Walchand College of Engineering

(Government Aided Autonomous Institute)

Vishrambag, Sangli-416415

Credit System for
F. Y. M. Tech. (Construction Management)
Semester-I and II

2024-25

Credit System for F. Y. M. Tech. (Construction Management) Sem-I AY 2024-25

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	MSE /LA1	ISE/ LA2	ESE	Remark
Professional Core (Theory)													
1	PC	1IC501	Research Methodology and IPR	3	0	0	0	3	3	30	20	50	
2	PC	1CM501	Project Planning and Control	3	1	0	0	4	4	30	20	50	
3	PC	1CM502	Building Information Modeling	3	0	0	0	3	3	30	20	50	
4	PC	1CM503	Construction Technology and Equipment	3	0	0	0	3	3	30	20	50	
Professional Core (Lab)													
6	PC	1CM551	Construction Planning Studio	0	0	2	0	2	1	30	30	40	OE
7	PC	1CM552	Modeling and Simulation Laboratory	0	0	2	0	2	1	30	30	40	OE
Professional Elective (Theory)													
8	PE	Refer List	Professional Elective 1	3	0	0	0	3	3	30	20	50	
9	PE	Refer List	Professional Elective 2	3	0	0	0	3	3	30	20	50	
			Total	**18**	**1**	**4**	**0**	**23**	**21**				

Head of Department Dean Academics

Professional Elective Course List for F. Y. M. Tech. (Construction Management) Sem-I AY 2024-25

Sr.No.	Course Code	Course Name
Professional Elective 1		
1	1CM511	Building Services and Maintenance Management
2	1CM512	Lean Construction
3	1CM513	Materials and Material Management
Professional Elective 2		
1	1CM514	Site Administration and Control
2	1CM515	Advanced Estimation & Quantity Surveying
3	1CM516	Advanced Concrete Technology

Head of Department Dean Academics

Credit System for F. Y. M. Tech. (Construction Management) Sem-II AY 2024-25

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	MSE/ LA1	ISE/ LA2	ESE	Remark
Professional Core (Theory)													
1	PC	1CM521	Project Quality and Safety Management	3	0	0	0	3	3	30	20	50	
2	PC	1CM522	Project Procurement and Contracts Management	3	0	0	0	3	3	30	20	50	
3	PC	1CM523	Financial Management in Construction	3	0	0	0	3	3	30	20	50	
Professional Core (Lab)													
3	PC	1CM571	Project Management Studio	0	0	2	0	2	1	30	30	40	OE
4	PC	1CM572	Digital Applications in Project Management	0	0	2	0	2	1	30	30	40	OE
5	PC	1CM545	Seminar	0	0	2	0	2	1	30	30	40	
Professional Elective (Theory)													
6	PE	Refer List	Professional Elective 3	3	0	0	0	3	3	30	20	50	
7	PE	Refer List	Professional Elective 4	3	0	0	0	3	3	30	20	50	
Open Elective													
8	OE	Refer List	Open Elective	3	0	0	0	3	3	30	20	50	
			Total	**18**	**0**	**6**	**0**	**24**	**21**				

Head of Department

Dean Academics

Professional Elective Course List for F. Y. M. Tech. (Construction Management) Sem-II AY 2023-24

Sr.No.	Course Code	Course Name
Professional Elective 3- Infrastructure		
1	7CM531	Supply Chain and Procurement Management
2	7CM532	Infrastructure Development and Management
3	7CM533	Sustainability in Construction Projects
Professional Elective 4- Building		
1	7CM534	Strategic Management in Construction
2	7CM535	Life Cycle Assessment
3	7CM536	Human Resource Management

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Walchand College of Engineering, Sangli

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AY 2024-25

Course Information	
Programme	M. Tech. Construction Management
Class, Semester	First Year M. Tech
Course Code	1CM501
Course Name	Professional Core (Theory) - Project Planning and Control
Desired Requisites:	Construction Project Management/Engineering Management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	1 Hr/week	30	20	50	100
Practical	-				
Interaction	-	**Credits: 4**			

Course Objectives	
1	To provide an in-depth understanding of the principles and practices of project monitoring and control in construction management.
2	To develop the ability to utilize various tools and techniques for effective project monitoring and control.
3	To enhance skills in data collection, analysis, and reporting within the context of project management.
4	To foster critical thinking and problem-solving skills to address project deviations and implement corrective actions.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Apply various tools and techniques for effective monitoring and control of construction projects.	Applying	III
CO2	Analyze project data and generate comprehensive project reports for decision-making.	Analyzing	IV
CO3	Evaluate project performance and identify deviations and their causes.	Evaluating	V
CO4	Create strategies and solutions to address project deviations and improve project performance.	Creating	VI

Module	**Module Contents**	**Hours**
I	**Introduction to Project Monitoring and Control** Overview of Project Management: Definitions, phases, and processes, Importance of Monitoring and Control: Key objectives and benefits., Project Life Cycle and Control Points: Critical stages for monitoring and control, Introduction to PMBOK and PRINCE2: Frameworks and methodologies, Stakeholders in Monitoring and Control: Roles and responsibilities.	6
II	**Tools and Techniques for Monitoring** Project Scheduling Tools: Gantt charts, CPM, PERT, Progress Tracking Techniques: Milestone charts, S-curve analysis, Earned Value Management (EVM): Concepts, metrics, and calculations, Software Applications: Introduction to MS Project, Primavera, and other tools, Data Collection Methods: Surveys, interviews, direct observations.	7

III	**Performance Measurement and Reporting** Key Performance Indicators (KPIs): Definition and examples specific to construction, Dashboard Reporting: Visual management and performance dashboards, Status Reporting: Daily, weekly, and monthly reporting formats, Variance Analysis: Cost, schedule, and scope variances, Risk Monitoring and Control: Identifying, assessing, and managing risks.	7
IV	**Project Control Methods** Change Control Processes: Handling scope changes, change requests, and approvals, Optimization of network duration, network: Updating Crashing, time-cost trade off, direct and indirect cost, total costs, cost slopes, Quality Control Techniques: Standards, inspections, and audits, Cost Control Methods: Budget management, cost estimation, and cost forecasting, Time Control: Techniques to manage project timelines and deadlines, Communication Management: Effective communication strategies and tools.	8
V	**Advanced Monitoring Techniques** Integration Management: Coordinating all aspects of project management, Resource Management: Allocation and optimization of resources, Advanced EVM Techniques: Variance at completion (VAC), to-complete performance index (TCPI), Quality Management Tools and Techniques (e.g., Six Sigma, Lean), Lean Construction Principles: Reducing waste and improving efficiency, Agile and Hybrid Methodologies: Applying agile principles in construction projects.	6
VI	**Resource Management** Resource allocation, scheduling, Resource smoothening, Resource levelling, Periodic progress reports, and periodical progress meetings, Material Plan, Manpower Plan, Machinery Plan.	6

Text Books	
1	Nagarajan, K. Project Management. India: New Age International (P) Limited, 2004.
2	Neeraj Jha, K. Construction Project Management. India: Pearson Education India, 2015.
3	Oberlender, G. D. Project Management for Engineering and Construction. Greece: McGraw-Hill Education, 2015.
4	Chitkara, K. K. Construction Project Management: Planning, Scheduling and Controlling. India: Tata McGraw-Hill Publishing Company, 1998.
References	
1	Project Management Institute, P. M. I. A Guide to the Project Management Body of Knowledge (PMBOK Guide) – Seventh Edition and The Standard for Project Management (FRENCH). United Kingdom: Project Management Institute, 2021.
2	Sears, S. K., Sears, G. A., Clough, R. H. Construction Project Management: A Practical Guide to Field Construction Management. Germany: Wiley, 2010.
3	Pilcher, R. Principles of Construction Management. United Kingdom: McGraw-Hill 1992.

Useful Links	
1	Project Management : Planning, Execution, Evaluation and Control - Course (nptel.ac.in)
2	Principles of Construction Management - Course (nptel.ac.in)
3	Project Management for Managers - Course (nptel.ac.in)

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1			3			3
CO2			2	2	3	1
CO3	2		1	2	3	2
CO4	2		3	3		
CO5		3		2	2	1
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	First Year M.Tech. Construction Management
Course Code	1CM502
Course Name	Professional Core (Theory) - Building Information Management
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To provide a foundational understanding of BIM (Building Information Modeling) and its benefits.
2	To illustrate how BIM serves as an effective tool for communication and collaboration.
3	To explain the process of implementing BIM and creating BIM-based designs.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the role of BIM in building design and construction	Understanding	II
CO2	Apply BIM approach in construction Planning, Control and Operation	Applying	III
CO3	Demonstrate the use of BIM as a communication tool for decision making among stakeholders	Analyzing	II
CO4	Design BIM for sustainable building design and construction practices through case studies	Creating	IV

Module	**Module Contents**	**Hours**
I	**Introduction to BIM Concepts and Design Authoring** Evolution of Engineering from 2D drawings to BIM Model, Isometric View, Limitation of Isometric views and concept of 3D-Modeling, Building Information Modelling – Introduction & Process, Design Authoring – Concepts and workflow, Fundamentals of Discipline Based Modelling, Introduction to stages of BIM Modelling process as per ISO 19650, Difference between BIM and Cad, Terms used in BIM, BIM Benefits, Risks and challenges, Present State of BIM Adoption and Road ahead.	6
II	**Visualization and Interference/Clash check** Views in BIM Model, Visualization Modes, Layers & Properties, Concept of viewpoints, Concept of BIM Kiosk & BIM Rooms, Visualization through Augmented Reality (AR), Virtual Reality (VR) & Mixed Reality (MR) Clash Check – Types, Clash avoidance process, Clash Detection	7

	Process, Clash Detection Priority Matrix and Report generation, Clash Detection Rules, Report, Grouping.	
III	**BIM Fundamentals** Level of Development (LoD), BIM dimensions, BIM uses in construction phase, existing condition modelling or field capturing, quantity take off, phase planning, 3D coordination, BIM and Procurement.	6
IV	**4D / Field BIM & Its Applications** Introduction to construction sequence and project schedule, Gantt Chart and its limitation, Synchronization with project schedule, Generation of Reports Application of Field BIM/ 4D BIM BIM in field for coordination-3D Coordination and Visual Communication, Site utilization planning and Construction analysis. Concept and usages of BIM in field for safety, disaster and risk analysis, digital fabrication and scan to BIM, Existing Condition Modelling, Phase Planning, As-built/ Record Models	7
V	**5D BIM and Emerging Trends** 5D BIM: Introduction concepts of 5D BIM, Quantity take off (QTO) with Units of Measure (UoM), 5D BIM with UoM with cost, Quantity take off exercise, Demo of Quantity take off: Understanding QTO for Wall, Plaster & Tile, BIM Maturity LOD and General Practice of QTO, Cost Breakup structures, 5D BIM and cost control	7
VI	**Future scope of BIM Application** Smart Infrastructure and the need for connected infrastructure, Digital twins- Concepts and benefits, National Digital Twin or a City level Digital Twin in a Smart City, Fundamental requirements for the success of a Digital Twin and its uses, Digital Twin applications in diverse industries.	7
Text Books		
1	Building Information Modelling (BIM) in Design, Construction and Operations De Wilde, P., Mahdjoubi, L., &Garrigós, A. G., WIT Press, 2019, Volume 192.	
2	BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. Eastman, C. M., Eastman, C., Teicholz, P., Sacks, R., & Liston, K.John Wiley & Sons, 2011, 2nd Edition.	
3	Building information modeling: BIM in current and future practice, Kensek, K., & Noble, D., John Wiley & Sons, 2014, 1st Edition.	
References		
1	Integrated Practice in Architecture: Mastering Design-Build, Fast-Track, And Building Information Modelling, Elvin, G., John Wiley & Sons, 2007, First Edition.	
2	Organization and digitization of information about buildings and civil engineering works, including building information modelling -- Information management using building information modelling: Concepts and principles, BS EN ISO 19650-1, The British Standards Institution, 2018.	
3	Organization and digitization of information about buildings and civil engineering works, including building information modelling -- Information management using building information modelling: Delivery phase of the assets, BS EN ISO 19650-2, The British Standards Institution, 2018.	
Useful Links		
1	https://youtu.be/iRMA2TauyvM	
2	https://youtu.be/mVsy_ycUD1Q	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	2		3	2		3
CO2	3	2	2	3		3
CO3	3	2		2	2	2
CO4	2			3	3	2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

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AY 2024-25

Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	First Year M.Tech. Construction Management
Course Code	1CM503
Course Name	Professional Core (Theory) - Construction Technology and Equipment
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To make students aware of construction techniques other than conventional.
2	To provide in-depth knowledge on construction equipment and their management.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Identify various construction techniques and their limitations.	Understanding	II
CO2	Analyse productivity and economics in construction techniques.	Analyzing	III
CO3	Prepare a suitable plan for erection of new plants like batching and mixing plant, Ready mix concrete plant at site.	Creating	IV
CO4	Manage and maintain the equipment and its cost control.	Applying	V

Module	Module Contents	Hours
I	**Prefabricated Structures** Introduction to Prefabricated structures, Planning for pre-casting, Selection of equipment for fabrication, Transport and erection of prefabricated components, Quality measures, Design considerations of precast elements, Safety measure during erection.	7
II	**Modular Construction Practices** Introduction to Modular Construction, Modular coordination, Modular Standardization, Modular System Building, Limitation and Advantages of Modular Construction.	7
III	**Formwork & High Rise Buildings** Requirements of Formwork, Loads carried by Formwork, Types of Formwork: Timber, Steel, Modular shuttering, Slip forms, Scaffolding, Deep Excavation Methods. New Design Trends in Geometrical Forms, Construction Techniques of High Rise Buildings, High Rise Construction Techniques, Brick work, Selected High-Tech High-Rise Buildings.	6

IV	**Construction Equipment & Management** Introduction, significance of equipment in construction industry - laboratory setting including plan reading, specification reading, construction scheduling and estimating, Job layout and its importance. Equipment Management- Introduction, Differences between men and manpower, Extent of Mechanisation, Equipment planning, Selection of equipment, Forward planning, Purchase of Equipment, Specifications for ordering equipment.	6
V	**Equipment for Earthwork** Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment –Excavation equipment- Power Shovels, Back Hoe, Drag line, Clamshell – Excavating and Earth Moving Equipment – Scrapers, Bull Dozers, Tractors, Hauling Equipment – Dump trucks, Dumpers Loaders, trucks, Earth Compaction Equipment- Tamping Rollers, Smooth Wheel Rollers, Sheepsfoot Roller, Pneumatic-tyred Roller, Vibrating Compactors, Vibro Compaction methods.	7
VI	**Other Construction Equipment** Pile driving Equipment - Erection Equipment – Cranes, Derrick Cranes, Mobile cranes, Overhead cranes, Traveller cranes, Tower cranes - Types of pumps used in Construction - Grouting - Material Handling Conveyors –Industrial Trucks, Forklifts and related equipment .	7
Text Books		
1	Construction Planning, Equipment, and Methods, Robert L. Peurifoy, Clifford J. Schexnayder, Robert Schmitt and AviadShapira, McGraw-Hill Education, 2018, Ninth Edition.	
2	Construction Equipment and Management, S. C. Sharma, Khanna Publishing, 2019, First Edition	
3	Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", McGraw Hill, Singapore, 2006.	
4	Sharma S.C. "Construction Equipment and Management", Khanna Publishers, New Delhi, 1988.	
References		
1	Principles and Practices of Commercial Construction, Cameron Andres, Ronald Smith and W. Woods, Pearson, 2018, Tenth Edition.	
2	Construction Materials and Techniques, D. S. Vijayan, S. Arvindan and A. Paulmakesh, Notion Press, 2021, First Edition.	
3	Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 1988.	
4	Dr.MaheshVarma, "Construction Equipment and its planning and Application", Metropolitan Book Company, New Delhi. 1983.	
Useful Links		
1	https://youtu.be/2B7DhQvL8kw?si=RuDOXXWwd7UNGSM4	
2	https://youtu.be/gJjLKpXhWns?si=rmjoKg0M90KdJP8f	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	3		2		1	
CO2		1	3	3		3
CO3			2	3	2	3
CO4				2	2	
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	M. Tech. Construction Management
Class, Semester	First Year SEM -I
Course Code	1CM551
Course Name	Professional Core (Lab) - Construction Planning Studio
Desired Requisites:	Construction Project Management

Teaching Scheme	**Examination Scheme (Marks)**				
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To provide hands-on experience in using Microsoft Project software for project planning, scheduling, and control. Students will learn to apply the software's functionalities to real-world construction management scenarios, enhancing their ability to manage complex projects efficiently.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Summarize the fundamental features and interface of MS Project	Understanding	I
CO2	Apply MS Project tools for creating and managing project schedules	Applying	III
CO3	Analyze project schedules and resource allocations using MS Project	Analyzing	IV
CO4	Design comprehensive project plans incorporating timelines, resources, and costs using MS Project	Creating	VI

Experiment	**List of Experiments/Lab activities**	**Hours**
I	**Introduction to MS Project** Overview of Project Management Software, Introduction to MS Project Interface, Creating a New Project, Setting Up Project Information (Start Date, Calendar, etc.)	4
II	**Project Planning and Scheduling** Defining Project Tasks and Durations, Creating and Organizing Work Breakdown Structure (WBS), Setting Dependencies and Relationships between Tasks, Applying Constraints and Deadlines	4

III	**Resource Management** Adding and Managing Resources (Work, Material, and Cost Resources), Assigning Resources to Tasks, Resource Allocation and Levelling, Identifying and Resolving Resource Over allocations	4
IV	**Cost Management** Defining Project Costs (Fixed, Variable, and Resource Costs), Assigning Costs to Tasks and Resources, Tracking Project Costs, Performing Earned Value Analysis (EVA)	4
V	**Monitoring and Controlling Project Performance** Tracking Progress and Updating Project Status, Variance Analysis (Schedule and Cost Variances), Implementing Corrective Actions, Using Baselines for Performance Measurement	4
VI	**Reporting and Presentation** Generating Project Reports (Progress, Cost, Resource, etc.), Customizing Reports and Views, Creating Gantt Charts and Other Visual Representations Exporting Data and Sharing Project Information	4

Text Books	
1	Biafore, B., Riopel, J. Practical Project Management with Microsoft Project. United States: Cold Press Publishing, 2021.
2	Lewis, C., Chatfield, C., Johnson, T. Microsoft Project 2019 Step by Step. United States: Pearson Education, 2019.
References	
1	Project Management Using Microsoft Project 2016: A Training and Reference Guide for Project Managers Using Standard, Professional, Server, Web Application and Project Online" by Gus Cicala
2	Lewis, C., Chatfield, C., Johnson, T. Microsoft Project 2019 Step by Step. United States: Pearson Education, 2019.
Useful Links	
1	Microsoft Project - Tutorial for Beginners in 14 MINUTES! [COMPLETE] (youtube.com)
2	MS Project Tutorial 1 Introduction (youtube.com)

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	1		2			2
CO2			2	2		1
CO3	1			3	1	
CO4			2	3	1	1
CO5		2		3	2	2
The strength of mapping: 1:Low, 2:Medium, 3:High						

Assessment				
There are three components of lab assessment, LA1, LA2, and Lab ESE IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates the starting week of a semester. The actual schedule shall be as per the academic calendar. Lab activities/Lab performance shall include performing experiments, mini-projects, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

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Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	First Year, Sem I
Course Code	1CM552
Course Name	Professional Core (Lab) - Modelling and Simulation Laboratory
Desired Requisites:	Engineering Drawing; Computer Aided Civil Engineering Drawing Lab

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture		**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To impart hands-on training of BIM-related softwares.
2	To make students aware of the real-world project information.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Define a model and analyse a building with its help	Analyzing	I, IV
CO2	Select and use dedicated tools for full information exchange and communication	Applying	III
CO3	Offer computer-aided design and investment management	Evaluating	V
CO4	Apply modern technologies in the construction industry	Applying	III

Experiment	**List of Experiments/Lab activities**	**Hours**
For a single storeyed commercial building, perform the tasks enlisted below using software/software modules such as Autodesk Revit, Autodesk Navisworks, Assemble Systems, ArchiCAD, Microstation, Tekla, RS Means. Each task may be performed over two consecutive practical turns.		
1	Exploration of basic BIM dimensions and their applications.	4
2	Creation of a realistic site scenario for BIM applications.	4
3	Building a detailed 3D model incorporating realistic elements.	4
4	Integrating scheduling information in BIM as 4D using Primavera P6.	4
5	Analyzing resource needs and estimating costs through BIM.	4
6	Assessing sustainability aspects using 6D BIM methodologies.	4

Text Books

1	Brad Hardin, Dave Mccool, “BIM and Construction Management: Proven Tools, Methods and Workflows”, 2ed, 2015
2	Karen M. Kensek, “Building Information Modeling”, Taylor & Francis, 2014

References	
1	Willem Kymmell, “Building Information Modelling”, McGraw-Hill Construction, New York, 2008.
2	BS 1192:2007, A2:2016 “Collaborative production of architectural, engineering and construction information. Code of practice”
3	PAS 1192-2 “Specification for information management for the capital/delivery phase of construction projects using Building Information Modelling”
Useful Links	
1	https://cat2.mit.edu/4.567/2022s/body.html
2	https://www.autodesk.com/in/solutions/bim

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	3	2	3	3	2	2
CO2	2	3	2	2	2	
CO3	3	2	3	3	2	2
CO4	3	2		3	3	3
CO5	3	2	3	3	2	2
The strength of mapping: 1:Low, 2:Medium, 3:High						

Assessment

There are three components of lab assessment, LA1, LA2, and Lab ESE
IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates the starting week of a semester. The actual schedule shall be as per the academic calendar. Lab activities/Lab performance shall include performing experiments, mini-projects, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information	
Programme	M. Tech. (Construction Management)
Class, Semester	M.Tech., Semester 1
Course Code	1CM511
Course Name	Professional Elective 1- Building Services and Maintenance Management
Desired Requisites:	Solid Mechanics, Concrete Technology, Structural Analysis

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To inculcate the principles of functional planning for various types of buildings.
2	To explain the concepts on space utilization, circulation patterns, and the functional requirements of different building types.
3	To provide pertinent knowledge of essential building services, including electrical systems, plumbing, HVAC (Heating, Ventilation, and Air Conditioning), and fire safety.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Demonstrate knowledge of the principles and objectives of functional planning for various types of buildings.	Applying	III
CO2	Identify and explain the essential building services, including electrical systems, plumbing, HVAC, and fire safety.	Understanding	I
CO3	Evaluate the impact of building services on the performance and sustainability of a building.	Evaluating	V
CO4	Develop maintenance schedules and plans that ensure the longevity and optimal performance of building systems.	Creating	II

Module	**Module Contents**	**Hours**
I	**Functional Planning** Definition and Principles, objective and importance, Space standards and guidelines, Efficient space planning, Horizontal and vertical circulation Functional Requirements of Different Building Types- Residential buildings, Commercial buildings, Institutional buildings, Industrial buildings	4
II	**Building Services Part-1** Importance of building services, type of services required to keep facility usable, planning of services. Organization structures of services management. Role and administrative functions of supervisors.	4

III	**Building Services- Electrical, Plumbing and Sanitation system** Electrical Systems, Basics of electrical distribution, Lighting systems design, Emergency power systems Plumbing and Sanitation, Water supply systems, Drainage and wastewater management Sustainable plumbing practices	7
IV	**Building Services- HVAC and Fire safety system** HVAC Systems, Principles of heating, ventilation, and air conditioning, Design and installation of HVAC systems, Maintenance of HVAC systems, Fire Safety Systems, Fire detection and alarm systems, Fire suppression systems, Emergency evacuation planning	8
V	**Building Services- Lifts/Elevators, Escalators** Legal formalities for elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.	8
VI	**Maintenance and Management** Developing maintenance schedules, Resource allocation for maintenance, Computerized Maintenance Management Systems (CMMS), implementation and benefits of CMMS, Key performance indicators (KPIs) for buildings, Methods of performance evaluation, Energy-efficient building practices.	8
Text Books		
1	Fred Hall, Roger Greeno, Building Services Handbook, 9th Edition, 2017.	
2	Walter T. Grondzik, Alison G. Kwok, and Benjamin Stein "Mechanical and Electrical Equipment for Buildings" ,2011	
References		
1	Tymkow, P., Tassou, S., Kolokotroni, M., Jouhara, H. Building Services Design for Energy Efficient Buildings. United Kingdom: CRC Press, 2013.	
2	Chanter, B., Swallow, P. (2008). Building Maintenance Management. Germany: Wiley.	
3	Gahlot, P. S., Sharma, S. Building Repair and Maintenance Management. India: CBS Publishers & Distributors, 2019.	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	2		2		2	2
CO2			3	2		2
CO3			3	3		2
CO4		1		3	1	2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment
• The assessment is based on MSE, ISE, and ESE. • MSE shall be typically on modules 1 to 3. • ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO. • ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6. • For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2024-25

Course Information

Programme	M. Tech. (Civil Engineering)
Class, Semester	First Year M.Tech.Construction Management
Course Code	1CM512
Course Name	Professional Elective 1- Lean Construction
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To introduce the students to the concepts and methods of lean construction.
2	To enhance their skills by training in lean project management software.
3	To explain lean management and cultivate a lean culture.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Develop lean thinking and map lean culture in project delivery.	Understanding	II
CO2	Demonstrate skill in applying Lean planning tools.	Applying	III
CO3	Create pull planning and other visual charts for follow up of project schedules and targets.	Creating	III
CO4	Investigate the key performance indicators and analyze project performance after implementation of lean management techniques.	Evaluating	V

Module	Module Contents	Hours
I	**Introduction to lean principles** Introduction productivity measurement in projects and work diagnostics; Mapping of lean principles into construction; Lean construction, fundamental concepts; Lean thinking and culture;	6
II	**Project life cycle and lean project delivery system** Project life cycle and lean project delivery system; Lean tools, techniques and measures; Collaborative planning and last planner system; Location based management system;	7
III	**Lean in design and lean tools** Lean in design and supply chain management; Lean enablers and integration; Application in lean project management software - Master planning; Value Stream Mapping, Visual Management, 5S	6
IV	**Planning and project performance** Framework for pull planning and constraint analysis; Look ahead planning, weekly work plans , Standup Meetings, Learning PPP, Key performance indicators for plan reliability and project performance.	6

V	**Lean Procurement** Introduction to lean procurement value and flow, Value Stream Mapping, Process Charts, Elimination of waste, Creating buffers for various resources.	6
VI	**Constructive assignments** Design of pull planning charts, weekly work plans and look ahead charts for display using a case study	5

Text Books	
1	Forbes, L. H., Ahmed, S. M. Modern Construction: Lean Project Delivery and Integrated Practices. Ukraine: CRC Press, 2010.
2	Gao, S., Low, S. P. Lean Construction Management: The Toyota Way. Germany: Springer Nature Singapore, 2014.
References	
1	Value and Waste in Lean Construction. United Kingdom: CRC Press, 2015.
2	Lean Construction: Core Concepts and New Frontiers. United Kingdom: CRC Press, 2020.
3	Alarcón, L. Lean Construction. United States: CRC Press, 2014.
Useful Links	
1	https://archive.nptel.ac.in/courses/105/106/105106213/
2	https://www.youtube.com/watch?v=FJxUuSvMvVE

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	2		3	2	1	2
CO2			2	2		
CO3				2	2	
CO4		2			1	
CO5	1	2		2	2	2
CO6	3		3	1		2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

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AY 2024-25

Course Information	
Programme	M. Tech. (Construction Management)
Class, Semester	First Year, Sem I
Course Code	1CM513
Course Name	Professional Elective 1- Materials And Material Management
Desired Requisites:	Building Materials, Building Construction, Project Management and Engineering Economics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To make students familiar with the material management organization and procurement process.
2	To enable students to understand the inventory management and material storage systems
3	To make students acquainted with the concept of material quality control and wastage management of materials

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Decide the plan for organizing material and store management.	Evaluating	V
CO2	Create purchase order for procuring material.	Creating	VI
CO3	Apply inventory control techniques for material management.	Applying	III
CO4	Suggest quality control techniques and remedial measures to control material wastage	Analyzing	V

Module	**Module Contents**	**Hours**
I	**Materials Management Importance** Importance - its role in construction industry - scope, objectives and functions of material management, Integrated approach to materials management, Role of materials manager. Organizing for materials management – basis for forming organizations – conventional and modern approaches to organizing materials management. Materials identification – classification and codification of materials – standardization – simplification and variety reduction of materials	6
II	**Material Procurement** Material research, Identification of sources of procurement, Planning and creative Purchasing of Materials – Purchase under different situations - Bulk purchasing -budgeting- Norms of Vendor Rating – vendor analysis- Concept of MRP- Supply Management – Sources of Supply – Out Sourcing Material Management- Procurement Organization - Procurement Planning and Methods – Legal Aspects – Insurance of Materials, Concept of international purchase	7

III	**Inventory Management** Inventory Control techniques, Economic Order Quantity (EOQ), Advantages and limitations, ABC Analysis-Procedure and its use, concept of JIT- Just in time management, Use of MMS – Materials Management Systems in materials planning, procurement, inventory, control, cost control etc. Introduction to application of software used for material management	6
IV	**Stores Management** Storing of Materials- Management of stores –Receipt and inspection- location -site layout and site organization– different types of stores – methods of storing –store accounts -stock verification- care, safety and security of materials - losses on storage- wastage, stores equipment – materials handling equipment – factors affecting materials handling	7
V	**Quality Control** Conventional methods of quality control of Construction materials, Statistical method of quality control, sampling techniques in quality control process, Quality management and its economics	6
VI	**Waste management** Obsolete, surplus and Scrap Materials Management – reasons for accumulation of surplus obsolete and scrap materials – methods of disposal – regulations and procedures	7
Text Books		
1	Gopalakrishnan And Sundaresan, "Materails Management: An Integrated Approach" PHI Learning, 2004	
2	Datta A. K. " Materials Management: Procedures, Text and Cases", PHI Learning, 2004	
3	Ghose D.N. " Materials of Construction", Tata-McGraw Hill Publication, 1989	
References		
1	Gopalakrishnan And Haleem, " Handbook of Material Management", PHI Learning, 2015	
2	Richard Tersine and John Campbell, "Modern Materials Management", North-Holland, 2008	
Useful Links		
1	https://nptel.ac.in/courses/110105095	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1			3	3	2	2
CO2		2		1	1	
CO3	2		2	3		2
CO4	2		3			2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment
• The assessment is based on MSE, ISE, and ESE. • MSE shall be typically on modules 1 to 3. • ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO. • ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6. • For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

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AY 2024-25

Course Information	
Programme	M. Tech. (Construction Management)
Class, Semester	M.Tech., Semester 1
Course Code	1CM514
Course Name	Professional Elective 2- Site Administration and Control
Desired Requisites:	Construction Project Management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To impart knowledge of the duties and responsibilities of a site administrator.
2	To provide necessary knowledge to implement control measures for site activities.
3	To develop an understanding of quality control procedures.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Demonstrate a deep understanding of project management principles and their application in the context of construction site administration and control.	Understanding	II
CO2	Analyze site requirements, plan effective site layouts, and organize site facilities and services efficiently.	Analyzing	IV
CO3	Develop expertise in cost estimation methods, budget preparation, and cost control strategies specific to construction projects.	Creating	VI
CO4	Interpreting quality management systems, quality assurance practices, and techniques for monitoring and improving construction project quality.	Applying	II

Module	**Module Contents**	**Hours**
I	**Site Identification and Assessment** Site layout planning, Temporary facilities and services, safety and security measures, preliminary survey, secondary survey,	5
II	**Construction Site administration and Scheduling** Overview of construction project, Role and responsibilities of a site administrator, Key functions of site management, Overview of construction project lifecycle, importance of site administration, Basics of Project Scheduling, Gantt Charts and Critical Path Method (CPM), Resource allocation and levelling	13
III	**Construction Site Management** Site Supervision and Coordination, Managing subcontractors and suppliers, Quality and assurance	7

IV	**Cost Control and Financial Management** Budgeting and cost estimation, Financial planning and control Variance analysis and cost reporting	6
V	**Health, Safety, and Environment (HSE)** HES assessment and compliance Risk assessment and management, Emergency response planning	6
VI	**Project Closeout and Evaluation** Project closeout procedures, Performance evaluation and feedback Post-project review and lessons learned	5

Text Books	
1	Gould, F., Joyce, N. Construction Project Management. United States: Pearson Education, 2020.
2	Peurifoy, R. L., Schexnayder, C., Ledbetter, W. B. Construction Planning, Equipment and Methods. United States: McGraw-Hill Higher Education, 2001.

References	
1	Sherratt, F. Introduction to Construction Management. United Kingdom: CRC Press, 2022.
2	Jackson, B. J. Construction Management JumpStart: The Best First Step Toward a Career in Construction Management. United Kingdom: Wiley 2020.
3	Forster, G. Construction Site Studies: Production Administration and Personnel. United States: CRC Press, 2017.

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1		2	2		3	3
CO2	2		2	3		
CO3	2			3	3	2
CO4			3	1	2	2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	M. Tech. Construction Management
Class, Semester	First Year M. Tech
Course Code	1CM515
Course Name	Professional Elective 2- Advanced Estimation & Quantity Surveys
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To introduce students to the basics of cost estimation, including the different types of estimates for buildings and their components.
3	To train students in the use of methods for rate analysis, quantity estimation, specification preparation, and material transportation.
4	To guide them in demonstrating techniques for valuing buildings and their components and in formulating comprehensive reports.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Apply Basics & Types of estimates for calculation	Applying	III
CO2	Analyze buildings and estimate the components also entire structure.	Analyzing	IV
CO3	Propose techniques for quantity estimation, specification and required for transport of materials.	Creating	VI
CO4	Demonstrate techniques for valuation of buildings, components & formulate reports	Applying	III

Module	**Module Contents**	**Hours**
I	**Introduction to Estimation** System and units involved in estimation, General items involved in building, Rates, Reducing Calculation, Units of measurement, Types of Estimates,	6

II	**Estimate of Buildings** Estimate of multi roomed buildings, Estimate of different shaped rooms, Estimate of office buildings, Estimate of shop building, Estimate of RCC members, Estimate of steel stanchion & beams, bar bending schedule,	8
III	**Estimation of Road, Railway line & Sanitary-Water Supply Scheme** Estimate of earthwork for Road, Estimate of earthwork for hilly roads, Estimates of Metalled road, Estimation for Railway line, Estimate of septic tank & soak pit, Estimate of water supply works, pipe line,	7
IV	**Analysis of Rates** Factors to be considered for Analysis of rates, Materials for different types of work, Analysis of rates for building works, Analysis of rates for water supply scheme, Analysis of rates for sanitary works	6
V	**Specifications, Quantities Estimation & Transport** General specification for different classes of Building, Specifications for major parts and components of a structure, Detailed specifications for roads and parts of road, Rules and methods related to measurement, Quantities of materials calculations for infrastructural projects, Transport of materials and estimate of transport of work.	6
VI	**Valuation & Reports** Terms involved in Valuation: Gross & Net Income, Outgoings, Sinking Fund, Depreciation, methods of valuation, Valuation of building, Concepts of lease & rent, Reports on Estimate & Valuation of different structures	5
Text Books		
1	Kohli, D. D., Kohli, R. C. A Textbook of Estimating and Costing (Civil). India: S. Chand &Company, Limited, 2012.	
2	Dutta, B. N., Dutta, S. Estimating and Costing in Civil Engineering. India: UBS Publishers Distributors (P), Limited, 1991.	
3	Principles of Building Drawing. Macmillan Publishers India Limited, 2000.	
References		
1	Gurcharan Singh and Jagdish Singh, Estimating costing and valuation, Standard Publishers.	
2	Ashworth, A., Heath, B. C. Advanced Quantity Surveying. United Kingdom: Butterworths, 1983.	
Useful Links		
1	Swayam NPTEL: Building cost estimation simplified: https://onlinecourses.swayam2.ac.in/nou20_cs11/preview	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	2		2		2	
CO2				3	2	2
CO3			2	2	1	1
CO4	2	1	2		1	2
CO5			3	2	1	
CO6		1	2	3		2

The strength of mapping: - 1: Low, 2: Medium, 3: High

Assessment
o The assessment is based on MSE, ISE, and ESE. o MSE shall be typically on modules 1 to 3. o ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO. o ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6. o For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

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Course Information

Programme	M. Tech. (Civil-Construction Management)
Class, Semester	F. Y. M. Tech., Sem I
Course Code	1CM516
Course Name	Professional Elective 2:-Advanced Concrete Technology
Desired Requisites:	Concrete Technology

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To give in-depth exposure to knowledge and concepts of cement, cement chemistry and hydration of cement.
2	To provide conceptual know-how of admixtures used in concrete to improve properties of concrete and develop skills to design concrete mixtures.
3	To make students conversant with durability issues of concrete and special types of concrete.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Perceive and apply the knowledge of cement, cement chemistry and concrete.	Understanding & Applying	II & III
CO2	Analyse and recommend chemical and mineral admixtures to fulfil the requirements of construction industries.	Analyzing & Evaluating	IV & V
CO3	Demonstrate and analyse the durability of issues of concrete and apply knowledge of special concretes.	Analyzing & Applying	III & IV
CO4	Design a concrete mixes according to construction industries requirements.	Creating	VI

Module	Module Contents	Hours
I	**Cement** Cement production and composition, Clinkering reactions, Hydration Reactions & Chemistry of Cement paste, Setting of Cements, Heat of Hydration, Microstructure of hydrated cement paste.	6
II	**Chemical Admixtures and Fresh Properties** Specification, Functions, Classification and Working Principles. Chemical Admixtures: Plasticizers, Super-plasticizer, Accelerators, Retarders, Air entraining agents, Speciality Admixture, Compatibility of Admixtures, Fresh Properties of Concrete, Pumping, Rheology	7
III	**Mineral Admixtures and Hardened Properties** Specification, Functions, and Classification. Mineral Admixtures: Fly ash, Silica Fume, Slag, Rice husk ash, Metakaolin, Sugarcane Bagasse	7

	ash etc. Pozzolanic Reactivity of Mineral admixtures Factoring affecting the compressive strength of concrete	
IV	**Concrete Mix Design** Factors to be considered, Concrete mix design of High Strength Concrete and SCC by IS: 10262 (2019) method, Concept of Particle Packing density, Statistical quality control	7
V	**Special Concretes:** Fibre reinforced concrete, Ultra-high strength concrete, Pervious Concrete, Self-Compacting Concrete, High-Performance Concrete	5
VI	**Durability of Concrete** Permeability and Pore Structure, Ionic Diffusion, Chemical Attack (Sulphate, Chloride, acid, leaching, Carbonation), Physical Attack (freeze-thaw), Corrosion of reinforcement, Alkali-Aggregate Reaction	8
Text Books		
1	Mehta P. K. and Paulo J. M. M, "Concrete – Microstructure, Properties and Material", McGraw Hill Professional 3rd Edition, 2009.	
2	Neville A. M. and Brooks J. J., "Concrete Technology", Pearson Education Limited, 1987	
3	Shetty M. S., "Concrete Technology", S. Chand & Company Ltd. New Delhi, 7th Edition, 2013.	
References		
1	Neville A. M., "Properties of Concrete", Prentice Hall, 5th edition, 2012	
2	Newman J., Choo B.S., Advanced Concrete Technology-Constituent Materials, Elsevier Ltd. 1st edition, 2003	
3	Taylor H.F.W., Cement Chemistry, Thomas Telford, 2nd edition, 1997	
Useful Links		
1	https://www.digimat.in/nptel/courses/video/105102012/L01.html	
2	https://www.digimat.in/nptel/courses/video/105104030/L01.html	
3	https://www.digimat.in/nptel/courses/video/105106176/L01.html	

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2	3		2
CO2	1		3		2	2
CO3			2	3	1	2
CO4	2		3		2	2s
The strength of mapping: 1:Low, 2:Medium, 3:High						

Assessment
• The assessment is based on MSE, ISE, and ESE. • MSE shall be typically on modules 1 to 3. • ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO. • ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6. • For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	First Year M.Tech. Construction Management
Course Code	1CM521
Course Name	Professional Core (Theory) - Project Quality and Safety Management
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To give in-depth knowledge of quality assurance and control techniques in construction.
2	To provide conceptual understanding of the clauses related to quality management in the construction industry.
3	To familiarize students with the various types of construction accidents and the costs associated with construction injuries.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Sense the importance of quality and quality management methods in construction.	Understanding	II
CO2	Develop an appropriate quality assurance plan to assess the ability of the service to meet its required national and international quality standards.	Applying	III
CO3	Discuss about the various laws related to construction safety and worker's compensation insurance premium	Understanding	II
CO4	Create the awareness about the role of safety in all the levels of management.	Creating	IV

Module	Module Contents	Hours
I	**Construction Quality** Introduction to quality - Importance - Types – Inspection - Control and enforcement-Quality Management Systems - Responsibilities and authorities in Quality assurance -Architects, Engineers, Contractors and Consultants.	6
II	**Quality Standards and Statistical Methods** Planning and control of quality - Tools and techniques for quality management - Inspection of materials and machinery - Quality audits-Statistical quality control - Tools ,Control charts - Acceptance sampling, Specification and tolerances.	7
III	**Quality Management** Quality policy - Objectives and methods -Consumer satisfaction-Ergonomics-Time of Completion-Taguchi's concept of quality- Quality	7

	standards/codes in design and construction (ISO: 9000) - Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification	
IV	**Quality Assurance and Control** Objectives-Regularity agent-Owner, Design, Contract and Construction Oriented Objectives, Methods-Techniques and Needs Of QA/QC-Different Aspects of Quality-Appraisals, Factors Influencing Construction Quality-Critical, Major Failure Aspects and Analysis.	6
V	**Construction Accidents** Injury and Accidents- Causes, Investigations and Prevention of Accidents, Hazards – Types , Nature, Causes and Control Measures - Identifications and Control Techniques - Cost of Construction Injuries-Legal Implications - Site management with regard to safety –Safety training and implementation - Construction safety and health manual.	6
VI	**Safety Policy and Organization** Need- Safety provisions -Factory Act-Laws related to the Industrial Safety-Measurement of Safety Performance, Safety Audit, Problem Areas in Construction Safety-Elements of an Effective Safety Programme-Job Site Safety assessment- Safety Meetings-Safety Incentives. Safety Policy, Safety Record Keeping, Safety Culture-Safe Workers-Safety and First Line Supervisors- Middle Managers-Top Management Practices, Company Activities and Safety-Sub contractual obligation, Project Coordination and Safety Procedures	8
Text Books		
1	Brian Thorpe and Peter Sumner , Quality Assurance in Construction, Routledge, 2016.	
2	Steven Mccabe, Quality Improvement Techniques in Construction: Principles and Methods, Routledge, 2016.	
References		
1	Abdul Razzak Rumane, Quality Management in Construction Projects, CRC Press, 2017.	
2	Tim Howarthand David Greenwood, Construction Quality Management: Principles and Practice, Routledge, 2017.	
3	Greg Hutchins, ISO 9000: A Comprehensive Guide to Registration, Audit Guidelines and Successful Certification Hardcover, Wight (Oliver) Publications Inc., U.S., 2010.	
4	Chung H.W., Understanding Quality Assurance in Construction: A Practical Guide to ISO 9000 for Contractors, Routledge, 2011.	
Useful Links		
1	https://youtu.be/dCUwmqXn22E?si=FUlRmO3FFEE1Az5E	
2	https://youtu.be/MHHNqSfoflk?si=Ryi7s1ybtq8vNUuY	

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	1	1	3	2	1	1
CO2	3	1	2	3	1	2
CO3	1	2	1	1	3	2
CO4	2	1	1	3	3	1
The strength of mapping: 1:Low, 2:Medium, 3:High						

Assessment
● The assessment is based on MSE, ISE, and ESE. ● MSE shall be typically on modules 1 to 3. ● ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO. ● ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6. ● For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	First Year M. Tech., Semester-II
Course Code	1CM522
Course Name	Professional Core (Theory) - Project Procurement and Contracts Management
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs./week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To provide a sound understanding of concepts and principles of contract management of engineering projects.
2	To develop proficiency with methods for civil engineering contract and dispute resolution systems.
3	To acquaint the students to formulate different contract documents

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Summarize provisions of Indian Contract Act	Understanding	II
CO2	Describe elements of Contract Management	Understanding	II
CO3	Appraise the different alternatives types of contracts and dispute resolution methods for an engineering project.	Analyzing	IV
CO4	Formulate conditions of contract and contract documents	Creating	VI

Module	Module Contents	Hours
I	**Introduction to Contract Management** Importance of contracts, Overview of contract management, Overview of activities in contract management, Scope of contract management, Professional ethics, Detailed project report and understanding nature, specification, scope, timeline, cost and other salient points of projects for contract drafting.	6
II	**Indian Contract Act 1872** Objectives of the act, Definition of contact, Meanings of proposal, promise, reciprocal promise, consideration, valid contract, free consent, Essential requirements of legally valid contract, Offer, Acceptance, Lawful Consideration, Intention, Capacity, and Legality of subject matter, Void and voidable contracts, Breach of contract and its consequences, Damages, Mitigating the loss or damage.	8
III	**Types Civil Engineering Contracts** Competitive bidding contracts, Negotiated contracts, Lump-sum contacts, Item rate contract, percentage rate contracts, cost plus types of	6

	contract, Turnkey contract, subcontract, annual maintenance contract, Supply and Installation Contracts, BOT, BOOT, BOLT, PPP, EPC, HAM, NCB, ICB etc. Pros and cons of each type, International contracts.	
IV	**Contract Formation** Tender, types of tenders, Tender notice, Pretender conference, Contents of tender notice, E-tendering, Tender preparation, Tender documents, Methods of tender submission, Opening of tenders, Scrutiny of tenders, Contract award and letter, Contract documents, Contract agreement, Bidding models and bidding strategies.	6
V	**Conditions of Contract** Notice to proceed, Handing over the site to contractor, Rights and duties of various parties, notices to be given, Fairness of Conditions of Contract, Subjects of conditions- Bid Security, Performance Security, Contract Duration and Price, Performance parameters; Payment terms, Delays, Penalties and liquidated damages; Force majeure, Suspension and termination, Changes and variations, subcontracting etc. Important contents of each condition, Typical conditions for each subject.	8
VI	**Dispute Resolution and Integrity in Contract** The "conventional" model of dispute resolution, Alternative Dispute Resolution methods (ADR), early neutral evaluation, negotiation, conciliation, mediation, and arbitration, Indian legislation for arbitration and conciliation, Integrity in Contract, its significance and typical clauses.	8

Text Books	
1	Ramaswamy B. S., "Contracts and their Management," Lexis Nexis, 5th Edition, 2016
2	Patil B. S., "Civil Engineering Contracts &Estimates", Orient Langman Ltd., 3rd Edition, 2006.
3	Gajria K., "Law relating to Building and Engineering Contracts in India," Butterworths India, 2000.

References	
1	Prasad L., "Managing Engineering and Construction Contracts: Some Perspectives," LAP Lambert Academic Publishing, 2010
2	Murdoch J. and Hughes W., "Construction Contracts: Law and Management, Routledge Publications, 2015.

Useful Links	
1	https://www.youtube.com/watch?v=O2AWwn-_zmg
2	https://www.youtube.com/watch?v=LvC4riB409E
3	https://www.youtube.com/watch?v=wJ8HZ7hqUs8&list=PL64587F5505355819

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	2		1			
CO2			2		3	
CO3	2		1	2		2
CO4				3	3	2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment
● The assessment is based on MSE, ISE, and ESE. ● MSE shall be typically on modules 1 to 3. ● ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO. ● ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6. ● For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by:	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	M. Tech. Construction Management
Class, Semester	First Year M. Tech
Course Code	1CM523
Course Name	Professional Core (Theory) - Financial Management in Construction
Desired Requisites:	Construction Project Management / Engineering Management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To provide comprehensive understanding of financial management principles and practices as they apply to construction projects.
2	To explain effective management of financial resources, analysis of financial statements, plan and control budgets, and assessment of the financial viability of construction projects.
3	To demonstrate knowledge about Cash Flow Management and about financial metrics.
4	To impart skills to evaluate financial plans and apply decision making tools

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Apply financial management tools and techniques to manage construction project finances	Applying	III
CO2	Analyze financial statements and budgets to assess project performance	Analyzing	IV
CO3	Evaluate the financial viability of construction projects using various financial metrics	Evaluating	V
CO4	Demonstrate effective financial decision-making skills in construction project management	Creating	III

Module	**Module Contents**	**Hours**
I	**Introduction to Financial Management in Construction** Overview of Financial Management, Importance of Financial Management in Construction, Key Financial Management Concepts and Terminologies, Financial Management Roles and Responsibilities in Construction, Depreciation, Inflation and Taxes, Depreciation, Inflation, Taxes.	6
II	**Financial Planning and Budgeting** Financial Planning Process, Budgeting Techniques and Methods, Preparing and Managing Construction Budgets, Cost Estimation and Cost Control Variance Analysis and Budget Adjustments	8

III	**Financial Analysis and Reporting** Analyzing Financial Statements (Balance Sheet, Income Statement, Cash Flow Statement), Financial Ratios and Performance Indicators, Project Financial Reporting, Interpreting Financial Reports for Decision Making, Construction accounting, Chart of Accounts, Financial statements – Profit and loss, financial ratios, Working capital management.	7
IV	**Cash Flow Management** Importance of Cash Flow Management in Construction, Cash Flow Forecasting and Budgeting, Managing Cash Inflows and Outflows, Cash Flow Analysis and Optimization, Time Value of Money Concepts,	6
V	**Project Financing** Sources of Project Financing, Financing Options for Construction Projects, Financial Risk Management, Evaluating Project Financing Alternatives Present, future and annual worth method of comparing alternatives, Rate of return, Incremental rate of return, Break-even comparisons, Capitalized cost analysis, Benefit-cost analysis.	6
VI	**Investment Analysis and Decision Making** Investment Appraisal Techniques (NPV, IRR, Payback Period), Cost-Benefit Analysis, Financial Decision Making in Construction Projects Basic principles, Quantifying alternatives for decision making	5
Text Books		
1	Ross, A., Williams, P. Financial Management in Construction Contracting. United Kingdom: Wiley, 2013.	
2	Chandra, P. Financial Management: Theory and Practice. India: Tata McGraw-hill Publishing Company Limited, 1990.	
3	Chandra, P. Projects: Planning, Analysis, Selection, Financing, Implementation and Review. India: Tata Mcgraw-Hill, 2002.	
4	Peterson, S. Construction Accounting and Financial Management. United Kingdom: Pearson Education, 2019	
5	Blank, L. T., Tarquin, A. Engineering Economy. United States: McGraw-Hill, 2005.	
References		
1	Chitkara, K. K. Construction Project Management: Planning, Scheduling and Controlling. India: McGraw-Hill Education (India) Private Limited, 2014.	
2	Clough, R. H., Sears, G. A., Sears, S. K., Segner, R. O., Rounds, J. L. Construction Contracting: A Practical Guide to Company Management. Germany: Wiley, 2015.	
3	Pilcher, R. Principles of Construction Management. United Kingdom: McGraw-Hill, 1992.	
6	Fundamentals of Financial Management, Eugene F. Brigham/Joel F. Houston, Cengage India Private Limited	
Useful Links		
1	NPTEL :: Civil Engineering - Construction Economics & Finance	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1		1	1		3	3
CO2			3	2	2	
CO3	2			3	2	
CO4	2		3			2
CO5			2	2		3
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	M. Tech. Construction Management
Class, Semester	First Year SEM -II
Course Code	1CM571
Course Name	Professional Core (Lab) - Project Management Studio
Desired Requisites:	Construction Project Management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives

1	The objective of this course is to provide hands-on experience in using Primavera P6 software for project planning, scheduling, and control. Students will learn to apply the software's functionalities to real-world construction management scenarios, enhancing their ability to manage complex projects efficiently.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the fundamental features and interface of Primavera P6	Understanding	I
CO2	Apply Primavera P6 tools for creating and managing project schedules	Applying	III
CO3	Analyze project schedules and resource allocations using Primavera P6	Analyzing	IV
CO4	Evaluate project performance and make necessary adjustments using Primavera P6	Evaluating	VI

Experiments	**List of Experiments**	
I	**Overview and Creating a Project** Project Management Life Cycle, Understanding Data in P6, Overview and Navigation, Creating a Project, Creating a Work Breakdown Structure, Adding Activities, Assigning Calendars	6
II	**Scheduling and Assigning Resources** Creating Relationships, Scheduling, Assigning Constraints, Creating Layouts, Understanding Roles and Resources, Optimizing the Project Plan	6
III	**Baselining and Executing** Baselining the Project Plan, Importing and Exporting Data, Methods of Applying Progress, Executing the Project Plan, Refection Projects, Analyzing the Updated Project	6

IV	**Reporting and Presentation** Generating Project Reports (Progress, Cost, Resource, etc.), Customizing Reports and Views, Creating Gantt Charts and Other Visual Representations, Exporting Data and Sharing Project Information	6
Text Books		
1	Harris, P. E. (2015). Planning and Control Using Oracle Primavera P6 Versions 8. 1 to 15. 1 PPM Professional. Australia: Eastwood Harris Pty Limited.	
2	Williams, D. L., Williams, D. Oracle Primavera P6 Version 8: Project and Portfolio Management. United Kingdom: Packt Publishing, 2012.	
References		
1	Online resources and tutorials from Oracle Primavera Learning	
Useful Links		
1	Enterprise Project Structure (EPS) in Primavera P6 (youtube.com)	
2	Organizational Breakdown Structure (OBS) in Primavera P6 (youtube.com)	
3	Create a Project in Primavera P6 (youtube.com)	
4	Create and Manage WBS in Primavera P6 (youtube.com)	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1			1		2	2
CO2	1		2	3		
CO3		1	2			1
CO4	1			2	1	
CO5		3		1		2
The strength of mapping: 1:Low, 2:Medium, 3:High						

Assessment				
There are three components of lab assessment, LA1, LA2, and Lab ESE IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates the starting week of a semester. The actual schedule shall be as per the academic calendar. Lab activities/Lab performance shall include performing experiments, mini-projects, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information	
Programme	M. Tech. (Construction Management)
Class, Semester	First Year, Sem II
Course Code	1CM572
Course Name	Professional Core (Lab) - Digital Applications in Project Management
Desired Requisites:	Engineering Drawing; Computer Aided Civil Engineering Drawing Lab

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture		**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives	
1	To impart hands-on training of project management software's.
2	To make students aware of the real world project information

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the applications of multiple digital tools used for project management	Understanding	I
CO2	Develop Advanced Project Schedules and Cost Management Tools Using Microsoft Excel	Applying	III
CO3	Perform Spatial Data Visualization and Analysis Using QGIS	Evaluating	V
CO4	Apply GIS Techniques for Infrastructure and Utilities Management in Projects	Applying	III

	List of Experiments/Lab activities	**Hours**
1	Learn to create and manage project schedules through Gantt charts using MS Excel.	4
2	Budgeting and Cost Management in Construction Projects with Microsoft Excel.	4
3	Spatial Data Visualization and Analysis.	4
4	Geospatial Data Layer Creation and Management.	4
5	Buffer Analysis and Proximity Analysis.	4
6	Creating and Analyzing Project Site Maps with QGIS.	4

Text Books

1	Winston, W. "Microsoft Excel Data Analysis and Business Modeling (Office 2021 and Microsoft 365)". United Kingdom: Pearson Education, 2021.
2	Graser, A., Peterson, G. N. "QGIS Map Design: With New and Updated Workflows for QGIS 3.4". United States: Locate Press, 2018.

References	
1	Longley, P. " Geographic Information Systems and Science", United Kingdom: Wiley, 2005.
2	McFedries, P. Excel Data Analysis: Your Visual Blueprint for Analysing Data, Charts, and PivotTables. Germany: Wiley, 2013.
	Lewis, C., Chatfield, C., Johnson, T. Microsoft Project 2019 Step by Step. United States: Pearson Education, 2019.
Useful Links	
1	https://youtu.be/1y40xTIEKbs?si=-46iwFWostOi_SAu
2	https://youtu.be/QGqMq4kaOX4?si=9C9w4zBUIErkEvYY

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1		2	2	3	2	3
CO2	2		3	2	2	2
CO3	2	1	3	3	2	
CO4	3		3	3		3
CO5	2	2	2		2	3
The strength of mapping: 1:Low, 2:Medium, 3:High						

Assessment

There are three components of lab assessment, LA1, LA2, and Lab ESE
IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates the starting week of a semester. The actual schedule shall be as per the academic calendar. Lab activities/Lab performance shall include performing experiments, mini-projects, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	M. Tech. Construction Management
Class, Semester	First Year M. Tech., Semester II
Course Code	1CM545
Course Name	Professional Core (Lab) - Seminar
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs./ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To encourage students to explore new research from a range of academic disciplines which shed light on environmental issues.
2	To create awareness amongst students about the cutting edge technical/industrial research projects that can be undertaken for their dissertation works.
3	To develop the attribute of effective communication (written and oral) through effective presentations

Course Outcomes (CO)

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

CO	Description	Bloom's Taxonomy	
		Descriptor	Level
CO1	Examine the confirming and opposing evidence from research papers in order to draw conclusions consistent with the topic.	Analyzing	IV
CO2	Summarize gaps in the research areas related to environmental engineering based on a thorough literature review of research papers from recognized authors/journals and prepare project proposals.	Understanding	II
CO3	Demonstrate effective written and oral communication, giving appropriate consideration to audience, context, format and textual evidence.	Applying	III

List of Experiments / Lab Activities/Topics

1	The students shall collect information on the probable topic of his/her dissertation by referring to research articles from journals and conferences.	8
2	Students should deliver minimum of three presentations on chosen topic with a view of enhancing their presentation skills on technical presentation.	8
3	A detailed report based on three presentations is to be prepared and submitted.	8

Textbooks	
1	Chandra P., “Projects: Planning, Analysis, Selection, Financing, Implementation, and Review,” Tata McGraw Hill Publication, 8th Edition, 2017.
2	Chitkara K. K., "Construction Project Management: Planning, Scheduling and Controlling”, Tata McGraw - Hill Education, 2nd Edition, 2010
References	
1	Pilcher R., “Principles of Construction Management,” McGraw Hill Publications, 3rd Ed., 2007.
2	National and International journals in Construction Management [a. International Journal of Project Management, b. Construction and Building Materials, c. Energy and Built Environment, d. Building Simulation, e. International Journal of Construction Management, f. Journal of Construction Engineering and Management - ASCE, g. Construction Management and Economics, h. Smart and Sustainable Built Environment, i. Building Research and Information, j. Journal of Building Performance Simulation, k. Advances in Concrete Construction l. Building and Energy]

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	3	1		2		
CO2	1	1	1			1
CO3	1	2	2		2	
The strength of mapping: 1: Low, 2: Medium, 3: High						

Assessment

There are three components of lab assessment, LA1, LA2 and ESE.
IMP: Lab ESE is a separate head of passing.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 4 Marks Submission at the end of Week 5	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 5 to Week 8 Marks Submission at the end of Week 9	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 10 to Week 14 Marks Submission at the end of Week 14	40

Week 1 indicates starting week of Semester.
Lab activities/Lab performance will include presentations, drawings, programming and other suitable activities, as per the nature and requirement of the project selected.

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	First Year M.Tech. Construction Management
Course Code	1CM531
Course Name	Professional Elective 3- Infrastructure – Supply Chain and Procurement Management
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To explain the management roles and recent developments to optimize solutions.
2	To demonstrate the various computer applications in construction management.
3	To provide the knowledge on modern technology in construction site and its management.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	To know and Master the fundamental concepts associated with Supply Chain Management and align with the vision of the organization from the perspective of built environment and infrastructure development.	Understanding	II
CO2	To analyse the decision chain process in a supply chain and evolve strategies to design effective supply chains based on recognized supply chain frameworks.	Analyzing	III
CO3	To build competence in management of vendors and sub-vendors to satisfy end requirements.	Creating	IV
CO4	To gain insight into E-Commerce and ERP2.0 concepts to increase efficiency of the supply chain	Applying	III

Module	**Module Contents**	**Hours**
I	**Introduction to Supply Chain** Supply chain stages and decision phases process view of a supply chain- Supply chain flows Examples - Competitive and supply chain strategies - supply chain performance - Framework for structuring drivers - Obstacles to achieving fit - Case discussions.	6
II	**Supply Chain Designing** Distribution Networking - Role, Design, Supply Chain Network - Role, Factors, Framework for Design Decisions - Models for facility location and capacity allocation -Discounted cash flow analysis - Evaluating network design -Decision trees.	7
III	**Sourcing** Role of sourcing, supplier – scoring and assessment, selection and contracts, Design collaboration, Case Studies	6

IV	**Transportation** Role of transportation - Factors affecting transportation decisions - Modes of transportation and their performance characteristics - Designing transportation network - Trade-off in transportation design. Routing and scheduling in transportation - International transportation - Analytical problems.	7
V	**Pricing** Role Revenue Management in the supply chain, Revenue management for: Multiple customer segments, perishable assets, seasonal demand, bulk and spot contracts.	7
VI	**Coordination and Technology and Emerging concept** Co-ordination in a supply chain: Bullwhip effect - Obstacles to coordination - Managerial levers to achieve co-ordination - Building strategic partnerships - Supply Chain IT framework - The role of E-business in a supply chain - The E-business framework - E-business in practice - Case discussion. Global Logistics -Reverse Logistics - Reasons, Activities, Role - Ware house Management Components, applications, implementation - Lean supply Chains-Sustainable supply Chain.	7

Text Books	
1	Sunil Chopra, Peter Meindl and D V Kalra, Supply Chain Management: Strategy, Planning, and operation, Pearson, New Delhi, 2016.
2	Chitalend A. K. and Gupta R. C. Materials Management: A Supply Chain Perspective - Text and Cases, PHI India, New Delhi, 2014.

References	
1	Jeremy F.Shapiro, Modeling the supply chain, Thomson Duxbury, 2nd Edition, Cengage Learning, 2006.
2	David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi and Ravi Shankar, Designing and Managing the Supply Chain: Concept Startegies and Case Studies, McGraw Hill, 2009.
3	Saurabh Kumar Soni, Construction Management and Equipment, S.K. Kataria& Sons, 2014.

Useful Links	
1	https://youtu.be/C_uz9H83p78?si=5z1Ge1HcXX5GBTW-
2	https://youtu.be/Mi1QBxVjZAw?si=rlC3WrgScJenKO6W

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1			3			3
CO2	3			3	2	3
CO3		3	2		3	
CO4	2		3	2		3
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment
• The assessment is based on MSE, ISE, and ESE. • MSE shall be typically on modules 1 to 3. • ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO. • ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6. • For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	M.Tech., Semester 2
Course Code	7CM532
Course Name	Professional Elective 3- Infrastructure – Infrastructure Development and Management
Desired Requisites:	Infrastructure Planning, Project Management.

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To develop the ability to conduct feasibility studies and assess the economic, social, and environmental impacts of infrastructure projects
2	To provide knowledge on emerging technologies and innovations in infrastructure development, including smart infrastructure.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Demonstrate an in-depth understanding of various types of infrastructure and their critical role in societal development.	Applying	III
CO2	Navigate and apply policy and regulatory frameworks, engage in strategic planning, and make informed decisions in the context of infrastructure development.	Applying	III
CO3	Explain the principles of operations management and maintenance planning for infrastructure projects, including asset management and lifecycle costing.	Understanding	II
CO4	Identify, assess, and mitigate risks associated with infrastructure projects and integrate sustainability principles into the planning and execution of these projects.	Remembering	I

Module	Module Contents	Hours
I	**Introduction to Infrastructure Development and Policy Framework** Definition and importance of infrastructure, Types of infrastructure: transportation, utilities, communication, and social infrastructure, Key stakeholders in infrastructure development, infrastructure planning processes, Policy and regulatory framework, Strategic planning and decision-making	4
II	**Project Feasibility and Financial Analysis** Feasibility studies, Economic, social, and environmental impact assessments, Financing infrastructure projects: public, private, and public-private partnerships (PPPs)	4

III	**Design and Construction Management** Design principles and standards for infrastructure projects, Construction management practices, Procurement and contract management	7
IV	**Operations and Maintenance** Infrastructure operations management, Maintenance planning and strategies, Asset management and lifecycle costing	8
V	**Risk Management and Sustainability** Risk identification and mitigation, Sustainable infrastructure development Environmental impact and sustainability assessment	8
VI	**Technology and Innovation in Infrastructure** Emerging technologies in infrastructure development, Smart infrastructure and digitalization, Case studies of innovative infrastructure projects	8
Text Books		
1	Goodman, Alvin S. and Makarand Hastak. Infrastructure Planning Handbook: 2006.	
2	Revelle, C.S., Whitlatch, E.E. and Wright, J.R. Civil and Environmental Systems Engineering; Prentice Hall, 2004.	
References		
1	Hudson, W.R., Haas, R. and Uddin, W. Infrastructure Management; McGraw Hill, 1997	
2	Verma S.P. ed. "Infrastructure in India's Development: Power, Transport and Communication", Institute of Public Administration, New Delhi, 2004.	
3	Edison, J. C. Infrastructure Development and Construction Management. United Kingdom: CRC Press, 2020.	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	3		2	3		
CO2	1		2	3		2
CO3				2	3	2
CO4	2	2	3		1	
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
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Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	M. Tech. (Construction Management)
Class, Semester	First Year, Sem II
Course Code	7CM533
Course Name	Professional Elective 3- Infrastructure – Sustainability in Construction Projects
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To Identify various concepts of sustainable construction
2	To develop students' skills in applying sustainability principles to project planning.
3	To guide students in selecting appropriate sustainable materials and renewable energy techniques for civil engineering projects.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain concepts related to energy and express the relevance of environment and energy efficiency in context to construction	Understanding	II
CO2	Calculate and assign the energy contribution of various materials and components in buildings.	Evaluating	III
CO3	Choose appropriate sustainable materials and renewable energy techniques for civil	Analyzing	III
CO4	Apply the concept of heat exchange in buildings and sustainability to project planning	Applying	III

Module	**Module Contents**	**Hours**
I	**Sustainability and Sustainable Development** Introduction to sustainable development Concepts and Theory. Definitions and Prospective theories on sustainability and sustainable construction planning. The Three E's. Environment, Economics, and Ethics. Ecology of sustainable developments.	6
II	**Sustainable Construction Planning** Principles of sustainability. Major Environmental challenges like Global Warming. Introduction to Building energy system. Strategies, Energy conservation in buildings. Energy Efficient	7

	projects. HVAC Systems. Water Conservation in buildings. Strategies for Rain water harvesting and management, Water Cycle	
III	**Green Buildings** Introduction, Green construction, Site selection for Green Construction, Design Considerations, Objectives of Green building movement. Green construction materials and resources. Material Selection Strategies. Eco-friendly Materials, Recyclable and Reusable Materials. Embodied Energy in Materials	6
IV	**Green Building Codes and Specifications** Introduction. Green building Codes and Standards. LEED Credits, IGBC. International Construction Codes, Carbon accounting, Green building Specifications.	7
V	**Sustainable Materials and Techniques** Masonry Felt requirements and real objectives of Green towns, Energy scenario in pre and post independent India, Need and approach to sustainability, Green building materials, Design constraints, Appropriate materials and techniques in construction	6
VI	**Energy systems in Building Maintenance** Operational energy reduction and net zero building, Optimization for design of building for energy efficiency and example of optimization through use of Evolutionary genetic algorithm, Radiation budget, Surface water balance, Effects of trees and microclimatic modification through greening, Use of Building Integrated Photo Voltaic (BIPV) and other renewable energy in buildings, basic concepts and efficiency	7
Text Books		
1	Alternative Building materials and Technologies by K.S. Jagadish, B.V.Venkatarama Reddy, K. S. Nanjunda Rao, New Age International, 2017, 2nd Ed.	
2	Manual of tropical Housing and Building- Climatic Design by Koenigsberger, Ingersoll, Mayhew, Szokolay, Universities Press (India) Pvt. Ltd., 2012	
3	Passive and Low Energy Building Design for Tropical Island Climates- by N. V. Baker, Published by Commonwealth Secretraiat Publications, copyright May 1987.	
4	Energy Efficient Buildings in India. Ed. Mujumdar Mili. TERI PRESS.	
References		
1	Building with Earth, John Norton, Intermediate Technology Pub., 1997.	
2	Green Building Design and Delivery, 2nd Edition, John Wiley, Hoboken -New Jersey.	
Useful Links		
1	https://archive.nptel.ac.in/courses/105/102/105102195/	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1			3	3	2	2
CO2		2		1	1	
CO3	2		2	3		
CO4	2		3			2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2024-25

Course Information	
Programme	M. Tech. (Construction Management)
Class, Semester	First Year, Sem II
Course Code	7CM534
Course Name	Professional Elective 4 - Building - Strategic Management in Construction
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/ week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To develop students' ability to apply strategic management principles effectively within an organization.
2	To guide students in analyzing the impact of competition on a firm's overall environment.
3	To equip students with the knowledge to implement various models and strategies used in construction organizations.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Analyze the importance of Strategic Management in a construction business organization.	Analyzing	IV
CO2	Identify organization environmental factors that influence construction firms.	Understanding	III
CO3	Assess the effect of competition on the construction business environment.	Evaluating	IV
CO4	Implement different models and strategies used by organizations.	Applying	III

Module	**Module Contents**	**Hours**
I	**Introduction to Strategic Management** Introduction to strategy, Purpose, Objectives, goals, Policies and programs, Structure-Strategy-System-Skills-Style-Staff-Shared values framework, Roles, Responsibilities, Structure and composition Role of top management.	6

II	**Organizational Environment Analysis** Internal & External organizational environment, Strategic Management process, SWOT Analysis Macroscopic and Microscopic factors affecting Business, industrial environment, Importance of value chain.	7
III	**Tools for Decision making and Analysis** Competitive Environment, Poter's five forces model, Factors driving industrial functions and associated change. Key factors for success in an organization including overall cost, Leadership, focus and differentiation strategies.	7
IV	**Financial Strategies** Growth strategy, stabilization strategy and retrenchment strategy. Portfolio strategies and different models.	6
V	**Strategic Events for industries** construction, parenting strategy, Product Development, Market Development and Market penetration and diversification strategies.	6
VI	**Strategic Management Evaluation and control techniques** Strategy implementation, evaluation control of strategic performance, performance gap, Return On Investment, Budget, Financial Ratios, Audits, Case studies of Construction Companies.	7
Text Books		
1	Strategic Management in Construction, David Langford, Steven Male, John-Wiley and Sons, 2008 and 2nd Edition	
2	Construction Management in Practice, Richard Fellows, Blackwell Science, 2001 and 2nd Edition.	
3	R Srinivasan, Case Studies in Marketing - The Indian Context, 4th Edition,PHI, 2008.	
References		
1	Crafting & Executing Strategy: Concepts and Cases, Arthur Thompson and Margaret Peteraf and John Gamble and A. Strickland, Mc Graw Hill, 2020, 22nd Edition	
2	Strategy Safari: A Guided Tour Through The Wilds of Strategic Management, Henry Mintzberg; Bruce W Ahlstrand; Joseph Lampel , New York : Free Press, 2005	
Useful Links		
1	https://archive.nptel.ac.in/courses/110/108/110108047/	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1			3	3	2	2
CO2		2		2	1	
CO3			2	3		2
CO4	2	1	3			3
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

- The assessment is based on MSE, ISE, and ESE.
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AY 2024-25

Course Information

Programme	M. Tech. Construction Management
Class, Semester	First Year M. Tech.
Course Code	7CM535
Course Name	Professional Elective 4- Building - Life Cycle Assessment
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs./week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To introduce students the fundamental concepts related to Life Cycle Assessment (LCA) and sustainability
2	To explain the applications of life cycle assessment methodology using appropriate case studies.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the concept of life cycle assessment, its importance and need in various fields.	Understanding	II
CO2	Identify issues and challenges in respective fields for life cycle assessment and come up with innovative solutions.	Understanding	II
CO3	Apply the field-based requirements and eco-labelling for the LCA.	Applying	III
CO4	Scrutinize Life Cycle Assessment (LCA) case studies.	Analyzing	IV

Module	Module Contents	Hours
I	**Introduction to Sustainability and LCA** Introduction, The magnitude of sustainability challenge, Energy and material use, Environmental emissions, Economic and social dimensions, Risk and Life Cycle Framework for sustainability: Introduction, Risk, Life Cycle Frameworks, Life Cycle Assessment (LCA) Tools.	7
II	**Life Cycle Assessment (LCA) Methodology and ISO Framework** Data Collection, Statistical Analysis of Data, Common Analytical Instruments, Overview of LCA Methodology: Goal Definition, Life Cycle Inventory, Life Cycle Impact Assessment, Life Cycle Interpretation, LCA software tools. Detailed Example on LCA Comparisons, LCA Benefits and Drawbacks, Historical Development and LCA Steps from ISO Framework	7

III	**Life Cycle Inventory and Impact Assessments** Unit Processes and System Boundary Data Quality, Procedure for Life Cycle Impact Assessment, LCIA in Practice with Examples, Interpretation of LCIA Results, Factors for Good LCA Study	6
IV	**Sustainable Materials** Green, Sustainable Materials: Introduction, Environmental and Natural Resource Use Footprints of Material Extraction and Refining, Tracking Material Flows in Engineered Systems, Environmental Releases.	6
V	**Design for Sustainability and Ecolabelling** Design for Sustainability: Economic, Environmental Indicators, Sustainable engineering design principles, Economic performance indicators, Environmental Performance Indicators (LCA), Introduction to Eco-labelling: ISO14024 guiding principles for Type 1,2 and 3 eco labels, Challenges, Public and private sector certification programs, Credibility and recognition, Trade issues.	8
VI	**Life Cycle Assessment (LCA) Case Studies** Case studies of Life Cycle Assessment (LCA) for wastewater treatment plant, Comparison of Hand Drying Methods, Biofuels for Transportation, Kerosene Lamp vs. Solar Lamp, Bioplastic.	6
Text Books		
1	Horne R., Grant T. and Verghese K., "Life Cycle Assessment: Principles, Practice and Prospects," CSIRO Publication, 2019.	
2	Allen D. and Shonnard D, "Sustainable Engineering: Concepts, Design and Case studies," ISBN-10:0132756544, ISBN-13:9780132756549.	
References		
1	Klöpffer W., Grahl B., "Life Cycle Assessment (LCA): A Guide to Best Practice," Wiley Publications, ISBN:9783527329861, 2014.	
2	Environmental Life Cycle Assessment: Measuring the Environmental Performance of Products – by Rita Schenck and Phillip White, 2010.	
Useful Links		
1	https://www.youtube.com/watch?v=lOazEjX43l4&pp=ygUVTGlmZSBDeWNsZSBBc3Nlc3NtZW50	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1	2			3	2	2
CO2	3		3			2
CO3			1	3	3	2
CO4	3		2	2		
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment
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AY 2024-25

Course Information

Programme	M. Tech. Construction Management
Class, Semester	First Year M. Tech, SEM- II
Course Code	7CM536
Course Name	Professional Elective 4- Building - Human Resource Management
Desired Requisites:	Construction Project Management / Engineering Management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To provide a thorough understanding of Human Resource Management (HRM) principles and practices as they apply to the construction industry.
2	To impart necessary knowledge to effectively manage human resources, including recruitment, training, performance evaluation, and conflict resolution, to enhance organizational productivity and employee satisfaction.

Course Outcomes (CO)

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

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the fundamental concepts of HRM in the construction industry	Understanding	I
CO2	Apply HRM practices to manage the workforce effectively in construction projects	Applying	III
CO3	Analyze the impact of HRM strategies on project performance and employee productivity	Evaluating	V
CO4	Design HRM strategies and plans that align with organizational goals in the construction sector	Creating	VI

Module	**Module Contents**	**Hours**
I	**Introduction to Human Resource Management** Overview of Human Resource Management (HRM), Importance of HRM in the Construction Industry,Key HRM Functions and Roles, Strategic HRM and its Relevance in Construction	6
II	**Recruitment and Selection** Workforce Planning and Job Analysis, Recruitment Strategies and Methods Selection Processes and Techniques, Legal and Ethical Considerations in Recruitment and Selection	8
III	**Training and Development** Importance of Training and Development, Training Needs Analysis, Designing and Implementing Training Programs, Evaluating Training Effectiveness	7

IV	**Performance Management** Performance Appraisal Systems, Key Performance Indicators (KPIs), Feedback and Coaching Techniques, Managing Underperformance	6
V	**Employee Relations and Conflict Resolution** Understanding Employee Relations, Conflict Resolution Techniques, Grievance Handling Procedures, Promoting a Positive Work Environment	6
VI	**Compensation and Benefits Management** Compensation Strategies and Structures, Job Evaluation and Pay Structures, Benefits Administration, Legal Aspects of Compensation and Benefits	5
Text Books		
1	Human Resource Management 6e. India: McGraw-Hill Education (India) Pvt Limited, 2010.	
2	P. Subba Rao, Personnel Management and Industrial Relations, Chand & Company Ltd. , New Delhi , 1999.	
References		
1	Mathis, R. L., Jackson, J. H., Tripathy, M. r. Human Resource Management: A South-asian Perspective. India: Cengage Learning, 2012.	
2	Loosemore, M., Dainty, A., Lingard, H. Human Resource Management in Construction Projects: Strategic and Operational Approaches. United Kingdom: CRC Press, 2003.	
Useful Links		
1	https://youtu.be/zAy6xT8Rvag?si=gYtIGA5lqNis_DIY	

CO-PO Mapping						
	Programme Outcomes (PO)					
COs	1	2	3	4	5	6
CO1			3	2		2
CO2				3	2	2
CO3	2		3		2	
CO4	3		1	3	1	
CO5		3	2	2		2
The strength of mapping: - 1: Low, 2: Medium, 3: High						

Assessment

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