VJEC B. Tech. Syllabus 2024

Minor Degree
in
Civil Engineering
Offered By: (Civil Engineering)

MINOR DEGREE STRUCTURE
Offered by Department of Civil Engineering

The B. Tech Minor program provides students with additional knowledge and skills in a secondary field, complementing their primary discipline. It enhances interdisciplinary competencies, employability, and broadens academic and professional horizons. By pursuing specialized courses outside their major, students gain expertise in a secondary area, diversifying their skill set and preparing them for multidisciplinary challenges. This qualification enriches their knowledge base and opens additional career pathways, equipping them to adapt to dynamic industry needs and excel in their careers.

Curriculum – Minor in Manufacturing

Sl. No:	Semester	Course Code	Course Title (Course Name)	Credit Structure				SS	Total Marks		Credits	Hrs./ Week
				L	T	P	R		CIA	ESE		
1	3	MNCET309	Water Resources and Environmental Engineering	3	1	0	0	5	40	60	4	4
2	4	MNCET409	Fundamentals of Transportation	3	1	0	0	5	40	60	4	4
3	5	MNCET509	Fundamentals of Structural, Geotechnical, and Concrete Engineering / MOOC	3	1	0	0	5	40	60	4	4
4	6	MNCET609	Construction technology and management/MOOC	3	0	0	0	5	60	40	3	3
Total Credits											15	

The Minor in Civil Engineering is designed to provide students from non-civil engineering branches an opportunity to gain fundamental knowledge and skills in Civil Engineering. This minor program aims to enhance multidisciplinary competence, thereby broadening career prospects and enabling students to tackle diverse engineering challenges.

The curriculum typically covers core aspects of civil engineering, including:

- Fundamentals of Structural Engineering and Concrete Structures: This course provides foundational knowledge in structural engineering and concrete design.
- Transportation Engineering: This course introduces the fundamentals of transportation systems, their significance in national development, and the engineering principles behind the planning,

design, and management of road, rail, air, and water transport systems.

- Water Resources and Environmental Engineering: This course introduces fundamental concepts and practices in managing water resources and addressing environmental challenges related to water, wastewater, solid waste, and air pollution.
- Construction Management: The course provides a introduction to modern construction practices, materials, planning, cost control, and project management tools.

The Minor in Engineering registration shall be along with the registration of the 3rd semester and completed in 6'th semester. If a student fails in any course of the minor, he/she shall not be eligible to continue the B. Tech Minor. However, the additional credits and grades thus far earned by the student shall be included in the grade card but shall not be considered in calculating the CGPA.

To qualify for the award of a B.Tech Degree with a Minor, a student must earn an additional 15 credits. Students may opt for MOOC courses in Semester 5 and Semester 6, as recommended by the Board of Studies and approved by the Academic Council

SYLLABUS

SEMESTER 3

WATER RESOURCES AND ENVIRONMENTAL ENGINEERING

Course Code	MNCET309	CIE Marks	60
Teaching Hours/Week (L: T:P: R)	3:1:0:0	ESE Marks	40
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Nil	Course Type	Theory

Course Objectives:

1. To understand the hydrologic cycle, water resources, and quality parameters for evaluating water availability and contamination.
2. To learn the design and operation of water distribution systems, loss management, automation, and sustainable pricing.
3. To gain knowledge of wastewater and solid waste management, including treatment, disposal, and sustainable practices.
4. To explore air pollution sources, impacts, and modern control methods for environmental and health protection.

SYLLABUS

Module No	Syllabus Description	Contact Hours
1	**Hydrologic Processes:** Basic overview of the hydrologic cycle. Key processes: Precipitation, evaporation, infiltration (brief explanation and significance). **Groundwater and Surface Water Resources**: Introduction to aquifers and wells. Basics of surface water: Streams and reservoirs (emphasis on use in water supply). **Water Demand and Supply**: Overview of urban and rural water supply systems. Brief on demand estimation and typical sources. **Water Quality Parameters**: Physical Characteristics -Temperature, color, turbidity, Chemical Characteristics-pH, hardness, DO, BOD, COD (focus on key indicators), Biological Characteristics: Common pathogens, bioindicators, basic microbiological quality.	12
2	**Water Distribution Systems**: Basic structure and components of a water supply network. Functioning and layout types (looped vs. branched systems – brief). **Water Losses and Control**: Introduction to water losses: Overview of Non-Revenue Water (NRW) and Unaccounted-for Water (UFW). Simple explanation of apparent vs. real losses. Basic water loss detection techniques and preventive strategies (without too much technical detail).	12

	Automation in Water Supply: Concept of automation and real-time monitoring. Introduction to Smart Water Supply Systems, with examples relevant to Indian cities (keep it conceptual). **Water Economics and Pricing**: Importance of water as an economic resource. Basic water metering types. Simplified approach to sustainable pricing and common challenges in Indian urban water pricing (no deep economics).	
3	**Wastewater Management**: Basics of Wastewater, Simple definitions and common sources (domestic, industrial) Wastewater Treatment-Primary Treatment (Basic idea of screening and sedimentation), Secondary Treatment Overview of biological processes of activated sludge and trickling filters (brief), Tertiary Treatment: Simple explanation of disinfection (chlorination, UV) Wastewater Disposal: General practices and importance of following standards (brief reference to Indian norms). **Solid Waste Management:** Collection: Basic methods, role of community participation, importance of segregation. Transportation: Introduction to transfer stations, common vehicle types. Disposal Techniques: Overview of major disposal methods-Landfilling (importance and issues), Incineration (basic concept), Composting and Recycling (brief, with practical examples)	**12**
4	**Air pollution and control methods**: Sources of air pollutants: Natural (volcanic eruptions, wildfires) and anthropogenic (industries, vehicles, biomass burning). Effects of air pollutants: Health impacts (respiratory issues, cardiovascular problems), environmental impacts (acid rain, smog, global warming). Control methods: Particulate control (cyclones, scrubbers, electrostatic precipitators), gaseous pollutant control (catalytic converters, adsorption, absorption).	**8**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Microproject	Internal Examination-1	Internal Examination- 2	Internal Examination- 3	Total
5	15	5	10	5	40

Sample microproject:

1. **Mini Survey and Analysis of Local Water Supply System**

   Objective: To understand the structure, components, and functioning of the local (urban/rural) water distribution system.

   Tasks:

   - Identify the main source and supply route of drinking water in a nearby locality.
   - Map key components: source, treatment unit (if any), storage tanks, and distribution layout (looped/branched).
   - Interview local officials or households about water availability and challenges.

Expected Outcome:

- Hand-drawn or digital layout map, brief report with photos and summary of findings.

2. Testing and Interpretation of Basic Water Quality Parameters

Objective: To measure and interpret key physical and chemical water quality indicators.

Tasks:

- Collect water samples (tap, borewell, river/lake, etc.).
- Test for basic parameters (temperature, color, turbidity, pH, hardness – use simple test kits or local lab if available).
- Compare results with BIS drinking water standards.

Expected Outcome: Tabulated results, comparison chart, and brief conclusions on water safety.

3. Model of a Smart Water Supply Monitoring System (Conceptual)

Objective: To explore automation in water distribution and propose a conceptual smart system for real-time monitoring.

Tasks:

- Study the concept of smart meters, flow sensors, leak detection, and SCADA systems.
- Identify water issues in a local area (like leakage, billing issues).
- Propose a simple smart system (concept only, using diagrams).

Expected Outcome: Flowchart or schematic of the proposed system, explanatory notes, and practical relevance.

4. Field-Based Study on Solid Waste Collection and Segregation

Objective: To observe and analyze solid waste management practices at the community level.

Tasks:

- Survey a neighborhood or ward on waste generation, collection frequency, and segregation practices.
- Interview residents or sanitation workers.
- Identify gaps and suggest improvements (community bins, color-coded segregation, awareness posters, etc.).

Expected Outcome: Short report with data summary, photos, and proposed awareness material.

5. Air Pollution Sources and Control in Your Locality

Objective: To identify and analyze sources of air pollution and available control techniques.

Tasks:

- Identify major sources in the area (vehicles, small industries, biomass burning).
- Conduct a small awareness survey on respiratory issues.
- Briefly explain control devices like catalytic converters, scrubbers (conceptual with examples).

Expected Outcome: Map/list of sources, brief infographic/poster on control methods, and report on public awareness.

6. Comparative Study of Wastewater Treatment Methods

Objective: To explore and compare basic wastewater treatment processes (primary, secondary, tertiary).

Tasks:

- Study and explain the steps in a typical domestic sewage treatment plant.
- Use diagrams to explain screening, sedimentation, biological treatment, and disinfection.
- If possible, visit a small treatment facility or use online videos/documentaries.

Expected Outcome: Illustrated report showing each stage with explanations and possible improvements.

Micro Project Assessment Rubric (2024 scheme)

Total Marks: 15
Group Members (Maximum 3):
Topic:

Criteria	Max Marks	Rubric Description
Understanding of Topic	3	3: Excellent grasp of topic, clear explanation 2: Good understanding with minor gaps 1: Basic level 0: Poor understanding
Content Accuracy & Relevance	3	3: Accurate and relevant content 2: Minor factual or conceptual errors 1: Limited or partly correct 0: Lacks relevance or copied
Team Participation	2	2: All members contributed actively 1: Uneven participation 0: One or more did not participate
Presentation & Neatness	2	2: Neatly presented with visuals 1: Average layout 0: Disorganized or difficult to follow
Creativity / Effort	2	2: Evidence of extra effort, innovation, or examples 1: Some effort 0: Minimal or no effort
Report Format & Structure	3	3: Clear structure with title, objectives, results, and conclusion 2: Mostly structured 1: Poor format 0: Not submitted

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 9 sub divisions. **(4x9 = 36 marks)**	60

Course Outcomes (COs)

At the end of the course students should be able to:

CO	Course Outcome	Bloom's Knowledge Level (KL)	Assessment Tool
CO 1	Understand key components of the hydrologic cycle, water resources, and assess water demand, supply, and basic water quality parameters.	K2	Written exam, Assignment
CO2	Describe the structure and functioning of water distribution systems, identify water losses, and explain basic automation and economic aspects of water supply.	K2	
CO3	Explain the basic principles of wastewater and solid waste management, including primary treatment processes, disposal methods, and sustainable practices.	K2	
CO4	Identify sources and impacts of air pollution and describe common control technologies for mitigating environmental and health effects.	K2	

Note: K1-Remember, K2-Understand, K3-Apply, K4-Analyse, K5-Evalaute, K6-Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2					2			1	
CO2	3	2	2		2	2	2	3		1	2
CO3	3	2	2		2	3	3	3	1	1	2
CO4	3	2			2	2	3			1	

Note: *1.' Slight (Low), 2.- Moderate (Medium), 3. Substantial (High), - No Correlation*

Reference book				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Water Supply & Sanitary Engineering (Vol.–I & II),	Modi P.N	Standard Book	9th edition,2016
2	Water Engineering & Sanitary Engineering	Punmia B. C	Laxmi Publication	2nd Edition
3	Environmental Engineering	Peavy, H.S., Rowe, D.R., & Tchobanoglous, G.	McGraw-Hill Education	2012
4	Air Pollution	Rao, M.N., & Rao, H.V.N	Tata McGraw-Hill	2012
5	Water Supply Engineering: Environmental Engineering Vol. I	Garg, S.K.	Khanna Publishers	2022

6	Wastewater Engineering: Treatment and Resource Recovery	Metcalf & Eddy	McGraw-Hill Education	2014

SEMESTER 4

FUNDAMENTALS OF TRANSPORTATION ENGINEERING

Course Code	MNCET409	CIE Marks	60
Teaching Hours/Week (L: T:P: R)	3:1:0:0	ESE Marks	40
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Nil	Course Type	Theory

Course Objectives:

1. To understand the basics of transportation engineering and learn about different types of roads.
2. To learn the basic elements of highway design.
3. To study traffic flow and safety
4. To get an introduction to railways, airports, and harbors, and understand their parts, functions,

SYLLABUS

Module No	Syllabus Description	Contact Hours
1	**Introduction to Transportation Engineering:** Importance of transportation. Modes of transport (road, rail, air – brief mention). Classification and Types of Roads: Basic classification: National highways, state highways, district roads, and village roads (based on location & function). Types of roads (basic idea only), IRC and MORTH standards (no in-depth specs) for roads Cross Sections of Roads: road layout. Basic components: Carriageway, shoulder, footpath, side drain. Basic Highway Geometric: Gradient. Sight Distance, Super elevation, Extra widening, Horizontal curves – curves on flat roads (basic intro) Vertical curves – curves on hilly roads (basic concept only).	**10**
2	**TRAFFIC ENGINEERING**: Basic Parameters of Traffic- Volume, -Speed and Density, -Traffic Volume Studies, -Speed studies, -Parking Studies and -Parking characteristics, Road Accidents-Causes, Road Traffic Signs – Types and Specifications, Road Markings, Types of road intersections **Advanced Traffic Management Systems (ATMS)**: Introduction to intelligent transportation systems (ITS) and smart traffic solutions, Real-time traffic monitoring, automated signaling, and adaptive traffic control systems	**12**
3	**RAILWAY ENGINEERING** Role of Indian Railways in National Development, Permanent way, Alignments, Specification of Components – ballast, -sleepers, -rail heads, -Signals, -Junction boxes, -Gauges, Typical cross sections, Embankments and cuttings, Construction	12

	and maintenance of permanent way. High-Speed Rail Systems: Engineering principles behind high-speed rail technology Modern Innovations in Railway Engineering: Introduction to metro rail systems, monorails, and bullet trains. Application of digital technologies and automation in railway	
4	**Airports and Harbors** Harbors: Definition and classification of harbors, key features, and essential requirements. Breakwaters: Importance, functions, and types. Docks: Purpose and classification of docks, including dry docks and wet docks (basic introduction). Airport Engineering: Main components of an airport and the typical airport layout. Runway orientation, taxiways, aprons, and terminal building (basic introduction**).**	**10**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1	Internal Examination- 2	Internal Examination- 3	Total
5	15	5	10	5	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which l question should be answered. • Each question can have a maximum of 9 sub divisions. **(4x9 = 36 marks)**	60

Course Outcomes (COs)

At the end of the course students should be able to:

CO	Course Outcome	Bloom's Knowledge Level (KL)	Assessment Tool
CO 1	Identify and classify different modes of transportation and road types	K2	Written exam, Assignment
CO2	Understand of traffic parameters, road safety and traffic management systems	K3	
CO3	Summarize the components and innovations in railway	K2	
CO4	Understand airport, and harbor engineering, and their importance in transportation.	K2	

Note: K1-Remember, K2-Understand, K3-Apply, K4-Analyse, K5-Evalaute, K6-Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2				1					
CO2	3	2	2				1				
CO3	3	3	2	2	2	2	1			1	
CO4	3	2	2		2	2	2			1	

Note: *1.' Slight (Low), 2.- Moderate (Medium), 3. Substantial (High), - No Correlation*

Reference book				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Highway Engineering	Khanna, S.K. & Justo E.G.,	Nem Chand & Bros	2000
2	Traffic Engineering& Transportation Planning	Kadiyali, L. R.,	Khanna Publishers	2017
3	Airport Planning and Design	Khanna, S. K. and Arora. M. G	Nemchand& Bros	
4	Railway Engineering,	Rangawala, S.C.	Charotar Publishing House	
5	Harbour, Dock & Tunnel Engineering,	Srinivasan,R.,	Charotar Publishing House	2016

6	IRC: 37-2001, Guidelines for the Design of Flexible Pavements, IRC 2001, New Delhi
7	IRC:37-2012, Tentative Guidelines for the Design of Flexible Pavements, PHI, 2017

SEMESTER 5

FUNDAMENTALS OF STRUCTURAL, GEOTECHNICAL, AND CONCRETE ENGINEERING

Course Code	**MNCET509**	**CIE Marks**	**60**
Teaching Hours/Week (L: T:P: R)	**3:1:0:0**	**ESE Marks**	**40**
Credits	**4**	**Exam Hours**	**2 Hrs. 30 Min.**
Prerequisites (if any)	**Nil**	**Course Type**	**Theory**

Course Objectives:

1. To introduce the scope of structural engineering and fundamental materials used in construction,
2. To develop a foundational understanding of structural analysis.
3. To familiarize students with the basic design principles of reinforced concrete structures
4. To explain structural behavior under various loads and concept of geotechnical engineering

SYLLABUS

Module No	Syllabus Description	Contact Hours
1	**Introduction to Structural Engineering:** Scope and importance of structural engineering, Types of structures: Buildings, Bridges, Towers, and Special Structures. Basic loads on structures: Dead, Live, Wind, Seismic. **Basics of Concrete Technology**: Composition and properties of concrete. Types of cement, aggregates, and admixtures. Concrete mix design: Nominal and design mixes (introduction only) Fresh and hardened concrete properties: Workability, strength, durability. Testing of concrete: Slump test, compressive strength, and tensile strength tests. (significance only) Factors affecting concrete performance and quality	**12**
2	**Structural Analysis Fundamentals.** Concept of equilibrium and stability. Shear force and bending moment diagrams for simple structures. Introduction to degree of indeterminacy. Concept of Analysis of continuous beams, trusses and simple portal frames. Effect of load on structural member/system, displacements, stresses and strains; their importance	**12**
3	**Introduction to Geotechnical Engineering** Definition and Importance, Branches of Geotechnical Engineering, Soil Formation and Types, Soil Properties and Classification. Concept of Bearing	**12**

	Capacity and load transfer, Factors Affecting Bearing Capacity, Types of Foundations (Overview).	
4	**Design of concrete structures**: Working stress method and limit state method. Design codes and standards (IS codes).Safety and serviceability considerations. Concept of design of structural component: Singly and doubly reinforced beams, short and long columns, One-way and two-way slabs	12

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1	Internal Examination- 2	Internal Examination- 3	Total
5	15	5	10	5	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 9 sub divisions. **(4x9 = 36 marks)**	60

Course Outcomes (COs)

At the end of the course students should be able to:

CO	Course Outcome	Bloom's Knowledge Level (KL)	Assessment Tool
CO 1	Explain the scope, importance, and types of structures, loads, and concrete materials used in structural and geotechnical engineering.	K2	Written exam, Assignment
CO2	Describe the composition, properties, and quality control measures of concrete, including mix design and testing methods.	K2	
CO3	Interpret shear force and bending moment diagrams, and understand basic concepts of structural analysis	K2	
CO4	escribe soil types, bearing capacity concepts, and the fundamental design principles of structural components as per IS codes.	K2	

Note: K1-Remember, K2-Understand, K3-Apply, K4-Analyse, K5-Evalaute, K6-Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2				1	1				
CO2	3	2		1							
CO3	3	3		2							
CO4	3	2	2								

Note: *1.' Slight (Low), 2.- Moderate (Medium), 3. Substantial (High), - No Correlation*

Reference book				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Basic Structural Analysis	C.S. Reddy	Tata McGraw-Hill	3rd Edition, 2019
2	Design of Reinforced Concrete Structures	N. Subramanian	Oxford University Press	2nd Edition, 2017
3	Concrete Technology	M.S. Shetty	S. Chand Publishing	Revised Edition, 2013
4	Soil Mechanics and Foundations	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications	16th Edition, 2017
5	Limit State Design of Reinforced Concrete	P.C. Varghese	PHI Learning Pvt. Ltd.	2nd Edition, 2009
6	IS 456: Code of Practice for Plain and Reinforced Concrete	Bureau of Indian Standards	BIS	Latest Edition (2000)

SEMESTER 6

CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Course Code	MNCET609	CIE Marks	60
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	40
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Nil	Course Type	Theory

Course Objectives:

1. To understand the basics and importance of construction technology in modern projects.
2. To learn about common construction materials and methods, both traditional and modern.
3. To get introduced to project planning and scheduling tools used in construction.
4. To understand the basics of project management, cost estimation, quality, safety, and green building practices.

SYLLABUS

Module No	Syllabus Description	Contact Hours
1	**Introduction to Construction Technology:** Definition and scope. Role of technology in modern construction. Phases of a construction project. **Construction Materials and Techniques**: Traditional and modern construction materials: Concrete, steel, composites. Formwork, scaffolding, and shoring techniques. Prefabrication and modular construction methods. Advanced construction techniques: 3D printing, precast technology.	**10**
2	**Project Planning and Scheduling** Importance of planning and control in construction projects. Project life cycle: Initiation, planning, execution, monitoring, and closure. Planning Techniques: Work Breakdown Structure (WBS) and its importance. Gantt charts and bar charts for construction planning. Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) brief Description only Scheduling Tools and Software: Introduction to software like MS Project and Primavera. Basics of creating schedules and tracking progress. Case study: Scheduling a residential building project	**10**
3	**Construction Project Management:** Roles and responsibilities of a project manager, Contract management and documentation, Risk management in construction projects. Quality assurance and quality control (QA/QC) practices. **Cost Estimation and Budgeting:** Types of estimates: Preliminary, detailed Techniques of cost estimation: Unit rate method, quantity survey, and cost indices. Budgeting and financial planning for construction projects	10

4	Building Information Modeling (BIM) for construction management**.** Green building certifications (LEED, GRIHA) Material management and inventory control. Labour management and workforce planning.Safety management: Safety plans, hazard identification, and risk mitigation**.**	**8**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1	Internal Examination- 2	Internal Examination- 3	Total
5	15	5	10	5	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 9 sub divisions. **(4x9 = 36 marks)**	60

COURSE OUTCOMES (COS)

At the end of the course students should be able to:

CO	Course Outcome	Bloom's Knowledge Level (KL)	Assessment Tool
CO 1	Understand the definition, scope, and phases of a construction project, and interpret the role of technology in modern construction.	K2	Written exam, Assignment
CO2	Explain the properties and applications of traditional and modern construction materials, and describe various construction techniques.	K3	
CO3	Interpret the fundamentals of project planning and scheduling techniques and recognize the use of project management software.	K2	
CO4	Understand the principles of construction project management including cost estimation, QA/QC, safety, labour and material management, and sustainability practices like BIM and green certification.	K2	

Note: K1-Remember, K2-Understand, K3-Apply, K4-Analyse, K5-Evalaute, K6-Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	1									2
CO2	3	2									1
CO3	3	1			3					2	1
CO4	3	1			2	2	3		2	2	3

Note: *1.' Slight (Low), 2.- Moderate (Medium), 3. Substantial (High), - No Correlation*

Reference book				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
	Construction Technology	Roy Chudley & Roger Greeno	Pearson Education	5th Edition, 2016
2	Construction Planning, Equipment and Methods	R.L. Peurifoy, Clifford J. Schexnayder	McGraw Hill	8th Edition, 2010
3	Construction Project Management: Planning, Scheduling, and Controlling	K.K. Chitkara	McGraw Hill Education	2nd Edition, 2014
4	Building Construction	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications	10th Edition, 2022
5	Construction Materials, Methods and Techniques	William P. Spence, Eva Kultermann	Cengage Learning	4th Edition, 2016
6	Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects and Builders	Chris Hendrickson	Prentice Hall (available online as open resource)	Latest Edition
7	Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations	Willem Kymmell	McGraw Hill	1st Edition, 2008
8	Estimating and Costing in Civil Engineering	B.N. Dutta	UBS Publishers	28th Edition, 2021
9	Principles of Construction Management	Roy Pilcher	McGraw-Hill	Reprint Edition, 2008

10	Green Building Fundamentals	Mike Montoya	Pearson	2nd Edition, 2010

GUIDELINES FOR MOOC COURSE SELECTION AND COMPLETION FOR MINOR PROGRAM (SEMESTER 5 & 6)

Eligibility and Approval

- MOOC courses can be taken only in place of courses offered in Semester 5 and Semester 6 of the Minor Program.
- A student is not eligible to register for MOOC courses under the Minor program if he/she has failed in any Minor course in Semester 3 or 4.
- The selected MOOC course must be chosen from the department-approved list relevant to the Minor specialization.
- Courses not included in the approved list will not be considered for credit transfer.
- Students have the flexibility to register for MOOC courses from Semester 4 onwards, but the courses must be successfully completed before the end of Semester 6.
- The certificate of completion must be submitted to the Controller of Examinations (CoE) through the Head of Department (HoD) at least five days before the commencement of the End Semester Examination (ESE).
- The MOOC course must be offered by an approved agency/platform/institution such as SWAYAM / NPTEL and should fall within the relevant discipline.
- The course should have a duration of 8 to 12 weeks.
- It is preferable that the course is AICTE or UGC recognized and listed in the KTU-approved MOOC course list for the discipline.
- The SFA shall inform the COE's office regarding the MOOC courses taken by students at the beginning of the Semester so that the names and codes of the course shall be included in the mark sheet for students.

General Guidelines

- Students are personally responsible for enrolling in, learning from, and successfully

completing the MOOC course within the stipulated time.

- The institution will not be responsible for any delays, non-completions, or platform-related issues.
- All expenses incurred **for course** registration, examination fees, certification, or any other charges **shall be** borne entirely by the student**.**
- If a student fails to complete the MOOC course or does not pass the final examination, he/she will not be allowed to continue the Minor program in subsequent semesters.
- Upon successful completion, the certificate must be submitted to the respective Mentor, who will report it to the CoE office and maintain it for record-keeping purposes**.**
- To ensure proper synchronization between the SWAYAM MOOC course schedule and the University academic calendar, the Student Faculty Advisor (SFA) shall take note of the MOOC examination dates at the beginning of the course. This is to avoid any potential clash with the End Semester and other Internal Examinations.
- The SFA shall actively encourage students to register for the approved MOOC courses and closely monitor their progress throughout the course duration. The SFA should also motivate students to complete all internal assessments on time, and provide necessary academic support.
- In case of any student grievances related to MOOC course registration, progress, or completion, the SFA shall address and resolve the issues promptly, with the support of the Head of the Department, if required.

Assessment and Certification

- Students must pass the final/proctored exam conducted by the MOOC platform.
- A valid certificate of completion, including the score/grade, issued by the MOOCs conducting agency in proof of credit attainment must be submitted.
- Internal assessment is not required for MOOC courses; however, faculty mentoring and progress tracking are strongly recommended to ensure timely completion.