DEPARTMENT OF CIVIL & STRUCTURAL ENGINEERING

VISION

The Department of Civil and Structural Engineering came into existence in the year 1978 with a vision to serve the industry, the profession and the society in general. The prime focus is to bring into limelight the inborn and untapped potential of the student fraternity and prepare them to face challenges of the future with confidence, courage and faith.

MISSION

The ultimate goal of the Department of Civil and Structural Engineering is to provide quality education to prepare nationally competitive students and trend setters for the future generation in the realm of technical education. The student should be able to assimilate the available theories, explore new frontiers to propound new theories which will result in improving the quality of the life of the people. It will also to develop their personality in a healthy way and to provide opportunity to acquire knowledge in state-of-the-art research; and to provide service to the university, engineering profession, and the public through consultancy services.

M.E. (CONSTRUCTION ENGINEERING AND MANAGEMENT)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The following program educational objectives are consistent with the university, college and department missions.

1. To prepare learner’s with a sound foundation in the mathematical, scientific Engineering and Management fundamentals.
2. To prepare learner’s to use effectively modern method and tools to solve the real life project management problem.
3. To prepare learner’s for successful career in multinational organisation to excel in research.
4. To encourage motivate learner’s for self-learning.
PROGRAMME OUTCOMES (PO)

On successful completion of the programme, the students will

PO 1: Identify the roles of individuals, companies and agencies involved in the construction process.

PO 2: Demonstrate an understanding of the contribution of the design disciplines processes.

PO 3: Employ appropriate practices to organize and image personnel, materials, equipment, cost, time and quality control and assurance of a construction project.

PO 4: Apply appropriate state-of-art electronic based technology to manage the construction process.

PO 5: Recognise the importance of implementing construction project safety strategies and jobsite procedures and create a construction project safety plan.

PO 6: Apply scheduling techniques to project planning activities and calculate necessary resource requirement throughout a construction projects.

PO 7: Analyse construction documents for planning and management, materials and equipment used to construction process.

PO 8: Identify the basic principles of mechanical, electrical and plumbing systems

PO 9: Understand the legal implications of contract, common and regulatory law to manage a construction projects and evaluate construction disputes based upon case facts and contract context.

PO 10: Understand construction accounting and cost control techniques and risk management techniques

PO 11: Demonstrate a method to plan measure and evaluate the facilities operational performance.

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M.E. / M. Tech (Two-Year Full Time & Three-year Part Time)

DEGREE PROGRAMME

CHOICE BASED CREDIT SYSTEM (CBCS)

REGULATIONS

1. **Condition for Admission**
   Candidates for admission to the first year of the four-semester M.E / M.Tech Degree programme in Engineering shall be required to have passed B.E / B.Tech degree of Annamalai University or any other authority accepted by the syndicate of this University as equivalent thereto. They shall satisfy the condition regarding qualifying marks and physical fitness as may be prescribed by the syndicate of the Annamalai University from time to time. The admission for part time programme is restricted to those working or residing within a radius of 90 km from Annamalainagar. The application should be sent through their employers.

2. **Branches of Study in M.E / M.Tech**
   The Branch and Eligibility criteria of programmes are given in Annexure 1

3. **Courses of study**
   The courses of study and the respective syllabi for each of the M.E / M. Tech programmes offered by the different Departments of study are given separately.

4. **Scheme of Examinations**
   The scheme of Examinations is given separately.

5. **Choice Based Credit System (CBCS)**
   The curriculum includes three components namely Professional Core, Professional Electives and Open Electives in addition to Thesis. Each semester curriculum shall normally have a blend of theory and practical courses.

6. **Assignment of Credits for Courses**
   Each course is normally assigned one credit per hour of lecture / tutorial per week and one credit for two hours or part thereof for laboratory or practical per week. The total credits for the programme will be 65.

7. **Duration of the programme**
   A student of M.E / M.Tech programme is normally expected to complete in four semesters for full-time / six semesters for part-time but in any case not more than four years for full-time / six years for part-time from the date of admission.

8. **Registration for courses**
   A newly admitted student will automatically be registered for all the courses prescribed for the first semester, without any option. Every other student shall submit a completed registration form indicating the list of courses intended to be credited during the next semester. This registration will be done a week before the last working day of the current semester. Late registration with the approval of the Dean on the recommendation of the Head of the Department along with a late fee will be done up to the last working day. Registration for the Thesis Phase - I and II shall be done at the appropriate semesters.
9. Electives
The student has to select two electives in first semester and another two electives in the second semester from the list of Professional Electives. The student has to select two electives in third semester from the list of Open Electives offered by the department/allied department. A student may be allowed to take up the open elective courses of third semester (Full Time program) in the first and second semester, one course in each of the semesters to enable them to carry out thesis in an industry during the entire second year of study provided they should register those courses in the first semester itself. Such students should meet the teachers offering those elective courses themselves for clarifications. No specific slots will be allotted in the time table for such courses.

Further, the two open elective courses to be studied in III semester (Full Time programme) may also be credited through the SWAYAM portal of UGC with the approval of Head of the Department concerned. In such a case, the courses must be credited before the end of III Semester.

10. Assessment
The break-up of continuous assessment and examination marks for theory courses is as follows:

First assessment (Mid-Semester Test-I) : 10 marks
Second assessment (Mid-Semester Test-II) : 10 marks
Third Assessment : 5 marks
End Semester Examination : 75 marks

The break-up of continuous assessment and examination marks for Practical courses is as follows:

First assessment (Test-I) : 15 marks
Second assessment (Test-II) : 15 marks
Maintenance of record book : 10 marks
End Semester Examination : 60 marks

The thesis Phase I will be assessed for 40 marks by a committee consisting of the Head of the Department, the guide and a minimum of two members nominated by the Head of the Department. The Head of the Department will be the chairman. The number of reviews must be a minimum of three per semester. 60 marks are allotted for the thesis work and viva voce examination at the end of the third semester. The same procedure will be adopted for thesis Phase II in the fourth semester.

11. Student Counsellors (Mentors)
To help the students in planning their course of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a member of the faculty who shall function as student counsellor for those students throughout their period of study. Such student counsellors shall advise the students, give preliminary approval for the courses to be taken by the students during each semester, monitor their progress in SWAYAM courses/open elective courses and obtain the final approval of the Head of the Department.
12. Class Committee
For each of the semesters of M.E / M.Tech programmes, separate class committees will be constituted by the respective Head of the Departments. The composition of the class committees from first to fourth semesters for Full time and first to sixth semesters for Part-time will be as follows:

- Teachers of the individual courses.
- A Thesis coordinator (for Thesis Phase I and II) shall be appointed by the Head of the Department from among the Thesis supervisors.
- A thesis review committee chairman shall be appointed by the Head of the Department
- One Professor or Associate Professor, preferably not teaching the concerned class, appointed as Chairman by the Head of the Department.
- The Head of the Department may opt to be a member or the Chairman.
- All counselors of the class and the Head of the Department (if not already a member) or any staff member nominated by the Head of the Department may opt to be special invitees.

The class committee shall meet three times during the semester. The first meeting will be held within two weeks from the date of class commencement in which the type of assessment like test, assignment etc. for the third assessment and the dates of completion of the assessments will be decided.

The second meeting will be held within a week after the completion of the first assessment to review the performance and for follow-up action.

The third meeting will be held after all the assessments but before the University semester examinations are completed for all the courses, and at least one week before the commencement of the examinations. During this meeting the assessment on a maximum of 25 marks for theory / 40 marks for practical and project work will be finalized for every student and tabulated and submitted to the Head of the Department for approval and transmission to the Controller of Examinations.

13. Temporary Break Of Study
A student can take a one-time temporary break of study covering the current semester and/or the next semester with the approval of the Dean on the recommendation of the Head of the Department, not later than seven days after the completion of the mid-semester test. However, the student must complete the entire programme within the maximum period of four years for Full time / six years for Part time.

14. Substitute Assessments
A student who has missed, for genuine reasons accepted by the Head of the Department, one or more of the assessments of a course other than the end of semester examination may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the date of the third meeting of the respective class committees.

A student who wishes to have a substitute assessment for a missed assessment must apply to the Head of the Department within a week from the date of the missed assessment.
15. Attendance Requirements
The students with 75% attendance and above are permitted to appear for the University examinations. However, the Vice Chancellor may give a rebate / concession not exceeding 10% in attendance for exceptional cases only on Medical Grounds. A student who withdraws from or does not meet the minimum attendance requirement in a semester must re-register and repeat the same semester in the subsequent academic years.

16. Passing and declaration of Examination Results
All assessments of all the courses on an absolute marks basis will be considered and passed by the respective results passing boards in accordance with the rules of the University. Thereafter, the controller of examinations shall convert the marks for each course to the corresponding letter grade as follows, compute the grade point average (GPA) and cumulative grade point average (CGPA) and prepare the mark sheets.

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<th>Marks Range</th>
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<td>90 to 100 marks</td>
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<td>70 to 79 marks</td>
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<tr>
<td>60 to 69 marks</td>
<td>‘C’</td>
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<td>Less than 50 marks</td>
<td>‘RA’</td>
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<td>Withdrawn from the Examination</td>
<td>‘W’</td>
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A student who obtains less than 30 / 24 marks out of 75 / 60 in the theory / practical examinations respectively or is absent for the examination will be awarded grade RA. A student who earns a grade of S, A, B, C, D or E for a course is declared to have successfully completed that course and earned the credits for that course. Such a course cannot be repeated by the student.

A student who obtains letter grade RA / W in the mark sheet must reappear for the examination of the courses.

The following grade points are associated with each letter grade for calculating the grade point average and cumulative grade point average.

- S - 10
- A - 9
- B - 8
- C - 7
- D - 6
- E - 5
- RA - 0

Courses with grade RA / W are not considered for calculation of grade point average or cumulative grade point average.

A student can apply for re-totaling of one or more of his examination answer papers within a week from the date of issue of mark sheet to the student on payment of the prescribed fee per paper. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.
After the results are declared, mark sheets will be issued to the students. The mark sheet will contain the list of courses registered during the semester, the grades scored and the grade point average for the semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the courses for the semester, divided by the sum of the number of credits for all courses taken in that semester.

CGPA is similarly calculated considering all the courses taken from the time of admission.

17. Awarding Degree

After successful completion of the programme, the degree will be awarded with the following classifications based on CGPA.

For First Class with Distinction the student must earn a minimum of 65 credits within four semesters for full-time / six semesters for Part time from the time of admission, pass all the courses in the first attempt and obtain a CGPA of 8.25 or above.

For First Class, the student must earn a minimum of 65 credits within two years and six months for full-time / three years and six months for Part time from the time of admission and obtain a CGPA of 6.75 or above.

For Second class, the student must earn a minimum of 65 credits within four years for full-time / six years for Part time from the time of admission.

18. Ranking Of Candidates

The candidates who are eligible to get the M.E / M.Tech degree in First Class with Distinction will be ranked on the basis of CGPA for all the courses of study from I to IV semester for M.E / M.Tech full-time / I to VI semester for M.E / M.Tech part-time.

The candidates passing with First Class and without failing in any subject from the time of admission will be ranked next to those with distinction on the basis of CGPA for all the courses of study from I to IV semester for full-time / I to VI semester for M.E / M.Tech part-time.

19. Transitory Regulations

If a candidate studying under the old regulations M.E. / M.Tech could not attend any of the courses in his/her courses, shall be permitted to attend equal number of courses, under the new regulation and will be examined on those subjects. The choice of courses will be decided by the concerned Head of the department. However he/she will be permitted to submit the thesis as per the old regulations. The results of such candidates will be passed as per old regulations.

The University shall have powers to revise or change or amend the regulations, the scheme of examinations, the courses of study and the syllabi from time to time.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Department</th>
<th>Programme (Full Time &amp; Part time)</th>
<th>Eligible B.E./B.Tech Programme *</th>
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<td>ii.</td>
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<td>iii.</td>
<td>Nano Materials and Surface Engineering</td>
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* AMIE in the relevant discipline is considered equivalent to B.E
## Courses of Study and Scheme of Examinations

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L - Lecture; P - Practical; T – Thesis; CA – Continuous Assessment; FE – Final Examination
### M.E Degree Programme in Construction Engineering and Management (Part Time) - (Three Year Degree Programme)

#### Courses of Study and Scheme of Examinations

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L - Lecture; P - Practical; T – Thesis; CA – Continuous Assessment; FE – Final Examination
**PROFESSIONAL ELECTIVES (PE)**

1. Forensic Engineering and Retrofitting of Structures
2. System Integration in Construction Engineering
3. Project Formulation and Appraisal
4. Contract Laws and Regulations
5. Construction Economics and Finance Management
6. Resource Management and Control in Construction
7. Construction Planning, Scheduling and Control
8. Advanced topics in Acoustics, Lighting and Ventilation
9. Information Technology for Construction Managers
10. Construction Workplace and Employees Behaviour
11. Advanced Concrete Technology

**OPEN ELECTIVES (OE)**

1. Geographic Information System in Construction Engineering and Management
2. Shoring, Scaffolding and Formwork
3. Value Engineering and Valuation
4. Energy Conservation Techniques in building Construction
5. Composite Construction
6. Advanced Construction Engineering Techniques
7. Prefabricated Structures
8. Public Health Engineering Structures
9. Research Methodology
10. Construction Personnel Management
11. Industries Organizational Psychology
COURSE OBJECTIVES:

- This course will provide the state-of-the-art knowledge about the theoretical background for modelling the real problems of construction management.

Basic Concepts of Probabilistic

Estimation Theory

Testing of Hypothesis
Sampling distributions - Tests based on Normal, t, Chi-square and F distributions - Analysis of variance - One way and Two way classifications.

Design of Experiments
Completely Randomised Design - Randomised Block Design - Latin Square Design – 22 Factorial Design

Queueing Theory
Single and Multiple server- Markovian Queueing models - Customer impatience – M/G/1 Queueing system - Queueing applications.

REFERENCES:


COURSE OUTCOMES:

At the completion of the course students will be able to

1. Determinate probability and estimation of variables.
2. Determine the statistics value of each variable by using sampling techniques
3. Find the block design by using various design of Experiment method.
4. Determine the queue system using queuing theory.
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**CEMC102 MODERN CONSTRUCTION MATERIALS**

**L** 4  **T** 0  **P** 0

**COURSE OBJECTIVES:**

- To study and understand the properties of modern construction materials used in construction such as special concretes, metals, composites, water proofing compounds, non weathering materials, and smart materials.

**Special Concretes**


**Metals**


**Composites**

Types of Plastics – Properties & Manufacturing process – Advantages of Reinforcedpolymers – Types of FRP – FRP on different structural elements – Applications of FRP- Cellular Cores – Geo-synthetics-. Polymers - Fibre reinforced plastic in sandwich panels – Adhesives and sealants. Structural elastomeric bearings, Moisture barriers Applications in civil engineering.

**Other Materials**


**Smart and Intelligent Materials**

Types & Differences between Smart and Intelligent Materials – Special features – Case studies showing the applications of smart & Intelligent Materials.

**REFERENCES:**

**Engineers, Pearson Prentice Hall, 2006.**


**COURSE OUTCOMES:**

At the completion of the course students will be able to

1. Know about the characteristics of new materials and application of field.

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**COURSE OBJECTIVES:**

- Student will be able to identify, analyze and implement suitable planning and management techniques create network, calculate project duration and optimize the time and minimize the cost implement resource allocation and control techniques plan and implement.

**Basics of Management**

Introduction to construction industries, concepts and need of management in construction. Modern scientific management, Management Functions, Management Styles.

**Construction Project Planning**

Project life cycle, identification, preparation, appraisal, detailed planning, implementation, Project delivery system, Leadership and motivation for the project team - effect of project risk on organization role and responsibilities of project Manager, Role of Project Management Consultants, Web based project management, monitoring and control.

**Project Scheduling**

Construction Scheduling, Work breakdown structure, activity cost and time estimation in CPM, PERT, RPM (Repetitive Project Modelling) techniques. LOB technique, Mass haul diagrams. Precedence Network Analysis, software in Construction scheduling (MSP, primavera, Construction manager).

**Project Controlling**
Monitoring and Control, Crashing, Resource Levelling, Updating.

**Construction Management**
Material Management: Scope, importance, objectives, functions of material management classification and codification of material, inventory control: need, function, economic order quantity.
Labour Management: Labour laws for construction projects, welfare measures for labours.
Equipment Management: Types of equipment and factors affecting selection, Functions of equipment management, owning and operating costs, Time-value of money concept, Economic life, safety, maintenance and repair of equipment.

**REFERENCES:**


**COURSE OUTCOMES:**

At the completion of the course students will be able to

1. Know about identify, analyze and implement suitable planning and management techniques and different delivery method of project.
2. Find project duration and optimize the time and minimize the cost implement resource allocation and control techniques plan and implement.

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COURSE OBJECTIVES:

- This subject provides the organization of the construction activities with quality assurance

Introduction
Definition-Concept of quality-meaning of quality-design-conformance-performance-dimensions-factors influencing construction quality.

Quality Management
Fundamentals of quality management—function-inspection, control and enforcement-quality management system and method-quality circle-total quality management-quality management guidelines-responsibilities and authority

Quality Planning
Quality policy, objectives and methods- consumers’ satisfaction-time completion-documents- process and products- quality cost- Taguchi’s concept-codes and standards

Quality Control And Assurance
Objectives of quality control-appraisals- needs and techniques of quality control- critical, major failure aspects-failure mode and effect analysis-statistical process control-quality systems-quality audit- responsibilities and authorities in quality control and assurance

Quality Improvement Techniques
Selection of new materials-influencing drawings, detailing, specification, standardization-bid preparation- construction activity, environmental safety, social and environmental factors-natural causes and speed of construction-life cycle costing- value engineering and value analysis.

REFERENCES:

3. Frank M Gryna, Quality Planning and Analysis, McGraw-Hill 2001

COURSE OUTCOMES:

At the completion of the course students will be able to
1. Know about the quality system application of system
2. Implement ISO methods in company standards.
COURSE OBJECTIVES:

This course provides a thorough knowledge of construction materials properties and selection by doing various tests on materials, based on IS standards and specifications.

Test Methods to cover the syllabus of CEMC 102 – Modern Construction Materials.

1) Concrete Mix Design by ACI, IS and BS methods.
2) Use of water reducing admixtures.
3) Use of accelerating/retarding admixtures in concrete
4) Non-Destructive Testing Methods - use of Rebound Hammer and Ultrasonic Pulse Velocity tester.
5) Preparation of reinforcement grill and casting of RCC beams (under-reinforced and over reinforced) and RCC columns.
6) Testing of reinforcement (Mild Steel, HYSD, and High Tensile) and prestressing strands.
7) Testing of masonry specimen (as per IS 1905)
8) Test on clear specimen of timber.
9) Bituminous Mix Design
10) Methods of sampling of construction material (as per IS Code)

COURSE OUTCOMES:

At the completion of the course students will be able to

1. Know about the material selection through the material testing.

COURSE OBJECTIVES:

• This course introduces the preliminaries of the computer applications to planning the project.
Introduction
Overview of IT Applications in Construction – Construction process – Computerization in Construction – Computer aided Cost Estimation – Developing application with database software.

Optimization Techniques
Linear, Dynamic and Integer Programming - Branch and Bound Techniques – Application to Production Scheduling, Equipment Replacement, Material Transportation and Work Assignment Problems – Software applications.

Inventory Models
Deterministic and Probabilistic Inventory Models - Software applications.

Scheduling Application
PERT and CPM - Advanced planning and scheduling concepts – Computer applications – Case study.

Other Problems
Sequencing problems – Simulation – Enterprises – Introduction to ERP systems.

REFERENCES:

COURSE OUTCOMES:
At the completion of the course students will be able to

1. Know about the preliminaries of the computer applications to planning and Scheduling, Simulation techniques in construction project.

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CEMC202
CONSTRUCTION EQUIPMENT AND MANAGEMENT

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COURSE OBJECTIVES:
- To study and understand the equipment management methods and equipment functional operation.
• To learn the applications of the equipment in construction projects. To enable the students familiarize with modern construction equipment and their applications.

**Construction Equipment Cost**

**Construction Equipment Management**

**Equipment for Earthwork**

**Equipment for Other Works**
Production of Aggregate, Concrete, and Asphalt Mixes - Production of Aggregate - Crushers – Feeders - Screening Equipment - Handling Equipment. Production of Concrete - Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment - Production of Asphalt Mixes – Problems. Paving and Surface Treatments- Concrete Paving –Asphalt Paving and Surface Treatments - Pavement Repair and Rehabilitation - Problems. Compressed Air and Water Systems - Introduction – Compressed Air Systems - Water Supply Systems – Problems. Drilling, Blasting And Tunnelling Equipment- Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunnelling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors. Pile driving equipment: Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact.
Equipment Scheduling

REFERENCES:

COURSE OUTCOMES:
At the completion of the course students will be able to

1. Know about the equipment in construction projects with modern construction equipment and their applications.

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CEMC203 | ADVANCED CONSTRUCTION METHODS FOR SPECIAL STRUCTURES |
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COURSE OBJECTIVES:

- This course provides a thorough knowledge about the construction methods and techniques for various kinds of special structures.

Introduction
Types of Special Structures: According to - location/environment, design, strength, radiation shielding, shape, aesthetic appearance, type of construction methods and techniques
Bridge Structures
Bridges, steel bridges, arch bridges, cantilever bridges, box girders. Construction of special type of bridges - cable stayed bridge, suspension and pre-stressed bridge. Segmental construction, cantilever construction, incremental construction, successive launching and pushing of box decks.

Underground Structures

Marine Structures
Off shore structures - beacons, oil drilling platforms, jetties and break water structures. Dredging equipments and techniques for construction of channels and islands. Laying operations for built up off-shore system. Underwater concreting using tremie method, underwater construction- problems encountered, caisson well sinking methods – conventional and jack down methods.

High Rise Structures and Power Plant Structures

REFERENCES:

COURSE OUTCOMES:
At the completion of the course students will be able to

1. Know about the advanced construction methods with special structures and their applications.

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CEMC204 SAFETY IN CONSTRUCTION

COURSE OBJECTIVES:

- This course provides a thorough knowledge about the organization of safety in construction.

Construction Accidents
Accidents and their Causes – Human Factors in Construction Safety - Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications

Construction Safety Management
Role of various parties, duties and responsibilities of top management, site managers, supervisors etc. role of safety officers, responsibilities of general employees, safety committee, safety training, incentives and monitoring. Writing safety manuals, preparing safety checklists and inspection reports.

Safety in Construction Operations
Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, etc. safety at various stages of construction. Prevention of accidents. Safety measures. Safety in use of construction equipment e.g. vehicles, cranes, hoists and lifts etc. safety of scaffolding and working platforms. Safety while using electrical appliances. Explosives used.

Various Safety Equipment And Gear Used On Site
First aid on site, Safety awareness program. Labour laws, legal requirement and cost aspects of accidents on site, Incentive for safety practices.

Study Of Safety Policies
Methods, equipment, training provided on any ISO approved construction Company, safety in office, working on sites of high rise construction, deep excavation.

REFERENCES:
4. ISI for safety in Construction – Bureau of Indian Standards.

**COURSE OUTCOMES:**
At the completion of the course students will be able to

1. Students can able to know about the safety in and their applications.

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**CEMP207** |**COMPUTING TECHNIQUES LABORATORY** | L | T | P
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**COURSE OBJECTIVES:**
- This course provides a thorough knowledge various computer application apply in construction Projects.

1. Quantity takeoff, Preparation and delivery of the bid or proposal of an Engineering construction project.
2. Design of a simple equipment information system for a construction project.
3. Scheduling of a small construction project using Primavera scheduling systems including reports and tracking.
4. Scheduling of a small construction project using tools like MS project scheduling systems including reports and tracking.
5. Simulation models for project risk analysis.

**COURSE OUTCOMES:**
At the completion of the course students will be able to

1. Know about the Computer application of estimation of quantity, Planning, Scheduling, Resource allocation and levelling and simulation techniques in construction projects

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CEMS208 | SEMINAR | L | T | P \\
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**COURSE OBJECTIVES:**

- To work on a technical topic related to Construction Engineering and Management, acquire the ability of written and oral presentation
- To acquire the ability of writing technical papers for Conferences and Journals

The students will work for two periods per week guided by student counsellor. They will be asked to present a seminar of not less than fifteen minutes and not more than thirty minutes on any technical topic of student’s choice related to Construction Engineering and Management to engage in discussion with audience. They will defend their presentation. A brief copy of their presentation also should be submitted. Evaluation will be done by the student counsellor based on the technical presentation and the report and also on the interaction shown during the seminar.

**COURSE OUTCOMES:**

1. The students will be getting the training to face the audience and to interact with the audience with confidence.
2. To tackle any problem during group discussion in the corporate interviews.

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CEMT303 | THESIS PHASE-I | L | T | P \\
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**COURSE OBJECTIVES:**

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To develop the methodology to solve the identified problem.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

The student individually works on a specific topic approved by the Head of the Department under the guidance of a faculty member who is familiar in this area of interest. The student can select any topic which is relevant to the area of Construction Engineering and Management. The topic may be theoretical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for
carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

COURSE OUTCOMES:

At the completion of the course students will be able to

1. Know about specific problem in construction

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CEMI304 INDUSTRIAL TRAINING

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COURSE OBJECTIVES:

- To train the students in the field work related the Construction Engineering and Management to have a practical knowledge in carrying out Construction Engineering and Management field related works.
- To train and develop skills in solving problems during execution of certain works related to Structural Engineering.

The students individually undergo a training program in reputed concerns in the field of Construction Engineering and Management during the summer vacation (at the end of second semester for full – time / fourth semester for part – time) for a minimum stipulated period of four weeks. At the end of the training, the student has to submit a detailed report on the training he had, within ten days from the commencement of the third semester for Full-time / fifth semester for part-time. The students will be evaluated by a team of staff members nominated by head of the department through a viva-voce examination.

COURSE OUTCOMES:

1. The students can face the challenges in the practice with confidence.
2. The student will be benefited by the training with managing the situation arises during the execution of works related to Construction Engineering and Management.

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COURSE OBJECTIVES:

- To solve the identified problem based on the formulated methodology.
- To develop skills to analyze and discuss the test results, and make conclusions.

The student should continue the phase I work on the selected topic as per the formulated methodology under the same supervisor. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated through based on the report and the viva-voce examination by a panel of examiners including one external examiner.

COURSE OUTCOMES:
At the completion of the course students will be able to

1. To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
2. To develop the methodology to solve the identified problem.
3. To train the students in preparing project reports and to face reviews and viva-voce examination.

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PROFESSIONAL ELECTIVES

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COURSE OBJECTIVES:

- This course provides a thorough knowledge various Repair, Rehabilitation and Maintenance techniques application in construction Projects.

**Durability and Deterioration of Concrete**

**Investigation and Diagnosis**

**Repair Materials**

**Refurbishment and Protection Techniques**

**REFERENCES**

**COURSE OUTCOMES:**
At the completion of the course students will be able to

1. Students can able to know about the the organization of safety in construction and their applications.

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COURSE OBJECTIVES:

- This course provides a thorough knowledge and understand the construction system integration, environmental factors, services, maintenance and safety systems in construction Engineering.

**Structural Integration**

**Environmental Factors**

**Services**
Plumbing – Electricity – Vertical circulation and their interaction – HVAC.

**Maintenance**
Component longevity in terms of operation performance and resistance to deleterious forces - Planning systems for least maintenance materials and construction – access for maintenance – Feasibility for replacement of damaged components – equal life elemental design – maintenance free exposed and finished surfaces.

**Safety**
Ability of systems to protect fire – Preventive systems – fire escape system design – Planning for pollution free construction environmental – Hazard free Construction execution.

**REFERENCES**

**COURSE OUTCOMES:**
At the completion of the course students will be able to

1. Students can able to know about the system integration, influence of environmental factors, services and maintenance in construction Engineering.
COURSE OBJECTIVES:

- This course provides a thorough knowledge understand the formulation, costing of construction projects, appraisal, finance and private sector participation in construction Industry.

Project Formulation

Project Costing

Project Appraisal

Project Financing

Private Sector Participation
Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT - Technology Transfer and Foreign Collaboration - Scope of Technology Transfer.

REFERENCES:

COURSE OUTCOMES:
At the completion of the course students will be able to

1. Students can able to know about the formulation, costing of construction projects, appraisal, finance and private sector participation in construction Industry.

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CEMEXXX CONTRACT LAWS AND REGULATIONS

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COURSE OBJECTIVES:

- This course provides a thorough knowledge in various types of construction contracts and their legal aspects and provisions, tenders, arbitration, legal requirement, and labor regulations in national and international construction Projects.

Construction Contracts

Tenders

Arbitration

Legal Requirements

Labour Regulations
REFERENCES:


COURSE OUTCOMES:

At the completion of the course students will be able to

1. Students can be able to know about the contracts and their legal aspects and provisions, tenders, arbitration, legal requirement, and labor regulations in national and international construction projects.

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COURSE OBJECTIVES:

- This course explores the need for engineering economics and financing and overview the accounting methods.

**Economics**

Interests and time value consideration-depreciation, tax, inflation-lifecycle cost analysis-approached to asset valuation-resource allocation decision for asset management-cost of construction resources-cost of construction, land and administration-contingencies provisions and management

**Financing**

Need for financial management-types of financing-short term borrowing-long term borrowing-leasing-equity financing-internal generation of funds-external commercial borrowing-assistance from government budgeting support and international finance corporation.

**Analysis of Finance**

Accounting Method
Basics of accounting method - budget and budgeting - site accounts-joint venture, project financial packaging, fund mobilization - accounting for tax reporting purposes and financial reporting purpose.

Lending to Contractors
Loans to contractors-work package breakdown-subcontracting and purchasing.

REFERENCES:

COURSE OUTCOMES:
At the completion of the course students will be able to

1. know about the Finance, Economics, Accounting and Leading to contractor in construction industries.

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CEMEXXX RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION

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COURSE OBJECTIVES:

- This course provides a thorough knowledge in resource allocation and levelling in construction Projects.

Resource Planning

Resource Allocation and Levelling
Time-cost trade of, Computer application in resource leveling examples, resource list, resource allocation graph, Resource loading, Cumulative cost ETC – Value Management.

Resources Management

Materials and Equipment
Time of purchase- Quantity of material- sources- Transportation- Delivery and Distribution. Planning and selecting by optimistic choice with respect to cost- Time- Source and handling.
Time
Personnel time- Management and planning - Managing time on the project - forecasting the future - Critical path measuring the changes and their effects.
Cost control: Cash flow and cost control - objectives of cost - Time and Quality.

REFERENCES:

COURSE OUTCOMES:
At the completion of the course students will be able to

1. know about the resource planning, allocation and leveling techniques in single and multi-projects.

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COURSE OBJECTIVES:
- To study and understand the concept of planning, scheduling, cost in construction, organization and use of project information necessary for construction project.

Construction Planning

Scheduling Procedures and Techniques

Cost Control, Monitoring and Accounting

Organization and Use of Project Information

REFERENCES:

COURSE OUTCOMES:
At the completion of the course students will be able to

1. know the development of construction planning, scheduling procedure and controls.

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COURSE OBJECTIVES:
- To Study acoustics, lighting and ventilation construction industries.

Acoustics

Lighting

Ventilation
Ventilation due to wind – Ventilation due to stack effect – Ventilation due to combined effect – Infiltration – Ventilation of industrial building – Calculation of Natural Ventilation

Mechanical Ventilation – Examples – Building regulation – Air Conditioning – Summary.

REFERENCES


COURSE OUTCOMES:

1. On completion of this course the students will know acoustics, lighting and ventilation construction industries.

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CEMEXXX

INFORMATION TECHNOLOGY FOR CONSTRUCTION MANAGERS

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COURSE OBJECTIVES:

- To study the various aspects of information technology for construction managers

Networking and Internet

Database Application
Information Systems for Strategic Management

Planning for Information Systems

Emerging Concepts and Issues in Information Systems

REFERENCES:

5. Prasanna Chandra. A management guide to PERT/CPM Project planning , analysis and selection.2011

COURSE OUTCOMES:

1. On completion of this course the students will know the application of information technology in construction management.

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COURSE OBJECTIVES:
- To Study workplace and employer behavior of construction projects.

Industrial Health, Safety

Stress in the Workplace

Common Stress Factors Time and Career Plateauing

Individual Behaviour

Group Behaviour
Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Teambuilding - Interpersonal relations – Communication – Control.

REFERENCE:
4. Mamoria C.B. and SathishMamoria, Dynamics of Industrial Relations, Himalaya Publishing

**COURSE OUTCOMES:**
1. On completion of this course the students will know workers difficulties in working place and behavior at construction work.

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**COURSE OBJECTIVES:**

- This course provides the advanced knowledge of concrete technology which covers the properties of fresh and hardened concrete and the concept of durability.


REFERENCES:


COURSE OUTCOMES:

1. On completion of this course the students will know various tests on fresh and hardened concrete.

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COURSE OBJECTIVES:

- This course provides the details of data collection and field modeling.
- This also provides the management of Natural Resources and their application.

Introduction to GIS


Types of Data


Data Structure

Raster and Vector Data Structure – Raster data storage – Methods of data compression-Run length, Chain and Block Coding – Vector Data Storage – Topology – Topological Models – Arc Node Structure – Surface Data – DEM – Grid DEM and TIN structure Applications of DEM- Database Management system

Data Quality and Output


Fields of application-construction management Parcel based, AM/FM applications examples – Case study

REFERENCES:

COURSE OUTCOMES:
1. On completion of this course the students will know the development of construction planning, scheduling procedure and controls.

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CEMEXXX | SHORING, SCAFFOLDING AND FORMWORK | L | T | P
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COURSE OBJECTIVES:
- To study and understand the overall and detailed planning of formwork, plant and site equipment.
- To understand the Design and erection of forms for various elements such as slabs, beams, columns, walls, shells and tunnels.
- To know the latest methods of form construction.

Planning, Site Equipment and Plant for Form Work
Introduction - Forms for foundations, columns, beams walls etc., General objectives of formwork building - Planning for safety - Development of a Basic System - Key Areas of cost reduction - Planning examples. Overall Planning - Detailed planning - Standard units - Corner units - Pass units - Calculation of labour constants - Formwork hours - Labour Requirement - Overall programme - Detailed programme - Costing - Planning crane arrangements - Site layout plan - Transporting plant - Formwork beams - Scaffold frames - Framed panel formwork - Formwork accessories.

Materials Accessories Proprietary Products and Pressures

Design of Forms and Shores
Basic simplification - Beam formulae - Allowable stresses - Deflection, Bending - Lateral stability - Shear, Bearing - Design of Wall forms - Slab forms - Beam forms - Column forms - Examples in each. Simple wood stresses - Slenderness ratio - Allowable load vs length behaviour of wood shores - Form lining Design Tables for Wall formwork - Slab Formwork - Column Formwork - Slab props - Stacking Towers - Free standing and restrained - Rosett Shoring - Shoring Tower - Heavy Duty props.

Building and Erecting the Form Work
Carpentry Shop and job mill - Forms for Footings - Wall footings - Column footings - Sloped footing forms - Strap footing - Stepped footing - Slab form systems - Sky deck and Multiflex
- Customized slab table - Standard Table module forms - Swivel head and uniportal head - Assembly sequence - Cycling with lifting fork - Moving with table trolley and table prop. Various causes of failures - ACI - Design deficiencies - Permitted and gradual irregularities.

Forms for Domes and Tunnels, Slip Forms and Scaffolds
Hemispherical, Parabolic, Translational shells - Typical barrel vaults Folded plate roof details - Forms for Thin Shell roof slabs design considerations - Building the forms - Placing concrete - Form removed -Strength requirements -Tunnel forming components - Curb forms invert forms - Arch forms - Concrete placement methods - Cut and cover construction - Bulk head method - Pressures on tunnels - Continuous Advancing Slope method - Form construction - Shafts. Slip Forms - Principles -Types - advantages - Functions of various components - Planning -Desirable characteristics of concrete - Common problems faced - Safety in slip forms special structures built with slip form Technique - Types of scaffolds - Putlog and independent scaffold - Single pole scaffolds - Truss suspended - Gantry and system scaffolds.

REFERENCES:
2. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996

COURSE OUTCOMES:

1. On completion of this course the students will know the design and erection of forms for various elements such as slabs, beams, columns, walls, shells and tunnels.

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CEMEXXX VALUE ENGINEERING AND VALUATION

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COURSE OBJECTIVES:
- To study the various aspects of value engineering and valuation in construction

Value
Value - Meaning of value, basic and secondary functions, factor contributing to value such as aesthetic, ergonomic, technical, economic: identifying reasons or unnecessary costs:

Value Analysis
10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation, follow up action, benefits of value analysis, various applications; assessing effectiveness of value analysis.
Life Cycle Costing
Life cycle costing – Forecasting of Capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis. Different methods of performing value engineering.

Valuation
Types of value, purposes of valuation factors affecting value. Different methods of valuation for different types of assets such as land and building, horticulture, historical places.

Valuation Report
Valuation Report, contents, standard formats, Case study of any one Report.

REFERENCES:
1. Del Younke, *Value Engineering: Analysis And Methodology*
7. Charotar Rangwala, *Estimating and Costing* Published by Publishing House,

COURSE OUTCOMES:
1. on completion of this course the students will know the application of value Engineering and valuation in construction projects.

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COURSE OBJECTIVES:
• This course introduces the use of non conventional energy system and also their management.

Introduction

**Environmental**


**Design**

Natural building design consideration - Energy efficient design strategies – Contextual factors - Longevity and process Assessment – Renewable energy sources and design - Advanced building Technologies - Smart buildings - Economies and cost analysis.

**Services**


**Energy Management**


**REFERENCES:**


**COURSE OUTCOMES:**

1. On completion of this course the students will know the use of non-conventional energy system and also their management.

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**COURSE OBJECTIVES:**
This course provides the technique of adopting composite type of constructions and their features in major projects.

**Introduction**

**Design of Composite Members**
Behaviour of composite beams, columns, design of composite beams, steel composite columns - design of composite trusses.

**Design of Connections**
Types of connections, Design of connections in the composite structures – shear connections- Design of connections in composite trusses.

**Composite Box Girder Bridges**
Introduction - behaviour of box girder bridges - design concepts.

**Case Studies**
Case studies on steel-concrete composite construction in buildings – Seismic behaviour of composite structures.

**REFERENCES:**

**COURSE OUTCOMES:**
1. On completion of this course the students will know the technique of adopting composite type of constructions and their features in major projects.

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**COURSE OBJECTIVES:**
- To study and understand the latest construction techniques applied to engineering construction for sub structure, super structure, special structures, rehabilitation and strengthening techniques and demolition techniques.

**Sub Structure Construction**
Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunnelling techniques - Piling techniques - Driving well and caisson - sinking cofferdam -
cable anchoring and grouting - Driving diaphragm walls, Sheet piles - Laying operations for built up offshore system - Shoring for deep cutting - Large reservoir construction - well points - Dewatering for underground open excavation.

**Super Structure Construction for Buildings**
Vacuum dewatering of concrete flooring – Concrete paving technology – Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – Erection techniques of tall structures, Large span structures – launching techniques for heavy decks – in-situ prestressing in high rise structures, Post tensioning of slab- aerial transporting – Handling and erecting lightweight components on tall structures.

**Construction of Special Structures and Demolition**
Erection of lattice towers - Rigging of transmission line structures – Construction sequence in cooling towers, Silos, chimney, sky scrapers - Bow string bridges, Cable stayed bridges – Launching and pushing of box decks – Construction of jetties and break water structures – Construction sequence and methods in domes – Support structure for heavy equipment and machinery in heavy industries – Erection of articulated structures and space decks.

**Rehabilitation and Strengthening Techniques**

**Demolition**
Demolition Techniques: Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling.

**REFERENCES:**

**COURSE OUTCOMES:**
1. On completion of this course the students will know the modern construction techniques to be used in the construction of buildings and special structures and also rehabilitation and strengthening techniques and demolition.

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COURSE OBJECTIVES:
- To Study the design principles, analysis and design of elements.

**Design Principles**
General Civil Engineering requirements, specific requirements for planning and layout of prefabrication plant. IS Code specifications. Modular co-ordination, standardization, Disuniting of Prefabricates, production, transportation, erection, stages of loading and code provisions, safety factors, material properties, Deflection control, Lateral load resistance, Location and types of shear walls.

**Reinforced Concrete**
Prefabricated structures - Long wall and cross-wall large panel buildings, one way and two way prefabricated slabs, Framed buildings with partial and curtain walls, -Connections – Beam to column and column to column.

**Floors, Stairs and Roofs**
Types of floor slabs, analysis and design example of cored and panel types and two-way systems, staircase slab design, types of roof slabs and insulation requirements, Description of joints, their behaviour and reinforcement requirements, Deflection control for short term and long term loads, Ultimate strength calculations in shear and flexure.

**Walls**
Types of wall panels, Blocks and large panels, Curtain, Partition and load bearing walls, load transfer from floor to wall panels, vertical loads, Eccentricity and stability of wall panels, Design Curves, types of wall joints, their behaviour and design, Leak prevention, joint sealants, sandwich wall panels, approximate design of shear walls.

**Industrial Buildings and Shell Roofs**
Components of single-storey industrial sheds with crane gantry systems, R.C. Roof Trusses, Roof Panels, corbels and columns, wind bracing design. Cylindrical, Folded plate and hyper-prefabricated shells, Erection and jointing, joint design, hand book based design.

**REFERENCES:**
COURSE OUTCOMES:
1. At the end of this course student will have good knowledge about the prefabricated elements and the technologies used in fabrication and erection.
2. They will be in a position to design floors, stairs, roofs, walls and industrial buildings, and various joints for the connections.

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COURSE OBJECTIVES:
- The courses provide basic knowledge relating to the analysis and design of public health structures as well as their maintenance.

Introduction
Review of the principle of design in respect of water treatment and waste treatment systems – criteria considered important structurally in the case of each component – consideration of soil bearing capacity under different combinations of soil types.

Factors Relevant to Structural Design
Ultimate load theory – plastic analysis – consideration on impact due to live and dead loads – considerations of corrosion effects on structural aspects – structural designs – construction below ground level.

Design of Overhead Water Tanks
Functional design – structural design – architectural design – cost aspects.

Design of Ground Level Water Retaining Structures
Functional aspects – maintenance factors.

Miscellaneous Structural Works

REFERENCES:
1. Gray, C, Reservoirs and Tanks
2. Reynolds, R.C. Designers Hand Book.
3. Abeles and Turner, Prestressed Concrete Designers Hand Book.
COURSE OUTCOMES:
1. On completion of this course the students will know the design of public health buildings.

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COURSE OBJECTIVES:
- To study and understand the research methodology in future research

Introduction to Research
Meaning of research - types of research- process of research- Sources of research problem- Criteria / Characteristics of a good research problem- Scope and objectives of research problem- Significance of Research-Research Methods versus Methodology- Research and Scientific Method -Errors in selecting a research problem- Criteria of Good Research - Problems Encountered- formulation of research hypotheses- Search for causation.

Developing a Research Proposal
Format of research proposal- Individual research proposal- Institutional research proposal- Significance- objectives- methodology- Funding for the proposal- Different funding agencies- Framework for the planning.

Design, Sampling Design, Measurement and Scaling Techniques

Data Collection and Analysis
Collection of Primary Data - Observation Method- Interview Method- Collection of Data through Questionnaires- Collection of Data through Schedules - Difference between Questionnaires and Schedules- Some Other Methods of Data Collection- Collection of Secondary Data- Selection of Appropriate Method for Data Collection- Elements/Types of Analysis - Measures of Dispersion- Approaches to qualitative and quantitative data analysis- Case study.
Report Writing, Presentation of Research

REFERENCES
3. Research Methodology: An Introduction ’by Wayne Goddard and Stuart Melville

COURSE OUTCOMES:
1. On completion of this course the students will know methodology of research in thesis work.

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CEMEXXX CONSTRUCTION PERSONNEL MANAGEMENT

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COURSE OBJECTIVES:
• To study the various aspects of manpower management such as man power planning, organization, human relations, and welfare and development methods in construction.

Leadership, Interpersonal and Communication

Stress, Conflict, Performance, Time and Motivation
Time as a Resource - Identify Important Time Management Wasters - Individual Time Management Styles - Techniques for better Time Management - Introduction to Motivation, Relevance and types of Motivation - Motivating the subordinates - Analysis of Motivation.

**Manpower Management**


**Relations and Compensation Management**


**Training and Development**


**REFERENCES:**


**COURSE OUTCOMES:**

1. On completion of this course the students will know the personnel manpower management such as man power planning, organization, human relations, and welfare and development methods in construction.
**COURSE OBJECTIVES:**

- To provide conceptual understanding amongst the upcoming managers of industrial & organizational psychology.
- To understand the types of psychology and its effect on the efficiency and productivity.

**Conceptual Awareness of Industrial Organizational Psychology**

Introduction of the terms ‘Industry’ ‘Organization’ and ‘Psychology.’ Definition & Nature – Industrial Organizational Psychology - Importance & Scope of its application - How I/O Psychology is different - Psychological factors responsible for behavior of an individual at work place Industrial-Organizational Psychology on the job and in Everyday Life.

**Characteristics Psychology**

Types and characteristics of psychology Impacting factors and their effects on the behavior - Human psychology - Differentiating male & female psychology - Determining factors impacting work efficiency and productivity.

**Organizational Psychology**

Monitoring Industrial Organizational Psychology - Different tools for testing psychology - Problems with Using Psychological Tests - Measuring effectiveness of these tests - Usage of tests for improving the employee psychology, - Challenges for I-O Psychology

**Workers Behavior**

Individual and Group Behavior - Interaction as Individuals and as Groups - Determining factors for improving their psychology Group Dynamics - Characteristics of Group Dynamics - Necessary steps in Group Dynamics to enhance efficiency & productivity.

**Occupational Stress**


**REFERENCES:**


**COURSE OUTCOMES:**

1. On completion of this course the students will know the conceptual understanding amongst the upcoming managers of industrial & organizational psychology.

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