Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech. VII
Course Code	6CV401
Course Name	Construction Methods and Equipment
Desired Requisites:	Building planning and Design

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 students with comprehensive knowledge and skills in modern construction methods and equipment.
2	To focus on understanding prefabricated structures, advanced construction techniques, equipment economics, and practical applications in earthwork, compaction, excavation, and concrete operations.
3	To integrate theoretical knowledge with practical insights, thereby enhancing construction efficiency, quality, and safety in contemporary construction projects.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	**Apply** the concepts of equipment economics in real-world scenarios, including cost analysis and decision-making for equipment replacement, rent, and lease.	Applying	III
CO2	**Demonstrate** knowledge of excavation in hard rock using rippers, jackhammers, drills, compressors, pneumatic equipment, blasting techniques and methods and equipment for pile-driving operations.	Applying	III
CO3	**Analyse** different types of formwork and scaffolding, assessing their requirements, loads, and suitability for various construction projects.	Analysing	IV
CO4	**Demonstrate** knowledge of Modern Construction Techniques	Analysing	IV

Module	**Module Contents**	**Hours**
I	**Construction Equipment Economics:** Equipment records, Cost of Capital, Elements of ownership Cost, Operating Cost, Replacement Decisions, Rent and Lease Considerations. Planning for Earthwork Construction: Planning, Earthwork Quantities, Mass Diagram, Pricing Earthwork Operations. Compaction and Stabilization Equipment: Compaction of Soil and rock, Types of Compacting Equipment, Dynamic Compaction, Stabilizing soils with Lime, Cement Soil Stabilization	8
II	**Dozers, Scrapers, Excavators:** Introduction, Performance Characteristics of Dozers, Pushing Material, Land Clearing, Scraper types, operation, Performance Charts, Production cycle, Hydraulic Excavators, Shovels, Hoes. **Trucks and Hauling Equipment:** Finishing Equipment: Trucks, productivity, Performance Calculations, Graders, Trimmers. **Drilling & Blasting** Excavation in hard rock: Rippers, jack hammers, drills, compressors and pneumatic equipment, Blasting explosives, detonators, fuses.	8
III	**Formwork:** Requirements of Formwork, Loads carried by Formwork, Types of Formworks, Timber, Steel, Modular shuttering, Slip forms, Scaffolding, Deep excavation methods	5

IV	**Modern Construction Techniques in Construction Projects.** Diaphragm Walls: Purpose and Construction methods, trenchless technology Steel Construction: Planning for field operations, selection of equipment and erection tools	5
V	**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	4
VI	**Plants for construction works and Pile-Driving Equipment:** RMC plant layout and applications, Asphalt mixing and batching plant (Hot mix plant), Sensor Paver for rigid roads, Aggregate crushing plants, Batching Concrete Materials, Mixing **Pile Construction** Driving Piles, Pile Hammers, Supporting and Positioning Piles During Driving, Spudding and Preaugering., Pile driving equipment- Types, pile driving hammers, single acting and double acting, differential acting hammers, hydraulic and diesel hammers, vibratory drivers.	9

Text Books	
1	Peurifoy, R. L., Schexnayder, C. J., Schmitt, R. Construction planning, equipment, and methods, McGraw-Hill Education, 9th Edition2018.
2	Varma M, "Construction Equipment and its Planning and Applications", 5th Edition, Metropolitan Book Co. Publishers, 2005.
3	Zha K. N., "Construction Project Management", Pearson India Education, 2nd edition, 2015.

References	
1	Sharma S.C., Construction Equipment and Management, Khanna Publishers New Delhi, 1st Edition,2019.

Useful Links	
1	https://archive.nptel.ac.in/courses/105/103/105103206/

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3										1	1	1	
CO2		2	2										2	2
CO3			2								2		2	
CO4	3										1	1	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 AAM DAC/BoS Secretary Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech., Semester VII
Course Code	6CV402
Course Name	Reinforced and Prestressed Concrete Design
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 provide the fundamental concepts of reinforced and prestressed concrete, including material properties, design principles, and behaviour under various loading conditions.
2	To develop the ability to design reinforced and prestressed concrete structural elements, such as beams, slabs, columns, and foundations, according to relevant standards and codes.
3	To enhance analytical skills in evaluating and optimizing structural designs, considering factors such as load distribution, stress analysis, and deflection criteria.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Demonstrate a thorough understanding of the material properties of concrete and reinforcing steel, and their behaviour under different loading conditions.	Understanding	II
CO2	Explain the principles and methodologies of reinforced and prestressed concrete design, including working stress, ultimate load, and limit state design concepts.	Applying	III
CO3	Design reinforced concrete structural elements such as beams, slabs, columns, and footings, ensuring compliance with relevant codes and standards.	Creating	VI
CO4	Design prestressed concrete elements, including beams and slabs, taking into account factors such as prestress losses, cracking, and deflection criteria.	Creating	VI

Module	Module Contents	Hours
I	**Water tank** Importance and necessity, Types of water tanks-underground, ground-level, and elevated tanks., Factors affecting the design of water tanks, Design of circular and rectangular water tank resting on ground using approximate and IS Code method.	7
II	**Foundation** Introduction to combined footing, Design principles and considerations, Structural design and reinforcement detailing, Design of combined footing (Slab type, slab beam type) and raft foundation	6
III	**Retaining wall –** Importance and functions of retaining walls, Types of retaining walls: gravity, cantilever, counterfort, anchored, Introduction and components of a cantilever retaining wall, Structural design and reinforcement detailing of cantilever & counterfort retaining wall.	7
IV	**Introduction to Prestressed Concrete** Basics of Prestressing: Concepts, types of prestressing, and materials used. Prestressing Systems: Pretensioning and post-tensioning methods, advantages and limitations. Losses in Prestress: Short-term and long-term losses, factors affecting prestress loss.	4

V	**Design of Prestressed Concrete Elements** Prestressed Beams: Design for flexure, shear, and deflection criteria. Slabs and Floors: Design of prestressed concrete slabs, considerations for large-span floors.	7
VI	**Analysis of Prestressed Concrete Structures** Analysis of rectangular and Symmetrical I section, thrust line, cable profiles. Design of rectangular and Symmetrical I section, kern distances & efficiency of section. End Block	8

Text Books	
1	Punmia, B. C., Jain A. K., Limit state design of reinforced concrete, Laxmi Publication, 4th Edition, 2016.
2	Shah, V. and Karve, S., Limit state theory and design of reinforced concrete, Structures Publications, 8th Edition, 2017.
3	N. Krishna Raju "Prestressed Concrete", Tata McGraw Hill Education, 6th Edition, 2018.

References	
1	IS 456:2000 (Reaffirmed in 2021) – Code of practice for plain and reinforced concrete, BIS and SP 34-1987 – Handbook on concrete reinforcement and detailing.
2	Ramamruthm, S., Design of reinforced concrete structures (confirming to IS 456), Dhanpat Rai Publishing, 18th Edition, 2011.
3	T.Y. Lin "Prestressed Concrete", John Wiley & sons Inc. New York, 3rd Edition, 1981.

Useful Links	
1	https://onlinecourses.nptel.ac.in/noc23ce79/preview
2	https://nptel.ac.in/courses/105108069
3	https://nptel.ac.in/courses/105106117

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												1	1
CO2	2	2	3	3									1	2
CO3	3		3	2									2	1
CO4	3		2	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)

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AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech., Sem VII
Course Code	6CV445
Course Name	Mini Project 4: Construction Project Management
Desired Requisites:	Building Planning Design, Estimating and Costing

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 the Construction Project Management Lab course is to provide students with hands-on experience in managing a construction project from inception to completion. Through practical exercises and the use of contemporary project management software
2	To develop amongst students, the necessary analytical & managerial skills to systematically analyze the scope of work on construction sites and evaluate the relation between time and money during the planning phase of construction projects to achieve better productivity
3	To understand the practical complexities involved during the planning and execution of various phases/activities of construction projects and learn the various tools and techniques to manage the resources namely time, money, material, equipment & labour, thereby facilitating to become productive managers.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Create a detailed Work Breakdown Structure (WBS) for the project, identifying at least 100 distinct activities.	Applying	III
CO2	Conduct a site visit for the selected project and prepare a comprehensive site visit report, detailing observations and relevant site-specific information	Applying	III
CO3	Utilize project management software to create an accurate project schedule, incorporating all necessary elements such as activity sequencing, resource allocation, and time management	Applying	III
CO4	Demonstrate conceptual level Quality management and safety management Programme for the same project	Applying	III

List of Experiments / Lab Activities

List of Experiments:

Small student groups formed will need to undertake following stages in this course; -

1. Identify a construction project and collect its documents defining scope (BOQ, drawingsetc.)
2. Carryout site visit for selected type of project and prepare a site visit report.
3. Prepare the Work breakdown structure (WBS) to evolve at least 100 distinct activities (appropriate software may be used)
4. Schedule the project using contemporary software taking into consideration following: -
    a. Activity list generated from WBS
    b. Construction methodology decision for each activity
    c. Important Resource allocations
    d. Precedence relations (Both technical and resource constrained)
    e. Time duration allotment (based upon resources, work content)
    f. Working calendar
5. Demonstrate quality management plan and safety management plan for the same project at preliminary level.

Text Books	
1	Zha K. N., Construction Project Management‖, Pearson India Education, 1st edition,(2011)
2	Saleh M, Construction Project Scheduling and Control‖, Wiley, 2nd edition (2010)
3	S. Seetharaman, ―Construction Engineering & Management‖, Umesh Publications Delhi, 4 th edition,(2008)
References	
1	Chitkara K K, ―Construction Project Management: Planning, Scheduling and Controlling‖, Tata McGraw - Hill Education, 2nd edition, 2010
2	Sonia Atchison, Brian Kennemer, Using Microsoft Project 2010‖, Pearson, 2011
3	Paul E Harris ,―Planning and Control Using Primavera® P6 Version 7: For All Industries‖, Eastwood Harris Pty Limited, 2013
Useful Links	

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		3			3			1	2	1	3	1	3	3
CO2					3			1	2	1	3	1	3	3
CO3						2		1	2	1	3	1	3	
CO4		3			3			1	2	1	3	1	3	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.

Walchand College of Engineering, Sangli

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Course Information	
Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech., Semester VII
Course Code	6CV446
Course Name	Mini-Project-5: Design and Drawings of RC Structures
Desired Requisites:	Engineering Mechanics, Design of steel structures, Design of Concrete structures I

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 expose students for holistic approach of planning, analysis and design of RCC building.
2	To enhance students' skill through usage of CAD and software tools for RC structure design.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy
CO1	Apply fundamental principles of reinforced concrete (RC) design to develop practical and effective structural solutions for real-world engineering projects.	Applying
CO2	Demonstrate a thorough understanding of relevant design codes and standards, ensuring compliance in all design aspects.	Evaluating
CO3	Design various RC structural elements, such as beams, slabs, columns, and foundations, ensuring structural integrity and safety.	Creating
CO4	Prepare detailed structural drawings that clearly communicate design intent, including reinforcement detailing and connection details using software tools.	Creating

List of Experiments / Lab Activities

The lab work shall consist of detailed design &drawing of the following R. C. structures by Limit State Method.

1. Residential G+2 storey building

a) Forming groups of 4-5 students in each batch and choose a specific Residential RC structure (G+2) with isolated footing to design.
b) Prepare detailed drawing of structure using AutoCAD.
c) Design structural element of RC structure. (Footing, Column, Beam, slab etc.)
d) Prepare detailed bar bending schedule for all structural elements.
e) Prepare detailed report of project.

Note: Create a structural model and perform structural analysis of the building using software tools (e.g., ETABS, STAAD Pro).

2. Prepare detailed design & drawing of any two of the following R. C. structures.

a) Circular water tank resting on ground with rigid base. (by working stress method)
b) Retaining wall (cantilever or counter fort type)
c) Combined footing/ raft foundation.

Note:• Drawings prepared shall indicate ductility details as per the provision in IS: 13920.

Text Books

1	N. C. Sinha & S. K. Roy, "Fundamentals of Reinforced Concrete" S. Chand Publishing, 4th Edition, 2013
2	B. C. Punmia, Jain and Jain, "Comprehensive Design of R.C. Structures", Standard Book House, New Delhi, 10th Edition, 2015.

3	Dr. V. L. Shah and Dr. S. R. Karve, "Limit State Theory and Design", Pune Vidyarthi Griha Publication, 7th Edition, 2015.
References	
1	Sinha, "RCC Analysis and Design Vol. I and II", S. Chand and Co. New Delhi, 3rd Edition, 2014.
2	P. C. Varghese "Limit State Design of Reinforced Concrete", Prentice Hall of India, New Delhi, 1st Edition,1999.
3	P. Dayaratnram, "Limit State Analysis and Design", Wheeler Publishing company, Delhi, 5th Edition, 1996.

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		3			2				2	1			1	
CO2			3						2	1			1	
CO3			3		3				2	1			1	
CO4			2		3				2	2				

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

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	Project activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Project Activities,attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Mini-Project PoE Performance and documentation	Lab Course faculty	Marks Submission during External PoE	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, 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	B. Tech. (Civil Engineering)
Class, Semester	Final Year B.Tech. Sem VII
Course Code	6CV491
Course Name	Project-I
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	6 Hrs/week				
Interaction	-	**Credits: 3**			

Course Objectives

1	To evaluate students' ability to apply the engineering knowledge for solving problems pertaining to industry and society.
2	To prepare students to work in teams for a coordinated success of the project task(s).
3	To provide opportunity to students to enhance their technical skills and knowledge by interaction with industry, institutes through projects associated with real-life problems.

Course Outcomes (CO)

CO	**Description**	**Blooms Taxonomy**	
		Descriptor	**Level**
CO1	Identify an industrial / societal / research problem related to Civil engineering.	Apply	2
CO2	Conduct literature review, study relevant codal provision / theory and provide its brief summary.	Apply and Analyze	3/4
CO3	Define the objectives, scope and device the methodology of the project work.	Analyze	4
CO4	Collect the primary data / information of the parameters/materials/ methods to be used for project work through onsite/online surveys, literature review etc.	Analyse and Evaluate	4/5
CO5	Work in team to address at least one of the objectives defined and present the progress of the work.	Evaluate	5

Module Contents

1. The students shall select the topic in the area of their interest in consultation with the guide.
2. The literature review shall be done by the students to identify the research gaps and define the objectives of the formulated problem.
3. The students shall define the methodology, scope of the project and the rough work plan for the completion of the project.
4. The progress of the work done related to problem definition, data collection and the analytical/experimental work shall be presented to the guide and panel.
5. The students shall submit the project report of the work progress; in the given standard format.

Text Books

1	Guide to Research Projects for Engineering Students: Planning, Writing, Presenting, Kenneth Keng Wee Ong, CRC Press, Taylor and Francis Publications.

References

1	R.C. Kothari, Research Methodology, New Age Publications, 2nd Edition
2	Technical Journals and Conference proceedings etc. pertaining to area of the project.
3	Dissertations of B.Tech./ M.Tech. Project work of previous students of department/institute

CO-PO Mapping														
	Programme Outcomes (PO)												PSPO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3				3	2	1			3	2	3	
CO2		1		1	1							1	3	
CO3				2						1	2			
CO4					1	2		1	1	1	1	1	1	
CO5					1			3	3	2		1	3	
The strength of mapping: - 1: Low, 2: Medium, 3: High														

Assessment				
The Project work will be evaluated in three stages LA1, LA2 and ESE as given below:				
Assessment	**Activity Related to**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	CO1 and CO2	Guide and Internal panel	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	CO1, CO2 and CO3	Guide and Internal panel	During Week 6 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	CO3, CO4, and CO5	Guide and External examiner	During Week 12 to Week 18 Marks Submission at the end of Week 18	40
The assessment of the students will be done individually by the respective supervisor/guide and in a group by the panel using the defined rubrics.				

Prepared by DAC/BoS Secretary Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B.Tech.
Course Code	6CV453
Course Name	Techno-Socio activity
Desired Requisites:	Nil

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	1 Hr/week	30	30	40	100
Practical	-				
Interaction	-	**Credits: 1**			

Course Objectives

1	To motivate the students to participate in co-curricular and extra-curricular activities.
2	To develop the student's ability to provide creative technical solutions to local and societal problems.
3	To encourage students to work in teams and connect with the society.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	To analyse the real-life problems in the society.	Analysing	2
CO2	Apply the technical knowledge and develop a structured action plan to provide innovative solutions to problems faced by the local community/ Society.	Applying, Developing	3 and 6
CO3	To exhibit social awareness and communications skills and excel at the technical completions.	Understanding and Evaluating	2 and 5
CO4	To illustrate the capability of self-learning.	Analyse	4
CO5	To work in teams, collaborate with local residents and authorities and work in teams to provide a solution to a techno-socio problem(s).	Creating	6

Contents

Open to students. Student can undertake any three techno-socio activity as listed below but not limited to it**:**

1. The students shall form groups and organize techno-socio activity for the students / community in rural areas, backward areas (**CO2, CO3**)
2. A student or a group of students shall participate in any social activity like "Swach Bharat Abhiyan", "Blood Donation Camp", or any social activity announced by Govt. / Corporation / Panchayat. (**CO2**)
3. A student or a group of students shall participate in University, State or National level technical events / competitions. (**CO3**)
4. A student shall complete online course(s) on topics beyond syllabus from Coursera, Udemy, Sky-fi lab or courses offered by CSIR / IIRS or Outreach Programmes by AICTE such as ATAL Course or courses on SWAYAM by NPTEL(**CO4**)
5. A student shall develop any innovative Patent /Gadget / Solution / System and transfer in the interest of Nation / Society / Institute (WCE). (**CO2**)
6. An Awards / Recognitions received in any techno-socio activity can be submitted as an achievement. (**CO4**)
7. A student shall publish paper (s) in National / International conferences / journals (**CO4**)
8. A student shall work as a Volunteer/ Co-ordinator in the students' organizations / clubs within/outside the institute (**CO3**)
9. A student shall contribute to the departmental development programs such as Laboratory development, NBA/NAAC preparation.

References	
1	National Institute for Engineering Ethics (NIEE)
2	Professional ethics, National Society of Professional Engineers (NSPE).

Useful Links	
1	(https://www.asce.org/pdf/ethics_manual.pdf)
2	https://www.aicte-india.org/atal
3	https://nptel.ac.in/
4	https://swayam.gov.in/

CO-PO Mapping

	Programme Outcomes (PO)												PSPO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2				3							2	
CO2	2	2	2	2		3							2	
CO3						3		3		3		3		
CO4			2			3			2			3	2	
CO5				2		3	2	2	2	2	1		3	

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

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
Important: ESE is a separate head of passing. (min 40 %), LA1+LA2 should be minimum 40%

Assessment	Based on	Marks
LA1	Participations in technical competitions, volunteer and coordinator for technical/non-technical events, organization of events, Awards and recognitions etc.	30
LA2	Online courses, Paper publishing Patent. Product/ gadget creation or Publication, contribution to department development, Participation, organization in social activity etc.	30
ESE	Group activity for providing technical solution to local, societal problem.	40

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech., Semester-I
Course Code	6CV411
Course Name	Professional Elective 3: Urban Drainage Management
Desired Requisites:	Basic courses on hydraulics and sewerage

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 in depth knowledge on urban drainage and its infrastructure requirements.
2	To introduce the concept on design of urban drainage system and its components.
3	To provide modelling concepts on sanitary and storm sewage system

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	***Explain*** concepts related to sewerage, storm drainage and rainfall modelling	Understanding	II
CO2	***Develop*** sewerage network	Analysing	IV
CO3	***Analyse*** the urban drainage system	Analysing	VI
CO4	***Design*** sanitary and storm drainage system	Analysing	IV VI

Module	Module Contents	Hours
I	**Sanitary Sewerage System** Purpose, types, system components. Review of sewer hydraulics: Velocity of flow, Hydraulic formulae, Gradient. Design of sanitary sewerage system: Estimation of design discharge, Design considerations, Procedure, Hydraulic design of sanitary sewerage system.	8
II	**Storm water Drainage System: System Components and Rainfall Modeling** Need and design objectives of storm water conveyance system, Hydrologic and Hydraulic Components, Basic Rainfall Characteristics, Obtaining Rainfall Data, Types of Rainfall Data, Rainfall Requirements for Modeling Runoff	6
III	**Storm water Drainage System: Modeling Runoff and Design** Rainfall Abstractions, Determination of Effective Precipitation (Runoff), Basin Response Time, Peak flow estimation by various methods. Initial and Final Pipe System Design, Outfall Design and Energy Dissipation, Hydraulic analysis of roadway gutter and inlets.	7
IV	**Combined Sewerage System and Sewage Pumping Station** Combined Sewerage System: Purpose, Estimation of design discharge, Hydraulic design of combined sewers Sewage Pumping Station: Types of pumps, components of pumping station, Design of pumping station	7

V	**Sewer** Sewer shapes, materials, material selection criteria, Laying and testing of sewer pipes, sewer appurtenances, Maintenance of sewers	5
VI	**Rainwater harvesting** Need and concept of rainwater harvesting, Systems of rainwater harvesting, Roof top harvesting of rainwater, Components, Estimation of water collection potential, Design considerations, Design of a roof top harvesting system.	6

Text Books	
1	Garg S. K., "Sewage Disposal and Air pollution Engineering", Khanna Publishers, 41st Edition, 2021.
2	Subramnaya K., "Engineering Hydrology", McGraw Hill Education, 4th Edition, 2017.

References	
1	"Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
2	"Manual on Storm Water Drainage Systems", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2019.
3	Haestad-Durrans, "Storm Water Conveyance Modeling and Design", Haestad Press, 1st edition, 2003.

Useful Links	
1	https://www.youtube.com/channel/UCbFIgNot42PRCi-05X8aF_A

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3					1	1						1	1
CO2		3				2	3						2	2
CO3			3			2	3						3	2
CO4		1	1			1	1				1		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: B. R. Kavathekar DAC/BoS Secretary Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B.Tech. Sem- II
Course Code	6CV412
Course Name	Elective 3: Building Information Modelling
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	The objective of this course is to provide students with a comprehensive understanding of Building Information Modelling (BIM) and its application in the construction industry.
2	Students will learn the principles, processes, and tools associated with BIM, and how to use BIM for effective project planning, design, construction, and management.
3	

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the fundamental concepts and benefits of BIM	Understanding	2
CO2	Apply BIM tools for creating and managing building models	Applying	3
CO3	Analyze BIM data for project planning and decision-making	Analysing	4
CO4	Design and implement BIM strategies for construction projects	Creating	4

Module	**Module Contents**	**Hours**
I	**BIM Fundamentals** Current industry scenarios - its struggles and challenges? Need of BIM? What problems do we face with 2D CAD? BIM & its benefits (BIM misconceptions, and challenges), BIM as a collaborative process, BIM workflow- preconstruction, construction, and operation stage, BIM Adoption status (global), BIM Execution Plans (global), and BIM stakeholders' roles and responsibilities.	8
II	**BIM Processes and Workflows** BIM Process Overview, BIM Standards, Maturity Model, Open BIM concept and challenges, BIM tools and applications, concepts such as CDE, Digital Twin, Open BIM, Data Repository, Maturity Levels, BIM Level of Development LoD, Integrated Model, etc. BIM Dimensions, BIM Project Cases, etc.	6
III	**BIM Tools and Technologies** Overview of BIM Software and Tools, Introduction to Autodesk Revit, Navisworks, and Other BIM Software, Hardware and Software Requirements for BIM, Cloud-Based BIM Platforms	6

IV	**BIM Modelling Techniques** Creating 3D BIM Models, Parametric Modelling and Object Libraries, Developing Architectural, Structural, and MEP Models, Integrating Models for Clash Detection and Coordination	6
V	**BIM in Project Lifecycle** BIM in Design and Pre-Construction Phases, BIM for Construction Planning and Management, BIM in Facility Management and Operation, Case Studies on BIM Implementation	6
VI	**Advanced BIM Applications and Future Trends** BIM for Sustainability and Green Building Design, BIM and GIS Integration, BIM for Infrastructure Projects (Roads, Bridges, etc.), Emerging Trends in BIM (4D/5D BIM, AI, AR/VR)	6

Text Books	
1	Sacks, R., Eastman, C., Lee, G., & Teicholz, P. (2018). BIM handbook: A guide to building information modelling for owners, designers, engineers, contractors, and facility managers. John Wiley & Sons.
2	T2. Kumar, B. (2015). A practical guide to adopting BIM in construction projects. Whittles Publishing.
3	"Building Information Modelling" by Nawari O. Nawari and Michael Kuenstle

References	
1	"Practical BIM: Implementing Building Information Modeling" by E. William East
2	"BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors" by Chuck Eastman, Paul Teicholz, Rafael Sacks, and Kathleen Liston
3	

Useful Links	
1	
2	
3	

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		2	2											
CO2	2		2	1	3								1	
CO3		2	2	1	3									1
CO4		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 AAM DAC/BoS Secretary Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B.Tech. VII
Course Code	6CV413
Course Name	Professional Elective-3: Traffic Engineering & Management
Desired Requisites:	Transportation Engineering

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 exposure to principles of Traffic Engineering and Management.
2	To comprehend traffic planning, trip distribution, traffic flow and land-use transport models.
3	To make acquainted with transport economics, public transport and intelligent transportation systems.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Articulate and demonstrate principles of intersection design, Highway capacity, Transportation Planning and Management and Trip Distribution.	Applying	II & III
CO2	Perceive and apply knowledge of traffic flow and transport economics.	Applying	II & III
CO3	Examine the various public transportation systems.	Applying	III
CO4	Demonstrate the concepts of intelligent transportation systems.	Applying	III

Module	**Module Contents**	**Hours**
I	**Traffic Engineering and Control -** Review of various traffic surveys and traffic Studies; Statistical methods for traffic engineering and their applications, Distributions, sampling theory and Significance testing, Regression and Correlation **Intersection design-** Principles, rotary design, mini roundabout, traffic signals, types of traffic signals, determination of optimal cycle time and signal setting, coordination of signals, area traffic control, delay at a signalized intersection. **Accident and road safety**: accident causes, recording system, analysis and preventive measures, accident cost, alternative methodologies for calculation.	8
II	**Traffic management-** various measures and their scope, relative merits and demerits. **Highway capacity:** passenger car units, level of service, factor affecting capacity and level of service, influence of mixed traffic. **Transportation Planning and Management -** Introduction to the process of urban transport planning. Travel demand forecasting, Trip generation analysis, trip classification, multiple regression analysis, and category analysis.	7
III	**Modal split analysis**: introduction, earlier modal split models, modal split models with behavioural basis. **Trip distribution analysis-** introduction, methods of trip distribution, uniform and average factor method, Fratar method, Furness method, The Gravity model, Intervening and competing, Linear programming approach to trip distribution.	7

IV	**Traffic Assignment-** purpose of traffic assignment, traffic flow characteristics, Assignment techniques, All or nothing assignment, Multiple route assignment, Capacity restraint assignment, Diversion curves. Rout building algorithms. **Theory of traffic flow-** Scope, definitions and basic relationship, review of flow density speed studies, hydrodynamic analogies, Application of hydrodynamic analogy.	6
V	**Car-** following theory and its application to traffic engineering, a probabilistic description of traffic flow, an introduction to queuing theory as applied to traffic flow problems for study state conditions, simulation studies. **Transport Economics-** Economic evaluation of highway schemes, need for economic evaluation, cost and benefits of transportation projects, basic principles of economic evaluation, Net present value method, benefit/cost ratio method, internal rate of return method. Vehicle operating costs, Value of travel time saving, Accident costs.	6
VI	**Public Transportation-** Mass transit systems: Bus and rail transit, characteristic capacities. Introduction to intelligent transportation systems, Introduction to advanced computational techniques for transportation planning.	5

Text Books	
1	Pingnataro G. J., Principles of Traffic Engineering, McGraw Hill, 1970.
2	Wohl and Martin, Traffic System Analysis for Engineering and Planners, McGraw Hill, 1983
3	Kadiyalai, L. R., "Traffic Engineering and Transport Planning", Khanna Publishers, 8th Edition 2013

References	
1	Saxena S., A Course in Traffic Engineering and Design, Dhanpat Rai & Sons
2	Chakraborty P. and Das A., Principles of Transportation Engineering, Prentice Hall, India
3	Hutchinson B.G., Introduction to Urban Transport Systems, Planning, McGraw Hill,1970.

Useful Links	
1	

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	1									1	2	
CO2	2	2	1									1	2	
CO3	1											1	1	
CO4	1											1	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	B. Tech. (Civil Engineering)
Class, Semester	Final Year B.Tech. VII
Course Code	6CV414
Course Name	Analysis of Statically Indeterminate Structures
Desired Requisites:	Solid Mechanics, Structural analysis, Structural Mechanics

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 the knowledge on analysis of its statically indeterminant structures(beam frame/ struss) by different methods.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	***Apply*** different methods for the analysis of structures.	Applying	3
CO2	***Calculate*** forces and displacements for structures.	Evaluating	5
CO3	***Evaluate*** internal forces in frames and beams.	Evaluating	5
CO4	***Analyze*** the continuous beams	Analyzing	4

Module	Module Contents	Hours
I	**Theorem of Three Moments Method** Clapeyron's theorem of three moments (no derivation), Application of Clapeyron's theorem (2 span and more), for beams with uniform moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. Draw SF diagrams and BM diagrams showing point of contra flexure for continuous beams. Use of software for computation of shear force and bending moment for beams with different methods.	8
II	**Consistent Deformation Method for beams** Introduction to force method- Static Indeterminacy, General Procedure, Analysis of Propped Cantilever Beams, Fixed beams, Continuous beams,	6
III	**Analysis of Indeterminate trusses and frames** Pin jointed and rigid jointed frames, External and internal static indeterminacy, Principle of Superposition, Compatibility conditions, redundant trusses & frames' analysis by consistent deformation method.	7
IV	**Rotation Contribution Method** Analysis of continuous beams, including support settlement, Rotation contribution method with side sway, single bay single storey and single bay two storey frames. Bending moment and shear force diagrams. Elastic curve.	6
V	**Analysis using Stiffness Method:** Displacement transformation matrix using Stiffness Method, Development of global stiffness matrix for continuous beams, plane trusses and rigid plane frames (having not more than six co-ordinates – 6x6 stiffness matrix)	6

VI	**Plastic Analysis:** Plastic modulus, shear factor, plastic moment of resistance, load factor, plastic analysis of continuous beam and simple rectangular portals, Application of upper and lower bound theorems	6

Text Books	
1	Vazirani. V. N. & Ratwani M. M., "Advanced Theory of Structures", Khanna Publishers, 2008
2	Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill, 7th Edition, 1981.
3	Vijayanand M., Muthu K. U., Narendra H., Janardhana M., "Indeterminate Structural Analysis" Dream Tech Press (1 January 2019)

References	
1	Mcquire and Gallagher. R. H. "Matrix Structural Analysis", John Wiley, 2nd Edition, 2000
2	Beaufit F.W et al. "Computer Methods of Structural Analysis", Prentice Hall, illustrated,1970
3	John L. and Meek, "Matrix Structural Analysis", McGraw Hill Book Company, illustrated,1971

Useful Links	
1	https://nptel.ac.in/courses/105/105/105105166/
2	https://onlinecourses.nptel.ac.in/noc23_ce87/preview
3	http://engineeringvideolectures.com/course/281?pn=0#videolist

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	2	2
CO1		3			1								3	
CO2		3			1								3	
CO3		3			1								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.
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- 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	B. Tech. (Civil Engineering)
Class, Semester	Final Year B.Tech., Semester- VII
Course Code	6CV415
Course Name	Professional Elective 3- Tunnel, Dock and Harbour Engineering
Desired Requisites:	Transportation Engineering

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 discuss to the fundamentals of Tunnel and docks & harbours engineering and construction methods.
2	To introduce unit operation of drilling and blasting.
3	

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the fundamentals tunnel and docks & harbours engineering.	Understand	I
CO2	Explain and analyse the various aspects of the design of the tunnel and docks & harbours.	Understand, Analyze,	II, IV
CO3	Design the various elements of tunnel and docks & harbours.	Create	VI
CO4	Appraise and apply various techniques used in the construction of tunnels and docks & harbours.	Understand, Evaluate	II, V

Module	**Module Contents**	**Hours**
I	**Introduction of Tunnel Engineering** General aspects, economic considerations, Selection of route, Classification of Tunnel, shapes and sizes, historical development of tunnel, advantages and disadvantages of tunnels, Geotechnical Investigation for Tunnel, Tunnel alignment and profile, transfer of CL on surface, Tunnel Cross-sections, Tunnel Lining, Methods of lining.	6
II	**Tunnel Construction Methods** Tunnelling Methods: Types and purpose of tunnels; factors affecting the choice of excavation technique; Methods – soft ground tunnelling, hard rock tunnelling, shallow tunnelling, deep tunnelling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques, methods of muck disposal, supporting, problems encountered in tunnelling and remedial measures. Tunnel Boring Machines (TBM)	6
III	**Tunnelling by Drilling and Blasting** Unit operations in conventional tunnelling; Drilling – drilling principles, drilling equipment, drilling tools, drill selection, rock drill ability factors; Blasting – explosives, initiators, blasting mechanics, blast hole nomenclature; types of cuts- fan, wedge and others; blast design, tunnel blast performance – powder factor, parameters influencing, models for prediction; mucking and transportation equipment selection. **Tunnel Support System** Temporary and Permanent support system, Initial Support, Primary support, secondary support, Specialized support system, Grouting and ground stabilization, Monitoring and Maintenance.Tunnel Ventilation and Lighting, Methods of Ventilation , Dust Control	7

IV	**Introduction of Dock & Harbour Engineering** Docks and Harbour Engineering - Sea and tides, hydrographic surveys, wind, waves and cyclones, siltation and erosion, investigations, traffic forecasting. Advantages and Disadvantages of Water Transportation, Elements of Water Transportation, Classification of Harbours, Ports Development in India, Port Authorities, Bodies and Association. **Harbour Planning** Site selection, Planning of Harbours, Ship Characteristics, Characteristics of Good Harbour, Size of Harbour, Harbour layout, channel, basin and berths, shore protection works, dry docks and slipways, Dredging and Coastal Protection: Classification, types of dredgers, choice of dredger, uses of dredged materials, coastal erosion and protection, sea wall, revetment, bulkhead, aprons, transit shades and warehouses, cargo handling equipment.	7
V	**Marine Structure** General Design Aspects, Breakwaters - Function, Types General Design Principles, Wharves, Jetties, Piers, Dolphin, Fenders, Mooring Accessories. **Navigational Aids** Navigational Aids: Requirements of signals, fixed navigation structures, necessity of navigational aids, light houses, beacon lights, floating navigational aids, light ships, buoys, radar.	7
VI	**Port Facilities** Port development, port planning, port building facilities, transit sheds, warehouses, cargo handling facilities, container handling terminal facilities, shipping terminals, inland port facilities. Inland waterways, Inland water transportation in India, classification of waterways, economics of inland waterways transportation, national waterways. **Environmental Impact assessment** Environmental consideration in dock and harbour projects, baseline assessment, Monitoring Assessment of impact, Mitigation measure.Case studies in India.	7

Text Books	
1	Saxena S.C., Tunnel Engineering, Dhanpat Rai & Sons, New Delhi, 1st Edition, 1984.
2	Srinivasan R., Harbour, Dock And Tunnel Engineering, Charotar Publishing, 30th Edition 2022

References	
1	Megaw T. M. and Bartlett J., Tunnels Planning, Design, Construction, EHJW, 1st Edition 1981
2	B. Maidi, M.Thews and U.Maidi, Handbook of Tunnel Engineering, Volume 1
3	Jarvis A., Port and Harbour Engineering, Ashgate, 1st Edition, 1998

Useful Links	
1	https://www.youtube.com/watch?v=MfkIm7qBiPk
2	https://www.youtube.com/watch?v=VE_xMqMp0k&list=PLSsfsY90RszGPQ1lCN4qpV5HvcYvgOqFs

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			1										1	2
CO2			2										1	
CO3			2	1									2	
CO4		1		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)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year, B. Tech. VII
Course Code	6CV416
Course Name	Integrated Waste Management for Smart City
Desired Requisites:	Waste Management and Pollution Control

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	03 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 03**			

Course Objectives

1	To provide the knowledge about fundamental components, and concept of circular economy for solid waste management.
2	To choose appropriate technologies and strategies regarding collection and transport of solid waste to the context of smart cities.
3	To appraise various treatment and disposal methods and technologies for solid waste.
4	To discuss policies, rules and regulations regarding solid waste management.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the fundamental components and concept of a circular economy for solid waste management.	Understanding	II
CO2	Choose appropriate technologies and strategies regarding the collection and transport of solid waste in the context of smart cities.	Applying	III
CO3	Evaluate various treatment and disposal methods and technologies for solid waste.	Analysing	IV
CO4	Explain policies, rules and regulations regarding solid waste management.	Understanding	II

Module	**Module Contents**	**Hours**
I	**Introduction to Solid Waste Management in Smart Cities:** overview of solid waste management, functional elements of solid waste management, Importance of integrated waste management in smart cities Challenges and opportunities in managing solid waste in urban areas Role of technology and innovation in smart waste management	7
II	**Waste Generation and Composition Analysis:** factors influencing waste generation in urban areas, Methods for waste characterization and composition analysis, Understanding the types and quantities of waste generated in smart cities, case studies on waste composition analysis in different urban settings	6
III	**Collection and Transportation Systems:** different waste collection and transport systems, design and planning parameters of efficient waste collection systems, technologies for optimizing waste collection routes, IoT and GPS for real-time monitoring of waste collection vehicles best practices in waste transportation and transfer stations	6

IV	**Treatment and Disposal Technologies:** overview of waste treatment technologies (e.g., composting, anaerobic digestion, recycling, waste-to-energy), selection criteria for appropriate treatment technologies in smart cities, case studies on successful waste treatment and disposal projects, environmental and economic considerations in waste treatment and disposal	7
V	**Resource Recovery and Circular Economy:** concept of resource recovery and circular economy in waste management, strategies for recovering valuable resources from waste streams, implementation of waste-to-resource initiatives in smart cities, role of stakeholders in promoting circular economy principles	6
VI	**Policy, Regulations, and Public Participation:** regulatory frameworks and policies governing solid waste management in smart cities, importance of public participation and community engagement in waste management, case studies on successful waste management policies and regulations, strategies for promoting public awareness and behaviour change towards sustainable waste management practices	6

Text Books	
1	George Tchobanoglous, Hilary Theisen, and Samuel Vigil, "Integrated Solid Waste Management: Engineering Principles and Management Issues", Mc Graw Hill publications, Edition 2014.
2	Sunil Kumar, "Municipal Solid Waste Management in Developing Countries", CRC Press publications, 1st Edition 2016.

References	
1	George Tchobanoglous, Frank Kreith, and Marcia E. Williams, "Handbook of Solid Waste Management", Mc Graw Hill publications, 2nd Edition. 2002.
2	"Solid Waste Engineering: A Global Perspective", CL Engineering publications, 3rd edition, 2016

Useful Links	
1	https://www.youtube.com/watch?v=jZhEe4q2GzE&list=PLwdnzlV3ogoXAap_BHeApkcF7M8nt13hv&index=4
2	https://www.youtube.com/watch?v=mnontR8NKqk&list=PLwdnzlV3ogoXAap_BHeApkcF7M8nt13hv&index=11
3	https://www.youtube.com/watch?v=yTYm5IuO6gg&list=PLwdnzlV3ogoXAap_BHeApkcF7M8nt13hv&index=18

CO-PO Mapping

	Programme Outcomes (PO)												PSPO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3					2	2						1	
CO2		2	2			2	3						1	
CO3			2			2	3						1	
CO4						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	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech., Sem VII
Course Code	6CV418
Course Name	Professional Elective 4: Highway Construction & Pavement Design
Desired Requisites:	Highway Engineering, Soil Mechanics

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 introduce highway pavements, design concepts and material properties.
2	To enable students to carry out the design of bituminous mixes, analyse and design flexible and rigid highway pavements.
3	To introduce the concepts of pavement evaluation and rehabilitation.

Course Outcomes (CO) with Bloom's Taxonomy Level

CO	Description	Blooms Taxonomy	
		Descriptor	Descriptor
CO1	Perceive and apply the knowledge of the pavement components and design bituminous mixes.	Understanding	II & III
CO2	Articulate and apply concepts of flexible and rigid pavements.	Understanding	II & III
CO3	Analyze and design flexible and rigid pavements.	Analyzing and creating	IV & VI
CO4	Evaluate the structural condition of the pavement.	Evaluating	V

Module	**Module Contents**	**Hours**
I	Introduction to highway pavements, Types and component parts of pavements, Factors affecting design and performance of pavements, Functions and significance of sub-grade properties, Various methods of assessment of sub-grade soil strength for pavement design, Mix design procedures in mechanical stabilization of soils, Design of bituminous mixes by Marshall, Hubbard - field and Hveem's methods	7
II	Introduction to analysis and design of flexible pavements, Stresses and deflections in homogeneous masses, Burmister's 2-layer and 3-layer theories, Wheel load stresses, ESWL of multiple wheels, Repeated loads and EWL factors	8
III	Empirical, semi-empirical and theoretical approaches for flexible pavement design, Group index, CBR, Triaxial, Mcleod and Burmister layered system methods	7
IV	Introduction to analysis and design of rigid pavements, Types of stresses and causes, Factors influencing stresses, General conditions in rigid pavement analysis, Warping stresses, Frictional stresses, Combined stresses	6
V	Joints in cement concrete pavements, Joint spacings, Design of slab thickness, Design and detailing of longitudinal, contraction and expansion joints, IRC methods of Design	6
VI	Introduction to pavement evaluation, Structural and functional requirements of flexible and rigid pavements, Quality control tests for highway pavements, Evaluation of pavement structural condition by Benkelman beam, rebound deflection and plate load	6

	tests, Introduction to design of pavement overlays and the use of geosynthetics	
Text Books		
1	Yoder and Witezak, Principles of Pavement design, John Wiley and sons, second edition,1975.	
2	Yang, Design of functional pavements, McGraw- Hill,1972.	
3	Khanna S. K. & Justo C. E. G., Highway Engineering, Nemchand & Bros, 9e.	
4	Hass & Hudson, 'Pavement Management System', McGraw Hill Book Co, 1978.	
References		
1	IRC: 37 - 2001, 'Guidelines for the Design of Flexible Pavements'.	
2	IRC: 58 – 2002, 'Guidelines for the Design of Rigid Pavements'.	
3	IRC: 37-2012, 'Tentative Guidelines for the Design of Flexible Pavements'.	
4	IRC: 58-2011, Guidelines for Design of Plain Jointed Rigid Pavements for Highways.	
Useful Links		
1	https://civildigital.com/pavement-design-road-construction-design-parameters/	
2	https://www.civil.iitb.ac.in/tvm/1100_LnTse/401_lnTse/plain/plain.html	
3	https://nptel.ac.in/courses/105/104/105104098/	
4	https://www.youtube.com/watch?v=3oNa9Z94Hiw	
5	https://www.youtube.com/watch?v=-qYRWWbIcCI	
6	https://nptel.ac.in/content/storage2/courses/105101087/downloads/Lec-28.pdf	

CO-PO Mapping

	Programme Outcomes (PO)												PSPO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2											1	1	
CO2	2											1	1	
CO3	3	2	2									1	2	
CO4	2	2										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

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech., Sem VII
Course Code	6CV419
Course Name	Professional Elective 4: Maintenance and Rehabilitation of Structures
Desired Requisites:	Strength of Materials, Building Materials and Construction

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 enable students to inspect and identify the damages in civil engineering structures.
2	To make students conversant with the techniques for repair, strengthening and retrofitting of structures.
3	Prepare the estimate of maintenance, repairs rehabilitation and strengthening of the structure.

Course Outcomes (CO)

CO	Description	Bloom's Taxonomy	
		Descriptor	Level
CO1	Understand different causes of damage and decide the appropriate technique of repair.	Understanding	2
CO2	Identify the causes of failure of masonry buildings and R.C.C. buildings.	Remembering	1
CO3	Distinguish between strengthening and retrofitting and employ the appropriate techniques accordingly.	Understanding	2
CO4	Compute strength and age of building, and prepare estimates and tenders for maintenance and repair of structures.	Applying	3

Module	Module Contents	Hours
I	**Introduction:** Maintenance: Necessity of maintenance, Classification of maintenance, Repairs: objectives of repairs, types of repair, repair techniques, methodical approach to repairs, renovation, strengthening, retrofitting, rehabilitation (restoration).	4
II	**Causes & detection of damages:** Causes of damages, damages due to earthquakes, fire hazards, flood hazards, dilapidation, List of basic equipment for investigation. **Materials for repairs:** Epoxy resin, epoxy mortar, gypsum cement mortar, quick setting, cement mortar, Shot-creating. Mechanical anchors.	7
III	**Masonry walls:** Damp walls, causes and effects, remedies, eradication of efflorescence Cracks in walls, remedial & preventive measures bond between old & new brick work, reinforced brickwork. **Repairs to foundation:** Remedies, types & processes of settlement, foundation sinking Examination of existing foundation, strengthening of foundation. Water proofing: Leaking Basements & roofs	7

IV	**Concept of repairs & strengthening of RCC structures:** Concept of repairs of RCC structures, Physical examination of common defects, Structural repairs. Strengthening methods: Cantilevers, beams, slabs, walls, columns, foundation **Damage due to fire:** Fire resistance, effects of temperature on RCC, Repairs to RCC structures damaged due to fire.	7
V	**Advanced Damage detection techniques:** Advanced damage detection techniques, non-destructive testing. Determination of strength of structural member of old building. age of building: Determination of approx. age of a building. Finding cost of an existing building.	7
VI	**Maintenance of life lines:** Maintenance of electric supply, water supply, leaking pipe joints and sewerage systems, closed drains. Maintenance of roads, road berms, side drains, maintenance of bridges, culverts causeways Estimates and tendering: Estimates of annual repairs, special repairs and maintenance work. Preparation of tender.	7

Text Books	
1	P.K. Guha, "Maintenance and Repairs of Buildings", New Central Book Agencies Publications, 5th Edition, 2015
2	Nayak B. S., "Maintenance Engineering for Civil Engineers" Khanna Publication, 2nd Edition, 2011.
3	Hutchinson B. D., "Maintenance and Repairs of Buildings", Newnes Butterworth Publications, 6th edition, 1975

References	
1	Shrikhande and Agrawal, "Earthquake resistant Design of Structures", 1st edition, PHI Learning Pvt. Ltd., 2006.
2	S. K. Duggal, "Earthquake Resistant Design of Structures" 3ed Edition, Oxford UniversityPress, 2007.

Useful Links		
1	https://archive.nptel.ac.in/courses/105/105/105105213/	(IIT Kharagpur)
2	https://archive.nptel.ac.in/courses/105/106/105106202/	(IIT Madras)

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			1		1									2
CO2				2										2
CO3			2		2									2
CO4			2		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 Dr D. S. Chavan	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Final Year B.Tech. VII
Course Code	6CV420
Course Name	PE 4: Computer Applications in Structural Engineering
Desired Requisites:	Strength of Materials, Structural Analysis, RCC

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To provide knowledge of numerical approaches and the significance of analysis by computers
2	To provide the necessary knowledge of numerical tools required for analysing and solving problems in structural design and analysis.
3	To train the students in the basic use of commercial software in structural analysis and design.
4	To enhance students' programming skills through the writing of programs for structural applications.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain the use of different softwares and their basic capabilities in Structural engineering.	Explain	nl
CO2	Design and analysis of RCC structural members using MS Excel or softwares such as STAAD.pro, ETABS etc.	Analysing	4
CO3	Development of a subroutine functions and small program for analysis of a structural members.	Creating	6
CO4	Development of Finite Element model of 2D and Continuum structures in software.	Creating	6

Module	**Module Contents**	**Hours**
I	**Introduction to Computer Applications in Structural Engineering:** Reasons for Computer-based design and analysis of structures, Computer tools in structural analysis and design, Introduction to software such as ETABS, SAP200-and STAAD.Pro, ABAQUS, ANSYS etc., Comparison and applications of different softwares	6
I	**Application of MS Excel in Structural Design:** Review of IS codes for RCC design (IS 456:2000, IS 875 parts I-V, IS 13920:2016) Illustration of design of various structural elements like, Slabs, Beams, Columns using Microsoft Excel	7
III	**Analysis and design of 2D structures using softwares:** Review of basics of structural analysis, User-interface capabilities of STAAD.pro, SFD and BMD of beams, columns and rigid frames using STAAD.pro, Interpreting and handling results from software output. Review of basics of RCC design, Design steps in softwares such as STAAD.pro, ETABS, Illustration of design of beams, columns, Interpretation of software outputs	7
IV	**Use of Programming Language for analysis of Beam:** Review of matrix methods of analysis, Introduction to MATLAB, Syntax and commands in MATLAB, Stiffness, Loading, Boundary condition arrays,	6

V	**Analysis of Beam using stiffness method in MATLAB:** Creating input file, calling inputs, Creating Function for joints, member properties, Loading, Stiffness Matrix, Illustration of analysis of 2D beam with different loads using the Program	6
VI	**Finite element modelling in software:** Fundamentals of Finite Element analysis, Steps in finite element modelling, Types of elements, Introduction to ABAQUS/ ANSYS, Steps for FE modelling of structures in ABAQUS/ANSYS, Analysis of 2D beam in ABAQUS/ANSYS	6

Text Books

1	Devdas Menon, and S. Pillai, Reinforced Concrete Design - The MC Graw Hill company Third Ed–2009
2	Pandit and Gupta "Structural Analysis", Tata MC Graw Hill Book company
3	Chapman, “MATLAB programming for Engineers”, Cengage Learning,

References

1	Steven Chapra and Raymond Canale, “Numerical methods for Engineers:” McGrew Hill Publication, 7th Edition 2015.

CO-PO Mapping

	Programme Outcomes (PO)												PSPO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1				3			1				2		3
CO2	1	3	3		3							3		3
CO3	1	3	3		3					2		3		3
CO4	1	3	3		3							3		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	B. Tech. (Civil Engineering)
Class, Semester	Final Year B. Tech., Semester VII
Course Code	6CV454
Course Name	Problem-Based Laboratory
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	4 hrs./week				
Interaction	-	**Credits: 2**			

Course Objectives

1	To inculcate problem-solving attitude in students.
2	To provide the students with hands-on practice of various Civil Engineering software

Course Outcomes (CO)

CO	**Description**	**Blooms Taxonomy**	
		Descriptor	**Level**
CO1	***Identify*** societal/engineering problems.	Remember	I
CO2	***Collect*** the data required for field-based/analytical problem identified for the study	Create	VI
CO3	***Design/decide*** the methodology for experimental/analytical work	Evaluate Create	V VI
CO4	***Study*** the problem and ***recommend*** alternative methods/measures to solve the problem using suitable software/tools.	Apply Analyze	III IV

List of Experiments / Lab Activities

Students are expected to select any societal/engineering problem and provide a solution to it preferably using a software/tool. Process given below shall be followed:

1. **Identification of problem (field-based or analytical)**
2. **Data collection**
   a. For field-based problems:
      Site visits
      Observations
      Sample collection
      Interaction
   b. For analytical problem:
      Selection of tool/software
      Use of tool/software
3. **Methodology**
   a. Design/finalize the experiment
   b. Finalize and document the procedure/process of experimentation
4. **Actual work**
   a. Experimental work
   b. Simulation/modelling/design/analysis

5. **Remedial measures/solution**
   a. Alternatives methods/measures to solve the problem
   b. Discussion on an alternative scenario
6. **Conclusion**

Text Books	
1	Water Infrastructure Division, US EPA, EPANET 2.2 User Manual, 2020.
2	Autodesk, An Introduction to AutoCAD for beginners, 2020
3	SewerGEMS V8i User Guide, Bentley Systems, 2020
References	
1	Shih R., AutoCAD 2021 Tutorial, 2021
2	Walski T., 'Advanced Water Distribution Modeling', Haestad Press, 1st Edition, 2003.
3	'Stormwater Conveyance Modeling and Design', Haestad Press, 1st Edition, 2007
Useful Links	
1	https://www.youtube.com/channel/UCbFIgNot42PRCi-05X8aF_A

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		3				1			1					
CO2			2	3					1					
CO3			2	3		1			1					
CO4			3		3	1	1		1				2	

Assessment				
Students are expected to work in groups of 3-5 for this laboratory 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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AY 2024-25

Course Information

Programme	B. Tech. (Other than Civil Engineering)
Class, Semester	Final Year B. Tech., Sem. VII
Course Code	
Course Name	Open Elective 3: Environmental Management Systems
Desired Requisites:	-

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	03 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 03**			

Course Objectives

1	To provide knowledge of ecological aspects, ethics legislation and certifications pertaining to environment
2	To familiarize students with auditing and impact assessment tools

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	***Explain*** ecological aspects and effects due to various types of pollution	Understanding	II
CO2	***Perceive*** environmental ethics and legislation.	Understanding	II
CO3	***Choose*** appropriate methodology for EIA and auditing and assess the impacts.	Applying	III
CO4	Explain benefits and processes of different certifications.	Understanding	II
CO5	***Implement*** EMS and Environmental Management Plan for infrastructural facilities.	Applying	IV

Module	**Module Contents**	**Hours**
I	**Ecological Aspects and types of Pollution** Ecological aspects: Salient features of major Ecosystems, Energy Transfer, Population Dynamics, Ecological imbalance, Preservation of Biodiversity. Land Pollution, Water Pollution due to sewage, industrial effluents and leachate, Pollution due to Nuclear Power Plants, Radioactive Waste, Thermal pollution, causes and control. Noise Pollution: Decibel Levels, Monitoring, Hazards, Control measures.	7
II	**Environmental Ethics and Legislation** Environmental Ethics: Ethics in society, Environmental consequences, Responsibility for environmental degradation, Ethical theories and codes of Ethics, Changing attitudes, Sustainable development. Environmental Legislation: Water (prevention and control of pollution) act 1974, The environmental act 1986, The Noise Pollution (Regulation and Control) Rules, 2000. Environmental economics.	7
III	**Environmental Impact Assessment (EIA)** Definitions and Concept, Scope, Objectives, Types of impacts, Elements of EIA, Baseline studies. Methodologies of EIA, Prediction of impacts and its methodology, Uncertainties in EIA, Status of EIAs in India.	6

IV	**Environmental Auditing** Definitions and concepts, Scope and Objectives, Types of audit, Accounts audit, Environmental audit statement, Qualities of environment auditor. Environmental Impact Statement (EIS).	6
V	**ISO Standards** ISO and ISO 14000 Series: Introduction, Areas covered in the series of standards, Necessity of ISO certification. Environmental management system: Evolution, Need, Elements, Benefits, ISO 14001 requirements, Steps in ISO 14001 certification, ISO 14001 and sustainable development, Integration with other systems (ISO 9000, TQM, Six Sigma), Benefits of integration.	6
VI	**Environmental Management Plan** Definition, Importance, Development, Structuring, Monitoring, Cost aspects. Strategy for siting of Industries, Eco-Labelling, Life-Cycle Assessment.	6

Text Books

1	Canter, L. W., Environmental Impact Assessment, McGraw-Hill, 2nd Edition, 1997.
2	Agarwal, N. P., Environmental Reporting and Auditing, Raj Pub., 1st Edition, 2002.
3	Judith, P. and Eduljee, G., Environmental Impact Assessment for Waste Treatment and Disposal Facilities, John Wiley & Sons, 1st Edition, 1994.

References

1	"Environmental Auditing", Published by CPCB, Govt. of India Publication, New Delhi.
2	Mhaskar, A.K., Environmental Audit", Media Enviro Publications, 2002.
3	K. Whitelaw and Butterworth, ISO 14001: Environmental System Handbook, 1997.

Useful Links

1	https://www.youtube.com/watch?v=wEqrMCdNjX4
2	https://www.youtube.com/watch?v=hfLGI73N_iA
3	https://www.youtube.com/watch?v=MpR6YiSiHrs

CO-PO Mapping

	Programme Outcomes (PO)												**PSPO**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3						2						1	
CO2	3						2						1	
CO3	3						2						1	
CO4	3						2						1	
CO5	3						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 2022-23

Course Information	
Programme	B. Tech. (All Branch)
Class, Semester	Final Year B. Tech., Sem I & II
Course Code	
Course Name	Constitution of India
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: Nil**			

Course Objectives	
1	To review and create awareness on various provisions in the constitution of India.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Explain the premises informing the twin themes of liberty and freedom from a civil rights perspective.	understand
CO2	Address the growth of Indian opinion regarding modern Indian intellectuals constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism	understand
CO3	Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution	understand

Module	**Module Contents**	**Hours**
I	History of Making of the Indian Constitution Drafting Committee, (Composition & Working	4
II	**Philosophy of the Indian Constitution :** Preamble, Salient Feature	4
III	**Contours of Constitutional Rights:** Fundamental Rights; Right to Equality; Right to Freedom; Right against Exploitation; Right to Freedom of Religion; Cultural and Educational Rights; Right to Constitutional Remedies; Directive Principles of State Policy; Fundamental Duties.	5
IV	**Organs of Governance:** Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions	5

CO-PO Mapping	
	Programme Outcomes (PO)

V	**Local Administration:** District"s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	5
VI	**Election Commission:** Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	5

Text Books		
1	Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.	
2	M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014	
3	D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015	
References		
1	The Constitution of India, 1950 (Bare Act), Government Publication	
Useful Links		
1	https://en.wikipedia.org/wiki/Constituent_Assembly_of_India	
2	https://nptel.ac.in/courses/129/106/129106003/	
3	https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-lw02/	
4	https://eci.gov.in/about/about-eci/the-functions-electoral-system-of-india-r2/	

Assessment
The assessment is based on 2 in-semester examinations in the form of MSE 30 and ISE of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 50 marks. MSE shall be typically on modules 1 and 2, ISE based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		**MSE**	**ISE**	**ESE**	**Total**
1	Remember				
2	Understand				
3	Apply	30	20	50	**100**
4	Analyze				
5	Evaluate				
6	Create				
Total		**30**	**20**	**50**	**100**