## CURRICULUM, SCHEME OF EXAMINATIONS AND SYLLABUS (2013 SCHEME)

**M.TECH in CIVIL ENGINEERING (STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT)**

**UNIVERSITY OF KERALA**

### SEMESTER I

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of Subject</th>
<th>Credits</th>
<th>Hrs / week</th>
<th>End Sem Exam hours</th>
<th>Marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMC 1001</td>
<td>Advanced Computational Mathematics</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40 60 100</td>
<td>Of the 40 marks of internal assessment 25 marks for test and 15 marks for assignment. End sem exam is conducted by the University</td>
</tr>
<tr>
<td>CMC 1002</td>
<td>Dynamics of Structures</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40 60 100</td>
<td>do</td>
</tr>
<tr>
<td>CMC 1003</td>
<td>Advanced Design of Structures</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40 60 100</td>
<td>do</td>
</tr>
<tr>
<td>CMC 1004</td>
<td>Construction Management and Planning</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40 60 100</td>
<td>do</td>
</tr>
<tr>
<td>CSC 1004*</td>
<td>Experimental Stress Analysis and Instrumentation</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40 60 100</td>
<td>do</td>
</tr>
<tr>
<td>CSC 1005*</td>
<td>Theory of Elasticity</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40 60 100</td>
<td>do</td>
</tr>
<tr>
<td>CMC 1101</td>
<td>Structural Engineering Lab</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>100</td>
<td>No End Semester Examinations</td>
</tr>
<tr>
<td>CMC 1102</td>
<td>Seminar</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>100</td>
<td>do</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>21</td>
<td>22</td>
<td></td>
<td></td>
<td>7 hrs of Departmental Assistance work</td>
</tr>
</tbody>
</table>
## SEMESTER II

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of Subject</th>
<th>Credits</th>
<th>Hrs / week</th>
<th>End Sem Exam hours</th>
<th>Marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Internal Continuous Assessment</td>
<td>End Semester Exam</td>
</tr>
<tr>
<td>CMC 2001</td>
<td>Construction Project Implementation and Review</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>CSC 2002*</td>
<td>Analysis and design of Earthquake Resistant Structures</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>**</td>
<td>Stream Elective I</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>**</td>
<td>Stream Elective II</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>**</td>
<td>Department Elective</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>CMC 2003</td>
<td>Research Methodology</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>CMC 2101</td>
<td>Advanced Computational Lab</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>CMC 2102</td>
<td>Thesis – Preliminary – Part I</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>CMC 2103</td>
<td>Seminar</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
| TOTAL    |                                                      | 22      | 23         |                    | 6hrs of Departmental Assistance work    |}

---

6hrs of Departmental Assistance work
List of Stream Electives (SEMESTER II)

Stream Elective I – Structural Engineering (Students should select a subject from this group)

- CSE 2001* Advanced Pre-Stressed Concrete Design
- CME 2001 Stability of Structure
- CSE 2003* Structural Optimization

* These subjects are the same as those offered for the Structural Engineering Stream.

Stream Elective II - Construction Management (Students should select a subject from this group)

- CME 2002 Production and Materials Management
- CME 2003 Project Cost Management
- CME 2004 Energy Management in Buildings

List of Department Electives (SEMESTER II)

- CMD 2001 Design of Offshore Structures
- CMD 2002 Design of Bridges
- CMD 2003 Strength and Behaviour of Structural Materials
- CMD 2004 Analysis and Design of Sub-Structures
- CMD 2005 Geographical Information Systems
- CMD 2006 Remote Sensing and its Application
- CMD 2007 Quantitative Methods in Construction Management
- CMD 2008 Organizational Behaviour
- CMD 2009 Management of Quality and Safety in Construction
- CMD 2010 Construction Productivity Improvement
# SEMESTER III

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of Subject</th>
<th>Credits</th>
<th>Hrs / week</th>
<th>End Sem Exam hours</th>
<th>Marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Assessment</td>
<td>End Semester Exam</td>
</tr>
<tr>
<td>**</td>
<td>Stream Elective III</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>**</td>
<td>Stream Elective IV</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>***</td>
<td>Non- Dept. (Interdisciplinary) Elective</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>CMC 3101</td>
<td>Thesis – Preliminary – Part II</td>
<td>5</td>
<td>14</td>
<td>-</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>14</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**List of Stream Electives (SEMESTER III)**

**Stream Elective III – Structural Engineering (Students should select a subject from this group)**

- CSE 3001* High Rise Structures
- CSE 3002* Engineering Applications of Artificial Intelligence and Expert System

* These subjects are the same as those offered for the Structural Engineering Stream

**Stream Elective IV - Construction Management (Students should select a subject from this group)**

- CME 3002 Civil Engineering Material Science
- CME 3003 Construction Methods and Equipment
- CME 3004 Construction Supervision, Repair and Maintenance of Buildings
- CME 3005 Construction Economics and Finance
<table>
<thead>
<tr>
<th>Code No</th>
<th>Subject Name</th>
<th>Credits</th>
<th>Hrs/week</th>
<th>Continuous Assessment</th>
<th>University Exam</th>
<th>Total</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 % of the evaluation mark is earmarked for Publication in journal/conference</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>21</td>
<td>150 Evaluation Committee</td>
<td>150 Thesis Evaluation</td>
<td>200 Viva Voce</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 hrs of departmental assistance work</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12</td>
<td>21</td>
<td>150 Guide</td>
<td>150 Thesis Evaluation</td>
<td>200 Viva Voce</td>
<td>600</td>
</tr>
</tbody>
</table>
SYLLABUS

SEMESTER I

CMC 1001  ADVANCED COMPUTATIONAL MATHEMATICS

Structure of the Course
Lecture: 3 hrs/ Week  Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
- To give awareness to different numerical solutions.
- To impart ability to apply mathematics for finding solutions to real-time problems.

Learning Outcomes
- Understand various computational methods available to solve practical problems
- Enhance the capacity to select appropriate techniques for tackling problems in engineering and science.

Module I

Module II

Module III

Note: Stress must be given to structural problems
Assignments must be computer oriented
References

Structure of the Question paper
For the end semester examination there will be three questions from each module out of which two questions are to be answered by the students.
CMC 1002  DYNAMICS OF STRUCTURES

Structure of the Course
- Lecture: 3 hrs/ Week
- Credits: 3
- Internal Continuous Assessment: 40 Marks
- End Semester Examination: 60 Marks

Course Objectives
- To understand the behaviour of structures under dynamic loads
- To familiarise with the dynamic analysis of structures subjected to time varying loads

Learning Outcomes
- Will be equipped with the analytical tools required to determine the dynamic response of structures
- Will serve as a pre-requisite to study the subject “Analysis and design of earthquake resistant structures”

Module I

Module II

Module III

References


**Structure of the Question paper**

For the end semester examination there will be three questions from each module out of which two questions are to be answered by the students.
CMC 1003  ADVANCED DESIGN OF STRUCTURES

Structure of the Course
Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
This course is designed to
- Provide the ability in analysis and design of basic reinforced concrete components
- Study of advanced topics including theory and design of reinforced concrete structures

Learning Outcomes
- Understand the theory and design of the main elements in reinforced concrete structures
- Understand the behaviour of reinforced concrete structures
- Carry out calculations on safety verification of reinforced concrete members
- Understand the design of special reinforced concrete members and components

Module I

Module II
Design of special RC members- Analysis of shear walls- distribution of lateral loads in uncoupled shear walls, Shear wall frame interactions. Design of concrete corbels, deep beams, ribbed slabs, pile caps.

Module III

References
5. IS 456 –2000, Indian Standard for Plain and Reinforced Concrete- Code of Practice, New Delhi
6. American Concrete Institute, Building Code Requirements for Structural Concrete (ACI 318-02) and Commentary (ACI 318R-02)

**Structure of the Question paper**
For the End Semester Examination the question paper will consist of 60% Design problems and 40 % Theory. There will be three questions from each module out of which two questions are to be answered by the students.
CMC 1004  CONSTRUCTION MANAGEMENT AND PLANNING

Structure of the Course
Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
This course is designed to
- Provide the student with an in-depth knowledge in construction planning
- Study of advanced topics in construction economics, contracts and project planning and control

Learning Outcomes
- Understand the theory and problems in construction economics
- Understand the process of bidding and awarding construction contracts
- Understand the theory and practice in construction planning scheduling and control

Module – I

Module – II

Module – III

REFERENCES
1. Kumar NeerajJha, Construction Project Management Theory & Practice, Pearson
3. Punmia B C, Project Planning and Control with PERT and CPM, Laxmi Publications

**Structure of the Question paper**
There will be three questions from each module out of which two questions are to be answered by the students.
CSC 1004*  EXPERIMENTAL METHODS AND INSTRUMENTATION

Structure of the Course

Lecture : 3 hrs/ Week                     Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course objectives

- Design experiments related to stress analysis problems
- Learn methodology for conducting laboratory and field experiments
- Analyse and interpret experimental observations and results

Learning outcomes

- Capability to provide suitable instrumentation for conducting experiments
- Acquire capacity to organize laboratory experiments for project and thesis works
- Building capacity to conduct destructive and nondestructive experiments as a practicing engineer

Module I

The measurement system: Purpose Structure and Elements - Characteristics of measurement system - Accuracy, Precision, Repeatability; Calibration – Standards and evaluation; Dynamic Characteristics – zero order, first order and second order instruments.
Measurement of Strain: Electrical resistance strain gauges - Gauge materials - gauge construction – gauge factor; Vibrating wire strain gauges; strain gauge bridges – Potentiometric and Wheatstone bridge - sensitivity –Strain Gauge rosettes
Force transducers: Load cells different types – design of force transducers; Force balance pressure gauges – construction - sensitivity.

Module II

Measurement of displacement: Potentiometers – different types; Linear variable differential transformer – principle and working.
Photo elasticity- use of polarised light - Maxwell’s law - Polariscopes and their use; Photoelastic model materials ; Two dimensional photo elasticity - analysis and reduction of data.

Module III

Non Destructive Testing Methods- Ultrasonic Methods; Hardness methods - Rebound Hammer; Core sampling technique; Pullout experiment; Detection of embedded reinforcement.
Indicating & recording elements – Chart recorders – Cathode ray oscilloscope; Computer based data acquisition systems – structure and components.
Statistical Analysis - Errors in measurement, Best estimate of true value, Normal Distribution, Confidence level.
References

Structure of the Question paper
For the End Semester Examination there will be three questions from each module out of which two questions are to be answered by the students.
CSC 1005  THEORY OF ELASTICITY

Structure of the Course
Lecture : 3 hrs/ Week  Credits: 3
Internal Continuous Assessment  : 40 Marks
End Semester Examination  : 60 Marks

Course Objectives
• To understand the behaviour of linear elastic solids under loads
• Provide a firm foundation for more advanced courses, for research and practise in civil engineering fields
• To provide the student with various solution strategies while applying them to practical cases

Learning Outcomes
• Understand concepts, principles and governing equations in dealing with elastic solids
• Understand the methods for solving elastic boundary value problems
• To obtain skill and capability in civil engineering in analysing and solving problems

Module I
Analysis of stress and strain in 3D:
Strain tensor – Strain displacement relations for small deformations – Compatibility conditions – Strain transformations – Principal strains – Strain invariants.

Module II
Two dimensional problems in Rectangular coordinates:
Plane stress and plane strain problems – Airy’s stress function - Solution by polynomials – Bending of cantilever loaded at free end., Bending of simply supported beam with udl.
Two dimensional problems in polar coordinates:
General equations- Equilibrium equations, Strain displacement relations and Stress strain relations. Biharmonic equations and Airy’s stress functions.
Problems of axisymmetric stress distributions - Thick cylinders - Stress concentration due to circular hole in plates (Kirsch’s problem).

Module III
Torsion of prismatic bars: Saint Venant’s Semi inverse and Prandtl’s stress function approach – Torsion of Straight bars – Elliptic and Equilateral triangular cross section. Torsion of thin walled open and closed tubes, Membrane Analogy
Plasticity: Basic concepts and yield criteria; Equations of plasticity, Theories of strength, Yield criteria, elasto-plastic analysis of torsion and bending problems.
References

Structure of the Question paper
For the End Semester Examination the question paper will consist of 60% problems and 40 % Theory. There will be three questions from each module out of which two questions are to be answered by the students.
CMC 1101  STRUCTURAL ENGINEERING LAB

Structure of the Course
Lab : 2 hrs/ Week  Credits : 1
Internal Continuous Assessment : 100 Marks

Course Objectives
- Practical training for conducting experiments related to structural engineering.
- Capability to use softwares for analysis of experimental data.

Learning Outcomes
- Acquire capacity to organise experiments for project and thesis works.
- Ability to analytically study the experimental results.

List of Experiments:
1. Review of testing methods of cement, coarse aggregate and fine aggregate as per Indian Standards.
2. Study of various instruments used for determining the material properties of concrete, steel, SCC etc
3. Design of concrete mixes.
4. Study of instruments used for determining the durability of materials
5. Calibration of various instruments and equipment used in the lab
6. Experimental study of behaviour of
   a) RCC structural elements
   b) Steel structural elements
7. Accelerated curing experiments for concrete.
8. Non-destructive testing of concrete
   a) Rebound hammer
   b) Core cutting
   c) Ultrasonic pulse velocity
   d) Pullout test
   e) Detection of embedded reinforcements
9. Study of computing techniques for numerical analysis of experimental data, error analysis and curve fitting.

The CA marks shall be awarded on the basis of performance in the laboratory, work report/record of experiments and a viva voce examination conducted at the end of the course.
Structure of the Course

Duration : 2 hrs/ Week
Credits : 2
Internal Continuous Assessment : 100 Marks

The student has to present a seminar in one of the current topics in the stream of Structural Engineering. The student will undertake a detailed study based on current published papers, journals, books on the chosen subject, present the seminar and submit seminar report at the end of the semester.

Distribution of Marks
Seminar Report Evaluation – 40 marks
Seminar Presentation – 60 marks
SEMESTER II
CMC 2001 CONSTRUCTION PROJECT IMPLEMENTATION AND REVIEW

Structure of the Course
Lecture : 3 hrs/ Week Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
This course is designed to
- Provide the student with an in-depth knowledge in construction management
- Study of advanced topics in construction management which includes productivity improvement, quality management and safety management

Learning Outcomes
- Understand the theory and problems in construction productivity improvement
- Understand the theory and problems in quality and safety management

Module – I

Module – II

Module – III

References
2. Productivity Improvement in Construction – Clarkson Oglesby, Henry Parker, Gregory Howell (McGrawHill Book Company, Inc.)
6. Construction Project Management Theory & Practice – Kumar NeerajJha, Pearson India
7. Managing For Total Quality – From Deming to Taguchi and Statistical Process Control, N. Logothetis, Prentice Hall of India Pvt Ltd.
Structure of the Question paper
For the End Semester Examination the question paper will consist of 20% problems and 80% Theory. There will be three questions from each module out of which two questions are to be answered by the students.
Structure of the Course

<table>
<thead>
<tr>
<th>Lecture : 3 hrs/ Week</th>
<th>Credits : 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Continuous Assessment</td>
<td>: 40 Marks</td>
</tr>
<tr>
<td>End Semester Examination</td>
<td>: 60 Marks</td>
</tr>
</tbody>
</table>

Course Objectives

- To impart awareness about the effect of earthquakes on structures.
- To study IS code provisions for the analysis, design and detailing of earthquake resistant structures

Learning Outcomes

- Understand various aspects of earthquake engineering
- Capable of design and detailing of earthquake resistant structures
- Awareness about disaster management due to earthquakes.

Module I

Elements of earthquake engineering- characteristics of ground motion – earthquake intensity and magnitude- recording instruments -seismic zoning- earthquake effects on different types of structures- Effect of architectural features and structural irregularities- review of damages during past earthquakes

Module II

Principles and guidelines for earthquake resistant design of structures- Design lateral forces- Static analysis – Dynamic analysis- Shear walls

Module III

IS Code provision for design and detailing for earthquake resistance- reinforcement detailing for members and joints- design examples. Repair and rehabilitation of damaged structures- case studies- methods for disaster mitigation- Vulnerability assessment and seismic evaluation of structures – vulnerability reduction

References

**Structure of the Question paper**
For the End Semester Examination the question paper will consist of 60% Design or Analysis problems and 40 % Theory. There will be three questions from each module out of which two questions are to be answered by the students.
STREAM ELECTIVE I – Structural Engineering

(Students should select one subject from this group)

CSE 2001* ADVANCED PRE-STRESSED CONCRETE DESIGN 3 – 0 – 0 - 3

Structure of the Course
Lecture: 3 hrs/ Week  Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
- To impart to students the knowledge of methods of prestressing, analysis and design of various prestressed concrete elements under relevant codal provisions

Learning Outcomes
- Understand and use suitably the different concepts of prestressing.
- Comprehend the design of various prestressed concrete members used in practice

Module I
Basic concepts and brief history of prestressing, advantages and limitations of prestressing, types of prestressing, prestressing systems and devices, concrete and steel used in prestressed concrete, losses in prestress, analysis of members under flexure, shear and torsion.

Module II
Design of axially loaded members, flexural members – Type I and Type II sections, limiting zone, design of end block, design for shear and torsion, calculation of deflection and crack width, detailing of reinforcement, design of one way and two way slabs, analysis and design of continuous beams.

Module III

References
3. Rajagopalan, N, Prestressed Concrete, Alpha Science, 2002
4. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
6. IS 1343: 1980 Indian Standard Code of Practice for Prestressed Concrete
7. IS 456: 2000 Indian Standard Code of Practice for Plain and Reinforced Concrete

Structure of the Question paper
For the End Semester Examination the question paper will consist of 60% Design problems and 40% Theory. There will be three questions from each module, out of which two questions are to be answered by the students.
Structure of the Course

Lecture : 3 hrs/ Week 
Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

• The ability to identify the importance of optimization in the engineering field
• Should be able to use optimization techniques for real life time applications
• Ability to apply optimization concepts for solving multi task applications

Learning Outcomes

• Understand various optimization methods
• Understand capabilities of optimization programmes
• Understand, analyse various techniques and apply them for real time applications

Module I
Problem formulation with examples- Single Variable Unconstrained Optimization Techniques – Optimality Criteria - Interpolation methods -Gradient Based methods

Module II
Multi Variable Unconstrained Optimization Techniques – Optimality Criteria.
Unidirectional Search - Direct Search methods - Simplex method - Gradient based methods - Constrained Optimization Techniques –Classical methods - Linear programming problem

Module III
Indirect methods - Direct methods Specialized Optimization techniques - Dynamic programming, Geometric programming, Genetic Algorithms.

References
2. Deb, K., Optimisation for Engineering Design – Algorithms and examples, Prentice Hall.

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
Structure of the Course
Lecture : 3 hrs/ Week  
Credits : 3  
Internal Continuous Assessment : 40 Marks  
End Semester Examination : 60 Marks

Course Objectives
- Provides students a strong background in buckling phenomenon, buckling in columns, beam columns, frames, plates and shells  
- Gives an idea of situations where the different structures are susceptible to buckling

Learning Outcomes
- Students become aware of the actual situations where stability becomes a governing factor

Module I
Large Deformation Theory for Columns. The Behaviour of Imperfect Columns. Eccentrically Loaded Column. Inelastic Buckling of Columns- Double Modulus Theory- Tangent Modulus Theory

Module II
Buckling of Built up Columns, Non-prismatic members- Effect of shear on critical Loads
Torsional Buckling. Torsional and Torsional – Flexural Buckling of Columns, Lateral Buckling of Beams. Continuous beams with axial load.

Module III
Stability of a frame by Matrix Analysis
Buckling of Plates – Differential Equation of Plate Buckling – Critical Load of a plate uniformly compressed in one direction. Tension field behavior in Plate Girder Webs Postbuckling behavior of axially compressed plates. Instability of shells

References

**Structure of the Question paper**
For the end semester examination there will be three questions from each module out of which two questions are to be answered by the students.
CME 2002  PRODUCTION AND MATERIALS MANAGEMENT     3 – 0 – 0 - 3

Structure of the Course
Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To give an idea of material management in industries as well as in sites, encompassing material planning, store functions, inventory and related costs, replenishment etc.
• Deals with related concepts like Value Engineering, Standardization, Selective Control etc.
• To give an insight into the potential of computers in material management.

Learning Outcomes
• Understand methods of inventory management
• Able to use computer applications in material management

Module I
Material management functions-standardization-codification-simplification-diversification-stores-stores functions

Module II
Inventory management - types of inventory - inventory control - costs associated with inventory - Selective control - ABC analysis - Economic order quantity - Replenishment systems - Perpetual Review system - periodic review system - Quantity to be recouped.

Module III
Production Planning and control functions - loading and scheduling- aggregate production planning Cost reduction through materials management- standardization and variety reduction-value analysis- value function- cost and worth- selection of items for value analysis- techniques-value analysis job plan - Computer application in material management-ideal areas for computerization.

References
1. Industrial Purchasing and Effective Material Management – Raymond R Calton& Walter F Rohrs.
3. Integrated Concept of Material Management – N.M. Sha

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
Structure of the Course

Lecture : 3 hrs/ Week  
Credits : 3  
Internal Continuous Assessment : 40 Marks  
End Semester Examination : 60 Marks

Course Objectives
- To introduce concepts in estimation of project cost  
- To impart importance of project cost and value management  
- To give an overview of various methods of cost control

Learning Outcomes
- Understand methods of preparing project estimates  
- Understand various cost control methods in construction project management

Module I

Module II
Project cost and value management – Project cost management – collection of cost related information – cost codes – cost statement – value management in construction – steps in the application of value engineering – introduction to whole life costing

Module III

References
1. Construction Project Management Theory & Practice – Kumar NeerajJha, Pearson  
2. Building Estimation ,costing and valuation- Chakraboorthy  
5. Construction Cost Management Learning from case studies - Keith Potts, Taylor & Francis

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
CME 2004 ENERGY MANAGEMENT IN BUILDINGS 3 – 0 – 0 - 3

Structure of the Course
- Lecture : 3 hrs/ Week
- Credits : 3
- Internal Continuous Assessment : 40 Marks
- End Semester Examination : 60 Marks

Course Objectives
- To introduce concepts of energy efficient building construction
- To impart importance of Sustainable development

Learning Outcomes
- Understand various concepts in energy management in buildings
- Insight into minimum requirements for the energy-efficient design and construction of buildings.

Module I
Energy scenario – Basics of Energy and its various forms- Energy Management and audit
Need for the Energy Conservation Concept of conventional, non-conventional, renewable, non-renewable energy sources Application of non conventional and renewable energy sources- Solar, wind, bio, hydro and tidal energy sources

Module II
Thermal performance characteristics of building elements Passive, active and hybrid systems of thermal comfort ,Energy efficient technologies in lighting, HVAC systems and electrical systems Role of designing according to the climate, Form, planning, layout, specification for walls and roofs,– Orientation, openings and ventilation, Conservation through landscape design– Shelter for hot-dry, warm-humid, composite climates, Energy efficiency in Traditional Kerala buildings

Module III
Energy Efficient buildings - Relation between Energy Efficiency and Sustainable development -Elements of energy efficient buildings -Introduction to the concepts of Green Buildings – Various rating systems for the assessment of sustainability - Indian systems TERI GRIHA, LEED India rating. Zero energy buildings

References
DEPARTMENT ELECTIVE
(Students should select one subject from this group)

CSD 2001 DESIGN OF OFFSHORE STRUCTURES

Structure of the course

Lecture: 3hrs/Week Credits: 3
Internal continuous assessment: 40 marks
End semester Examination: 60 marks

Objective:
The course is designed to expose the students to the elementary design of offshore structures. The students undergoing the course is expected to understand the basic theory behind the design of offshore structures which includes the evaluation of environmental forces viz. Wave force current force & wind load in addition to the imposed and live load. This will also familiarize the students to the design of tubular members, its joint, and fatigue effects.

Outcome:
The students will be capable of taking further advanced research / Design and development projects in the emerging & challenging area of offshore structural design. They will also be capable of taking up job assignments in the highly potential area of Offshore and coastal engineering.

Module I
Introduction to Ocean oil gas and other resources – near shore structures - Different types of ocean structures and systems - Gravity, fixed, floating semi submersibles, compliant structure-Tension legged platform, guyed tower and Spar Platforms
Basics of wave motion, Wave kinematics, pressure field under wave system, wave energy, Energy propagation (Energy flux or wave power), group velocity in deep and shallow water conditions-related problems.
Wave Transformations- Shoaling, refraction – refraction patterns on different bed configurations-problems considering shoaling and refraction effects, wave reflection wave diffraction, wave breaking in deep water, transitional water and shallow water, types of breakers.

Module II
Environmental load calculation (wind, wave, current and tidal) and design parameters Wave forces on offshore structures Morisons Equation for calculation of wave force on slender tubular members
Wave forces on large structures Linear diffraction theory
Basic principles of design of concrete offshore platforms - Jack up platforms, Compliant Platforms - Design principles of - Tension leg platform Spar Platforms.
Design of Tubular members Problems on checking the sufficiency of tubular members under different loading conditions in conformity with the API-Code.

Module III
Tubular Joints—different types. Analysis of Joints, Stress concentration factor, (API Code formulae for simple joints only) Fatigue failure—SN curves Cumulative damage ratio Palmgren Miner rule Evaluation of Fatigue life of components

Sub sea pipeline—pipeline safety. Design Process—internal pressure—external pressure. On bottom stability objective—static analysis. Laying Pipeline—different methods

References:
7. Minoo H Patel Dynamics of Offshore Structures Butterworth

Question paper:

Duration: 3 Hrs.
There will be three questions from each module. The candidate has to answer any two full question from each module.

Note: No charts, tables, codes are permitted in the Examination hall. If necessary the same shall be given along with the question paper by the question paper setter.
CMD 2002 DESIGN OF BRIDGES

Structure of the course

Lecture: 3hrs/Week  
Credits: 3  
Internal continuous assessment:  40 marks  
End semester Examination:  60 marks

Course Objectives

- To understand the theory and design methods of various forms of bridges.

Learning Outcomes

- Students should be able to select a particular form of bridge to suit the requirements and analyse, design the same.

Module I

Classification and components of bridge. Review of road and railway bridge specifications and IRC provisions.

Foundation and substructure: Types of foundations, Piers and abutments- Forces on piers and abutments, Design of piers and abutments, bed blocks.

Bearings: Concrete, steel and neoprene bearings, Design of elastomeric pad bearings.

Module II

Bridge decks- Grid analysis- Courbons method- Orthotropic plate theory.

R. C. Bridges: Design of R. C bridge decks-slab bridges- Design of T beam bridges and balanced cantilever bridges. Introduction to – continuous girder bridges, box girder bridges, rigid frame bridges and arch bridges

Module III

Pre-stressed Concrete Bridges: Design of single span bridges- Introduction to various forms. Slab bridges-girder bridges-box girder bridges-Steel bridges: Design of plate girder and Pratt truss bridges, Introduction to suspension bridges and cable stayed bridges.

References

2. Vazirani V. N., Design of Concrete Bridges, Khanna Publishers, 2004

Structure of the Question paper
For the end Semester Examination the question paper will consist of 60% design problems and 40% theory. There will be three questions from each module out of which two questions are to be answered by the students.
CMD 2003 STRENGTH AND BEHAVIOUR OF STRUCTURAL MATERIALS

Structure of the course

Lecture: 3hrs/Week  Credits: 3
Internal continuous assessment:  40 marks
End semester Examination:  60 marks

Course Objective:

- To teach the modern trends in material technology and study the performance of modern structural materials with respect to strength and durability.

Learning Outcome:

- Students will become aware of use of modern construction materials, their application in typical locations. May be useful in exposing the students on latest research techniques.

Module I
Microstructure of hardened concrete – Aggregate phase, hydrated cement paste, interfacial transition zone.
Dimensional stability of concrete – Elastic behaviour, shrinkage and creep.

Module II
Durability of concrete – physical and chemical causes, concrete exposed to seawater and fire.
Special concretes – properties, mix design and application of lightweight concrete, high-strength concrete, fibre reinforced concrete, polymer concrete, recycled aggregate concrete, self-compacting concrete.

Module III
Steel and metal alloys – structural properties, tests, temperature effects.
Heat treatment of steels, special steels and protection of steel reinforcement.
Materials for thermal insulation, sound insulation and decorative finishes.
Recent developments in the use of glass, plastic, rubber and wood products.

REFERENCES:

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
CMD 2004 ANALYSIS AND DESIGN OF SUBSTRUCTURES  3 – 0 – 0 - 3

Structure of the Course

Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

• Ability to identify the soil-structure interaction
• Ability to select suitable foundation for different types of structures
• Should be able to analyse and design substructures

Learning Outcomes

• Basic understanding of type and selection of foundations
• To analyse and design foundations

Module I

Introduction to soil-structure interaction - Soil-structure interaction problems. Contact pressure distribution beneath rigid and flexible footings on sand and clay - Contact pressure distribution beneath raft. Selection of foundations. Structural design of spread footing, combined Footing and raft foundation.

Module II

Pile foundation: Introduction - Estimation of pile capacity by static and dynamic formulae-Settlement of single pile - Laterally loaded piles - Brom’s method - Ultimate lateral resistance of piles - Pile groups - Consideration regarding spacing - Efficiency of pile groups – Pile Cap-Structural Design of Pile and pile cap

Module III

Retaining Walls-Types - Stability analysis of cantilever retaining walls against overturning and sliding-Bearing capacity considerations- Structural design of retaining walls

Introduction to well foundations – Elements of well foundations – Types – Sinking stresses in wells – Design of well cap, Well steining, well curb, cutting edge and bottom plug

References


Structure of the Question paper

For the End Semester Examination the question paper will consist of three questions from each module out of which two questions have to be answered by the students.
Structure of the Course

Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

- To create general awareness about the principles of GIS

Learning Outcomes

- To enable the students to apply principles of GIS to different complex problems in Civil Engineering

Module I

Geographic information system (GIS) – definition, components – data acquisition and data management – manipulation and analysis – hydrologic modeling and GIS – Geographic data in the computer – Database structures and database management, data structures for representing the geometry of a spatial phenomena. Raster and vector models. Data input, verification, storage and output

Module II


Module III

Analysis of discrete entities in space, operation on attributes, buffering, connectivity, Spatial analysis using continuous fields, interpolation, spatial filtering, derivatives of continuous surface, deriving surface topology and drainage networks, clumping, view sheds, shaded relief, irradiance, spatial analysis in surface water hydrology. Source errors in spatial data, factors affecting reliability of spatial data.

References

Structure of the Question paper

For the End Semester Examination the question paper will consist of three questions from each module out of which two questions have to be answered by the students.
Structure of the Course

Lecture: 3 hrs/ Week  
Credits: 3  
Internal Continuous Assessment: 40 Marks  
End Semester Examination: 60 Marks

Course Objectives

- To create general awareness about the principles of photogrammetry and remote sensing

Learning Outcomes

- To enable the students to process the remote sensing data to apply it for various problems in the area of Civil Engineering

Module I

Fundamental of Photogrammetry: Geometric characteristics of aerial photographs – Photographic scale – Photo co-ordinates and ground co-ordinates – relief displacement – Image parallax – Ground control – Flight Planning


Module II

Types of Satellites, Sensors and Images:

Types of satellites – Orbital path – Swath width – IFOV  
Along track and across track scanners. Multi spectral, Thermal and radar images – image resolution – image distortions  

Module III

Digital image processing: Image rectification and restoration – image enhancement – image classification

Applications of remote sensing: Land use and land cover mapping – Geologic and soil mapping – terrain classification and evaluation – Water pollution detection – Flood mapping – snow mapping – urban and regional planning

References:

1. T.M. Lillesand and R. W. Kiefer, Remote Sensing and Image Interpretation, John Willey and Sons, 1979
CME 2007 QUANTITATIVE METHODS IN CONSTRUCTION MANAGEMENT

Structure of the Course
Lecture : 3 hrs/ Week Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To give awareness to different basic concepts of probability and operations research in engineering

Learning Outcomes
• Understand various optimisation methods in engineering systems.
• Enhance the capacity to apply the theory of optimisation in different varieties of network problems from engineering field.

Module I
Introduction-concepts in probability and statistics-linear programming-formation and solution-transportation and assignment problems.

Module II
Dynamic programming-waiting line models- decision theory- game theory

Module III
Computer applications-network preparation and computation- scheduling and allocation-simulation-solution to problems using appropriate software.

References

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
Structure of the Course
Lecture : 3 hrs/ Week
Internal Continuous Assessment : 3
End Semester Examination : 40 Marks

Course Objectives
The course is designed to provide an understanding of organizational behavior, the processes of recruitment, training and development of employees.

Learning Outcomes
It helps one understand the complexities of attitudes and how to bring out the best from individuals and groups.

Module 1
Definition of management – managerial functions – inter relationship between managerial functions - managerial skills – roles of managers.
Overview of Organizational Behaviour-Responding to global and cultural diversity -
Foundations of individual behavior – perception - individual decision making – values –
attitudes - Analysis and design of jobs - Human Resource Planning - Procurement -
Recruitment and selection - Induction and placement - Training and development.

Module 2
Motivation of individuals – theories of motivation - Maslow’s theory –Herzberg’s model –
McClelland’s three need model – Vroom’s expectancy theory – McGregor’s theory.
Leadership – definition – leaders vs. managers – styles of leadership - Theories of leadership

Module 3
Communication – importance and process – directions of communication – media and types of communication - factors affecting communication – barriers to communication –
improving interpersonal and organizational communication - Transactional analysis

References
2. Organizational Behaviour – Stephen Robbins, Pearson

Structure of the Question paper
There will be three questions from each module out of which two questions are to be answered by the students.
CME 2009 MANAGEMENT OF QUALITY AND SAFETY IN CONSTRUCTION

Structure of the Course
Lecture : 3 hrs/ Week Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
This course is designed to

- Provide the student with an in-depth knowledge in quality management
- To impart knowledge about the importance of safety in construction

Learning Outcomes

- Understand the various tools of quality and apply it to construction
- Understand the importance of quality and safety and to develop manuals

Module – I
Construction quality – definitions – inspection, quality assurance and control - total quality management concepts – PDCA cycle – quality gurus and their teachings - Deming, Juran and Crosby’s philosophies

Module – II

Module – III

References
1. Construction Project Management Theory & Practice – Kumar NeerajJha, Pearson India

Structure of the Question paper
There will be three questions from each module out of which two questions are to be answered by the students.
Structure of the Course

Lecture : 3 hrs/ Week  
Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

- The course is designed to provide an understanding of importance of productivity, tools which can be used to measure construction productivity, productivity improvement methods

Learning Outcomes

- It helps one understand the importance of improving productivity and to solve related problems in construction sites by applying suitable tools and techniques.

Module – I


Module – II

Factors Influencing Productivity – Sources of Lost Time –Tools to Identify Productivity Loss Productivity Improvement Methods – Influence of Human Factors on Productivity – Motivation – Methods of Motivating for Improved Productivity

Module – III


References


Structure of the Question paper

There will be three questions from each module out of which two questions are to be answered by the students.
CCC 2003 RESEARCH METHODOLOGY
Structure of the Course
Practical : 2 hrs/ Week Credits : 1
Internal Continuous Assessment : 100 Marks
No End Semester Examination

Course Objectives
• Ability to identify the response of structures subjected to dynamic loading
• Provide a firm foundation for research and practise in civil engineering
• Ability to solve dynamic problems numerically

Learning Outcomes
• Understand concepts and principles involved in structural dynamics
• To train the students to perform experimental work for project and thesis

Details of Experiments
1. Free Vibration of Cantilever beam.
2. Dynamics of simply supported beam subjected to harmonic load.
3. Dynamics of a three storied building frame subjected to harmonic base motion
4. Dynamics of a single storied building frame with planar asymmetry subjected to harmonic base motion
5. Vibration isolation of a secondary system
6. Dynamics of a vibration absorber
7. Dynamics of a four storied building frame with and without an open ground floor
8. Dynamics of a single span and two span beams
9. Dynamics of free standing rigid bodies under base motion (Demonstration only)

Note: Results obtained from experiments may be numerically verified wherever possible.
CMC 2102 THESIS PRELIMINARY PART – I

Structure of the Course

Hours/week: 2  
Credits: 2  
Internal Assessment: 100 Marks

For the Thesis - Preliminary Part I, the student is expected to start the preliminary background studies towards the Thesis by conducting a literature survey in the relevant field. He/she should broadly identify the area of the Thesis work, familiarize with the design and analysis tools required for the Thesis work and plan the experimental platform, if any, required for Thesis work. The student will submit a detailed report of these activities at the end of the semester.

Distribution of Marks

Internal assessment of work by the guide: 50 marks  
Internal evaluation by the committee: 50 marks

CMC 2103 SEMINAR

Structure of the Course

Duration: 2 hrs/Week  
Credits: 2  
Continuous Assessment: 100 Marks

The student is expected to present a seminar in one of the current topics in the stream of Construction Management. The student will undertake a detailed study based on current published papers, journals, books on the chosen subject, present the seminar and submit seminar report at the end of the semester.

Distribution of Marks

Seminar Report Evaluation: 40 marks  
Seminar Presentation: 60 marks
SEMESTER III
Stream Elective III - Structural Engineering
(Students should select one subject from this group)

CSE 3001* HIGH RISE STRUCTURES 3 – 0 – 0 - 3

Structure of the Course
Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• The ability to identify the structural systems for various combinations of gravity and horizontal loading considering their functional use and heights.
• Should be able to analyse the behaviour and drift capacities of various high rise structural forms

Learning Outcomes
• Understand behaviour of common high rise structures under gravity and lateral loading
• Understand the drift capabilities of different structural forms

Module I

Module II
Structural form, Floor systems, Rigid frame Structures- rigid frame behaviour –approximate determination of member forces by gravity loading- two cycle moment distribution, approximate determination of member forces by lateral loading- Portal method, Cantilever method, approximate analysis of drift, Braced frames- Types of bracings-behaviour of braced bents-method of member force analysis-method of drift analysis, Infilled frames- behaviour of infilled frames-stresses in infill-forces in frame-design of infill- design of frame- horizontal deflection.

Module III
Shear wall Structures-behaviour of shear wall structures-proportionate wall systems, non proportionate wall systems- horizontal deflection, Coupled shear walls-behaviour of coupled wall structures-method of analysis, Wall frame structures- behaviour of wall frames, Tubular structures-framed tube structures-bundled tube structures-braced tube structures, Core structures, Outrigger-Braced Structures, Foundations for tall structures-pile foundation-mat foundation, Modelling for analysis for high rise structures – approximate analysis, accurate analysis and reduction techniques, Discussion of various Finite Element Packages for the analysis of High Rise Structures
References
5. ATC40- Seismic evaluation and retrofitting of concrete buildings, Seismic safety commission, California 1996.

Structure of the Question paper
For the end semester examination there will be three questions from each module out of which two questions are to be answered by the students.
CSE 3002 ENGINEERING APPLICATIONS OF ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

Structure of the Course
Lecture: 3 hrs/ Week Credits: 3
Internal Continuous Assessment: 40 Marks
End Semester Examination: 60 Marks

Course Objectives
- Introduces the different algorithms that can be applied in Artificial Intelligence.
- Impart an idea about how these algorithms can be used to solve Civil Engg problems

Learning Outcomes
- Students become aware of expert systems for knowledge representation, neural networks for knowledge organization and search techniques for knowledge manipulation.

Module I

Module II

Module III

References
4. Winston, Artificial Intelligence, Addison-Wesley, 1992

Structure of the Question paper
For the end semester examination there will be three questions from each module out of which two questions are to be answered by the students.
Structure of the Course
Lecture : 3 hrs/ Week Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To provide an understanding of fundamental knowledge and technique of FEM
• To develop tools to analyse engineering problems using FEM and typical commercial FEA package.

Learning Outcomes
• To analyse and build FEA model for various engineering problems.
• Can be extended to the dynamic analysis of structures

Module I

Module II
Element properties- Displacement functions- convergence requirements- equilibrium and compatibility in the solution- Development of equilibrium equation- Types of finite elements- Development of shape functions for truss, beam and frame elements- CST, LST- Lagrange and Serendipity elements- Plane stress and plane strain problems- Gauss quadrature technique- Development of stiffness matrix for truss and beam elements.

Module III
Development of consistent nodal load vector- patch test- static condensation- Concept of isoparametric formulation- Line element- Plane bilinear element- Subparametric and superparametric elements- Assembly procedure and storage techniques of stiffness matrix, Application of boundary conditions- Solution techniques of equilibrium equation- Introduction to plate and shell elements- Types of 3D elements- Discussion of finite element packages.

References

**Structure of the question paper**
For the end semester examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
Stream Elective IV – Construction Management

(Students should select one subject from this group)

CME 3002 CIVIL ENGINEERING MATERIAL SCIENCE 3 – 0 – 0 - 3

Structure of the Course
Lecture : 3 hrs/ Week   Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
- This paper introduces the development, technology and applications of various engineering materials applicable to civil engineering

Learning Outcomes
- On completion of this course work, the students will be able to undertake research in the area of modern construction materials.

Module – I

Module – II

Module – III

References
6. Concrete – Mindess, Young and Darwin – Prentice Hall.

**Structure of the Question paper**
For the end semester examination there will be three questions from each module out of which two questions are to be answered by the students
CME 3003  CONSTRUCTION METHODS AND EQUIPMENT

Structure of the Course
Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
- This course introduces students to construction equipment and selected construction methods. This includes economy, selection, and technical fundamentals of common construction equipment and construction procedures for civil construction.

Learning Outcomes
- Students will be aware of the latest developments in construction methods and use of suitable equipments.

Module I
Factors affecting selection of equipment and methods - Technical and economic-construction engineering fundamentals-analysis of production output and costs- Modular co-ordination-standardization-mass production and transportation-elements of pre cast and prefabricated construction-prestressing-conventional and modern techniques of construction

Module II
Planning and selection of equipments, for earthmoving, hauling, hoisting, conveying, pneumatic, pumping, aggregate production, concrete production, pile driving, tunneling and road construction applications.

Module III
Concrete construction- batching, mixing, transport, placement, finishing, formwork, scaffolding. Steel construction- fabrication and erection

References
3. Construction Engineering & Management by Dr. S. Seetharaman – Umesh Publications

Structure of the question paper
For the end semester examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students
CME 3004 CONSTRUCTION SUPERVISION, REPAIR AND MAINTENANCE OF BUILDINGS

Structure of the Course

Lecture : 3 hrs/ Week Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

- This course introduces students to various methods of record keeping, preparation of checklists, identification of defects and selecting suitable repair techniques.

Learning Outcomes

- Students will be equipped to identify the defects in buildings and propose suitable repair and rehabilitation techniques.

Module I

Functions of construction supervisor-position of construction supervisor-interpretation-importance of estimation in work planning.
Record keeping –muster rolls, books and bills, site registers, materials at site account.

Module II

Works supervision check list-foundation-masonry works- concrete works-steel works-utilities-finishing items.
Defects in buildings-introduction to defects – defects in steel-defects in timber- defects in sanitary fittings and plumbing.

Module III

Repairing material-repairing materials for defects in timber.
Repair and preventive maintenance techniques-repair of floors- strengthening of stone-concrete and masonry structures-water proofing strengthening of cracked beams columns-foundations.

References

1. A textbook on estimating and accounts by D DKohli & R C Kohli
2. Construction Project Management Theory & Practice – Kumar NeerajJha, Pearson India
3. Construction Management and Accounts by Singh harpal, Tata McGrawhill
6. IS 2556 (Parts I to XI), SP 35 – Handbook on water supply and drainage, BIS, New Delhi

Structure of the question paper

For the end semester examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
CME 3005  CONSTRUCTION ECONOMICS AND FINANCE3 – 0 – 0 - 3

Structure of the Course

<table>
<thead>
<tr>
<th>Lecture : 3 hrs/ Week</th>
<th>Credits : 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Continuous Assessment</td>
<td>: 40 Marks</td>
</tr>
<tr>
<td>End Semester Examination</td>
<td>: 60 Marks</td>
</tr>
</tbody>
</table>

Course Objectives
- The paper is meant to create awareness in students on the different aspects of construction economics, cost analysis and financial management.

Learning Outcomes
- Student will be able to apply concept of construction economics to evaluate the best among several project alternatives

Module I
Construction economics- time value of money - cash flow, depreciation, taxes, inflation, economic evaluation of alternatives - NPV, rate of return, benefit cost analysis, breakeven analysis, replacement analysis.

Module II
Work pricing, cost elements of contract, bidding and award, revision due to unforeseen causes, escalation. Turnkey activities, project appraisal and project yield.

Module III
Working capital management, financial plan and multiple sources of finance, budgeting and budgetary control, performance budgeting, appraisal through financial statements.

References
2. Construction Project Management Theory & Practice – Kumar NeerajJha, Pearson

Structure of the question paper
For the end semester examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students
CMC 3101 THESIS PRELIMINARY PART - II

Structure of the Course

- Hours/week: 15
- Credits: 5
- Continuous Assessment: 200 Marks

The Thesis Preliminary Part -II is an extension of Thesis Preliminary Part I. Thesis Preliminary Part II comprises of preliminary thesis work, two seminars and submission of thesis –preliminary report. The first seminar would highlight the topic, objectives and methodology and the second seminar will be a presentation of the work they have completed till the third semester and the scope of the work which is to be accomplished in the fourth semester, mentioning the expected results.

Distribution of Marks

- Internal assessment of work by the guide: 100 marks
- Internal evaluation by the committee: 100 marks
SEMESTER IV

CMC 4101 THESIS

Structure of the Course

| Hours/week: | 21 |
| Credits:    | 12 |
| Continuous Assessment | : 300 Marks |
| End Semester Examination | : 300 Marks |

The student has to continue the thesis work done in second and third semesters. There would be an interim presentation at the first half of the semester to evaluate the progress of the work and at the end of the semester there would be a Pre-Submission seminar before the Evaluation committee for assessing the quality and quantum of work. This would be the qualifying exercise for the students for getting approval from the Department Committee for the submission of Thesis. At least once technical paper is to be prepared for possible publication in Journals/Conferences. The final evaluation of the Thesis would be conducted by the board of examiners constituted by the University including the guide and the external examiner.

Distribution of marks

Internal evaluation of the Thesis work by the guide: 150 marks

Internal evaluation of the Thesis by the Evaluation Committee: 150 marks

Final evaluation of the Thesis Work by the Internal and External Examiners: 300 marks

[Evaluation of Thesis: 200 marks+ Viva Voce: 100 marks (5% of the marks is earmarked for publication in Journal/Conference)]– 300 marks