सावित्रीबाई फुले पुणे विद्यापीठ

Savitribai Phule Pune University,
Pune, Maharashtra, India

Faculty of Science and Technology

National Education Policy (NEP)-2020 Compliant Curriculum

ME – Civil Engineering (2025 Pattern)

Master of Engineering
(Construction Management)

(With effect from Academic Year 2025-26)

Contents

Preface by Board of Studies

Dear Students and Teachers,

We, the members of Board of Studies Civil Engineering, are very happy to present ME – Civil engineering (2024 Pattern) Master of (Construction Management) Engineering syllabus effective from the Academic Year 2025-26.

Civil Engineering is a dynamic discipline that lies at the intersection of engineering, design, and environmental stewardship. It provides the foundation for the planning, design, construction, and maintenance of infrastructure systems that support modern society. This curriculum is designed to provide students with a comprehensive understanding of the fundamental principles, theories, and practices of civil engineering, while also preparing them to address the challenges of an ever-evolving built environment and sustainable development.

The revised syllabus falls in line with the objectives of NEP-2020, Savitribai Phule Pune University, AICTE New Delhi, UGC, and various accreditation agencies by keeping an eye on the technological developments, innovations, and industry requirements. Learners are now getting sufficient time for self-learning either through online courses or additional projects for enhancing their knowledge and skill sets. Learners can be advised to take up online courses, on successful completion they are required to submit certification for the same. This will definitely help learners to facilitate their enhanced learning based on their interest.

This curriculum is the result of extensive consultation with academic experts, industry professionals, and alumni to ensure relevance and excellence. It is designed not only to meet the current industry standards but also to prepare students for higher studies and research in the field of Civil Engineering.

We hope that this curriculum will inspire students to become competent professionals, responsible citizens, and contributors to the technological advancement of society.

Dr. S. B. Thakare

Chairman
Board of Studies

Members of Board of Studies-Civil Engineering	
Dr. Ganesh A Hinge	Dr.Pratibha M. Alandkar
Dr.U. R. Awari	Dr.Jyotiba B. Gurav
Dr.Vilas K. Patil	Dr.Deepa Joshi
Dr.Manoj P. Wagh	Dr.Hanumant T. Dhumal
Dr.W. N. Deulkar	Er. Yusuf A. S. Inamdar
Dr.Vinaykumar C. H.	Er.Ramesh D. Raskar

Program Specific Outcomes (PSO)

PSO1: The graduates of this programme will be able to meet the needs of public in the Planning and execution of quality construction work.

PSO2: The graduates will be able to work effectively as an individual or in a team having acquired leadership skills and manage projects in multidisciplinary environments.

PSO3: Succeed in construction management careers emphasizing applications of construction management principles with the ability to solve broad range of problems in construction.

Program Educational Objectives (PEO)

Program Educational Objectives (PEOs): Program Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

PEO1: Core Competency and Professional Excellence

Graduates will establish themselves as successful Civil Engineering professionals by applying their technical knowledge, problem-solving abilities, and ethical values in planning, designing, and executing infrastructure projects that meet societal needs.

PEO2: Higher Education and Lifelong Learning

Graduates will pursue advanced education, research, or professional development to stay current with emerging trends, technologies, and practices in Civil Engineering and related interdisciplinary fields.

PEO3: Leadership and Social Responsibility

Graduates will demonstrate leadership, teamwork, effective communication, and a commitment to sustainable development by engaging in projects that contribute to environmental conservation and the betterment of society.

Program Outcomes (PO)

Graduate Attributes (GAs) are measurable outcomes that indicate the competencies a postgraduate student is expected to achieve. They represent the qualities and skills required for professional practice at the postgraduate level. The NBA defines the following Graduate Attributes for all PG programmes.

1. Scholarship of knowledge

Acquire in-depth knowledge of specific discipline or professional area, including wider and global perspective, with an ability to discriminate, evaluate, analyze and synthesize existing and new knowledge, and integration of the same for enhancement of knowledge.

2. Critical thinking

Analyze complex engineering problems critically, apply independent judgement for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.

3. Problem solving

Think laterally and originally, conceptualize and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.

4. Research skill

Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.

5. Usage of modern tools

Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities with an understanding of the limitations.

6. Collaborative and multidisciplinary work

Possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness, objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.

7. Project management and finance

Demonstrate knowledge and understanding of engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economic and financial factors.

8. Communication

Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.

9. Life-long learning

Recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

10. Ethical practices and social responsibility

Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.

11. Independent and reflective learning

Observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistakes without depending on external feedback.

General Rules and Guidelines

- Course Outcomes (CO): Course Outcomes are narrower statements that describe what students are expected to know, and are able to do at the end of each course. These relate to the skills, knowledge and behavior that students acquire in their progress through the course.
- Assessment: Assessment is one or more processes, carried out by the institution, that identify, collect, and prepare data to evaluate the achievement of Program Educational Objectives and Program Outcomes.
- Evaluation: Evaluation is one or more processes, done by the Evaluation Team, for interpreting the data and evidence accumulated through assessment practices. Evaluation determines the extent to which Program Educational Objectives or Program Outcomes are being achieved, and results in decisions and actions to improve the program

Guidelines for Examination Scheme

Theory Examination: The theory examination consists of two parts, Comprehensive Continuous Evaluation (CCE) and End-Semester Examination (ESE).

Comprehensive Continuous Evaluation (CCE):

Comprehensive Continuous Evaluation (CCE) of 50 marks based on all units of course, to be scheduled & conducted at institute level. CCE consists of parameters and weightage as mentioned below:

Sr.	Parameters	Marks	Coverage of Units
1.	Written Unit Test	10 Marks	Units 1 and Unit 2
2.	Open Book Test	10 Marks	Units 3 and Unit 4
3.	Assignments / Case Study	10 Marks	Unit 5
4.	Seminar Presentation/Field Visit	10 Marks	Any Units
5.	Mini Project	10 Marks	Any Units
6.	Term Paper	10 Marks	Any Units
7.	Project-Based Learning	10 Marks	Any Units

HoD/PG Coordinator may select any parameter from above list. One Unit text is mandatory. At the end of the semester, the final marks for CCE shall be assigned based on the performance of the student and is to be submitted to the University.

- **Format and Implementation of Comprehensive Continuous Evaluation (CCE)**
- **Unit Test and Open Book Test**

Format: Questions to be designed as per Bloom's Taxonomy guidelines to assess various cognitive levels (Remember, Understand, Apply, Analyze, Evaluate, Create).

Implementation: Schedule the Unit test after completing Units 1 and 2. Ensure the question paper is balanced and covers key concepts and applications. Schedule the open book test after completing Units 3 and 4.

Sample Question Distribution

- Remembering (2 Marks): Define key terms related to [Topic from Units 1 and 2].
- Understanding (2 Marks): Explain the principle of [Concept] in [Context].
- Applying (3 Marks): Demonstrate how [Concept] can be used in [Scenario].
- Analyzing (4 Marks): Compare & contrast [Two related concepts] from Units 1 and 2.
- Evaluating (4 Marks): Evaluate the effectiveness of [Theory/Model] in [Situation].

- **Assignments / Case Study**

Students should submit one assignment or case study report based on Unit 5.

Format: Problem-solving tasks, theoretical questions, practical exercises, or case studies that require in-depth analysis and application of concepts.

Implementation: Distribute the assignments or case study after covering Units 5.

Provide clear guidelines and a rubric for evaluation.

- **Seminar Presentation**

Format: Presentation on any topic from syllabus followed by a Q & A session.

Deliverables: Presentation slides, a summary report in 2 to 3 pages, and performance during the presentation.

Implementation: Schedule the seminar presentations at the end of the course.

- **Mini Project**

Each student shall carry out an individual mini project on any topic from syllabus.

Format: The mini project report structure should include: Title page (project and student details), Certificate and acknowledgement, Abstract (summary of work), Introduction (problem, objectives and scope), Literature review (related studies), Methodology (tools, design, process), Implementation (step-by-step procedure, with photos/screenshots), Results (tables, graphs, visuals), Conclusion (achievements & future scope), References and appendix (if required).

Implementation: Students should independently identify the problem, carry out the work, and present outcomes. Reports must demonstrate originality, clarity in methodology, and result presentation (tables/graphs/diagrams).

- **Project Based Learning (PBL)**

  Format: It can be carried out in small groups (2–3 students). Students shall work on a realistic, open-ended problem relevant on any topic from syllabus. The PBL task may involve design, analysis, simulation, model development, field-based study, or innovative solutions to practical challenges. The PBL report structure should include: Title page (problem and student / group details), Certificate and acknowledgement, Abstract (summary of problem and approach), Problem definition and objectives, Literature survey / background study, Proposed methodology (tools, models, design, assumptions), Implementation / solution development (steps, models, or prototypes), Results and discussion (analysis, comparisons, visuals), Conclusion (outcomes, limitations, and scope for future work) References and appendix (if required).

  Implementation: Students should identify the problem, define objectives, and work towards a solution through design, analysis, simulation, or model development. Reports must highlight clarity in methodology, originality, and proper presentation of results (tables/graphs/diagrams), along with conclusions and future scope.

- **Schedule for conducting CCE**
  - Weeks 1 - 5: Cover Units 1 and 2
  - Week 6: Conduct Unit Test
  - Weeks 7 - 9: Cover Units 3 and 4
  - Week 10: Conduct Open Book Test.
  - Weeks 11-12 : Cover Unit 5
  - Week 13: Distribute and collect Assignments / Case Study

HoD /PG Coordinator may decide schedule for other parameters from above list.

Evaluation and Feedback:

Unit Test: Evaluate promptly and provide constructive feedback on strengths and areas for improvement.

Assignments / Case Study: Assess the quality of submissions based on the provided rubric. Offer feedback to help students understand their performance.

Seminar Presentation: Evaluate based on content, delivery, and engagement during the Q&A

session. Provide feedback on presentation skills and comprehension of the topic.

End-Semester Examination (ESE)

End-Semester Examination (ESE) of 50 marks theory examination based on all the units of course scheduled by the university. Question papers will be sent by the University through QPD (Question Paper Delivery). University will schedule and conduct ESE at the end of the semester.

The paper setting, conduct of examination and paper assessment for the End-Semester examination of the subjects Elective I, Elective II and Elective III shall be done by the respective college, as per the schedule of Savitribai Phule Pune University. Director/Principal approve the panel of paper setters in consultation with the head of the department. Out of Three Question papers sets, Director/Principal shall choose any one question paper for distribution during the examination on the day of the examination.

- **Format and Implementation: Question Paper Design:**

Below structure is to be followed to design the End-Semester Examination (ESE) for a theory subject of 50 marks on all 5 units of the syllabus with questions set as per Bloom's Taxonomy guidelines.

Balanced Coverage: Ensure balanced coverage of all units with questions that assess different cognitive levels of Bloom's Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, and Create. The questions should be structured to cover the Bloom's Taxonomy as applicable:

  - Remembering: Basic recall of facts and concepts.
  - Understanding: Explanation of ideas or concepts.
  - Applying: Use of information in new situations.
  - Analyzing: Drawing connections among ideas.
  - Evaluating: Justifying a decision or course of action.
  - Creating: Producing new or original work.

- **Detailed Scheme**

Unit-Wise Allocation: Unit wise allocation 10 Marks per unit. Each unit will have a combination of questions designed to assess different cognitive levels. By following this scheme, you can ensure a comprehensive and fair assessment of students' understanding and application of the course material, adhering to Bloom's Taxonomy guidelines for cognitive skills evaluation.

NEP 2020 Compliant Curriculum Structure

First Year ME – Civil Engineering (2025 Pattern)
Master of Engineering (Construction Management)
Semester I

Credit Level 6.5															
Course Code	**Type of Course**	**Course Title**	**Teaching Scheme (Hrs./week)**			**Examination Scheme and Marks**						**Credits**			
			Theory	**Tutorial**	**Practical**	**CCE***	**End-Sem**	**Term work**	**Practical**	**Oral**	**Total**	**Theory**	**Tutorial**	**Practical**	**Total**
	Semester I														
PCC-501-CON	Major Mandatory	Construction Management and Project Planning	4	-	-	50	50	-	-	-	100	4	-	-	4
PCC-502-CON	Major Mandatory	Construction Technology	4	-	-	50	50	-	-	-	100	4	-	-	4
PCC-503-CON	Major Mandatory	Total Quality Management	4	-	-	50	50	-	-	-	100	4	-	-	4
PCC-504-CON	Major Mandatory	Material Management	4	-	-	50	50	-	-	-	100	4	-	-	4
PCC-505-CON	Major Mandatory	Practical 1 (On Core Subjects)	-	-	4	-	-	25	-	25	50	-	-	2	2
PEC-510-CON	Major Elective I	Elective Course 1	3	-	-	50	50	-	-	-	100	3	-	-	3
PEC-511-CON	Major Elective I	Practical 2 (On Elective Subject)	-	-	2	-	-	25	-	25	50	-	-	1	1
Total			**19**	**0**	**6**	**250**	**250**	**50**	**0**	**50**	**600**	**19**	**--**	**3**	**22**

CCE*: Comprehensive Continuous Evaluation

PEC-510-CON: Elective Course 1
a. Construction Quality and Safety Management
b. Sustainable Construction Materials
c. Real Estate Practices and Management
d. Statistical Methods in Construction

First Year ME – Civil Engineering (2025 Pattern)
Master of Engineering (Construction Management)
Semester II

Credit Level 6.5															
Course Code	**Type of Course**	**Course Title**	**Teaching Scheme (Hrs./week)**			**Examination Scheme and Marks**						**Credits**			
			Theory	**Tutorial**	**Practical**	**CCE***	**End-Sem**	**Term work**	**Practical**	**Oral**	**Total**	**Theory**	**Tutorial**	**Practical**	**Total**
	Semester II														
PCC-506-CON	Major Mandatory	Construction Contracts and Legal disputation	4	-	-	50	50	-	-	-	100	4	-	-	4
PCC-507-CON	Major Mandatory	Operation Research	4	-	-	50	50	-	-	-	100	4	-	-	4
PCC-508-CON	Major Mandatory	Project Economics and Financial Management	4	-	-	50	50	-	-	-	100	4	-	-	4
PCC-509-CON	Major Mandatory	Practical 3 (On Core Subjects)	-	-	4	-	-	25	-	25	50	-	-	2	2
PEC-512-CON	Major Elective II	Elective Course 2	3	-	-	50	50	-	-	-	100	3	-	-	3
PEC-513-CON	Major Elective III	Elective Course 3	3	-	-	50	50	-	-	-	100	3	-	-	3
SEM-514-CON	Seminar I	Technical Seminar I	-	-	4	-	-	25	-	25	50	-	-	2	2
Total			**18**	**0**	**8**	**250**	**250**	**50**	**-**	**50**	**600**	**18**	**-**	**4**	**22**

PEC-512-CON: Elective Course 2	**PEC-513-CON: Elective Course 3**
a. Thrust areas in Project Management	a. Automation in Construction Industry
b. Infrastructure Development	b. Disaster Management and Mitigation
c. Value Engineering &Valuation	c. International Contracting
d. Construction Site administration and Control	d. Advanced Construction Technology

Second Year ME– Civil Engineering (2025 Pattern)
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Semester III

Credit Level 7															
Course Code	**Type of Course**	**Course Title**	**Teaching Scheme (Hrs./week)**			**Examination Scheme and Marks**						**Credits**			
			Theory	**Tutorial**	**Practical**	**CCE***	**End-Sem**	**Term work**	**Practical**	**Oral**	**Total**	**Theory**	**Tutorial**	**Practical**	**Total**
	Semester III														
RM-601-CON	Research Methodology	Research Methodology	4	-	-	50	50	-	-	-	100	4	-	-	4
OJT-602-CON	On Job Training / Internship	On Job Training / Internship	-	-	10	-	-	100	-	-	100	-	-	5	5
SEM-603-CON	Seminar II	Technical Seminar II	-	-	8	-	-	25	-	25	50	-	-	4	4
PRJ-605-CON	Research Project	Research Project Stage I	-	-	18	-	-	25	-	25	50	-	-	9	9
Total			**4**	**0**	**36**	**50**	**50**	**150**	**0**	**50**	**300**	**4**	**0**	**18**	**22**

Second Year ME– Civil Engineering (2025 Pattern)
Master of Engineering (Construction Management)

Semester IV

Credit Level 7																
Course Code	**Type of Course**	**Course Title**	**Teaching Scheme (Hrs./week)**			**Examination Scheme and Marks**						**Credits**			
			Theory	**Tutorial**	**Practical**	**CCE***	**End-Sem**	**Term work**	**Practical**	**Oral**	**Total**	**Theory**	**Tutorial**	**Practical**	**Total**
	Semester IV														
SEM-604-CON	Seminar III	Technical Seminar III	-	-	8	-	-	50	-	50	100	-	-	4	4
PRJ-606-CON	Research Project	Research Project – Stage II	-	-	36	-	-	150	-	50	200	-	-	18	18
Total			**0**	**0**	**44**	**0**	**0**	**200**	**0**	**100**	**300**	**0**	**0**	**22**	**22**

Savitribai Phule Pune University, Pune

Maharashtra, India

ME– Civil Engineering (2025 Pattern)
Master of Engineering (Construction Management)

Semester I

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-I

Course Code: PCC-501-CON

Course: Construction Management and Project Planning

Teaching scheme	Credit	Examination	
Theory: 4 hours / week	04	CCE ESE	50 marks 50 marks

Perquisites: Project management

Companion course: Practical 1

Course Objectives:

1. To introduce students to the fundamentals of modern management and various classical and scientific management theories applicable to construction.
2. To develop the ability to plan, schedule, and organize construction projects.
3. To equip students with knowledge of project administration and control methods.
4. To develop awareness regarding construction safety practices, legal frameworks, and hazard control methods.
5. To impart skills in work study techniques and incentive schemes.

Course outcomes:

On completion of the course learner will be able to:

CO1. Understand classical and modern management theories and perform SWOT analysis.
CO2. Develop a work breakdown structure and apply scheduling techniques.
CO3. Analyze and manage project control functions like crashing, resource leveling, Earned Value Management (EVM), and prepare various site reports and MIS documentation.
CO4. Demonstrate knowledge of construction safety protocols, statutory regulations, and hazard identification techniques.
CO5. Demonstrate the ability to conduct work study techniques and to recommend appropriate incentive schemes.

COURSE CONTENTS

Unit I	**Management Concepts**	**(12 hours)**

Basics of Management: Modern scientific management, management theories of F. W. Taylor, Fayol & Mayo, Fourteen principles of management-by Henry Fayol. Hawthrone Experiment- by Elton Mayo. Functions of Management. Styles of Management. SWOT Analysis in construction.

Construction Project Management: Types of Organizations with their merits and demerits. Forms of organizations. Construction Project lifecycle. Project feasibility reports-Technical analysis, financial analysis, Economic analysis, Ecological analysis. Project clearance procedures and necessary documentation for major works like dams, multistoried structures, ports, tunnels. Qualities, role and responsibilities of project manager. Role of Project Management Consultants.

Unit II	**Project Planning and Scheduling**	**(12 hours)**

Defining Project scope. Developing Work breakdown structure for residential, industrial and infrastructure projects. Use of Project scheduling Techniques like Gantt Chart, Critical Path Method (CPM) (with numerical), Programme Evaluation and Review Technique (PERT) (with numerical), Line of Balance Technique (LOB)-concept only, Precedence Network Analysis (with numerical). Constrained resource scheduling. Software in Construction scheduling.

Unit III	**Project Administration and Control**	**(12 hours)**

Project controlling: Network crashing with numerical. Resource allocation and leveling (with numerical). Project updating. Earn value analysis.

project performance record keeping and reporting- (i) Daily reporting: Daily progress report (DPR), Material inward report, Material transfer receipt (MTR), Material issue slip, Daily store consumption report, Daily (Departmental) labor slip, Watchman's report, Clarification report, Memo details, **(ii) Weekly reporting:** Cash bills, Settlement of accounts, Ident (Requisition), Rending Indent, **(iii) Monthly reporting:** Monthly material consumption report, Monthly cement consumption report, Electric meter reading report, Water meter reading report, Machinery and instrument report, Excess material list, Construction progress chart, Cube testing report,

Other aspects: Site mobilization and demobilization aspects. Training for Construction Managers, Engineers, Supervisors. Application of MIS in project management. Enterprise Resource Planning (ERP).

Unit IV	**Construction Safety**	**(12 hours)**

Causes of Accidents on various sites, safety measures and safety policies to be adopted, determination of safety parameters, personal protective equipment.

The Construction (General Provisions) Regulations 1961, The Construction (Lifting operations) Regulations 1961, The Construction (Working places) Regulations 1966, The Construction (Health and Welfare) Regulations 1966, The health and Safety act 1974, Workmen compensation Act,

Construction Hazards and their prevention-Trench excavation, shaft excavation, Scaffolding, Falsework, Crane operation, Tunneling, Sewer work, Work in confined spaces, Demolition work,

Hazard Identifications and Control Techniques - HAZOP, FMEA, FMECA. Cost of Construction Injuries-Legal Implications

Safety Organization –Safety Policy, Safety audit, Safety Record Keeping, Safety Culture, Employer's responsibilities, Employee's responsibilities, safety manual, safety training

Unit V	**Work Study & Incentive Schemes**	**(12 hours)**

Definition, Objectives, basic procedure, method study and work measurement, Work study applications in Civil Engineering. Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams. Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating. Activity sampling, time-lapse , photography technique, Analytical production studies, Incentive Schemes- Necessity, Merit rating, job evaluation, installation, modification and maintaining of incentive schemes based on implementation experience.

LEARNING RESOURCES

Text books

1. Construction Project Management Theory & practice, Kumar Neeraj Jha, 2nd Edition, Pearson
2. Construction Management and Planning, Sengupta and Guha, Standard Edition, Tata McGraw Hill publication.
3. Project Management, K Nagrajan, 2nd Edition, New age International Ltd.

Reference books

1. Construction management fundamentals, Knutson, Schexnayder, Fiori, Mayo, 2nd Edition, Tata McGraw Hill publication.
2. Work study, R. M. Currie, 2nd Edition, Pitman Publication 1963.
3. Construction Project Management Planning, Scheduling and Controlling, Chitakara, Tata McGraw Hill, New Delhi.
4. Introduction to work study by George Kanawaty, 4th edition, Universal publishing corporation, Bombay.
5. A to Z Practical building construction and it's management by Mantri institute of development and research

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester: I

Course Code: PCC-502-CON

Course: Construction Technology

Teaching scheme	Credit	Examination	
Theory: 4 hours / week	04	**CCE** **ESE**	50 marks 50 marks

Perquisites: Building Materials, Building Construction, Concrete Technology, Foundation Engineering, Tunnel Engineering

Companion course: Practical 1

Course Objectives:

1 To know the various methods and techniques involved in construction of pile foundations.
2 To know the construction techniques involved in tunnel/underground construction.
3 To know the construction techniques involved in Underwater Construction.
4 To understand the types of cofferdams, caissons and its techniques of construction.
5 To get familiar with different construction using Concrete Technology.

Course outcomes:

On completion of the course, learner will be able to:
CO1 Understand the various methods and techniques involved in construction of pile foundations.
CO2 Explain the construction techniques involved in tunnel/underground construction.
CO3 Explain the construction techniques involved in Underground Construction.
CO4 Decide the types of cofferdams, caissons and its techniques of construction.
CO5 Get familiar with different construction using Concrete Technology.

COURSE CONTENTS

Unit I	**Pile Construction**	**(12 hours)**

Introduction, uses, selection of piles, Classification of piles based on function, pile driving techniques, grouping of piles, efficiency of group of piles, pile cap and pile shoe, load tests on piles, loads on piles, pulling of piles, causes of failures of piles and precautionary measures, Use of NDT in pile construction.

Unit II	**Underground Construction**	**(12 hours)**

Tunnel alignment, size and shape of tunnel, tunneling in hard and soft strata, tunnel shaft-sinking and construction, tunnel lining, ventilation and lighting in tunnel, advanced techniques for tunnel maintenance, Micro Tunneling.

Unit III	**Underwater Construction**	**(12 hours)**

Problems encountered in excavation, Underwater drilling, blasting, Grouting methods in soft and hard soil including Jet grouting and Chemical grouting, dewatering in shallow and deep excavations using different methods, Vacuum Dewatering and Well point system, electro-osmosis, injections with cement and chemical, freezing process, vibro-flotation.

Unit IV	**Cofferdams & Caissons**	**(12 hours)**

Cofferdams: types, selection, design features of coffer dams and construction of single, double wall, Sheet pile cofferdams, concrete wall movable cofferdam, land cofferdams.

Caissons: Definition, uses, types of caissons, Construction of pneumatic and precast caissons, floating of caissons, cutting edges, sinking of caisson, tilting of caisson, caisson diseases

Unit V	**Construction using Concrete Technology**	**(12 hours)**

Concrete – Various types and erection methods of shuttering, Operation and erection of Ready Mix Concrete Plant, Pumped Concrete, Concrete mix design with various methods of concreting and also underwater concreting using tremie method, Concreting for underwater Construction, Self-compacting concrete.

LEARNING RESOURCES

Text Books:

1. A Text Book of Building Construction, S.P. Arora & S.P. Bindra, , Dhanpat Rai &Sons, New Delhi.
2. Construction Technology, S.K. Sarkar and S. Saraswati,Oxford University Press,New Delhi.
3.Building Construction, B.C. PunamiaLaxmi Publications, New Delhi
4. Building Construction S.C. Rangwala, , Charotar Publication Pvt Ltd. Anand
5. Construction Equipment Planning and Applications – Dr. Mahesh Varma

Reference Books:

1. Construction Technology, Analysis, and Choice, 2ed, Bryan, Wiley India
2.Construction Planning, Equipment and methods –Peurifoy-Tata McGraw Hill Publication
3. Journals such as CE & CR. Construction world, International Construction.
4. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester: I
Course code: PCC-503-CON
Course: Total Quality Management.

Teaching scheme	Credit	Examination	
Theory: 4 hours / week	04	CCE ESE	50 marks 50 marks

Perquisites: TQM & MIS at UG Level, Awareness of Quality Construction Aspects

Companion course: Practical 1

Course Objectives:

1. To provide students with a comprehensive understanding of economic principles and to understand the need of QM in construction and apply necessary tools to achieve quality.
2. To apply necessary trainings for the effective utilization of resources
3. To apply effectively the eight principles of ISO for quality processes in construction
4. To apply Six Sigma tool for TQM in construction project

Course Outcomes

On completion of the course, learner will be able to:
CO1. Understand and apply the TQM philosophy in construction
CO2. Able to use effectively QC tools.
CO3. Apply ISO principles for effective Quality processes in construction
CO4. Able to apply Six Sigma effectively.

COURSE CONTENTS

Unit I	Concepts of Quality	12 hours)

Definition of quality as given by Deming, Juran, Crosby, difference between Quality control, Quality Assurance (QA/QC). Total quality control (TQC) and Total Quality Management (TQM), Need for TQM in construction industry. Organization necessary for implementation of quality, Quality manual-Contents, data required, preparation, responsibility matrix, monitoring for quality- PDCA Cycle. Quality aspects in every phase in the life cycle of Construction project.

Unit II	Statistical quality Control &Quality Control Tools	(12 hours)

Histogram, Pareto diagram, Fishbone diagram, Quality control chart-Testing required for quality control of construction material used in RCC Work- destructive and Non destructive Test (NDT)
Statistical Quality Control- Necessity, Benchmarking, Application of dispersion methods in quality control of construction activity.

Unit III	Quality Control Team & Six Sigma and Application	(12 hours)

Development of quality circles, quality inspection team, inspection reports, monitoring and control, 360‘feedback for quality. Definition of six sigma, evolution – Historical aspects, probability distribution Six sigma ratings, Six sigma training, six sigma as an effective tool in TQM.

Application: RCC Work in building, DLC and PQC layers in road construction, Assessment of overall construction process from concept to completion of a 16-construction project

Unit IV	**Training and development of Human Resources for QM & Study of ISO 9004- Quality System Standards**	**(12 hours)**

Training needs assessment, technical and managerial competencies necessary for achieving quality, preparation for training. Training on Project Rework Reduction Tool (PRRT) software- training for preparation of checklist necessary for RCC work, for commonly used formats.

Purpose of ISO Standards. Difference between ISO 9001 and ISO 9004.Certification process for ISO 9001. Certification bodies involved. Eight Principles of ISO-Basic meaning, applying these principles for an effective quality process in the organization. Management support and commitment necessary for achieving implementation for quality system standards.

Unit V	**Achieving TQM on Construction Projects**	**(12 hours)**

Advantages, barriers, principles, steps in implementation, seven types of construction defects. Determining cost of poor quality including hidden cost. Quality functions deployment (QFD). Importance of third-party quality audits. CIDCCQRA quality rating systems, customers satisfaction surveys, Non Conformity reports (NCR), remedial strategy for reducing NCR‘s.

LEARNING RESOURCES

Text Books:

1. Quality Control and Total Quality Management by P.L.Jain- Tata McGraw Hill Publ.Company Ltd
2. Total Engineering Quality Management – Sunil Sharma – Macmillan India Ltd.
3.Total Project Management – The Indian Context - P.K.Joy Macmillan India Ltd.

Reference books

1. International Standards Organization – ISO 9001 and ISO 9004
2. Mantri Handbook – A to Z of Construction – Mantri Publications
3. Juran‘s Quality Handbook – Joseph M. Juran, A. Blanton. Godfrey – Mcgraw Hill International Edition (1998)
4. Probability and Statistics for Engineers – Miller, Freund-Hall, Prentice India Ltd.
5. Quality Control and Total Quality Management, P.L.Jain, Tata Mcgraw Hill Publ.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-I

Course Code: PCC-504-CON

Course: Material Management

Teaching scheme	Credit	Examination	
Theory: 4 hours / week	04	CCE ESE	50 marks 50 marks

Perquisites: Building Construction materials

Companion course: Practical 1

Course Objectives:

1. To provide a foundational understanding of materials management in construction projects.
2. To develop skills in codification, standardization, and strategic procurement planning.
3. To teach effective inventory and store management techniques using modern tools.
4. To ensure understanding of quality control processes and sustainability in materials.
5. To expose students to advanced digital and technological tools for materials management.

Course outcomes:

On completion of the course, learner will be able to:

CO1. Understand the functions and importance of materials management in construction success.
CO2. Apply codification and standardization techniques and perform procurement analysis.
CO3. Implement efficient inventory and store management systems.
CO4. Execute quality control measures using modern testing and assessment methods.
CO5. Demonstrate use of digital systems like ERP, BIM, and AI for planning and tracking materials.

COURSE CONTENTS

Unit I	**Fundamentals of Materials Management**	**(12 hours)**

Definition and significance of materials management in construction. Objectives and scope of materials management. Functions and role of a Materials manager. Integrated approach to materials planning, procurement, and usage. Interdepartmental coordination: procurement, finance, scheduling. Ethical sourcing, sustainable procurement, and environmental considerations. Global sourcing and impact of international logistics. Circular economy in construction materials, Net Zero Material Management.

Unit II	**Codification, Standardization and Procurement**	**(12 hours)**

Codification and classification of construction materials (By type, use, source). Material analysis: ABC (Always Better Control), VED (Vital-Essential-Desirable), HML (High-Medium-Low). National and international material standards (IS, ASTM, BS, ISO). Procurement lifecycle: planning, requisition, tendering, contracting. MRP (Material Requirements Planning) and BOM (Bill of Materials). Vendor management: prequalification, evaluation, performance rating. Risk in procurement and vendor relations. E-procurement and supply chain digitization. Smart Contracts in procurement, Sustainable Procurement Strategies (SPP), Environmental, Social and Governance **(**ESG) in supply chain.

Unit III	**Inventory and Stores Management**	**(12 hours)**

Inventory Management : Inventory types and functions. Inventory control techniques: EOQ, Reorder Point, Safety Stock, Stockout analysis. Inventory review systems: Periodic vs. Continuous. Just-In-Time (JIT) and Lean Inventory Systems. Inventory effectiveness indices: ITR (Inventory Turnover Ratio), Fill Rate, Deadstock. AI for demand forecasting. RFID, IoT-enabled inventory systems, Digital Inventory Dashboards. **Stores Management :**Stores layout planning and material stacking systems. Material receipt, inspection, documentation, and record keeping. Prevention of material loss (damage, theft, deterioration). Site logistics and scheduling. Bulk purchasing: benefits and risks. Drone-based material tracking, Mobile warehousing solutions.

Unit IV	**Material Quality Control**	**(12 hours)**

Importance and methods of material quality control. Acceptance criteria: IS codes for aggregates, cement, steel, concrete, etc. Sampling methods and Statistical Quality Control (SQC). Process control methods in material handling. Quality economics: cost-benefit analysis of testing and assurance. Life Cycle Assessment (LCA) of materials. Use of smart sensors and NDT (Ultrasonic, Rebound Hammer, etc.). AI-based predictive quality analytics.

Unit V	**Advanced Material Management**	**(12 hours)**

Overview of digital material management systems (MMS). Software tools in material management, MMS integration with scheduling softwares. Cost control and performance analytics using MMS. Block chain for procurement transparency and smart contracts. Digital twins and BIM integration for material traceability. AI, ML, and Data Analytics in material planning. Carbon tracking in supply chain, Environmental, Social and Governance (ESG) reporting tools in MMS. Waste management and recycled material usage. Autonomous delivery robots, Decentralized logistics, Construction cloud platforms.

LEARNING RESOURCES

Text books

1. Construction Project Management, Kumar Neeraj Jha, Pearson Education.
2. Materials Management: An Integrated Approach, Gopalakrishnan P., Sundaresan M., PHI Learning.
3. Materials Management,K.C. Arora, Laxmi Publications.

Reference books

1. Materials Management, S.K. Bhattacharya & T.H. Nand, Sultan Chand & Sons.
2. Introduction to Materials Management, Arnold & Chapman, Pearson.
3. BIM Handbook – Eastman et al., Wiley.
4. A Guide to the Project Management Body of Knowledge (PMBOK Guide), PMI Standards.
5. Articles from Construction Management Association of America (CMAA) and McKinsey Global Construction Reports.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-I

Course Code: - PCC-505-CON

Course: Practical 1 (On Core Subjects)

Teaching scheme	Credit	Examination	
Practical: - 4 hours / week	02	Term work Oral	25 marks 25 marks

Perquisites: Knowledge of fundamental mathematics.

Companion course: All core subjects

Course Objectives:

1. To introduce students to the fundamentals of modern management and various classical and scientific management theories applicable to construction
2. To apply necessary trainings for the effective utilization of resources
3. To apply effectively the eight principles of ISO for quality processes in construction
4. To know the various methods and techniques involved in construction of pile foundations.
5.To provide a foundational understanding of materials management in construction projects.

Course outcomes:

CO1 Demonstrate the ability to conduct method study and time-motion analysis to improve construction productivity using techniques such as flow charts and activity sampling.
CO2Understand the various methods and techniques involved in construction of pile foundations.
CO3 Explain the construction techniques involved in Underground Construction.
CO4 Implement efficient inventory and stores management systems.

LIST OF PRACTICALS

1. Assignment onWrite a report summarizing management principles, styles, and perform a SWOT analysis of a real-life construction project.

2. Assignment onConduct a site safety audit and identify hazards with mitigation measures.

3. Prepare a safety policy document and analyze any two safety laws applicable to construction work.

4. Assignment on showing the schematic of a pumped concrete layout and determining the total length of the pipe-line required, considering dependent factors.

5.Site visit - Any one Of Following

Pile construction

Tunnel

Cofferdams

Caisson

6. Assignment on formulation of linear regression equation between a dependent variable and independent variable, applicable in construction

7.Case Study : Quality Assessment report for (Any 2)

a. RCC work

b. DLC of road

c. PQC of road

8. Assignment onPrepare a report by interviewing a project/site manager on materials management practices.

9. Assignment on toCreate a codified list of materials, prepare ABC analysis.

10.Assignment on Calculate EOQ, Reorder Point, and Fill Rate for three key materials using given data

Note- Practical no. 5, 7 and 10 are compulsory, solve any 5 from others.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-I
Course Code: PEC-510-CON a
Course: Elective I: Construction Quality and Safety Management

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	**03**	**CCE** **ESE**	**50 marks** **50 marks**

Perquisites: Basic knowledge of Construction Practices, Project Management, and Occupational Safety Standards.

Companion course: Practical 2 (Based on Elective Subject – Construction Quality and Safety Management)

Course Objectives:

1. To impart knowledge of principles, guidelines, and implementation strategies for construction quality management.
2. To develop competency in quality assurance, control tools, audits, and failure analysis techniques in construction.
3. To understand construction safety management systems, safety programs, and organizational responsibilities.
4. To analyze causes of construction accidents, associated legal frameworks, and preventive risk management practices.
5.To integrate sustainable and ethical practices in quality and safety management for achieving long-term construction excellence

Course outcomes:

On completion of the course, the learner will be able to:

CO1 Explain quality management concepts, objectives, standards, and their role in construction project success.
CO2 Apply quality assurance/control tools, conduct audits, and perform reliability/failure analysis in construction projects.
CO3 Design and evaluate safety management systems, including job-site programs, responsibilities, and safety culture.
CO4 Analyze causes of accidents, interpret legal frameworks, and propose risk mitigation strategies.
CO5 Develop integrated approaches combining quality and safety management for sustainable and efficient project delivery.

COURSE CONTENTS

Unit I	**Fundamentals of Construction Quality Management**	**(08 hours)**

Definitions, objectives, and significance of quality in construction. Factors influencing quality: materials, equipment, workmanship, and human resources. Roles, responsibilities, and authority of stakeholders in quality implementation. Quality objectives, quality policy, quality circles, and management guidelines. Concepts of consumer satisfaction, ergonomics, completion time, and statistical tolerance. Overview of standards, contracts, documents, and programming in quality assurance.

Unit II	Quality Assurance and Quality Control Techniques	(08 hours)
Role of regulatory agencies, owners, designers, and contractors in QA/QC.Tools for quality assurance/control: checklists, audits, appraisals, statistical methods. Failure Mode and Effects Analysis (FMEA) and critical failure aspects. Reliability concepts: optimum design, stability methods, prediction models. Taguchi's concept of quality and application of cost-benefit models in construction QA		
Unit III	**Safety Management and Safety Programs**	**(08 hours)**
Significance and current status of safety in construction projects**.** Problem areas in construction safety (scaffolding, lifting, excavation, high-rise works). Components of effective safety programs**:** job-site assessments, toolbox talks, safety meetings, and safety incentives. Safety training modules, documentation, and feedback systems for safety improvement. Development of safety culture**:** characteristics, strategies, and organizational responsibilities. Roles of workers, supervisors, managers, safety personnel, and subcontractors in safety compliance.		
Unit IV	**Construction Accidents and Legal Aspects**	**(08 hours)**
Causes and types of accidents in construction (mechanical, electrical, human error, natural). Human factors and behaviour-based safety (BBS) approaches. Cost of accidents and their impact on productivity and project performance. Hazard identification and risk assessment methods. Legal frameworks in India**:** Acts, Rules, Provisions (Factories Act, BOCW Act, IS: 3786, OSHA guidelines). Case studies of construction accidents and related legal judgments**.**		
Unit V	**Integrated Quality and Safety in Construction**	**(08 hours)**
Relationship between quality management and safety management. Importance of sustainability and ethics in QA/QC and safety practices. Role of codes and standards (IS 456, IS 800, IS 1200, ISO 9001, OSHA). Cost implications of quality failures and accidents – preventive vs corrective costs. Best practices and future trends in construction quality and safety integration (digital monitoring, AI, BIM-enabled QA/QC, IoT-based safety).		

LEARNING RESOURCES

Text books

1. Juran's Quality Control Handbook, J.M. Juran, McGraw Hill Education
2. Safety Management in Construction, – R.K. Khandpur, Dhanpat Rai Publications
3. Total Quality Management**,** Dale H. Besterfield, Pearson Education

Reference books

1.Construction Safety Management – John V. Grimaldi & Rollin H. Simonds, Wiley
2.Quality Assurance and Quality Control in Construction – James J. O'Brien, McGraw Hill Education
3.IS Codes: IS 456, IS 800, IS 1200 Series (Latest BIS Publications)
4.OSHA Guidelines (Occupational Safety and Health Administration, U.S. Dept. of Labor) and IS:3786 (BIS Publication

Savitribai Phule Pune University

ME - Civil (Construction Management) 2025 Pattern

Course code: PEC-511-CON a

Course: Practical 2 (On Elective Subject) Construction Quality and Safety Management

Teaching scheme	Credit	Examination	
Practical: 2 hours / week	01	Term work Oral	25 marks 25 marks

Perquisites: Knowledge of site procedures and familiarity with construction documents.

Companion course: Construction Quality and Safety Management (Elective I – Theory)

Course Objectives:

1. To provide hands-on exposure to safety and quality processes on construction projects.
2. To develop skills in preparation of quality plans, audits, checklists, and risk assessment forms.

Course outcomes

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

CO1. Prepare and evaluate quality management and safety documentation.
CO2. Conduct inspections, audits, and site safety analysis.
CO3. Analyze root causes of defects or failures in quality and safety parameters.

LIST OF PRATICALS

Term Work (Based on practical sessions)

Part A: Based on Elective Subject (Any Six)

1. Preparation of Quality Assurance Plan – Develop a QA plan for a construction project including objectives, responsibilities, control points, and documentation formats.
2. Inspection and Test Plan (ITP) – Draft an ITP for activities like concreting, reinforcement, or waterproofing with acceptance criteria and inspection stages.
3. Safety Plan and Checklist – Prepare a site-specific safety plan covering hazards, PPE, signage, and emergency response.
4. Case Study on Construction Failure – Identify root causes (technical, human, or managerial) and suggest preventive measures.
5. Quality Control Documentation – Design a flowchart and formats for inspection records, NCRs, and approval notes.
6. Material Quality Register – Prepare a register to track material quality with certificates, sources, and inspection status.
7. Evaluation of BIS/ISO Codes – Summarize provisions of IS 456, IS 3786, ISO 9001 relevant to QA/QC and safety.
8. Safety Training Module – Develop a training module for site workers on safety practices and emergency preparedness.

9. Computational Work (Any One) – Reliability prediction, cost-benefit analysis of QA/QC, or Taguchi method for process optimization.

Part B: Based on Site Visit (Any Two)

1. Mock Site Safety Audit – Conduct an audit using OSHA/BIS checklists, assess compliance, and prepare a structured report.
2. Quality and Safety Documentation Study – Visit a construction site to study inspection/test records and reporting formats.
3. Risk Assessment Report – Observe ongoing site activities, identify hazards, and prepare a risk analysis report.
4. Case Study Visit – Study a project with reported failures or safety issues and recommend corrective measures.
5. Interaction with Safety Personnel – Interview site engineers/safety officers to understand roles, responsibilities, and safety culture.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-I

Course Code: PEC-510-CON b

Course: Elective-I (Sustainable Building Materials)

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	03	CCE ESE	50 marks 50 marks

Perquisites: Various construction materials.

Companion course: Practical 2

Course Objectives:

1. Understand the fundamental concepts of sustainability
2. Discuss and understand the properties of building Materials
3. Understand the knowledge of modern construction materials to be used in the field.
4. To understand role of traditional, Innovative and smart building materials in construction.
5. To promote reuse and recycling of construction material.

Course outcomes: On completion of the course, learner will be able to:

CO1 To select eco-friendly and sustainable building materials for construction.
CO2 To understand the need of traditional and alternate building materials.
CO3 To know the use of smart and intelligent materials & its applications civil engineering projects.
CO4 To study impact of embodied energy, carbon foot print & green building rating systems.
CO5 To study & analyze EIA for sustainable civil engineering projects.

COURSE CONTENTS

Unit I	**Introduction to Sustainable Building Materials**	**(08 hours)**

Introduction to sustainable building materials, qualities, use, examples - Natural building materials, Role of Material: Carbon from Cement, alternative cements and cementitious material, Alternative fuel for cements for reduction in carbon emission. Sustainability issues for concrete. Role of quality, minimization of natural resource utilization, concrete with alternative material for sustainability.

Unit II	**Traditional and Alternate Building Materials**	**(08 hours)**

Traditional Building materials and their characteristics (Carbon Negative BM)- Mud, Stone, Thatch, Bamboo, Binders- Lime, Laterite Quarry waste.

Alternate Building Materials- Requirement of Alternate Building Materials, Flyash concrete, Bamboo Reinforced Concrete, Phospho-gypsum, Furnace Slag, Fiber Reinforced Concrete. Aerated Concrete, Ferro cement concrete, High performance concrete, self-healing concrete, Recycled Plastics concrete, chemicals/admixtures.

Innovative building materials- – environmentally friendly, reliable and durable Building Materials, Permeable Concrete, Nanocellulose composite brick, Argo bricks.

Unit III	**Smart Building Materials**	**(08 hours)**

Introduction- Characteristics of smart materials in comparison to common building materials, Types of Smart Materials, Application of smart materials on building components – Piezometric material, shape memory alloys (SMAs), Nano material, Characteristic and application of Photochromic, Thermochromics,

Unit IV	**Concept of Embodied Energy and Carbon Footprint**	**(08 hours)**

Idea of embodied energy - Development of the concept, factors to be considered, calculation techniques for embodied energy - Data sets available for calculation of embodied energy - Case studies of embodied energy calculations- carbon footprint of material, calculation techniques, methods to off-set high embodied energy - Cradle to cradle material, whole life cycle and life cycle costing analysis techniques.

Unit V	**Environment Impact Assessment**	**(08 hours)**

Impact of development projects of civil engineering on environment - Environmental Impact Assessment (EIA) concept, limitations, Legal provisions on EIA, methods of EIA, Addressing the issues related to the Project Affected People-ISO 14000, EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects,

LEARNING RESOURCES

Text books

1. Building Materials, Ghosh.
2. Sustainable Building Design Manual- Volume II, Published by TERI, New Delhi, 2009.
3. Sustainable Building - Design Manual, TERI. (2004), New Delhi: Teri Press, The Energy and Resources Institute.

Reference books

1. Traditional Construction for A Sustainable Future Carole Ryan, 2011, Spon Press.
2.Civil Engineering Materials, Shan Somayaji, Prentice Hall Inc., 2001
3.Alternative Building Materials and Technologies, Jagadish,Chennai: New age International Pvt Ltd Publishers

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-I

Course Code: PCC-511-CON b

Course: Practical-2- Elective-I -(Sustainable Building Materials)

Teaching scheme	Credit	Examination	
Practical: - 2 hours/ week	01	Term Work Oral	25 marks 25 marks

Perquisites: Physical and mechanical properties of construction materials

Companion course: - Elective -I

COURSE CONTENTS

LIST OF PRACTICALS

The Term work shall consist of the following

A) Assignments and Case Study **B) Site visit**

Any two assignments from Sr. No. 1- 4, assignment no.5 and site visit are compulsory.

A) Assignments: (Two assignments on each unit)

1. Application, challenges and future of smart Sustainable materials in construction.
2. Enlist challenges of smart building materials over traditional.
3. Write in brief any two-software used for sustainable material selection and uses.
4. Show the Life Cycle of any one construction material. It should depict every step, starting from the material extraction till the waste disposal/management. It can be an illustration like flow chart or even descriptive with words
5. Case study: Discuss environment impact and cost analysis of use of sustainable construction material at site.

B) Site visit related to various use of Sustainable construction methods and Techniques.

LEARNING RESOURCES

Text books

1.New Building Materials and Construction World magazine

Reference books

1. Traditional Construction for A Sustainable Future, Carole Ryan, 2011, , Spon Press
2. Concrete Technology: Theory and Practice,Shetty M. S, ", S.Chand& Company Ltd., 2005

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester: I

Course Code: PEC-510-CON c

Course: Elective I Course: Real Estate Practices and Management

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	**03**	**CCE**	**30 marks**
		ESE	**70 marks**

Perquisites: Basic knowledge of Building Construction and Project Management**.**

Companion course: Project Management

Course Objectives:

1. Introduce learners to the scope, dynamics, and classifications of the real estate market.
2. Study statutory provisions, land-use controls, and ethical frameworks governing real estate practices.
3. Understand the real estate project lifecycle including feasibility, development, financing, marketing, and facility management.
4. Analyze stakeholder roles, documentation, financial transactions, and valuation methods in real estate.
5. To enable learners to adopt sustainable, transparent, and modern practices in real estate aligned with RERA and global trends.

Course outcomes:

On completion of the course, learner will be able to:
CO1 Explain the scope, classification, and peculiarities of the real estate sector, and assess factors influencing real estate markets.
CO2 Interpret and apply statutory provisions, land-use controls, registration requirements, and environmental considerations in real estate projects.
CO3 Analyze the roles, responsibilities, and ethical practices of stakeholders, consultants, and property managers in real estate management.
CO4Develop and manage real estate projects by handling feasibility, financing, risk management, and post-construction facility management.
CO5 Prepare and evaluate documentation, valuation methods, and legal transactions while ensuring compliance with RERA and professional standards.

COURSE CONTENTS

Unit I	**Real Estate Market and Statutory Framework**	**(08 hours)**

Real Estate Scope – classification of real estate activities and peculiarities – Factors affecting real estate market – Role of Government in real estate market; Laws – rules and regulation – land use controls in property development – registration And licensing requirements – Knowledge base for assessment and forecasting the Real Estate market – environmental issues related to Real Estate Transactions.

Unit II	**Participants, Stakeholders, and Ethical Practices**	**(08 hours)**

Role – Scope – working characteristics and principal functions of real estate participants and stakeholders – real estate consultants and their activities – role and responsibilities of property managers – Code of ethics for Real Estate participants – Good practices and managerial responsibilities.

Unit III	**Real Estate Development and Project Management**	**(08 hours)**

Functions of real development like project formulation – feasibility studies – developing – costing and financing – managing including planning – Scheduling and monitoring of real estate projects – risk management – Facilities management – marketing/advertising – post construction management etc – Real estate investment, Sources and related issues.

Unit IV	**Documentation, Appraisal, and Legal Transactions**	**(08 hours)**

Types of real estate interests and property rights, Documentation in real estate processes, Transfer of titles, records, and registration requirements, Real estate appraisal and valuation methods, Agreements between consultants, developers, and principals, Closing of real estate transactions and compliance issues

Unit V	**Post-Construction and Emerging Practices**	**(08 hours)**

Post-construction property management and facility services. Real estate investment approaches and income-based models. Digital tools in real estate (GIS, BIM, PropTech applications). Sustainable real estate and green building practices. Future trends: smart cities, co-working spaces, and global real estate transformations.

LEARNING RESOURCES

Text books

1.Real Estate Management, Gaurav Jain, , University Science Press

2.Commercial Real Estate Analysis and Investments, David M. Geltner, Norman G. Miller, Cengage

3.Real Estate Laws and Management, Chetan V. Mehta, LexisNexis

Reference books

1.RERA Act, 2016 – Government of India

2. RICS Practice Standards – Royal Institution of Chartered Surveyors

3. Real Estate Development and Management, K. Sriram, PHI

4.Indian Real Estate Industry: Post RERA Transformation, Prashant Thakur CREDAI-Publication

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester I

Course code: PEC-511 c

Course: Practical 2 (On Elective Subject) Real Estate Practices and Management

Teaching scheme	Credit	Examination	
Practical: - 2 hours/ week	01	Term Work Oral	25 marks 25 marks

Perquisites: Basic knowledge of Building Construction and Project Management.

Companion course: Project Management

Course Objectives:

1. To provide practical knowledge of regulatory, legal, and financial aspects of real estate development.
2. To develop skills in documentation, valuation, project scheduling, and compliance in real estate practices.
3. To expose students to real estate industry processes through case studies and site visits.

Course outcomes

CO1. Analyze and prepare documentation related to land title, agreements, valuation, and compliance.
CO2. Evaluate the feasibility and scheduling of real estate projects using modern tools and methods.
CO3. Assess real estate practices through case studies, marketing strategies, stakeholder analysis, and site visit reports.

LIST OF PRATICALS

Term Work (Based on practical sessions)

Part A: Based on Elective Subject (Any Eight)

1. Study of FSI, TDR, and zoning regulation through case files.
2. Preparation of land title and ownership documentation.
3. Drafting of agreement for sale and development agreement.
4. Report on real estate project financial feasibility.
5. Marketing and branding case study of real estate projects.
6. Property valuation using market comparison approach.
7. Stakeholder analysis in a real estate project.
8. Preparation of a sample RERA compliance checklist and documentation.
9. Case study on post-construction management.
10. Real estate project scheduling using MS Project / Primavera or Excel-based income method model.

Part B: Based on Site Visit (Any Two)

1. Site visit to an ongoing real estate project – preparation of report on planning, approvals, and development process.
2. Visit to a government office (e.g., Town Planning / Registration) to study procedures related to land title, registration, and approvals.
3. Visit to a real estate consultancy/developer's office to understand documentation, marketing, and sales processes.
4. Case study visit ost-construction property management and facility services.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-I

Course Code: -PEC-510-CON d

Course: Elective-I-Statistical Methods in Construction Management

Teaching scheme	Credit	Examination	
Theory: - 3 hours / week	03	CCE ESE	50 marks 50 marks

Perquisites: Fundamental knowledge of mathematics, including algebra and basic calculus. Understanding of basic engineering concepts related to construction processes and project management. Familiarity with measurement units, data collection methods, and interpretation of technical drawings and reports.

Companion course: Statistical Methods in Construction Management

Course Objectives

1. To provide a comprehensive understanding of statistical methods relevant to construction project planning, monitoring, and control.
2. To develop analytical skills for data collection, interpretation, and decision-making in construction projects.
3. To apply probability, regression, hypothesis testing, and forecasting techniques for addressing real-world construction management problems.
4. To equip learners with the use of statistical tools and software for quality control, productivity analysis, and evidence-based project recommendations.

Course outcomes:

On completion of the course, learner will be able to:

CO1 Apply descriptive and inferential statistical methods for analyzing construction-related data.

CO2 Use probability distributions and regression models for risk assessment, planning, and cost estimation.

CO3 Perform hypothesis testing, time series analysis, and forecasting for effective project management decisions.

CO4 Employ statistical quality control techniques and software tools for monitoring, evaluating, and improving construction processes.

COURSE CONTENTS

Unit I	**Fundamentals of Statistics & Data Relationships**	**(08 hours)**

Scope and limitations of statistical methods in construction, Concepts of population and sample, frequency distribution, Measures of central tendency (mean, median, mode), Measures of dispersion (range, variance, standard deviation, coefficient of variation), Skewness and correlation (simple and multiple), Scatter diagrams, curve fitting methods, and introduction to regression.

Unit II	**Regression, Probability & Distributions**	**(08 hours)**

Linear regression, multiple regression, and introduction to multivariate analysis, Review of probability concepts: rules of probability, random variables, And Discrete Probability Distributions: Binomial, Poisson, Geometric, Hyper geometric, Continuous probability distributions: Exponential and Normal, Applications of probability distributions in construction and highway engineering.

Unit III	**Statistical Inference & Hypothesis Testing**	**(08 hours)**

Introduction to statistical decisions and hypothesis formulation, Significance levels and confidence intervals, Tests concerning means (one-sample and two-sample), Testing equality of means of two populations, Tests concerning variance, Chi-square test for goodness of fit., Z-test, t-test and practical applications in construction management.

Unit IV	**Forecasting & Time Series**	**(08 hours)**

Forecasting in engineering and construction contexts, Time series components: trend, seasonal variation, cyclical variation, irregular components, Methods: smoothing, moving averages, trend analysis, Applications in construction and transportation planning,

Unit V	**Statistical Quality Control**	**(08 hours)**

Statistical Quality Control (SQC): concept of process variation, control charts for variables ($\bar{X}$ & R charts) and attributes (p, np, c charts), Process capability analysis and quality improvement in construction projects.

LEARNING RESOURCES

Text books

1. Gupta, S.C. and Kapoor V.K. Fundamentals of Mathematical statistics, Sultan Chand and Sons, 1978.
2. Medhi J (1982) Introduction to statistics. New age publications, New Delhi.

Reference books

1. Probability and statistics for Engineers and Scientists, Walpole R. E. and R. H. Mayers (1982): . Wiley Intl. 2002.
2. Statistics -Principles and methods, Johnson R and G. Bhattacharya (1985): John Wiley, NY.
3. Probability and statistics for Engineers, Ross S. M. Wiley Int. Edition.
4. Traffic Engineering and Transport Planning, KadiyaliL.R., Khanna Publishers

Savitribai Phule Pune University ME - Civil (Construction Management) 2025 Pattern			
Semester-I **Course Code: -**PEC-511-CON d **Course:** Practical 2 (On Elective Subject)-Statistical Methods in Construction Management			
Teaching scheme	**Credit**	**Examination**	
Practical: - 2 hours/ week	01	Term Work Oral	25 marks 25 marks
Perquisites: Fundamental Mathematics			
Companion course: - Elective -I			
COURSE CONTENTS			
LIST OF PRACTICALS			

The Term work shall consist of the following

A) Assignments

Solve any three assignments

1. Define the scope of statistical methods in construction project management.
2. Explain the significance of regression analysis and probability distributions in construction and highway engineering. Include examples to illustrate how these statistical tools help in decision-making and quality control.
3. Discuss the role of hypothesis testing in statistical decision-making. Explain the concepts of significance levels, confidence intervals, and the differences between Z-test, t-test, and chi-square test. Provide examples to illustrate when each test is appropriately used
4. Explain the importance of forecasting and statistical quality control (SQC) in engineering. Describe the components of a time series and discuss common forecasting methods such as smoothing, moving averages, and trend analysis. Additionally, explain the concept of process variation and the use of control charts in quality monitoring

All Assignments are compulsory

1. Explain the importance of statistical methods in construction, highlighting the role of population and sample, frequency distribution, measures of central tendency and dispersion, and the use of correlation and regression in analyzing construction data. Support your answer with relevant examples
2. Discuss the applications of probability distributions and regression analysis in construction and highway engineering. Your answer should include an explanation of linear and multiple regression, an introduction to multivariate analysis, and a review of key probability concepts. Illustrate your answer with examples involving discrete and continuous probability distributions (such as Binomial, Poisson, and Normal).
3. In the context of construction management, explain how hypothesis testing can be used to make decisions about material quality and project performance. Choose a scenario such as comparing the compressive strength of two types of concrete or evaluating the variance in labor productivity. Apply suitable statistical tests (e.g., t-test, Z-test, or chi-square test) and interpret the results
4. Discuss how forecasting and statistical quality control techniques can be applied in construction project planning and quality assurance. Use examples such as predicting labor or material demand using time series analysis, and monitoring concrete strength or defect rates using $\bar{X}$ & R charts or p-charts. Describe how process capability analysis supports quality improvement in construction projects.
5.

Savitribai Phule Pune University, Pune

Maharashtra, India

ME– Civil Engineering (2025 Pattern)
Master of Engineering (Construction Management)

Semester II

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-II

Course Code: PCC-506-CON

Course: Construction Contracts and Legal Disputes

Teaching scheme	Credit	Examination	
Theory: 4 hours / week	04	CCE ESE	50 marks 50 marks

Companion course: Practical 3

Course Objectives:

1. Understand the legal foundations governing construction contracts in India.
2. Analyze the formation, execution, and closure of construction contracts and tenders.
3. Interpret general and special contract conditions relevant to construction projects.
4. Study national and international construction contract standards.
5. Evaluate construction disputes and apply knowledge to practical contract documents.

Course outcomes:

On completion of the course, learner will be able to:

CO1. Interpret the Indian Contract Act and its application in construction projects.
CO2. Evaluate and compare various forms of tendering processes.
CO3. Interpret and analyze contract conditions and stakeholder roles.
CO4. Explain international construction contract standards like FIDIC and ICE standards.
CO5. Evaluate claim documentation and apply appropriate dispute resolution methods.

COURSE CONTENTS

Unit I	**Legal Framework of Construction Contracts**	**(12 hours)**

Indian Contract Act, 1872: Definitions, valid/void/voidable contracts, Clauses of offer, acceptance, consideration, legality , Clauses 1 to 75 in construction contracts, Breach of contract: causes, effects, remedies, Workmen's Compensation Act, 1923: Applicability in construction, Common legal terms in contracts, Case studies: breach and remedy analysis, Digital execution and e-signing of contracts (legality & enforceability under Indian law), Integration of AI tools in contract review and compliance checking, Use of contract lifecycle management (CLM) systems in large-scale projects, Legal implications of remote/on-site hybrid workforce agreements.

Unit II	Contract Formation and Tendering	(12 hours)
CPWD, MES, and PWD contract forms, Methods of tendering: open, limited, negotiated, two-stage, Pre-bid meetings, pre-qualification criteria, Tender scrutiny, bid evaluation, comparative statements, Contract duration, obligations, payment terms, Pricing methods: item rate, lump sum, cost-plus, Contract correspondence and closure, E-Tendering in India, Ethical practices in procurement , Blockchain in tendering for transparency and traceability, AI-based bid evaluation systems, Integration of e-Governance platforms (GeM, eProcure), Green procurement and sustainable bidding practices, Mandating Environmental, Social and Governance (ESG) compliance in public contracts		
Unit III	**Conditions of Contracts**	**(12 hours)**
General vs Particular Conditions, CPWD and MOSPI model contracts, Stakeholder agreements: client, contractor, supplier, Clauses: risk, escalation, variation, Insurance and indemnity clauses Force majeure and termination, Digital risk management and clause tracking using smart contract tools, Climate change and Environmental, Social and Governance (ESG)-linked escalation clauses, Use of Building Information Modeling (BIM) in defining scope and terms, Smart contract enforcement through blockchain, Dynamic insurance solutions integrated with IoT-enabled construction monitoring		
Unit IV	**International Contract Standards**	**(12 hours)**
Institution of Civil Engineers (ICE) historical background and contract terms, International Federation of Consulting Engineers (FIDIC) structure: Red, Yellow, Silver Books, Employer vs contractor roles and liabilities, Short form contracts – risks and applicability, FIDIC usage in India and developing nations, Comparison of Indian and FIDIC standards, Common disputes in international contracts, Increasing use of FIDIC in Indian PPP/infrastructure projects, Integration of Dispute Avoidance and Adjudication Boards (DAAB), International arbitration hubs and their growing relevance (e.g., Singapore International Arbitration Centre (SIAC), The London Court of International Arbitration (LCIA)), FIDIC digital contract versions (online interactive templates), Application of FIDIC in climate-resilient infrastructure projects		
Unit V	**Construction Claims and Contract Administration**	**(12 hours)**
Claims: delays, cost overruns, quality failures, Claim documentation and justification, Dispute prevention strategies, Dispute resolution: negotiation to arbitration, Dispute Review Board(DRBs) and Arbitration & Conciliation Act (1996 vs 1940), Arbitral tribunal: powers and procedures, Enforcement of awards, Digital documentation in arbitration, Online Dispute Resolution (ODR) platforms in construction, Role of Artificial Intelligence in claim analysis and evidence sorting, Use of drones and sensors for real-time claim validation, Fast-track arbitration clauses in international contracts, Block chain evidence systems for tamper-proof documentation, Contract administration lifecycle,Labour law and legal compliance, IoT-based real-time safety monitoring and automated compliance alerts,Taxation and GST aspects, Legal audits and statutory inspections, Use of contract management software.		
LEARNING RESOURCES		

Text books

1. Construction Contracts, Jimmie Hinze, 3rd Edition, McGraw Hill publication
2. Construction Contracts: Law and Management, Will Hughes, Ronan Champion, 5th Edition,
3. Civil Engineering Contracts and Estimates, B. S. Patil, 2006 Edition, Universities Press.
4. Law of contract Part I and Part II, Dr. R.K. Bangia, 2005 Edition, Allahabad Law Agency.

Reference books

1. Law of Contract – Avtar Singh
2. The Indian Contract Act (9 of 1872), 1872, Bare Act, 2006 edition, Professional Book publishers
3. Construction Law – Julian Bailey (3 Vol Set)
4. CPWD Works Manual – Central Public Works Department, Govt. of India
5. FIDIC Contract Guide (Red, Yellow, Silver Book) – FIDIC
6. Arbitration and Conciliation Act, 1996 – Bare Act Edition
7. FIDIC Contracts in Asia Pacific – Donald Charrett
8. The Workmen‘s Compensation Act, 1923 (8 of 1923) Bare Act- 2005- Professional Book Publishers.
9. Law Relating to Infrastructure Projects – Gajaria

Online Resources

Indian Contract Act https://indiacode.nic.in

CPWD Manuals https://cpwd.gov.in

FIDIC Contracts https://fidic.org

E-Tendering Guidelines https://eprocure.gov.in

Arbitration and Conciliation Act https://legislative.gov.in

Construction Law Cases https://indiankanoon.org

Ministry of Statistics Model Contracts https://mospi.gov.in

Dispute Review Board Foundation https://www.drb.org

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-II

Course Code: PCC-507-CON

Course: Operations Research

Teaching scheme	Credit	Examination	
Theory: 4 hours / week	04	CCE ESE	50 marks 50 marks

Perquisites: Knowledge of fundamental mathematics.

Companion course: Practical 3

Course Objectives:

1. Understand the mathematical tools and techniques that are needed to solve optimization problems.
2. Apply fundamental knowledge of Operation Research in Construction Projects.
3. Solve linear programming problems using appropriate techniques and optimization solvers, Interpret the results obtained and translate solutions into directives for action.

Course outcomes:

On completion of the course, learner will be able to:

CO1. Students will be able to study linear programming methods to find solution.

CO2. Students will have practical experience to solve various problems practically on game theory.

CO3. Students will have knowledge of choosing the best strategy out of available strategies which Is essential to solve the problem.

CO4 Students will be able to apply Queuing Theory & decision theory to solve civil engineering Problems.

CO5 Students will study about Inventory and Inventory models.

COURSE CONTENTS

Unit I	**Introduction to Operation Research**	**(12 hours)**

Origin of Operations Research, Historical Standpoint, Methodology, Different Phases, Characteristics, Scope and Application in Civil Engineering and Managerial Decision-making process. Introduction to Optimization Techniques and their application in Engineering Planning, Design and Construction.

Unit II	**Linear Programming**	**(12 hours)**

Linear programming: Formulation of Linear optimization models, Civil engineering applications. Simplex method, special cases in simplex method, Method of Big M, two phase method, duality, sensitivity analysis.

Unit III	**Decision Theory**	**(12 hours)**

a) Transportation Model and its variants

b) Assignment Model and its variants.

c) Decision theory

Unit IV	**Inventory Control Models**	**(12 hours)**

Deterministic Inventory control models: functional role of inventory, inventory costs, model building, Single item inventory control model without shortages, with shortage and quantity discount. Inventory control model with uncertain demand, service level, safety stock, P and Q systems.

Unit V	**Queuing Theory & Game Theory**	**(12 hours)**

Queuing Theory, Simulation, Sequencing model – n jobs through 2, 3 and M machines, Replacement models.

Introduction, Characteristics of Game Theory, Two Person, zero sum games, Pure strategy. Dominance theory, Mixed strategies (2x2, mx2), Algebraic and graphical methods.

LEARNING RESOURCES

Text books

1. Operations Research, R.Pannerselvam, PHI Publications 2006.

2. Operations Research, Gupta and Heera, S. Chand Publications.

Reference books

1. Operations Research – An Introduction, Hamdy A Taha-2017

2. Operations Research, A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education

3. Operation Research, J.K. Sharma, Mac Milan 2010.

Savitribai Phule Pune University

ME - Civil (Construction Management) 2025 Pattern

Semester-I

Course Code: PCC-508-CON

Course: Project Economics & Financial Management

Teaching scheme	Credit	Examination	
Theory: 4 hours / week	04	CCE ESE	50 marks 50 marks

Perquisites: Basic knowledge of Engineering Economics, Project Planning, and Financial Terminologies.

Companion course: Construction Project Planning and Control

Course Objectives:

1. To understand and apply economic principles for decision-making in construction projects.
2. To analyze cost structures, financial viability, and capital requirements for construction projects.
3. To develop knowledge of financial planning, budgeting, and accounting systems in construction management.
4. To familiarize with corporate finance, taxation, and regulatory frameworks affecting construction projects.
5. To develop the ability to interpret and apply real-world case studies involving project economics and financial management.

Course outcomes:

On completion of the course, learner will be able to:

CO1: Apply economic principles to construction project planning and decision-making.
CO2: Conduct detailed cost analysis, financial appraisal, and risk assessment of construction projects.
CO3: Design and implement effective project financial planning, budgeting, and control systems.
CO4: Understand corporate finance structures, tax regulations, and the role of financial institutions in construction projects.
CO5: Prepare construction accounts, financial reports, and analyze case studies for project-specific financial decision-making.

COURSE CONTENTS

Unit I	**Principles of Economics and Capital Requirements**	**(12 hours)**

Importance of economic background in project decision-making, Objectives and growth of business firms, Constraints on firm expansion, Study of current economic scenarios, Capital: Working capital needs, estimation, credit and cash management, corpus fund formation

Unit II	Economic Analysis, Cost Planning, and Risk Assessment	(12hours)
Cost implications: construction types, material lifecycle, installation, and operating costs. Capital investment and project cost analysis. Cost planning during design and cost control during construction. Depreciation methods, break-even analysis, and cash flow analysis. Risk identification, management, and role of Lender's Engineer. Pricing methods in construction projects.		
Unit III	**Financial Planning and Budgeting**	**(12 hours)**
Sources and need for project finance, Long-term financing: shares, loans, debentures, public deposits, Dividend policy and issuance of bonus shares, Creation of reserves and market value of shares, Types of budgets: capital, operational, zero-based, flexible, Budget preparation procedures and master budget formation, Budgetary control and variance analysis, Budget manual and financial governance, Accounting Information Systems (AIS) in construction finance, Project commentary and running financial commentary.		
Unit IV	**Corporate Finance, Taxation, and Financial Institutions**	**(12 hours)**
Corporate financial planning and tax implications, corporate tax planning strategies, Role and function of credit rating agencies (ICRA, CRISIL, CARE), Global financial markets and their influence on construction, Role of financial institutions (HUDCO, NHB, SIDBI, ADB, World Bank), SEBI regulations and compliance for construction companies, Structure and applicability of GST: CGST, SGST, IGST, Overview of direct taxation system and tax courts		
Unit V	**Construction Accounts, Financial Reporting, and Case Studies**	**(12 hours)**
Accounting processes in construction industry, Preparation of profit and loss account and balance sheet (Companies Act 2013), Preparation of project-specific contract accounts, Site accounting vs. head office accounting systems, Ratio analysis: profitability, liquidity, solvency, efficiency, Escrow accounts: structure and application in PPP projects, Fund tracking and reconciliation techniques, Financial documentation and compliance Case studies (PPP, MRTS, dams, government-funded projects) focusing on: Project appraisal techniques, Funding strategies and financial structuring, Cost-to-completion analysis using financial tools		

LEARNING RESOURCES

Text books

1.Construction Management & PWD Accounts ,D. Lal, , S. K. Kataria& Sons, 2012

2.Construction Management and Accounts, H. Singh, Tata McGraw Hill

3.Principles of Corporate Finance, Tata R.A. Brealey, McGraw Hill

4.Fundamentals of Engineering Economics, Pravin Kumar, Wiley India

Reference books

1.Construction Project Scheduling and Control, Mubarak, Wiley

2.Construction Management: Planning and Finance, Cormican D., Construction Press

3.Real Estate Finance and Investment, Bruggeman & Fisher, McGraw Hill

4.Financial Management, Indian Institute of Banking and Finance – Macmillan

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ME - Civil (Construction Management) 2025 Pattern

Semester-II

Course Code: PCC-509-CON

Major Mandatory Course: Practical 3 (On core subjects)

Teaching scheme	Credit	Examination	
Practical: 4 hours / week	02	Term Work Oral	25 marks 25 marks

Course Outcomes:

At the end of the course, the students is able to:

1. Select relevant national and international codes for performing new experiments in various laboratories
2. Exercise hands on experience to develop higher level motor skills
3. Prepare practical and site visit reports for various assigned activities
4. Develop mathematical thinking in the conduct of different experiments and presentation of results precisely

Assignments (Any 3 from 1 to 6)

1.Draft a model construction contract highlighting valid/void clauses under Indian Contract Act
2.Prepare a comparative evaluation of bids from a sample tender notice
3.Identify and explain 10 essential clauses in CPWD General Conditions with real-life application
4.Compare Red Book (FIDIC) vs. CPWD format with a matrix chart
5.Prepare a detailed claim document for a simulated delay case and propose dispute resolution steps
6.Simulate a contract administration plan including compliance checklists and safety protocols

Assignments (Any 2 from 7 to 10)

7.Solve two numerical linear programming methods.
8.Solve two numericals on decision theory.
9. Solve two numerical Queuing theory.
10. Solve two numericals on game theory.

Any 2 from 11 to 13

11.Site Visit Report (If Visit Arranged)

Title :Financial Aspects of a Construction Project – Visit-Based Report

Example Sites: Metro project, Smart City road work, Real estate housing site, Government-funded construction site

Report Should Include (Simple 8–10 Slides):

Project name, location, and client

Type of project and work in progress

Estimated cost of the project

Who is funding it? (Govt/PPP/Private)

Budgeting – how money is spent phase-wise

Basic info on accounting/reporting system

Challenges or financial risks observed

Learning from the visit

12.Case Study of Any Known Project

Title: Cost and Budgeting of a Real Project (e.g. Flyover, School Building)

Examples: Pune Metro, Bandra-Worli Sea Link, Government hostel/school construction

Report Should Cover:

Name and location of the project

Total project cost

Sources of funds

Budget planning and allocation

Cost control measures used

Simple cash flow or bar chart (optional)

Problems in cost or time

Lessons learned

13.Hypothetical Construction Project Budgeting

Title: Budgeting and Planning for a New Bus Station / Small Bridge / Hostel

Report Should Cover**:**

Give name and brief idea of project

Total estimated cost

Phase-wise budget (foundation, structure, finishing)

Who will pay? (Govt, private, donation)

What software or system may be used for tracking?

Sample monthly expense chart (basic)

What problems might occur in cost?

What would you improve

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ME - Civil (Construction Management) 2025 Pattern

Semester: II

Course code: PEC-512-CON a

Course: Elective-II-Thrust Areas in Project Management

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	03	CCE ESE	50 marks 50 marks

Perquisites: Basic &project management and risk assessment technique

Course Objectives:

1.Formulation of Specifications, Schedules, Standards on proven building materials/technologies including emerging technologies/systems
2.Documentation of benefits, durability and acceptability of cost effective and innovative building materials and technologies.
3.Promoting disaster resistant construction technologies
4.Project management and consultancy services.

Course Outcomes

On completion of the course, learner will be able to:

CO1.Understand Building Construction Technology – Demonstrate knowledge of fundamental building construction concepts, including structural and non-structural components.
CO2.Analyze Traditional and Modern Techniques – Compare and apply traditional and modern construction techniques in various building projects.
CO3.Evaluate Conventional and Sustainable Materials – Identify and assess different conventional building materials with a focus on sustainability and environmental impact.
CO4.Interpret Building Bye-laws & Regulations – Interpret and apply building bye-laws, regulations, and drawing standards, particularly in line with UDCPR, Maharashtra State.

COURSE CONTENTS

Unit I	**Project Pre-planning and Partnering**	**(08 hours)**

Project preplanning: - Project Influence cost diagram. Need for project preplanning in the context of time and cost overruns, reduction in economic benefits. Definition selecting pre-planning team and evaluation of alternatives. Decision whether to invest in project design Concept of PDRI— Project definition rating index. PDRI for residential and industrial buildings. Utility of PDRI with respect to benchmarking. Any case study on Project pre—planning.

Project partnering: - Delimitation, partnering as an effective risk sharing mechanism, partnering charter, partnering workshop. Advantages of partnering role in preventing construction disputes, risk management and QM. C Critical success factors for implementation Any case study on project partnering.

Unit II	**S. W. O. T. analysis and S. C. M**	**(08 hours)**

S. W. O. T Strengths, Weaknesses, opportunity, threats analysis. Conduct S. W. O. T. for individual construction organization, Indian Construction industry. Advantages, S. W. O. T. matrix utility of S. W. O. T. matrix on strategic planning and management.

S. C. M. Supply Chain Management. Concept of Supplier and customer in context of ISO. Identifying the chain associated connecting various processes between the supplier and the customer in context of construction project. Management strategy for implementing S. S. C. M. in construction organizations and on construction projects. Benefits of S. C. M.

Unit III	**Critical Chain Management (CCM)**	**(08 hours)**

Critical Chain Management (CCM):-- Concept of critical chain in construction projects based on the theory of constraints. Developing critical chain plans for a single project and multiple projects. Measuring, monitoring and controlling the critical chain. Advantages of CCM.

Unit IV	**Fast Track Construction**	**(08 hours)**

Fast Track Construction: -- Diagrammatic representation of the concept of the fast track construction. Advantage, suitability of fast-track construction. Form of contract suitable for fast track projects. Concept of guaranteed maximum pricing (GMP). Any one case study on fast track constriction.

Unit V	**Earned Value Analysis and Project Reporting Earned Value Analysis**	**(08 hours)**

Definition of earned value. Importance of Earned value analysis. Concepts of cost variance, schedule variance, cost performance index and schedule performance index methods of determining earned value viz. Ratio method, repetitive type work package method, Complex construction work package method, start or finish method. Accounting practices for determining the earned value.

LEARNING RESOURCES

Reference books

1. Pre-project planning handbook—published by Construction Industry Institute (CIT) USA. ASCE journal papers on project pre-planning to be used. ASCE journal papers on project partnering to be used.
2. Project Management—Financial evaluation with strategic planning, networking and control—Bhavesh Patel—2 nd edition 2010, reprinted in 2011—Vikas publishing House Pvt. Ltd.

3. Scheduling Construction Projects—Principles and practices—Sandra Weber—Indian edition published in 2012—Pearson Publication. 4. Construction Project management—Planning, Scheduling and controlling—K. K. Chitkara—Eight reprint 2004, Tata McGraw Hill Publishing Company Limited.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester-II
Course Code: PEC-512-CON b
Course: Elective-II (Infrastructure Development)

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	03	CCE ESE	50 marks 50 marks

Perquisites: Various construction materials.

Course Objectives:

1.To understand and explain concepts of infrastructure, private involvement in infrastructure, challenges to successful infrastructure planning and implementation, strategies for successful infrastructure project implementation, sustainable development of infrastructure Discuss and understand the properties of building Materials.

2.Analyze complex engineering problems of infrastructure engineering and management critically; apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context

Course outcomes:

On completion of the course, learner will be able to:

CO1. Understand the basic concepts related to Infrastructure development.

CO2. Explain the role of private sector in infrastructure growth.

CO3. Identify and interpret the challenges for successful Infrastructure Project implementation.

CO4. Develop Infrastructure modeling and Life Cycle Analysis Techniques.

COURSE CONTENTS

Unit I	**Introduction to Infrastructure Development**	**(08 hours)**

Definition of infrastructure; Multiplier effects of infrastructure development on economic development of the nation (Reduce/Reuse/Recycle/Refuse/Repair/Repurpose), Current Scenario of Sustainable Design: India and world.

Unit II	**Private Involvement in Infrastructure**	**(08 hours)**

Introduction to infrastructure development through PPP route; Benefits of PPP mode of procurement; Types of PPP Models and their contractual structure, Financial and Economic Appraisal of BOT Projects; VFM evaluation, Case study – Procurement process of Indian PPP projects.

Unit III	**Challenges To Successful Infrastructure Planning and Implementation**	**(08 hours)**

Mapping and Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks: The Case study for Political Risks, Socio-Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal and Contractual Issues in Infrastructure, Challenges in Construction and Maintenance of Infrastructure.

Unit IV	**Infrastructure Modeling and Life Cycle Analysis Techniques**	**(08 hours)**

Information Technology and Systems for Successful Infrastructure Management, - Innovative Design and Maintenance of Infrastructure Facilities, Infrastructure Modeling and Life Cycle Analysis Techniques, Capacity Building and Improving the Governments Role in Infrastructure Implementation, An Integrated Framework for Infrastructure Management Systems and Future Directions.

Unit V	**Strategies For Successful Infrastructure Project Implementation**	**(08 hours)**

Risk Management Framework for Infrastructure Projects, Shaping the Planning Phase of Infrastructure Projects to mitigate risks, Designing Sustainable Contracts, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on Infrastructure Projects.

LEARNING RESOURCES

Text books

1. Infrastructure Planning Handbook by Alvin S. Goodman &Makarand Hastak
2. Infrastructure Management by W.R. Hudson, R.C.G. Hass, W. Uddin

Reference books

1. Grigg, Neil, Infrastructure engineering and management, Wiley, (1988).
2. Hudson, Haas, Uddin, Infrastructure management: integrating design, construction, maintenance, rehabilitation, and renovation, McGraw Hill, (1997).
3. World Development Report 1994: Infrastructure for Development (1994).

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester: II

Course Code: PEC-512-CON c

Course: Elective-II -Value Engineering and Valuation

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	**03**	**CCE** **ESE**	50 marks 50 marks

Perquisites: Project Management & Economics, Construction Management

Course Objectives:

1. To produce civil engineers with knowledge of VE used in construction industry
2. To produce civil engineers with knowledge VE Methodology.
3. To produce civil engineers with knowledge of Application of VE to a Construction Project
4. To produce civil engineers with knowledge of analysis carried out for life cycle.
5. To produce civil engineers with detailed knowledge of the valuation process.

Course outcomes:

On completion of the course, learner will be able to:

CO1. Analyze products using value engineering.
CO2. Understand the Value Engineering Methodology.
CO3. Understand the Application of VE to a Construction Project.
CO4. Explain the Life cycle costing.
CO5. Prepare valuation report of product by applying Value Engineering.

COURSE CONTENTS

Unit I	**Value Engineering**	**(08 hours)**

Definition, Importance to Contractors, Potential Applications Value: basic and secondary functions, factors contributing to value such as aesthetic, ergonomic, technical, economic: identifying reasons or unnecessary costs.

Unit II	**Value Engineering Methodology**	**(08 hours)**

Orientation phase, Information phase, Function Analysis phase, Creative Phase, Evaluation Phase, Development Phase, Presentation Phase, implementation Phase.

Unit III	**Application of Value Engineering to a Construction Project**	**(08 hours)**
VE during the Planning Phase of a Construction Project, VE during the Design Phase of a Construction Project, VE during the Construction Phase of a Construction Project		
Unit IV	**Life Cycle Costing**	**(08 hours)**
Forecasting of Capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, and sensitivity analysis.		
Unit V	**Valuation and Report**	**(08 hours)**
Types of value, purposes of valuation factors affecting value, Valuation Report, contents, standard formats, Case study of any one Report.		

LEARNING RESOURCES

Text books:

1. Value Engineering: Analysis and Methodology By Del Younke

2. Industrial Organization &Engg. Economics, T.R.Banga, S.C.Sharma, Khanna Publ.

3. Estimating and Costing in Civil Engineering: Theory and Practice B.N Dutta Published S. Dutta & Company, Lucknow.

Reference books;

1.Industrial Engg. & Mgt., O.P.Khanna, Dhanpat Rai Publ.

2.Estimating and Costing By G.S.Birdie

3.Estimating and Costing By Rangwala Published By: Charotar Publishing House,

4.Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders

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ME - Civil (Construction Management) 2025 Pattern

Semester II

Course Code: PEC-512-CON d

Course: Elective Course II Construction Site Administration and Control

Teaching scheme	Credit	Examination	
Theory:3 hours / week	**03**	**CCE** **ESE**	**50 marks** **50 marks**

Perquisites: Fundamental knowledge of Construction Management, Project Planning, and Contract Management.

Course Objectives:

1. To introduce learners to the Indian construction industry, its structure, challenges, and contribution.
2. To study project life cycle stages, delivery systems, and stakeholder roles.
3. To provide knowledge on construction site administration practices including layout, safety, documentation, and labour management.
4. To develop skills in communication, coordination, use of manuals, and analysis of real-world case studies for effective site control.
5. To explore communication strategies and real-world case studies in construction projects.

Course outcomes:

On completion of the course, learner will be able to:

CO1.Explain the structure, scope, and challenges of the Indian construction industry.

CO2.Interpret project life cycle phases, delivery systems, and stakeholder responsibilities.

CO3.Apply site management practices including layout, facilities, safety, documentation, billing, and labour management.

CO4.Demonstrate effective project communication, coordination, ERP usage, and analyze case studies for site administration and control.

CO5 Communicate effectively across project stakeholders and analyze real-world case studies.

COURSE CONTENTS

Unit I	**Indian Construction Industry**	**(08 hours)**

Overview and Introduction to Indian Construction industry – Various sectors in Indian Construction Industry, Various reasons of project delays, Contribution of Indian Construction Industry towards the GDP, Project as a business

Unit II	Project Life Cycle and Delivery Systems	(08 hours)
Project Life Cycle – Understanding the project from concept to completion/closeout, Role of client/owner, consultant, and contractor in different stages of the project. Project delivery systems– Different Project delivery systems their merits and demerits, role of agencies and people involved in different project delivery systems.		
Unit III	**Construction Site Management**	**(08 hours)**
Job Site Layout, Facilities Setup, Site Safety and accident prevention, documentation and record keeping, contract appreciation document for contract administration and coordination.		
Unit IV	**Field Procedure Manual (Fpm)**	**(08 hours)**
Field Procedure Manual and its importance, Labor and subcontractor management, Site waste management, measurement and billing, project control estimate, and project escalations.		
Unit V	**Project Communication and Case Studies**	**(08 hours)**
Meetings, review, inter & intra organizational relationships, Enterprise resource planning, Case Studies – Construction project case studies.		

LEARNING RESOURCES

Text books

1. Construction Project Management:Theory and Practice, Jha, K.N., Pearson Education
2. Construction Project Management: Planning, Scheduling and Control,Chitkara, K.K., Tata McGraw Hill
3. Construction Management and Accountancy, Goel, B.S., Deep & Deep Publications

Reference books

1. Construction Methods and Management, Nunnally, S.W., Pearson
2. CIDC Publications on Safety and Site Practices
3. Bureau of Indian Standards (IS Codes) relevant to site practices
4. PMBOK Guide Project Management Institute

Savitribai Phule Pune University

ME-Civil (Construction Management) 2025 Pattern

Semester II

Course Code: PEC-513-CON a

Course: Elective III –Automation in Construction Industry

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	**03**	**CCE** **ESE**	**50 marks** **50 marks**

Perquisites: Basic knowledge of construction techniques and project management

Companion course:Construction Equipment and Management

Course Objectives:

1. Introduce the role, need, and evolution of automation in the construction sector.
2. Develop knowledge of modern tools and technologies used in automated construction.
3. Study the application of robotics, drones, 3D printing, and BIM in construction processes.
4. Analyze real-world case studies to assess automation's benefits in productivity, cost-efficiency, and safety.
5. Enable students to design, recommend, or implement automation solutions in future construction projects.

Course outcomes:

On completion of the course, learner will be able to:

CO1. Describe the evolution, need, and scope of automation in the construction industry.
CO2. Identify and classify various automation tools and techniques in construction operations.
CO3. Apply the knowledge of robotics, 3D printing, and BIM in construction project planning and control.
CO4. Analyze and evaluate case studies highlighting automation's impact on project success.
CO5. Recommend automation strategies for improving efficiency in real-life construction challenge

COURSE CONTENTS

Unit I	**Introduction to Automation in Construction**	**(08 hours)**

Introduction to automation and digitization in construction; evolution from manual methods to mechanization and automation; classification of automation; benefits such as productivity, quality, safety, and cost savings; challenges in Indian context vs global practices; applications across planning, design, execution, and monitoring phases.

Unit II	**Tools and Technologies for Automation**	**(08 hours)**

Overview of modern automated construction equipment including mixers, pavers, TBMs; automation in precast systems; use of drones for surveying and monitoring; IoT in construction safety and monitoring; role of AI and data analytics; comparison of on-site and off-site automation.

Unit III	**Robotics, 3D Printing & Modular Construction**	**(08 hours)**

Applications of robotics in construction tasks; 3D printing methods and materials; case studies on global and Indian 3D printed projects; introduction to modular construction; automated prefabrication; case studies on modular hospitals and schools; concept of Design for Manufacture and Assembly (DfMA).

Unit IV	**BIM and Digital Integration in Automated Construction**	**(08 hours)**

Basics of BIM and its role in planning, design, and management; BIM dimensions from 3D to 7D; introduction to Digital Twin technology and its comparison with BIM; automation through project management tools; applications in clash detection, scheduling, and smart construction site integration.

Unit V	**Digital Integration & Future Trends in Automated Construction**	**(08 hours)**

Digital Twin Technology: concept, applications, and comparison with BIM. Project management tools for automation and smart construction site integration. Smart construction technologies: sensor-based monitoring, cloud-based collaboration. Industry 4.0 and Construction 4.0 applications. Case studies of successful automation projects (Indian & global). Future scope: AI-driven design, robotics-enabled site execution, sustainability through automation.

LEARNING RESOURCES

Text books

1. Construction Equipment and Management, S.C. Sharma , Khanna Publishers2.
2. Construction Planning and Equipment, Mahesh Varma, Metropolitan Book Co.
3. Concrete Bridges: Practice & Design, V.K. Raina , Shroff Publishers
4. Project Management Techniques, H.N. Ahuja et al., Wiley India

Reference books

1. Construction Technology, K.N. Vaid, Standard Publishers
2. Construction Project Management, Kumar Neeraj Jha, Pearson India
3. Building Information Modelling, Laxmi Publications
4. IT in Construction, FarzadKhosrowshahi (Ed.), Springer India

5.Indian standards and guidelines for BIM, IS Codes / CPWD / DGCA Guidelines drones, and automation in construction

Savitribai Phule Pune University

ME - Civil (Construction Management) 2025 Pattern

Semester II

Course code- PEC513 CON b

Course: Elective – III (Disaster Management and Mitigation)

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	03	**CCE** **ESE**	**50 marks** **50 marks**

Perquisites: Construction Management

Course Objectives:

1 To make students aware about various types of natural and manmade disasters and their effects.

2 To make students self-efficient to solve the challenges with the aid of technological aids used in disaster management.

3 To make students aware about various IT aids and Public awareness & their Management.

Course outcomes:

After learning the course, the engineers should be able to

CO1 To justify effect of various natural and manmade disasters.

CO2 To explain various aspects of disaster management.

CO3 To organize emergency management programme.

COURSE CONTENTS

Unit I	**Disasters & Management**	**(08 hours)**

Natures and extent of disasters, natural calamities such as earthquake, floods, drought volcanoes, forest, coasts hazards, landslides etc. Manmade disasters such as chemical and industrial hazards, nuclear hazards, fire hazards etc.

Disaster Management – Financing relief expenditure, legal aspects, rescue operations. Casual management, risk management.

Unit II	**Emergency Management Program**	**(08 hours)**

Administrative setup and organization. Hazard analysis, training of personnel, information management, emergency facilities and equipment necessary public awareness creation, preparation and execution of the emergency management program.

Unit III	**Organizations**	**(08 hours)**

Various organizations registered with Government and NGO_s working for disaster relief-Challenges faced by organizations.

Unit IV	**Method Of Assessment of Disaster Management**	**(08 hours)**

Methods of assessment - Methods of assessment of impact of disasters such as photogrammetric methods, media survey, ground data collection

Unit V	**International Adopted Practices**	**(08 hours)**

-International adopted practices for disaster mitigation. Rules and regulations, Monitoring aspects of disaster mitigations programs.

Term Work

1. Prepare a Case Study Report on a Disaster Event In-depth analysis of a natural or manmade disaster. Should

cover causes, extent of damage, rescue and relief operations, financing, legal aspects, and lessons learned.

2. Design an Emergency Management Plan (EMP) for a selected scenario (e.g., college campus, factory, flood-prone village). Must include hazard analysis, resources, emergency facilities, public awareness plans.

3. Prepare a report on the role of an NGO or government body in disaster management. Include organizational setup, challenges, and methods used for assessment like ground surveys, media analysis.

4. Group or individual presentation/poster on international disaster mitigation rules, policies, or monitoring programs. Encourages research and global awareness.

LEARNING RESOURCES

Reference Books:

1. Construction Engineering and Management – Seetharaman
2. Project Management – K Nagarajan (New Age International Ltd.)
3. Different sites on internet on disaster management
4. NICMAR Publications
5. CECR‟s JournalsPlane Surveying & Higher Surveying, Dr A. M. Chandra, New Age International Publishers New Delhi.

Savitribai Phule Pune University
ME - Civil (Construction Management) 2025 Pattern

Semester II

Course Code: PEC-513-CON c

Course: (Elective Course III) International Contracting

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	03	**CCE** **ESE**	**50 marks** **50 marks**

Perquisites: Basic knowledge of project management, construction contracts, and legal frameworks in infrastructure projects.

Companion course: Construction Contracts and Legal Aspects

Course Objectives:

1. To introduce learners to the scope, significance, and global trends of international construction contracting.
2. To familiarize students with FIDIC contract conditions, global regulatory frameworks, and financial institutions in infrastructure projects.
3. To develop understanding of various international project delivery models (BOT, BOOT, DBFO, etc.) and their contractual/financial aspects.
4. To provide knowledge of dispute causes and international dispute resolution mechanisms, including arbitration and DRBs.
5. To build the ability to analyze international case studies, market opportunities, and best practices in global contracting.

Course outcomes:

On completion of the course, learner will be able to:

CO1 Analyze the structure, scope, and stakeholders involved in international contracting.
CO2 Interpret and apply FIDIC clauses and international financial frameworks in contract documentation.
CO3 Evaluate international PPP/BOT-based project delivery methods and risk allocation strategies.
CO4 Apply dispute resolution mechanisms such as DRBs, UNICTRAL, ICC, SIAC, and LCIA to real-world cases.
CO5 Examine case studies of international projects to derive insights on contractual, financial, and managerial best practices.

COURSE CONTENTS

Unit I	Introduction to International Contracting	**(08 hours)**

Meaning, scope, and relevance of international contracting, Global construction market: trends and opportunities, Role of Asia-Pacific countries in global construction development, WTO and GATS: impact on Indian construction market (domestic and export sector), Human resource selection for overseas projects: adaptation to socio-economic and environmental differences, Structuring of multinational construction organizations		
Unit II	**FIDIC and Global Regulatory Framework**	**(08 hours)**
Overview and applications of FIDIC Conditions of Contract (Red, Yellow, Silver Books). International regulatory and legal frameworks in construction contracting. Project exports from India: strategies, challenges, and market access. International trade practices and alliances in cross-border construction projects.		
Unit III	**Global Financial Institutions and Funding Mechanisms**	**(08 hours)**
Role of World Bank (WB), IMF, ADB, AfDB in infrastructure financing. Bilateral and multilateral funding mechanisms.Financial risk allocation and structuring of international construction projects.Case insights on funding strategies for large-scale infrastructure.		
Unit IV	**International Project Delivery Models (PPP & BOT Variants)**	**(08 hours)**
Classification and features of BOT-type models: BOT, BOOT, BOO, DBFO, DBO, BLT, BTO, BOR, MOOT, ROT, ROO, BOLT. Contractual procedures, tendering, and documentation in concession projects. Legal & commercial features of international PPP models. Risk allocation and operation/revenue-sharing mechanisms in global projects.		
Unit V	**Dispute Resolution in International Contracting**	**(08 hours)**
Common disputes in international projects: causes and implications. International courts and their jurisdiction. Dispute Resolution Boards (DRBs): constitution, procedures, Indian/global experience. UNICTRAL Model Law, International Arbitration forums: ICC, LCIA, SIAC, CIDC. Case studies of at least two international projects focusing on dispute and resolution.		
LEARNING RESOURCES		

Text books

1. A Short Course in International Contracts – Karla C. Shippe, World Trade Press
2. FIDIC Conditions of Contract (Red, Yellow, Silver Books)
3. Construction Contracts & Claims – Simon M.S., McGraw Hill

Reference books

1.Unified Contract Documents, Ministry of Statistics &Programme Implementation, Government of India

2. Dispute Review Board Manual – Robert Matyas and Mathews

3. International Construction Contracting – K. N. Vaid, NICMAR Publications

4. Legal Aspects of Architecture, Engineering and the Construction Process – Sweet &Schneier

5 International Construction Contract Law – Lukas Klee, Wiley

Savitribai Phule Pune University
ME- Civil (Construction Management) 2025 Pattern

Semester: II

Course Code: PEC-513-CON d

Course: Advanced Construction Technology

Teaching scheme	Credit	Examination	
Theory: 3 hours / week	03	**CCE** **ESE**	50 marks 50 marks

Perquisites: Construction Technology, Concrete Technology.

Course Objectives:

1. To acquire knowledge of implementation of advanced construction techniques in construction of high-rise structures.
2. To provide knowledge about equipment, systems required in construction metro and monorail construction
3. To know the Construction of Special structures.
4. To know the process of Construction of Bridges
5. To know the process of Construction of Marine and offshore structures

Course outcomes:

On completion of the course, learner will be able to:

CO1. Recommend the method of construction used for high rise construction.
CO2. Select construction equipment and processes involved in metro and monorail construction.
CO3. Facilitate the Construction of Special Structures.
CO4. Understand about equipment, systems required for Construction of Bridges
CO5. . understand the process of Construction of Marine and offshore structures

COURSE CONTENTS

Unit I	**Construction Of High-Rise Structures**	**(08 hours)**

Steel and concrete composites construction methods, techniques, automation used for construction, Fabrication and erection of heavy structures including prefab construction, Erection of different cranes like mobile, lifting, tower, roof truss. Innovative methods of construction – Jump form, Aluform & Tunnel Form Technology, Drywall technology**.**

Unit II	**Construction Of Metro and Monorail**	**(08 hours)**

Underground and over ground structures, different methods and techniques of construction. Problems and solutions – during maintenance and up-keep of structures. Fire, Ventilation, Dewatering and power supply, Subsidence, Vibration etc.

Unit III	**Construction of Special structures**	**(08 hours)**

Features and functions of the special types of civil engineering structures: Silos, Elevated service reservoir, domes and arches, Construction of power generating structures – Atomic Power stations, Thermal power stations. Cogeneration power plant, Windmills, Transmission towers, Chimneys.

Unit IV	**Construction Of Bridges**	**(08 hours)**

Types, Construction methods for substructure and super- structure, various launching methods, Steel Bridges, Arch Bridges, Cantilever Bridges, Segmental construction & Box Girders. Construction of special types of bridges such as cable stayed bridge, suspension and Prestressed bridge.

Unit V	**Marine and offshore structures**	**(08 hours)**

Beacons, Oil drilling Platforms, light houses.

Barges- types, Function, utilization & economics of barges.

Term Work

1.Prepare a report, individual or in a group, focusing on one method (e.g., Aluform, Tunnel Form, Jump Form, Prefab construction). Include materials, equipment, advantages, and real-world applications.

2. Case Study on a completed metro/monorail project (preferably local/national), covering construction techniques, structural challenges, fire and ventilation systems, and solutions to problems.

3. Group or individual presentation/poster on structures like silos, windmills, or chimneys. Should include features, construction methods, and unique challenges.

4. Create a detailed method sheet or infographic for construction of any one bridge type (e.g., cable-stayed, cantilever, prestressed). Should include steps, equipment, safety measures.

5. Prepare a physical model or detailed drawing of any advanced construction element or system (e.g., tower crane setup, segmental bridge, dome). Assessed for technical accuracy and creativity.

LEARNING RESOURCES

Text books:

1. Text Book of Building Construction, S.P. Arora & S.P. Bindra, A Dhanpat Rai &Sons, New Delhi.
2. Construction Technology, S.K. Sarkar and S. Saraswati, Oxford University Press,New Delhi.
3. Building Construction, B.C. Punamia, Laxmi Publications, New Delhi
4. Building Construction,S.C. Rangwala, Charotar Publication Pvt Ltd. Anand
5. Construction Equipment Planning and Applications – Dr. Mahesh Varma

Reference books:

1. Construction Planning, Equipment and methods – Peurifoy- Tata McGraw Hill Publication
2. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
3. Journals such as CE & CR. Construction world, International Construction.
4. Dr. Kumar Niraj Jha, ― Formwork for Concrete Structures, Mc Graw Hill Publication

Savitribai Phule Pune University
ME-Civil (Construction Management) 2025 Pattern

Semester-II

Course Code: SEM-514-CON

Course: Seminar-I

Teaching scheme	Credit	Examination	
Practical: 4 hours / week	02	Term work Oral	25 marks 25 marks

Perquisites: Students must have completed core courses in construction management, possess basic research, analytical skills, and be familiar with current industry practices, codes, and standards.

Companion course:

Course Objectives:

1. Develop the ability to identify, analyze, and present emerging issues or advancements in construction management.
2. Enhance skills in conducting structured literature reviews and synthesizing research findings.
3. Strengthen academic writing and technical presentation competencies.
4. Foster critical thinking and problem-solving in addressing construction-related challenges.
5. Encourage the application of theoretical knowledge to real-world construction management contexts

Course outcomes:

On completion of the course, learner will be able to:
CO1. Select and critically evaluate a topic from any subject in the Elective I list, integrating literature findings to identify knowledge gaps or practical implications.
CO2. Prepare a concise seminar report and deliver a professional oral presentation demonstrating subject understanding, clarity, and effective engagement with the audience.

COURSE CONTENTS

The seminar shall focus on an advanced or emerging topic from any subject in the Elective I list. The topic shall be selected by the student in consultation with the faculty supervisor and may be based on recent research developments, innovative materials, advanced analysis/design methodologies, notable project case studies, or industry-relevant challenges within the selected elective domain. The content should demonstrate a clear understanding of the subject, include a critical review of relevant literature, identify knowledge gaps or practical implications, and highlight future directions or applications. The seminar must reflect the student's ability to synthesize technical information, present it logically, and engage the audience with meaningful discussion. As part of the seminar, students shall prepare a well-structured report summarizing the literature review, identified research gap, rationale, objectives, and methodology or key findings related to the elective topic. They shall also deliver a professional oral presentation of their work, use appropriate visual aids, and respond confidently to questions and feedback.

Savitribai Phule Pune University, Pune

Maharashtra, India

ME– Civil Engineering (2025 Pattern)
Master of Engineering (Construction Management)

Semester III

Savitribai Phule Pune University
ME-Civil (Construction Management) 2025 Pattern

Semester-III
Course code: RM-601-CON
Course: Research Methodology

Teaching scheme	**Credit**	**Examination**	
Theory: 4 hours / week	04	CCE ESE	50 marks 50 marks

Course Objectives:

1. To provide foundational understanding of research methodology and formulation of research problems.
2. To develop skills for effective literature review, research proposal preparation, and ethical research practices.
3. To apply appropriate techniques for data collection, measurement, and statistical analysis.
4. To enhance competence in writing research reports, papers, and presentations.

Course Outcomes:

On completion of the course, learner will be able to:
CO1. Formulate research problems and hypotheses relevant to construction management.
CO2. Conduct literature reviews using ethical and valid research practices.
CO3. Apply data collection, sampling, and measurement techniques effectively.
CO4. Perform basic and advanced statistical analyses for research interpretation.
CO5. Prepare and present research reports, papers, and proposals professionally.

COURSE CONTENTS

Unit I	**Introduction**	**(12 hours)**

Research: Meaning of research, types of research, process of research, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, formulation of research hypotheses. Search for causation.
Research Proposal: Developing a Research Proposal Format of research proposal, Individual research proposal, Institutional research proposal, Significance, objectives, methodology, Funding for the proposal, Different funding agencies. Framework for the planning

Unit II	**Literature survey & Research ethics**	**(12 hours)**

Definition of literature and literature survey, need of literature survey, sources of literature, elements and objectives of literature survey, styles of literature survey, and strategies of literature survey.
Ethical Issues, Ethical Principles that govern Research, ethically valid Information Sources, Regulatory Compliance.

Unit III	**Data collection & Preliminary Analysis**	**(12 hours)**

Classification of data, benefits and drawbacks of data, evaluation of data, methods of data collection, Sampling, sample size, sampling strategy, attitude measurement and scaling, types of measurements, criteria of good measurements, classification of scales.

Data Analysis: Testing of hypothesis- concepts and testing, analysis of variance techniques, introduction to non- parametric tests. Validity and reliability, Approaches to qualitative and quantitative data analysis.

Unit IV	**Advanced data analysis techniques**	**(12 hours)**

Correlation and regression analysis, Introduction to factor analysis, discriminant analysis, cluster analysis, multidimensional scaling, Descriptive statistics, Inferential statistics, Multi-dimensional measurement and factor analysis

Unit V	**Report writing**	**(12 hours)**

Need of effective documentation, importance of report writing, types of reports, report structure, report formulation, Plagiarism. Research briefing, presentation styles, impact of presentation, elements of effective presentation, writing of research paper, presenting and publishing paper, patent procedure.

LEARNING RESOURCES

Text Books:

1. Research Methodology: concepts and cases, Deepak Chawla and Neena Sondhi, Vikas Publishing House Pvt. Ltd.
2. Research Methods for Business, Sekaran Uma and Rogure Boudie, Wiley, India.
3. Research Methodology: Methods and Trends, by Dr. C. R. Kothari, New Age International Publishers.

Reference books:

1. Research Methods in Education, Louis Cohen, Manion, Morrison, Routledge(Taylor & Francis Group)/ Cambridge University Press India Pvt. Ltd.
2. Research Methodology: An Introduction, Wayne Goddard and Stuart Melville.
3. Research Methodology: A Step by Step Guide for Beginners, by Ranjit Kumar
4. Research in Education, John Best and James Kahn, Prentice Hall of India Pvt. Ltd.

Savitribai Phule Pune University
ME-Civil (Construction Management) 2025 Pattern

Semester-III

Course Code: OJT-602-CON

Course: On Job Training (OJT) / Internship

Teaching scheme	Credit	Examination	
Practical: 10 hours / week	05	TW	100 marks

Perquisites: Working knowledge of engineering basics, Planning and building materials, Project management, Quantity estimation, Contracts/procurement, Safety and quality.

Companion course: On Job Training / Internship

Course Objectives:

1. Apply theoretical knowledge to real-world construction projects.
2 Develop professional competencies in planning, execution, and control of work.
3. Enhance skills in communication, coordination, and decision-making on site.
4. Gain practical exposure to safety, quality, and environmental management systems.
5. Understand the application of construction contracts, codes, and standards.
6. Strengthen problem-solving abilities in dynamic project environments.
7. Accurate documentation of site activities in a structured and professional format
8. Build readiness for leadership roles in construction project delivery.

Course outcomes:

On completion of the course, learner will be able to:

CO1. Demonstrate the ability to integrate academic concepts with on-site practices.
CO2. Apply project planning, scheduling, and resource management tools effectively.
CO3. Implement safety, quality, and environmental compliance measures in real projects.
CO4. Interpret and use construction drawings, specifications, and BIM models.
CO5. Communicate and coordinate efficiently with multi-disciplinary project teams.
CO6. Identify, analyze, and propose solutions to on-site challenges.
CO7. Exhibit professional ethics, responsibility, and adaptability in workplace settings.
CO8. Production of a comprehensive report/logbook meeting industry documentation standards.

COURSE CONTENTS

Internship is mandatory for all PG Students. During an OJT program students gain experience in using tools, software, techniques, equipment used for survey,data collection and analysis etc. from the relevant field in a live environment and experience the work culture. Students can do activities as,

1. Exposure to project planning processes, preparation of Work Breakdown Structures (WBS), and use of project management tools such as Primavera P6 or MS Project.
2. Monitoring and participating in site execution activities across different stages, recording daily progress reports (DPRs), and facilitating coordination among multidisciplinary teams.
3. Engagement in quality assurance/control processes including material testing (as per IS/ASTM standards), checklists, and inspection documentation.
4. Participation in safety inspections, toolbox talks, hazard analysis, and implementation of risk mitigation measures.
5. Involvement in contract administration tasks such as interpreting BOQs, site measurements, preparation of RA bills, and cost monitoring using Earned Value Management (EVM).
6. Observation of sustainable construction practices and application of technologies such as BIM, drones, and IoT-based monitoring systems.

TERM WORK SUBMISSION

Students must maintain an Internship Logbook provided by the College throughout the duration of the Internship. Upon completion, the logbook should include:Date, time, and duration of work,Tasks accomplished,Learning outcomes,Signature of the Internal Mentor, Internship supervisor and External Mentor.
After completion of the program the students must submit the duly signed completion certificate and report during the internship period, to the OJT coordinator
The students must also give presentation of their work done during internship in front of the college committee.

ASSESSMENT CRITERIA

Assessment shall be based on the technical accuracy of concepts, calculations, and methods; the application of theoretical knowledge to practical or case-based scenarios.

LEARNING RESOURCES

Text books:

1.Relevant national and international construction codes (e.g., IS Codes, FIDIC, ISO 9001, ISO 45001).
2.Site-specific project documents, drawings, specifications, and BIM models.
3. Construction planning and scheduling software (MS Project, Primavera P6).
4. Safety manuals, environmental management guidelines, and quality control checklists.

Reference books:

1. Construction Planning, Equipment, and Methods- Robert L. Peurifoy, Clifford J. Schexnayder, and Aviad Shapira – McGraw Hill
2. Construction Site Safety: A Guide for Managing Contractors- Richard D. Hislop – CRC Press.

Savitribai Phule Pune University
ME-Civil (Construction Management) 2025 Pattern

Semester: III

Course Code: SEM-603-CON

Course: Seminar- II

Teaching scheme	Credit	Examination	
Practical: 8 hours / week	04	Term work Oral	25 marks 25 marks

Perquisites: Students must have completed core courses in construction management, possess basic research, analytical skills, and be familiar with current industry practices, codes, and standards.

Course Objectives:

To enable students to explore and critically analyze an advanced or emerging topic from any subject in the Elective II list, and to effectively communicate the findings through a structured report and professional presentation.

Course outcomes:

On completion of the course, learner will be able to:
CO1. Select and critically evaluate a topic from any subject in the Elective II list, integrating literature findings to identify knowledge gaps or practical implications.
CO2. Prepare a concise seminar report and deliver a professional oral presentation demonstrating subject understanding, clarity, and effective engagement with the audience.

COURSE CONTENTS

Seminar II: shall be on the topic relevant to latest trends in the field of concerned branch, preferably on the topic of specialization based on the electives selected/research project stage I by him/her approved by authority. The student shall submit the seminar report in standard format, duly certified for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

The topic shall be selected by the student in consultation with the faculty supervisor and may be based on recent research developments, innovative materials, advanced analysis/design methodologies, notable project case studies, or industry-relevant challenges within the selected elective domain. The content should demonstrate a clear understanding of the subject, include a critical review of relevant literature, identify knowledge gaps or practical implications, and highlight future directions or applications. The seminar must reflect the student's ability to synthesize technical information, present it logically, and engage the audience with meaningful discussion. As part of the seminar, students shall prepare a well-structured report summarizing the literature review, identified research gap, rationale, objectives, and methodology or key findings related to the elective topic. They shall also deliver a professional oral presentation of their work, use appropriate visual aids, and respond confidently to questions and feedback.

TERM WORK SUBMISSION

All submissions shall be as per the requirements prescribed in the format, and must be completed on or before the specified deadline.

ASSESSMENT CRITERIA

The course concludes with evaluation through presentation delivery, question–answer sessions, and submission of a comprehensive seminar report

LEARNING RESOURCES

Relevant national and international construction codes International and National published Journals, conference papers and book chapters,

Reference books

1. Research Methodology- C.R. Kothari- New Age International Publishers.

Savitribai Phule Pune University
ME-Civil (Construction Management) 2025 Pattern

Semester: III

Course Code: PRJ-605-CON

Course: Research Project Stage-I

Teaching scheme	Credit	Examination	
Practical: 18 hours / week	09	TW OR	25 marks 25 marks

Perquisites: Civil Engineering, Research methodology and basic mathematical statistics

Course Objectives:

1. Enable students to identify and define a real-world problem related to the construction industry or a macro-level issue affecting its performance.
2. Foster the application of scientific research methodologies including design, data collection, and data analysis.
3. Promote analytical and critical thinking in addressing complex engineering problems.
4. Encourage independent learning, originality, and individual contribution in research work.
5. Facilitate the preparation of a technically sound report and the development of effective communication and presentation skills.
6. Encourage scholarly dissemination of research through conference presentations or journal publications.

Course outcomes: On completion of the course, student will be able to-

CO1. Identify and formulate a research problem relevant to the construction or allied industries.
CO2. Conduct comprehensive literature reviews and establish the theoretical foundation of the study.
CO3. Develop a systematic methodology for research including data collection and analytical techniques.
CO4. Analyze field or experimental data to draw meaningful inferences.
CO5. Demonstrate effective technical writing and presentation skills in compiling a professional research report.
CO6. Exhibit the ability to communicate research findings through oral presentations and scholarly publications.

COURSE CONTENTS

Research Project Stage – I:

Project work Stage – I is an integral part of the project work. In this, the student shall complete the partial work of the project which will consist of problem statement, literature review, project overview, scheme of implementation (Mathematical Model/SRS/UML/ERD/block diagram/ PERT chart, etc.) and Layout & Design of the Set-up.

As a part of the progress report of Project work Stage-I, the candidate shall deliver a presentation on the advancement in Technology pertaining to the selected dissertation topic.

The student shall submit the duly certified progress report of Project work Stage-I in standard format for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

Report Guidelines

The Research project Stage I report must be presented in a standard, professional format. It should be submitted as a spiral-bound hard copy, preferably printed double-sided on A4-sized paper. The report must include the following components-

1. **Introduction**- Statement of objectives and Scope and limitations of the study
2. **Literature Review**- Background and context of the research and Summary of relevant studies and findings
3. **Problem Statement and Methodology**- Clear articulation of the research problem and Methodological approach to be adopted
4. Theoretical Framework- Concepts and theories relevant to the research topic
5. Field Applications and Case Studies- Real-world applications and documented case examples
6. Data Collection and Experimental Work- Details of data gathered from field studies or organizations and Description of experimental or analytical procedures
7. Analysis and Inferences- Initial interpretation of findings and insights obtained
8. Work Plan for Dissertation Stage II- Outline of the remaining research tasks and timeline
9. References Properly cited sources using a standard referencing style as suggested by concern faculty.

Presentation:

Students must prepare a PowerPoint presentation summarizing their work, to be delivered within 25 minutes, followed by a 5-minute Q&A session.

LEARNING RESOURCES

Web Resources

1. Google Scholar (https-//scholar.google.com)
2. NPTEL MOOCs on Research Methodology, Project Management, and Data Analysis
3. MIT Open Course (https-//ocw.mit.edu)
4. Coursera and edX courses on construction engineering and research methods
5. ASCE Library – https-//ascelibrary.org
6. ScienceDirect (Elsevier) – https-//www.sciencedirect.com
7. SpringerLink – https-//link.springer.com
8. IEEE Xplore – https-//ieeexplore.ieee.org
9. Taylor & Francis Online – https-//www.tandfonline.co
10. Shodhganga (INFLIBNET India) – https-//shodhganga.inflibnet.ac.in

Savitribai Phule Pune University, Pune

Maharashtra, India

ME– Civil Engineering (2025 Pattern)
Master of Engineering (Construction Management)

Semester IV

Savitribai Phule Pune University
ME-Civil (Construction Management) 2025 Pattern

Semester-IV
Course Code: SEM-604-CON
Course: Seminar-III

Teaching scheme	Credit	Examination	
Practical: 8 hours / week	04	Term work Oral	50 marks 50 marks

Perquisites: Students must have completed core courses in construction management, possess basic research, analytical skills, and be familiar with current industry practices, codes, and standards.

Companion course: Seminar-I

Course Objectives: To develop the student's ability to independently investigate and critically analyze an advanced topic in structural engineering, and to effectively communicate the findings through a well-structured report and professional oral presentation.

Course outcomes:

On completion of the course, learner will be able to:

CO1. Select and critically evaluate an advanced topic in structural engineering, integrating literature findings to identify knowledge gaps or emerging opportunities.

CO2. Prepare a comprehensive seminar report and deliver a professional oral presentation demonstrating technical depth, clarity, and effective audience engagement.

COURSE CONTENTS

Seminar III: shall preferably an extension of seminar II or similar topic. The student shall submit the duly certified seminar report in standard format, for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

The seminar should be based on any advanced topic selected by the student in consultation with the faculty supervisor. The seminar should demonstrate a strong grasp of the subject, supported by critical evaluation of relevant literature, identification of knowledge gaps or emerging opportunities, and discussion of practical or research implications. As part of the seminar, students shall prepare a structured report that includes the literature review, identified research gap, rationale, objectives, methodology or findings, conclusions, and future scope. They shall also deliver a professional oral presentation using appropriate visual aids, and respond confidently to questions and feedback.

TERM WORK SUBMISSION

All submissions shall be as per the requirements prescribed in the format, and must be completed on or before the specified deadline.

ASSESSMENT CRITERIA

The course concludes with evaluation through presentation delivery, question–answer sessions, and submission of a comprehensive seminar report

LEARNING RESOURCES

Relevant national and international construction codes International and National published Journals, conference papers and book chapters,

Reference books

1. Research Methodology- C.R. Kothari- New Age International Publishers.

Savitribai Phule Pune University
ME-Civil (Construction Management) 2025 Pattern

Semester-IV

Course Code: PRJ-606-CON

Course: Research Project Stage-II

Teaching scheme	Credit	Examination	
Practical: 36 hours / week	18	TW OR	150 marks 50 marks

Perquisites: Civil Engineering, Research aptitude/methodology, analytical skills.

Course Objectives:

1. To enable students to apply scientific research methodologies to investigate and solve real-world or industry-relevant construction problem
2. To develop students' abilities to critically analyze data, draw meaningful inferences, and formulate viable, practical solutions.
3. To encourage individual contribution and professional reporting skills through comprehensive documentation and effective presentation of research findings.

Course outcomes: On completion of the course, student will be able to-

CO1.Formulate a well-defined problem statement based on literature survey, field studies, and current industrial challenges in the environment and other allied sectors.
CO2. Demonstrate proficiency in data collection, analytical tools, interpretation of results, and development of conclusions through independent research work.
CO3. Effectively communicate research outcomes through a professionally written dissertation and a formal oral presentation, with an aim to publish or present findings at academic or professional platforms.

COURSE CONTENTS

In Project Work Stage – II, the student shall complete the remaining part of the project which will consist of the fabrication of set up required for the project, work station, conducting experiments and taking results, analysis & validation of results and conclusions. Comparative analysis with state of art systems/algorithms/existing procedures is expected.

The student shall prepare the duly certified final report of project work in standard format for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

Institute must submit the list of candidates, guide and project details (title, area, problem definition, abstract - clearly indicating objectives and scope, sponsorship details, if any) to the university within month of commencement of third semester. The guide must be approved/qualified full time teacher of the Institute. A guide can accept/enroll at the most 8 students per year.

Final Report Submission-

The final dissertation report must be compiled and submitted in a standardized black-bound hard copy, preferably printed on both sides of the paper. The report should be structured with the following key components-

1. Introduction- Project overview, objectives, and scope, Limitations and challenges encountered
2. Literature Review- Summary of previous studies and theoretical background and Identification of research gaps
3. Research Methodology- Clear articulation of the problem statement, hypothesis, designing the research and Detailed description of the research methodology
4. Theoretical Framework- Relevant theories, models, and concepts related to the research, Real-world applicability of the research and Documentation of case studies, if any
5. Result and discussion- Field data, organizational inputs, or lab-based experimentation and Tools, instruments, and procedures used/adopted, Comprehensive analysis of the results and Key findings and derived inferences, applications, representations,
6. Conclusion and Recommendations- Summary of contributions, conclusions, and suggested improvements and Recommendations for industry or future research
7. References- Properly formatted citations of all literature and sources used in APA - American Psychological Association referencing style
8. Appendices (if applicable)- Supplementary materials such as publications, sponsored ship, questionnaires, raw data, charts, etc.

Presentation and Evaluation

Each student shall prepare a PowerPoint presentation of their project findings, to be presented within 45 minutes, followed by a 15-minute Q&A session. The presentation should effectively communicate the research problem, methodology, analysis, and conclusions.

Publication Encouragement

Students are strongly encouraged to publish their research findings in a PG Con (SPPU)/peer-reviewed journal/present them at a recognized conference, thereby contributing to academic and professional knowledge in the field before final oral examination.

LEARNING RESOURCES

Web Resources

11. Google Scholar (https-//scholar.google.com)
12. NPTEL MOOCs on Research Methodology, Project Management, and Data Analysis
13. MIT Open Course (https-//ocw.mit.edu)
14. Coursera and edX courses on construction engineering and research methods
15. ASCE Library – https-//ascelibrary.org
16. ScienceDirect (Elsevier) – https-//www.sciencedirect.com
17. SpringerLink – https-//link.springer.com
18. IEEE Xplore – https-//ieeexplore.ieee.org
19. Taylor & Francis Online – https-//www.tandfonline.co
20. Shodhganga (INFLIBNET India) – https-//shodhganga.inflibnet.ac.in