Implementation Aspects-Feasibility study ,Construction and execution techniques

Advantages and Limitations-Benefits of proposed infrastructure ,Constraints and challenges

Conclusion and Future Scope-Summary of findings ,Scope for future improvements and smart infrastructure development

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B.TECH. (Civil Engineering)
Semester-VII

CIVILHon – 05C: Mini Project

***Teaching Scheme**
Practical: 04 Hours/week, 02 Credits

***Examination Scheme**
ICA: 50 Marks

Course Introduction:

The mini-project is designed to help students develop practical skills and hands-on knowledge of tools and techniques required to solve real-life problems related to industry, academic institutions, and society. The course **Sustainability Engineering** in Civil Engineering focuses on developing environmentally responsible, resource-efficient, and sustainable solutions for modern infrastructure challenges.

This course enables final-year Civil Engineering students to integrate theoretical knowledge with practical applications through sustainable design approaches, use of green materials, and environmentally conscious engineering practices. Students will gain exposure to planning, design, modelling, and evaluation of civil engineering systems with emphasis on minimizing environmental impact, improving energy efficiency, and ensuring long-term sustainability.

Course Objectives:

Upon completion of this course, students will be able to:

1. Identify real-world environmental and sustainability challenges in civil engineering and develop appropriate solutions.
2. Apply fundamental engineering principles in the design and analysis of sustainable infrastructure systems.
3. Utilize modern tools and software (such as AutoCAD, STAAD, GIS, etc.) for sustainable design and modelling.
4. Develop eco-friendly, energy-efficient, and cost-effective engineering solutions using green materials and technologies.
5. Demonstrate teamwork, project management skills, technical documentation, and professional ethics during project execution.

Course Outcomes:

By the end of this course, students will be able to:

1. Explain concepts of sustainability, green engineering, and environmental impact in civil engineering applications.
2. Apply design methods and calculations for sustainable infrastructure development.
3. Analyse performance parameters such as energy efficiency, resource utilization, environmental impact, and cost effectiveness.
4. Design and develop a mini-project (model/prototype/simulation) addressing sustainability-related civil engineering problems.
5. Propose feasible, eco-friendly, and technically sound engineering solutions.
6. Present project outcomes effectively through reports, drawings, and teamwork-based presentations.

Chapter 1: Fundamentals of Sustainability Engineering

Introduction to Sustainability-Definition and importance of sustainability ,Principles of sustainable development

Role of Sustainability in Civil Engineering-Environmental, economic, and social aspects ,Life cycle approach in construction

Need for Sustainable Practices-Environmental challenges (pollution, resource depletion) ,Climate change and its impact

Modern Trends in Sustainability Engineering-Green buildings ,Renewable energy integration, Sustainable materials and construction methods

Chapter 2: Sustainable Design and Methodologies

Sustainable Design Principles-Energy-efficient design ,Water conservation techniques ,Waste minimization

Problem Identification-Real-life sustainability issues in civil engineering ,Case study approach

Sustainable Engineering Techniques-Use of recycled and eco-friendly materials ,Low-impact construction methods ,Resource optimization

Tools and Software-AutoCAD, STAAD, GIS ,Basic modelling and environmental analysis

Project Planning and Methodology-Data collection methods ,Design development steps,Sustainability assessment criteria

Chapter 3: Application, Analysis, and Outcomes

Development of Sustainable Design-Conceptual design of selected project ,Layout and planning

Analysis and Evaluation-Environmental impact assessment ,Energy and resource efficiency analysis ,Cost analysis

Implementation Aspects-Feasibility study ,Construction techniques for sustainability

Advantages and Limitations-Benefits of sustainable design ,Challenges and constraints

Conclusion and Future Scope-Summary of findings ,Scope for future sustainable innovations

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B.TECH. (Civil Engineering)
Semester-VII

CIVILHon – 05D: Mini Project

***Teaching Scheme**
Practical: 04 Hours/week, 02 Credits

***Examination Scheme**
ICA: 50 Marks

Course Introduction:

The mini-project is designed to help students develop practical skills and hands-on knowledge of tools and techniques required to solve real-life problems related to railway systems, transportation networks, and infrastructure development.

The course **Railway Engineering in Civil Engineering** focuses on planning, design, construction, operation, and maintenance of railway infrastructure. It emphasizes safe, efficient, and modern railway systems that support economic growth and sustainable transportation.

This course enables final-year Civil Engineering students to integrate theoretical knowledge with practical applications through railway track design, station planning, signaling systems, and infrastructure development. Students will gain exposure to surveying, geometric design, track components, and evaluation of railway systems with emphasis on safety, efficiency, and modernization.

Course Objectives:

Upon completion of this course, students will be able to:

1. Identify real-world problems related to railway transportation systems and propose appropriate engineering solutions.
2. Apply fundamental civil engineering principles in the planning, design, and analysis of railway infrastructure.
3. Utilize modern tools and software (such as AutoCAD, STAAD, GIS, etc.) for railway design and modelling.
4. Develop safe, efficient, and cost-effective railway systems considering operational and environmental factors.
5. Demonstrate teamwork, project management skills, technical documentation, and professional ethics during project execution.

Course Outcomes:

By the end of this course, students will be able to:

1. Explain basic concepts of railway engineering, including track components, alignment, and operations.
2. Apply design methods and calculations for railway track geometry and infrastructure development.
3. Analyse performance parameters such as safety, efficiency, capacity, and cost effectiveness of railway systems.
4. Design and develop a mini-project (model/prototype/simulation) related to railway engineering problems.
5. Propose feasible, safe, and technically sound railway engineering solutions.
6. Present project outcomes effectively through reports, drawings, and teamwork-based presentations.

Chapter 1: Fundamentals of Railway Engineering

Introduction to Railway Engineering-Definition and importance of railway transportation ,History and development of railways

Components of Railway Track-Rails, sleepers, ballast, and subgrade ,Types of rails and rail joints

Role of Railways in Transportation-Economic and social importance ,Advantages over other transport modes

Geometric Design of Track-Alignment (horizontal and vertical) ,Gradients and curves

Modern Developments in Railways-High-speed rail systems ,Metro and urban rail transport

Chapter 2: Railway Design and Methodologies

Railway Track Design Principles-Gauge selection ,Track structure design ,Load distribution and track stability

Surveying and Alignment-Preliminary and detailed surveys ,Route selection criteria

Railway Engineering Techniques-Track laying methods ,Welding of rails and maintenance practices ,Drainage and track safety measures

Tools and Software-AutoCAD, STAAD, GIS ,Railway alignment and track modelling

Project Planning and Methodology-Data collection and field surveys ,Design procedures and calculations ,Safety and operational considerations

Chapter 3: Application, Analysis, and Outcomes

Development of Railway Design-Conceptual design of railway track or station ,Layout planning and infrastructure development

Analysis and Evaluation-Safety analysis and risk assessment ,Capacity and operational efficiency analysis ,Cost analysis of railway projects

Implementation Aspects-Feasibility study ,Construction and maintenance techniques

Advantages and Limitations-Benefits of railway systems ,Challenges such as cost, land acquisition, and maintenance

Conclusion and Future Scope-Summary of findings ,Scope for modernization (bullet trains, smart rail systems, automation)

Steps to do a Successful Mini Project:

1. Project Proposal

Objective: Problem identification and feasibility assessment

Contents:

a. Title of the mini project
b. Background and motivation (EV relevance)
c. Problem statement and objectives
d. Scope and limitations
e. Expected outcomes
f. Block diagram / concept sketch

2. Literature Review Report

Objective: Understanding existing research and industry practices

Contents:

a. Review of minimum 8–10 technical papers / standards / patents
b. Summary table of reviewed literature
c. Research gaps identified
d. Relevance to selected mini project

3. Methodology & Design Calculations

Objective: Application of engineering principles

Contents:

a. System description and assumptions
b. Design calculations (Civil, Water supply, or Geotechnical as applicable)
c. Material selection and justification
d. CAD models / system architecture
e. Flow chart or algorithm (for simulation-based projects)

4. Modeling / Simulation / Experimental Setup

Objective: System modeling and implementation

Contents (any one as applicable):

a. MATLAB/Simulink model with explanation
b. CAE analysis
c. Experimental setup description with instrumentation
d. Prototype fabrication details

5. Results, Analysis & Discussion

Objective: Interpretation and critical analysis of outcomes

Contents:

a. Simulation or experimental results
b. Performance parameters
c. Comparison with theoretical or published results
d. Error analysis and limitations

6. Prototype / Model / Demonstration

Objective: Validation of concept

Contents:

- Working prototype / scaled model / validated simulation
- Demonstration of functionality
- Safety and ethical considerations

The mini-project shall be evaluated in two stages, Intermediate review and End Semester Review. The following points are considered for evaluation:

Sr. No.	**Evaluation Criteria**
1	Quality of the presentation
2	Quality and clarity of the project report
3	Extent and depth of the work carried out
4	Understanding of the selected subject
5	Ability to address and respond to questions effectively

Internal Continuous Assessment (ICA):

Guidelines for Mini-Project Content and Mark Distribution

1. A mini-project group shall consist of a maximum of four (04) students.
2. Each group must maintain a work diary and report progress to the project guide as per the prescribed contact hours.
3. The work diary should clearly reflect the efforts undertaken by the project group, including:
   a. Identification and search for a suitable mini-project topic.
   b. A brief review of relevant journals, research papers, conference papers, books, or other literature.
   c. Survey and analysis carried out to identify and finalize the mini-project area.
   d. A brief report on feasibility studies conducted to support the proposed solution.
   e. Preliminary sketches, design calculations, and related technical details.

4. The mini-project may involve software development, experimentation, analysis, or fabrication work.
5. Preference will be given to mini-project topics that are aligned with the students' proposed final-year project.
6. At the end of the semester, the group shall deliver a PowerPoint presentation before the departmental faculty members or evaluation panel and submit a spiral-bound project report limited to 25-30 pages

Final Year B.TECH. (Civil Engineering)
Semester-VIII

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CIVPCC-15. PROFESSIONAL PRACTICE, LAW & ETHICS

Teaching Scheme	**Examination Scheme**
Lectures:- 3 Hrs/Week, 3 Credits	**ESE:** 100 Marks

Course Outcomes:

1. Understand the roles of stakeholders in civil engineering projects.
2. Apply professional ethics and codes of conduct.
3. Identify ethical issues and professional accountability.
4. Draft and manage construction contracts.
5. Analyze delays, risks and claims in construction projects.
6. Use arbitration, ADR and labour laws in construction works.

SECTION I

Unit 1: Stakeholders & Professional Practice **(6 Hrs)**

Government and regulatory authorities; BIS, IRC, NBC; Professional bodies (IEI, IRC, IIA/COA, ECI); Local bodies and planning authorities; Clients/Owners; Developers; Consultants; Contractors; Manufacturers, vendors and service agencies. Roles and responsibilities of each stakeholder. Professional coordination in civil engineering projects.

Unit 2: Professional Responsibility & Ethics **(6 Hrs)**

Ethics and professional ethics. Business, corporate, engineering and personal ethics. Code of Ethics of Institution of Engineers (India). Profession, professionalism and professional responsibility. Ethical conduct in civil engineering practice.

Unit 3: Ethical Issues and Accountability **(7 Hrs)**

Conflict of interest. Gift versus bribery. Negligence and professional liability. Environmental and safety violations. Vigil mechanism, whistle-blowing and protected disclosures. Ethical decision making and social responsibility of engineers.

SECTION II

Unit 4: Contract Management **(8 Hrs)**

Indian Contract Act, 1972 – essentials of valid contracts. Types of construction contracts. Prime and sub-contracts; Joint ventures and consortiums. Tendering process, bids and bid evaluation. Contract documents, conditions and specifications. Variations and changes in contracts.

Unit 5: Construction Claims, Risks & Disputes **(8 Hrs)**

Differing site conditions. Critical / "Red Flag" conditions. Delays, extensions of time and force majeure. Delay analysis (introductory). Liquidated damages and penalties. Insurance and taxation. Wrong practices in contracting – bid shopping, bid fixing. BOO, BOT, PPP and international commercial terms.

Unit 6: Arbitration, ADR & Labour Laws **(9 Hrs)**

Arbitration – meaning, scope and types. Arbitration Acts 1940 and 1996. UNCITRAL Model Law. Arbitration agreement and arbitral tribunal. Arbitral awards and Enforcement of foreign awards – New York and Geneva Convention Awards. Conciliation, mediation, negotiation, Dispute

Resolution Boards, Lok Adalat. Role of labour in construction. Industrial Disputes Act, Standing Orders Act. Workmen's Compensation Act. Building and Other Construction Workers Act. Safety, health, welfare and statutory compliance.

Text/Reference Books:

1. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
2. The National Building Code, BIS, 2017
3. RERA Act, 2017
4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. ProfessionalOffset
5. Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. AvinashPublications Mumbai
6. Avtarsingh (2002), Law of Contract, Eastern Book Co.
7. Dutt (1994), Indian Contract Act, Eastern Law House
8. Anson W.R. (1979), Law of Contract, Oxford University Press
9. Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law onUNCITRAL Model Law on Arbitration, Indian Council of Arbitration
10. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
11. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House
12. Bare text (2005), Right to Information Act
13. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
14. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act
15. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil

PROGRAMME ELECTIVE COURSE-V

CIVPEC-05A CONCRETE COMPOSITES

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes: -

At the end of the course, students will be able to

1. Design and evaluate fiber reinforced concrete based on fresh and hardened properties.
2. Design and analyze ferrocement structural elements using appropriate materials and construction techniques.
3. Develop and assess silica fume concrete to meet strength, durability, and performance requirements.
4. Design and evaluate polymer and polymer-impregnated concrete for specialized construction applications.
5. Formulate and evaluate high strength and high performance concrete mixes considering material properties and structural performance.
6. Design and assess self-compacting concrete mixes based on fresh, mechanical, and durability properties.

Section–I

Unit No. 1: Fiber Reinforced Concrete ***(*6 Hrs.)**

Introduction; properties of constituent materials; mix proportioning; mixing and casting methods; properties of freshly mixed fiber reinforced concrete; workability tests; mechanical properties; behavior of fiber reinforced concrete under compression, tension, and flexure; research findings; applications of fiber reinforced concrete.

Unit No. 2: Ferrocement ***(6 Hrs.)***

Introduction; materials used; mechanical properties; construction techniques; design in direct tension; applications; merits of ferrocement as a structural material.

Unit No. 3: Silica Fume Concrete ***(6 Hrs.)***

Introduction; physical and chemical properties of silica fume; reaction mechanism of silica fume; properties of silica fume concrete in the fresh state; mechanical properties and durability of silica fume concrete.

Section-II

Unit No. 4: Polymer concrete ***(6 Hrs.)***

Introduction, classification, properties of constituent materials, polymer impregnated concrete, polymer concrete, application.

Unit No. 5: High Strength Concrete – ***(6 Hrs.)***

Microstructure – Manufacturing and Properties – Design of HSC using Erintroy Shaklok method – Ultra High Strength Concrete – High Performance Concrete – Requirements and Properties of High Performance Concrete – Design Considerations.

Unit No. 6: Self-Compacting Concrete (SCC) ***(6 Hrs.)***

Introduction and need for self-compacting concrete; materials used in SCC; basic mix design concepts; fresh properties of SCC; tests for SCC; mechanical properties; advantages limitations, and applications of self-compacting concrete.

References:

1. *Concrete Technology & Design* by R. N. Swamy, Surrey University Press.
2. *Special Structural Concrete* by Rafat Siddique, Galgotia Pub. Pvt. Ltd.
3. *Fiber Reinforced Cement Composites* by P. N. Balaguru, S. P. Shah, Mc-Graw Hill.
4. *Fiber Cement and Fiber Concrete* by John Wiley and Sons.
5. *Fracture Mechanics and Structural Concrete* by Bhushan L. Karihal, Longman Scientific and Technical, John Wiley and Sons.
6. *Self-Compacting Concrete: Materials, Properties and Applications* by Okamura & Ouchi — CRC Press.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

PROGRAMME ELECTIVE COURSE-V

CIVPEC-05B TQM AND MIS IN CIVIL ENGINEERING

Teaching Scheme	**Examination Scheme**
Lectures:-4 Hrs/Week, 4 Credits	**ESE:** 100 Marks

Course Outcomes:

At the end of course, students will be able to

1: Understand the concept, philosophies and framework of Total Quality Management.
2: Explain TQM leadership, employee involvement and continuous improvement principles.

3: Apply quality tools, Six Sigma and ISO systems in civil engineering projects.
4: Explain MIS concepts, components and need for civil organizations.
5: Apply MIS for planning, scheduling, and cost and resource management in construction.
6: Evaluate Decision Support Systems, emerging MIS technologies, and case studies of implementation in construction.

SECTION I

Unit 1: Introduction to Total Quality Management (8 Hrs)

Need for quality in engineering; Evolution of quality concepts; Definitions and dimensions of product/service quality.

Quality philosophies, Contributions of Deming (PDCA cycle), Juran (quality trilogy), and Crosby (zero defects).

TQM framework, Barriers to implementation, benefits, and customer focus (orientation, satisfaction, complaints, retention).

Unit 2: TQM Principles (7Hrs)

Leadership and strategic quality planning; Quality statements and councils.

Employee involvement, Motivation, empowerment, teamwork, recognition, and performance appraisal. Continuous process improvement: Kaizen, 5S, supplier partnership (selection and rating).

Unit 3: Quality Tools and Systems (9 Hrs)

Seven traditional tools of quality (e.g., Pareto chart, cause-and-effect diagram); new management tools; Benchmarking and FMEA (Failure Mode and Effects Analysis).

Introduction to Six Sigma, Concepts, methodology, and applications in manufacturing/service sectors.

ISO 9000 standards, quality audits, and basic concepts of Quality Function Deployment (QFD). Applications in civil engineering using tools for quality assurance in concrete technology and project risk assessment.

SECTION – II

Unit 4: MIS Fundamentals for Civil Engineers (8 Hrs)

Concept, need and role of Management Information Systems; data, information and knowledge; types of information systems (transaction processing, management reporting, decision support, executive information).

System components: hardware, software, databases, networks, procedures and people; characteristics of good MIS; information needs at different levels in construction and infrastructure organizations.

Unit 5: MIS in Planning, Design and Construction (8 Hrs)

MIS for project planning and scheduling (integration with CPM/PERT, construction

planning software), cost control, materials and equipment management.
Applications of MIS in contract administration, site communication, document management, quality and safety management; brief introduction to BIM-based information management and e-governance in public works.

Decision Support Systems (DSS), knowledge-based systems and dashboards for project monitoring; introduction to database and reporting concepts relevant to civil engineering projects.
Case studies of MIS and quality systems implementation in construction companies, public works departments and urban local bodies; challenges, change management and ethical, legal and security issues in information handling.

TEXT BOOKS

1. Total Quality Management, Prentice Hall of India by L. Suganthi and Anand A. Samuel.
2. Total Quality Management, Pearson Education by Dale H. Besterfield.
3. Management Information Systems: Text and Cases – A Global Digital Enterprise Perspective, Tata McGraw-Hill by Waman S. Jawadekar
4. Management Information Systems: Managing the Digital Firm, Pearson by Kenneth C. Laudon and Jane P. Laudon.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II
Semester- VII
PROFESSIONAL ELECTIVE COURSE-V
CIVPEC-05C DISASTER MANAGEMENT

Teaching Scheme
Lectures – 3 Hrs/Week, 3 Credits

Examination Scheme
ESE – 100 Marks

Course Outcomes:
By the end of the course students will be able to
1) Apply various disaster preparedness, mitigation and management techniques.
2) Apply the Geo-informatics techniques for prepare hazard zonation maps for Disaster management.
3) Apply the various schemes and programmes of International, National and State and District Level Agencies for disaster management.

SECTION-I

Unit 1: Environmental Hazards and Disasters (08 Hrs)
Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology- Landscape Approach- Ecosystem Approach- Perception approach- Human ecology & its application in geographical researches.

Unit 2: Types of Environmental hazards and Disasters:- (08 Hrs)
Natural disaster and Planetary Hazards Earthquake Hazards/ disasters- Introduction, general characteristics, mechanism, causes and effects of Earthquakes, prediction, seismic zones, seismic waves, vulnerability,
Volcanic Hazards/Disasters:- Volcanoes Causes of volcanism, volcanic materials, hazardous effects and impacts of volcanic eruptions.
Landslide and Land Degradation:- Causes, tectonic conditions, erosion, avalanches, rock fall, damage assessment. Landslide prone area in India.
Cyclones and Tsunamis:- Structure and nature of cyclones (Tropical cyclones & Local storms) & tsunamis, characteristics, hazard donation, factors, hazard potential, impact assessment. Cyclone prone areas in India.
Floods:- General characteristics, causes, Flood hazards India, geomorphology and floods, flood forecasting, river and coastal floods, flash floods, lake outburst, risks, environmental planning, flood control and management (Human perception & mitigation).
War and Chemicals disaster: - Release of toxic chemicals Hazardous wastes, reactivity,toxicity, nuclear war, biological weapons, armed conflicts, land mines etc.
Biodiversity Extinction and Deforestation:- Biodiversity, species at risks, loss of biodiversity management of species diversity, deforestation its causes & adverse effects.
Biological hazards/ disasters: - Population Explosion.

Unit 3: Disaster Management:- Three Stages (06 Hrs)
Pre-disaster stage (Preparedness):- Introduction to disaster preparedness, Three A's of disaster preparedness, principles of disaster preparedness, steps in disaster preparedness, Preparing hazard zonation maps, Predictability/ Forecasting & warning, preparing disaster preparedness plan. Land use zoning- Preparedness through (IEC) Information, education and Communication. Disaster resistant house construction- Population reduction in vulnerable areas- Awareness.
Emergency stages: - Planning, mitigation, preparedness, response and recovery.
Post Disaster stage (Rehabilitation):- Physical and Social Infrastructure, Social and economic rehabilitation, Repair and retrofitting, Political Administrative Aspect.

SECTION-II

Unit 4: Natural Disaster Reduction and Management:- (05 Hrs)

Provision of Immediate relief measures to disaster affected people-Prediction of Hazards & Disasters-Measures of adjustment to natural hazards.

Unit 5: Disaster Mitigation:- (09 Hrs)

Disaster Mitigation through Development: Disaster Mitigation: Basic Concepts, Meteorological and Seismological observation, Structured and Non Structured Mitigation, disaster mitigation strategies, importance of Information and Communication in Disaster Mitigation, Relationship between Disaster and Development, Sustainable Development for Disaster Mitigation, Importance of various Agencies/sectors involved for disaster mitigation.

Role of Media

Monitoring Management- Programme of disaster research and mitigation of disaster of following organizations. International Council for Scientific Unions (ICSU)-Scientific committee on problems of the Environment (SCOPE), International Geosphere Biosphere programme (IGBP) - World federation of Engineering Organizations (WFED). National Academy of Sciences-World Meteorological organizations (WMO). Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

Unit 6: Agencies in Disaster Management (9Hrs)

International Agencies: United Nations and its specialized agencies like UNDP, FAO, WHO AEC (Atomic Energy Commission), United Nations Disaster Management Cell, New Delhi. International Federation of Red Cross and Red Crescent Societies (IFRC) and National Red Cross/Red Crescent Societies.

National Agencies: Disaster Management Cell (Ministry of Home Affairs, Govt. of India), National Institute of Disaster Management, Indian Red Cross Society, Planning Commission, National Civil Defense Organization, Bharat Scouts and Guides. Military and Para-Military Forces; Corporate Bodies etc.

State and District Level Agencies: Disaster Management cells at state level and District level, District Magistrate office, Role and Responsibilities of DM in prevention, preparedness, mitigation, relief and rehabilitation; local bodies and role of different functionaries.

TEXT BOOKS

1. The Environment as Hazards, Kates, B.I& White, G.F, Oxford, New York, 1978
2. Disaster Management, R.B. Singh, Rawat Publication, New Delhi, 2000.
3. Disaster Management H.K. Gupta, Universities Press, India, 2003.
4. Space Technology for Disaster Mitigation in India (INCED), R.B. Singh, University of Tokyo, 1994.
5. Disaster Management in Hills, Dr. Satender, Concept Publishing Co., New Delhi, 2003.
6. Plan for Earthquake, Disaster, Mitigation, Disaster Management, A.S. Arya, V.K. Sharma, Action IIPA Publication New Delhi, 1994.
7. An overview on Natural and Man-made Disaster & their Reduction, R.K. Bhandani, SIR, New Delhi.
8. Disaster Mitigation, Preparedness, Recovery and Response, P. C. Sinha, SBS Publishers and Distributors Pvt. Ltd.
9. Introduction to International Disaster Management, D. P. Coppola, ButterworthHeinemann.
10. Disaster Management M. Sharma, Vinod K., NCDM, IIPA, New Delhi, 1994
11. Housing in Disaster prone areas, National Building Organization and U.N. Regional Centre, Mathur G.C., ESCAP, New Delhi, 1986.
12. Disaster Management, Dr. Mrinalini Pandey, Wiley Publication.

REFERENCE BOOKS

1. Disaster Management in India – A Status Report, National Disaster Management Division, Ministry of Home Affairs, Govt. of India, 2004.
2. Disaster Management and Preparedness, Collins Larry R. and Scheind Thomas D.(2000)., Taylor and Francis, 2000.
3. Disaster Management, Sharma V.K., Indian Institute of Public Administration, NewDelhi, 1995.
4. National Disaster Response Plan, NCDM, New Delhi, 2001

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Final Year B.TECH. (Civil Engineering)
Semester-VIII
CIVILOJT: On Job Training

Teaching Scheme
Practical : 24 Hours/week, 12 Credits

Examination Scheme
ICA: 200 Marks
OE: 100 Marks

Course Introduction:

The On-Job Training (OJT) course provides final-year Civil Engineering students with practical exposure to real-world industrial environments. It bridges the gap between theoretical knowledge and industrial practice, enabling students to understand Construction processes, systems, design applications, and operational workflows. During this training, students observe, participate, and apply engineering principles in actual work scenarios, gaining hands-on experience in equipment, tools, and organizational processes. The course enhances professional skills such as problem-solving, teamwork, time management, and technical communication, preparing students for successful careers in mechanical engineering, design, production, and operations management.

Course Objectives:

During this course, student is expected to:

1. Understand real-world industrial operations, workflows, and Construction processes.
2. Apply theoretical Civil engineering knowledge to practical industrial tasks.
3. Develop skills in observing, analyzing, and documenting Construction processes.
4. Gain hands-on experience with Civil equipment, tools, and machinery.
5. Learn professional skills such as teamwork, communication, and problem-solving in an industrial environment.
6. Understand safety, quality standards, and efficiency practices in Civil engineering operations.

Course Outcomes:

At the end of this course, student will be able to:

1. Explain the functioning and workflow of Construction processes observed during training.
2. Apply Civil engineering principles to solve practical industrial problems.
3. Analyze and document industrial operations, processes, and improvements.
4. Demonstrate proficiency in using Civil tools, equipment, and software in industrial applications.
5. Exhibit effective communication, teamwork, and professional behavior in an industrial setting.
6. Evaluate safety practices, quality measures, and efficiency standards, suggesting improvements where necessary.

Report Format as per AICTE Internship Policy:

Daily Diary / Log

Students must maintain a daily record during training. It should include:

Date & Duration of Work
Tasks Assigned
Processes/Tools Used
Observations & Learnings
Sketches / Process Flow / Photos where applicable

Final Training Report

The training report should contain:

- ***Title Page***
  - Student name, roll number, department
  - Name of organization, period of training
- ***Certificate of Completion***
  - Signed by Industry Supervisor
- **Acknowledgement**
- **Contents / Table of Contents**
- **Introduction**
  - About organization and department
  - Training objectives
- ***Description of Work Assigned***
  - Tasks, tools, machines, software used
- ***Learning & Outcomes***
  - Interpretation of learning vis-à-vis academic theory
- ***Conclusion***
  - Summary of work, achievements
- ***Appendix***
  - Daily Log pages (certified)
  - Attendance Record
  - Photos / Drawings / Data sheets

The report **must be signed by the supervisor, faculty mentor, and TPO** before submission.

Assessment Procedure:

Evaluation of internship is divided into **Continuous Internal Evaluation (CIE)** and

End-of-Training Evaluation:

Continuous Assessment

f) **Log / Diary Maintenance** – Quality & completeness

g) ***Industry Supervisor Evaluation***

- Discipline, technical ability, responsibility

h) ***Faculty Mentor Visit Report***

- Periodic assessment of progress

Final Evaluation

1. **Final Training Report**
    a. Technical contents, clarity, organization

2. ***Seminar / Viva-Voce***
    a. Presentation by student

3. ***Final Supervisor***

Assessment Evaluation

Criteria

a) Regularity of diary

b) Technical content & relevance

c) Practical application of theory

d) Quality of presentation / report