ST.JOSEPH'S
COLLEGE OF ENGINEERING AND TECHNOLOGY,
- P A L A I -
AUTONOMOUS

Choondacherry P.O., Pala, Kottayam 686579

Kerala, India

CURRICULUM & SYLLABUS

Minor in

CONSTRUCTION TECHNOLOGY

Offered by: Department of Civil Engineering (CE)

Eligible Departments: AD,CA,CC,CS,EC,EE,ER,ME

2024 SCHEME

CURRICULUM

<table>
<tr><th colspan="11">Minor in CONSTRUCTION TECHNOLOGY</th></tr>
<tr><th rowspan="2">Sl. No:</th><th rowspan="2">Semester</th><th rowspan="2">Course Code</th><th rowspan="2">Course Title</th><th colspan="3">Credit Structure</th><th rowspan="2">SS</th><th colspan="2">Total Marks</th><th rowspan="2">Credits</th><th rowspan="2">Hrs./ Week</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>CIA</th><th>ESE</th></tr>
<tr><td>1</td><td>3</td><td>24SJMNCET309</td><td>Building construction & Structural systems* /MOOC#</td><td>3</td><td>1</td><td>0</td><td>5</td><td>40</td><td>60</td><td>4</td><td>4</td></tr>
<tr><td>2</td><td>4</td><td>24SJMNCET409</td><td>Building drawing*/ MOOC#</td><td>3</td><td>1</td><td>0</td><td>5</td><td>40</td><td>60</td><td>4</td><td>4</td></tr>
<tr><td>3</td><td>5</td><td>24SJMNCET509</td><td>Structural mechanics* /MOOC#</td><td>3</td><td>1</td><td>0</td><td>5</td><td>40</td><td>60</td><td>4</td><td>4</td></tr>
<tr><td>4</td><td>6</td><td>24SJMNCET609</td><td>Estimation costing & Valuation* /MOOC#</td><td>3</td><td>0</td><td>0</td><td>5</td><td>40</td><td>60</td><td>3</td><td>3</td></tr>
<tr><td colspan="7" align="center">Total</td><td>20</td><td></td><td></td><td>15</td><td>15</td></tr>
</table>

*Students must register for theory courses listed in the 3rd and 4th semesters of the minor curriculum.

#Students who fail a theory course listed in the Minor curriculum are permitted to register for an alternate MOOC course specified in the minor curriculum.

SEMESTER 3

BUILDING CONSTRUCTION AND STRUCTURAL SYSTEMS

Course Code	**24SJMNCET309**	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:1:0:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)		Course Type	Theory

Preamble:

This course provides the essential aspects of building construction such as components of buildings, materials of construction and structural systems to the students of other branches of Engineering.

Pre requisite: Nil

Course Outcomes: After the completion of the course the student will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Explain the properties and testing methods of different materials used for building construction.	K3
CO2	Explain the construction details of different components of buildings.	K3
CO3	Explain construction practices such as prefabricated, cost effective and sustainable technologies	K3
CO4	Explain the details and behaviour of structural systems and structural elements used in buildings.	K3

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1	2	-	-	-	-	-	-	-	-	-	-
CO 2	2	-	-	-	-	-	-	-	-	-	-
CO 3	2	-	-	-	-	-	-	-	-	-	-
CO 4	2	-	-	-	-	-	-	-	-	-	-

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

Continuous Internal Evaluation Pattern:

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Pattern:

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 =24marks)	• 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 3 sub divisions. (4x9 = 36 marks)	60

.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Cement – Types, Composition, manufacturing process, properties, tests. Aggregates – properties, tests. Mortar – types, properties, uses. Chemical admixtures – types, uses.	9
2	Concrete – PCC, RCC. Properties of fresh concrete, Workability – tests. Properties of hardened concrete – tests for strength, Nominal mix and design mix	10
3	Flooring and roofing materials, Lintels and arches, Types and construction details of doors, windows and ventilators. Finishing works, Timber products, Formwork	9
4	Foundations – shallow and deep, Cost effective construction, Sustainable building technologies, Non destructive testing of concrete, Prefabricated construction. Structural elements - beams, columns and slabs. Principles	14

| | of reinforced concrete, types of reinforcements, Reinforcement details of structural elements, Structural systems, Concrete floor systems | |

Text Books

1. Punmia B. C, Building Construction, Laxmi Publications, Twelfth Edition, 2023.

2. Arora and Bindra, Building Construction, Dhanpath Rai and Sons.

3. Shetty M.S., Concrete Technology, S. Chand & company. 8th Edition, 2018.

References

1. Madan Mehta, Walter Scarborough and Diane Armpriest, Building Construction – Principles, Materials and Systems, Pearson, 3rd Edition,2017.

2. Daniel Schodek and Martin Bechthold, Structures, Pearson.

3. V. SankaraSubramaniyan, Construction Technology, Lakshmi Publications, Chennai.

4. S. S. Bhavikatti, Construction Technology, Chess Educational Publishers, Chennai.

5. Rangwala S C., Engineering Materials, Charotar Publishers,43rd edition,2021.

6. P. C. Varghese, Building Materials, PHI Learning Pvt Ltd., Delhi.

7. Mehta and Monteiro, Concrete - Micro structure, Properties and Materials, McGraw Hill Professional,4th edition,2014.

8. Neville A. M. and Brooks J. J., Concrete Technology, Pearson Education,2nd edition,2019.

9. R. Santhakumar, Concrete Technology, Oxford Publications,2nd edition,2018.

BUILDING DRAWING

Course Code	**24SJMNCET409**	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:1:0:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)		Course Type	Theory

Preamble: Objective of the course is to give exposure to building rules, impart training in visualisation and planning of various types of buildings and their components.

Prerequisite: Engineering Graphics

Course Outcomes: After the completion of the course the student will be able to

CO 1	The student will be able to understand building drawing, scales and methods of dimensioning
CO 2	The student will be able draw the details of panelled door, glazed windows, joint details of roof truss
CO 3	The student will be able to draw plan and sectional elevation of reinforced concrete staircase
CO 4	Understand the basic concepts and methods of building drawing using AutoCAD Software
CO 5	The student will be able to prepare site plan, service plan, Septic tank and soak pit detailed drawing

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1	2	2	-	-	2	-	-	-	-	-	-
CO 2	3	3	-	-	3	-	-	-	-	-	-
CO 3	3	3	-	-	3	-	-	-	-	-	-
CO 4	3	3	-	-	3	-	-	-	-	-	-
CO 5	3	3			3						

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

Continuous Internal Evaluation Pattern:

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

End Semester Examination Pattern:

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 =24marks)	• 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 3 sub divisions. (4x9 = 36 marks)	60

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	General – Study of IS Codes of practice on building drawing – Scales- method of dimensioning. Sectional plan, sectional elevation, front view and joint details of Panelled door and Glazed windows	8
2	Types of Roof- Roofing- Elevation and joint details-Roof truss in steel sections. Types of Stairs- Plan and sectional elevation of reinforced concrete staircase	8
3	Building rules- Two storied and multi-storeyed building-Plan, section and elevation. Public buildings like offices, bank, dispensary etc.	8

4	Building rules -Industrial building- Plan, section and elevation. Preparation of site plan and service plan. Preparation of Septic tank and soak pit -detailed drawing	10

REFERENCE BOOKS

1. National Building Code of India.2016.

2. Kerala Municipal Building Rules,2019(Amended in 2023).

3. Dr. Balagopal T.S. Prabhu, Building Drawing and Detailing, Spades Publishers, Calicut.

SEMESTER 5
STRUCTURAL MECHANICS

Course Code	24SJMNCET509	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:1:0:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)		Course Type	Theory

Preamble: Structural Mechanics is a basic course in the analysis of structural systems. The course helps students to develop their analytical and problem-solving skills. The course introduces students to the various internal effects induced in structural members as well as their deformations due to different types of loading. After this course students will be able to analyse simple structural systems.

Course Outcomes: After the completion of the course the student will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Recall the fundamental terms/theorems associated with mechanics of linear elastic deformable bodies and explain the behavior/response of various structural elements under various loading conditions.	K3
CO2	Calculate the stresses/strains in structural elements subjected to axial load and bending/twisting moments.	K3
CO3	Analyse statically determinate beams and trusses to determine the internal forces.	K3
CO4	Determine the deflection of statically determinate beams.	K3
CO5	Analyse statically indeterminate beams and frames.	K3

Mapping of course outcomes with program outcomes (Minimum requirement)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1	2	-	-	-	-	-	-	-	-	-	-
CO 2	3	3	-	-	-	-	-	-	-	-	-
CO 3	3	3	-	-	-	-	-	-	-	-	-
CO 4	3	3	-	-	-	-	-	-	-	-	-
CO 5	3	3									

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

Continuous Internal Evaluation Pattern:

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Pattern:

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 =24marks)	• 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 3 sub divisions. (4x9 = 36 marks)	60

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Review of statics, Concept of stress and strain – types, Stress – strain relation - Hooke's law, Young's modulus of elasticity. Axially loaded bars with uniform cross section– stress, strain and deformation. Deformation of axially loaded bars with varying cross section and bars with varying axial loads. Torsion of circular shafts – stress and deformation, Power transmitted by circular shafts	9

2	Analysis of truss – method of joints and method of sections. Beams – different types. Types of loading on beams. Concept of bending moment and shear force. Shear force and bending moment diagrams of cantilever beams and simply supported beams for different type of loads	9
3	Theory of simple bending, assumptions and limitations. Calculation of normal stress in beams, moment of resistance Shear stress in beams (concept only). Moment-curvature relation. Deflection of beams by successive integration. Macaulay's method - Deflection of cantilever beams and simply supported beams	13
4	Statically indeterminate structures, degree of static and kinematic indeterminacy. Fixed beam – fixed end moments for simple cases of loading (No analysis required). Method of consistent deformation - Analysis of propped cantilever beam and continuous beams with maximum two redundant.	13

Text Books:

1. Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall International Series.
2. James M Gere, S.P. Timoshenko, Mechanics of Materials, CBS Publishers and Distributors, New Delhi.
3. R. K. Bansal, A Text book of Strength of Materials, Laxmi Publications (P) Ltd, New Delhi.7th edition,2024.

References:

1. R.C. Hibbeler, Structural Analysis, Pearson.
2. Devdas Menon, Structural Analysis, Narosa Publications.
3. H. J. Shah and S. B. Junnarkar, Mechanics of Structures Vol - I, Charotar Publishing House,8th edition.
4. S. Ramamrutham and R. Narayanan, Strength of Materials, Dhanpat Rai Publishing Co (P) Ltd,18th edition,2014.
5. B. C. Punmia, Ashok K. Jain, Arun Kumar Jain, Mechanics of Materials, Laxmi Publications(P)Ltd, New Delhi.2017.

ESTIMATION, COSTING AND VALUATION

Course Code	**24SJMNCET609**	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)		Course Type	Theory

Preamble: The course introduces the various types of estimation, specification writing, analysis of rate and various methods to determine the valuation of building. It enables the students to prepare the detailed estimate of various items of work related to civil engineering construction. This course trains the student to find out the valuation of building by various methods.

Prerequisite: Building drawing

Course Outcomes: After the completion of the course the student will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Explain the specifications for various items of work associated with building construction	K2
CO2	Analyse the unit rates of different items of work associated with building construction	K3
CO3	Prepare the approximate estimate of building	K3
CO4	Prepare detailed estimates of buildings and the bar bending schedules for R.C.C works	K3
CO5	Describe various principles and methods of valuation	K3
CO6	Determine the valuation of buildings by different methods	K3

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3									2	
CO 2	3									3	
CO 3	3	2								3	
CO 4	3	2								3	
CO 5	3	2									
CO 6	3	2									

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

Continuous Internal Evaluation Pattern:

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Pattern:

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 =24marks)	• 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 3 sub divisions. (4x9 = 36 marks)	60

Note: For analysis of rate and cost estimation, unit rate and labour requirement should be given along with the questions in the question paper. No other charts, tables, codes are permitted in the Examination Hall. If necessary, relevant data shall be given along with the question paper.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	General introduction- Quantity surveying- Basic principles, Types of Estimates- purposes, Specifications- General &detailed specification for building materials and execution of major item of work (Earth work excavation, masonry, concrete, finishing) of building work with reference to CPWD specifications-Method of measurement with reference to IS1200	9
2	Analysis of rates, Introduction to the use of CPWD schedule of rates as per latest DSR and Analysis of rate as per latest DAR, Overhead charges. Analysis of rates for Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing work, masonry work, stone works, flooring with reference to latest DSR and latest DAR .Types of tender, contracts, General and important conditions of contract, contract document(concept only). Duties and roles of client, architects/engineer, contractor and local bodies.	10
3	Detailed Estimate- Preparation of detailed measurement and abstract of estimate using Centreline method &Long wall short wall(separate wall) method for RCC single storey building, (students may answer the question by using any of the two methods)Septic tank and Soak Pit, preparation of Bar Bending Schedule– lintel, beams, slabs, RCC column footings	12
4	Valuation – explanation of different technical terms, purpose. Depreciation – methods of calculating depreciation – straight line method, constant percentage method, sinking fund method and quantity survey method, obsolescence. Principles of valuation of open land- comparative method, abstractive method, belting method, valuation based on hypothetical building schemes. Methods of valuation of land with building – rental method, direct comparison of capital cost, valuation based on profit, depreciation method. Free hold and leasehold properties, Forms of rent, Rent fixation- Methods	12

Text Books:

1. B. N. Dutta, Estimation and Costing in Civil Engineering, UBS Publishers,28th edition, 2020.

2. Rangwala, Estimation Costing and Valuation, Charotar publishing house Pvt. Ltd,18th edition,2023.

3. Dr. S. Seetha Raman, M.Chinna Swami, Estimation and Quantity Surveying, Anuradha Publications Chennai.

4. M Chakraborthy, Estimating, Costing, Specification and Valuation, published by the author, 21 B, Babanda Road, Calcutta 26,29[th] edition,2006.

References:

1. B S Patil, Civil Engineering Contracts and Estimates, University Press

2. V N Vazirani& S P Chandola, Civil Engineering Estimation and Costing, Khanna Publishers

3. IS 1200-1968; Methods of Measurement of Building &Civil Engineering Works

4. CPWD DAR 2018 and DSR 2018 or latest