

CONSTRUCTION MANAGEMENT**Course Code : 313010**

Programme Name/s : Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering/
Programme Code : CE/ CR/ CS/ LE
Semester : Third
Course Title : CONSTRUCTION MANAGEMENT
Course Code : 313010

I. RATIONALE

The construction industry is in continuous need of skilled professionals, capable of managing projects efficiently in the capacity of project engineers, construction managers, site supervisors, and project coordinators, among others. It is required for a civil engineer to plan, manage and execute Civil Engineering works with utmost precision within the time frame so as to optimize the resources. Therefore, it is necessary to develop a perfect blend of knowledge, skills, and attitudes in the form of the competencies among the learners to tackle with such engineering projects effectively and efficiently leading towards sustainable development. This course will help in developing these basic competencies among the students which will enable them to get an employment in the market.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Manage the given construction project using the relevant techniques of construction management.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Conduct the project feasibility analysis of the given project.
- CO2 - Apply the relevant scheduling technique in the given situation to decide the ethical element of the project.
- CO3 - Manage the inventory using relevant inventory control techniques.
- CO4 - Execute the project as per the prevailing safety practices

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Abbr | Course Category/s | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | | Total Marks | | |
|-------------|-------------------------|------|-------------------|--------------------------|----|----|-----|-----|---------|-------------------|----------------|--------|-----|-------|-----|------------------|-----|-------|-----|-------------|-------------|-----|--|
| | | | | Actual Contact Hrs./Week | | | SL | H | | NL | Paper Duration | Theory | | | | Based on LL & TL | | | | Based on SL | | | |
| | | | | | | | | | | | | | | | | Practical | | | | | | | |
| | | | | CL | TL | LL | | | | | | FA-TH | | SA-TH | | Total | | FA-PR | | SA-PR | | SLA | |
| | | | | | | | Max | Min | | Max | | Min | Max | Min | Max | Min | Max | Min | Max | Min | | | |
| 313010 | CONSTRUCTION MANAGEMENT | CMA | DSC | 1 | - | 2 | 1 | 4 | 2 | - | - | - | - | - | 25 | 10 | - | - | 25 | 10 | 50 | | |

CONSTRUCTION MANAGEMENT**Course Code : 313010****Total IKS Hrs for Sem. : 0 Hrs**

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @\$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr.No | Theory Learning Outcomes (TLO's) aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|-------|--|--|---|
| 1 | <p>TLO 1.1 Explain the term, "Project Life Cycle" with its importance.</p> <p>TLO 1.2 Identify the characteristics of the given project with relevant constraints.</p> <p>TLO 1.3 Select the project from the available options based on feasibility analysis.</p> <p>TLO 1.4 Justify the importance of project management frameworks and standards.</p> <p>TLO 1.5 Select the relevant type of equipment for the given type of activity of project.</p> | <p>Unit - I Project Initiation and its feasibility</p> <p>1.1 Project: Basic Definitions, management functions, ethics, project life cycle- Project Initiation, Project Planning, Project Executing, Project Monitoring and Controlling, Project Closing.</p> <p>1.2 Project Characteristics and Constraints- Scope, time, cost, Quality; Stakeholder.</p> <p>1.3 Project Feasibility Analysis- Market analysis, Financial analysis- Net Present Value(NPV), Payback Period, Examine the business problem/opportunity, Identify the requirements, undertake a feasibility study, Rank the feasibility results- Define the criteria, give ranking scores, Identify the feasibility outcome.</p> <p>1.4 Project Management Frameworks and Standards, Project Management consultant (PMC)- roles & responsibilities.</p> <p>1.5 Equipment used in executing the Civil Engineering projects- •Earth moving equipment (Tractor, Bulldozer, Scrapers, Excavators), • Hauling Equipment (Drum trucks, Front end loader, Conveyor belt), • Concreting Equipment (RMC mixer, Concrete pump), • Hoisting Equipment (Lifting & lowering equipments, Cranes).</p> | Lecture Using Chalk-Board Presentations Site/Industry Visit |

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| Sr.No | Theory Learning Outcomes (TLO's) aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|-------|--|---|---|
| 2 | TLO 2.1 Identify the broad activities involved in given construction project. TLO 2.2 Apply the relevant technique of analysis to get the required information about the given project. TLO 2.3 Explain the process of developing the critical path line in solving the given problem. | Unit - II Project Management and Scheduling 2.1 Broad activities in construction work – Earthwork, Foundation, RCC Work, Brick work, Scaffolding, Plastering, Painting etc & duration required for complete the activity 2.2 Methods of Scheduling-Gantt Chart, Bar chart, Development of Bar charts and Gantt chart, Merits & limitations of Bar chart & Gantt chart. 2.3 Concept of CPM & PERT: Introduction to Critical path method (CPM), Program evaluation & review techniques (PERT), Network Diagramming of Projects Activity-on-arrow (AOA) Diagrams- Concept of Activity and Event, Time-Analysis of Networks- Forward Pass, Backward Pass, Probabilistic Durations- Optimistic Time, Pessimistic Time, Most Likely Time, Project Scheduling- ES and LS Schedules as Limits, Resource Scheduling, Time/Cost Trade-off | Lecture Using Chalk-Board Video Demonstrations Hands-on Presentations |
| 3 | TLO 3.1 Apply the relevant material management techniques in the given construction project. TLO 3.2 Apply the material management technique for rebar in the given construction project.. | Unit - III Material Management 3.1 Material Management-Introduction, Inventory and inventory control, EOQ (Economic order of quantity), ABC technique, V-E-D analysis, Just in Time Strategy (JIT), Store management & various records related to store management 3.2 Rebar Management: Wastage of steel on site, Preventive measures to avoid the wastage of steel. Rebar, Importance of rebar, Fabrication and transportation of Rebar. Understanding rebar drawings. | Lecture Using Chalk-Board Video Demonstrations Presentations Site/Industry Visit |
| 4 | TLO 4.1 Explain the remedial measures with preventative strategies for the relevant identified cause of accidents on construction sites. TLO 4.2 Follow the relevant legal provisions related to labor laws in project execution. | Unit - IV Safety and labour laws in construction 4.1 Importance of Safety in construction work, causes of accidents on construction site & remedial measures, precautions to avoid accidents at site, safety policies. 4.2 Introduction to Labour laws related to construction- Workman Compensation Act, Minimum Wages Act, The Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, Janshree Vima Yojna | Lecture Using Chalk-Board Video Demonstrations Presentations Site/Industry Visit |

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|-------|--|----------------|--------------|
| LLO 1.1 Identify the roles and responsibilities of manpower required for a construction project | 1 | *Draw the flow chart of manpower required for a given type of project | 2 | CO1 |
| LLO 2.1 Select the relevant resources required for foundation or RCC or Brickwork for given construction project/data | 2 | *Draw the resource allocation plan for Foundation or RCC or Brickwork activity on construction site | 2 | CO1 |
| LLO 3.1 Select the relevant resources required for Structural members of beam or column for given construction project/data | 3 | Draw resource allocation plan for Structural members for beam or column or slab for G+5 activity on site | 2 | CO1 |

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| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|--------------|--|-----------------------|---------------------|
| LLO 4.1 Select the relevant resources required for plastering or flooring for given construction project/data | 4 | Draw resource allocation plan for plastering or painting or flooring activity on site | 2 | CO1 |
| LLO 5.1 Select different equipments used to carry out the construction of building | 5 | Write a brief report of site inspection with special reference to construction equipments used in the project with relevant photographs, video etc | 2 | CO1 |
| LLO 6.1 Apply the concept of bar chart/Gantt chart to get the required information about the given project. | 6 | Draw the bar chart / Gantt chart for the activities of given construction project by using MS Excel/MS Project | 2 | CO2 |
| LLO 7.1 Apply the concept of network diagram to get the required information about the given project. | 7 | Forecast the time duration required for various activities of the given construction project to represent them through a network diagram | 2 | CO2 |
| LLO 8.1 Determine/Find the duration of the project and the sequence of critical activities. | 8 | *Solve the numerical on CPM for finding duration of project and Critical path of the any one problem for the given data | 2 | CO2 |
| LLO 9.1 Apply the concept of PERT technique to get the required information about the given project. | 9 | *Solve the numerical on PERT to represent the sequence of activities and critical path of the any one problem for the given data. | 2 | CO2 |
| LLO 10.1 Determine the Economic Order Quantity (EOQ) based on the given data | 10 | *Determination of EOQ (Economic order quantity) based on the given data. (Solve one Numerical) | 2 | CO3 |
| LLO 11.1 Identify the most important product in given construction project/data | 11 | *Carry out the ABC analysis for the given problem/data (Solve one Numerical) | 2 | CO3 |
| LLO 12.1 Apply the principles of management for rebar procurement on the given site. | 12 | Develop rebar procurement plan for the given construction site. (Manually or by using any open-source software) | 2 | CO3 |
| LLO 13.1 Select the causes and remedial measures for given construction project/data | 13 | *Prepare a report on minimum five expected causes of accidents on construction sites with their remedial measures. (Visit any one Industrial/Residential/Public construction building) | 2 | CO4 |
| LLO 14.1 Select the action plan measures for given construction project/data | 14 | *Prepare a brief report of the observation made on site with respect to safety on site (Visit any one Industrial/Residential/Public construction building) | 2 | CO4 |
| LLO 15.1 Select various safety devices used at given construction site | 15 | Prepare the charts/report on various safety devices used at given construction site (Visit any one Industrial/Residential/Public construction building) | 2 | CO4 |
| Note : Out of above suggestive LLOs - <ul style="list-style-type: none"> • '*' Marked Practicals (LLOs) Are mandatory. • Minimum 80% of above list of lab experiment are to be performed. • Judicial mix of LLOs are to be performed to achieve desired outcomes. | | | | |

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)**Micro project**

- Prepare a report on different forms of inventory storage along with your interpretation.
- Collect the information about latest safety measures adopted at construction project.

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- Collect information and prepare a report on any one top construction companies in India.
- Compare any 3 construction management software.
- Use any one free open ware software to collect information about modern techniques of material management like JIT/SAP/ERP/MSP/MSEXCEL/Primavera.
- Collect information and prepare a report on various construction equipments used in construction industry.
- Use any one free open ware software of Construction Management to prepare the scheduling of a project.
- Use any one free open ware software of Construction Management to determine the critical path for the given construction project.
- Interpret the network figures used in given civil engineering projects.

Assignment

- Prepare a brief report on overview of Construction Professional Practice in India
- Solve the numerical on bar chart, CPM and cost optimization for the given data.
- Collect and interpret various store forms from PWD, WRD, MJP.
- Download the labour laws documents from internet and write a brief summary on it.
- Learn material management module from free open ware website.
- Visit to a Site to study the construction technique and use of major construction equipment.
- Student should watch any 3 learning website link given in XIII learning websites & portal and prepare a brief report on it.
- Prepare a brief report on role of construction industry in national development.
- Compile minimum 10 safety slogans displayed at various sites with sources and write a brief summary on it.
- Prepare project cost analysis for small construction project.
- Collect & interpret bar chart/CPM network for existing construction project.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicious mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|-------|---|---------------------|
| 1 | Free Open ware software-1. Just-In-Time (JIT), 2. System Application & Product in data processing (SAP), 3. Microsoft Project (MSP)4. Microsoft Excel (MS Excel)5. Primavera6. Enterprise Resource Planning (ERP) | 2,3 |

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

| Sr.No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|-------|------|--|-------------|----------------|---------|---------|---------|-------------|
| 1 | I | Project Initiation and its feasibility | CO1 | 6 | 0 | 0 | 0 | 0 |
| 2 | II | Project Management and Scheduling | CO2 | 5 | 0 | 0 | 0 | 0 |
| 3 | III | Material Management | CO3 | 2 | 0 | 0 | 0 | 0 |
| 4 | IV | Safety and labour laws in construction | CO4 | 2 | 0 | 0 | 0 | 0 |

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| Sr.No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|--------------------|------|------------|-------------|----------------|----------|----------|----------|-------------|
| Grand Total | | | | 15 | 0 | 0 | 0 | 0 |

X. ASSESSMENT METHODOLOGIES/TOOLS**Formative assessment (Assessment for Learning)**

- Term work, Self Learning Assessment (Assignment & Microproject). Note: Each Practical will be assessed considering-60% weightage to process related and 40 % weightage to product related

Summative Assessment (Assessment of Learning)**XI. SUGGESTED COS - POS MATRIX FORM**

| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | |
|--|--|-----------------------|---------------------------------------|------------------------|--|-------------------------|-------------------------|-------------------------------------|-------|-------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | | | |
| CO2 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | | | |
| CO3 | 3 | 3 | 1 | 2 | 1 | 2 | 2 | | | |
| CO4 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | | | |
| Legends :- High:03, Medium:02,Low:01, No Mapping: - *PSOs are to be formulated at institute level | | | | | | | | | | |

XII. SUGGESTED LEARNING MATERIALS / BOOKS

| Sr.No | Author | Title | Publisher with ISBN Number |
|-------|-------------------------------------|--|---|
| 1 | S.C. Sharma, S.V. Deodhar | Construction Engineering and Management | Khanna Book Publishing Co (P) Ltd. ISBN 9789386173980 |
| 2 | IGNOU | Project Management | Indira Gandhi National Open University(eKumbh-AICTE) |
| 3 | K. K. Chitkara | Construction Project Management-Planning, Scheduling & Controlling | McGraw Hill Education ISBN-10 0070680752, ISBN-13 978-0070680753 |
| 4 | L. S. Srinath | PERT And CPM Principles And Applications | East-West Press (Pvt.) Ltd. ISBN-10 8185336202 ISBN-13 978-8185336206 |
| 5 | Jack Gido, Jim Clements, Rose Baker | Successful Project Management | Cengage Publication ISBN: 9781337363853 |

XIII. LEARNING WEBSITES & PORTALS

| Sr.No | Link / Portal | Description |
|-------|---|--|
| 1 | https://archive.nptel.ac.in/courses/105/103/105103206/ | Construction Method and Equipment Management |
| 2 | https://www.youtube.com/watch?v=Cx7i2wXB0kA&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs&index=16 | Project Scheduling |

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| Sr.No | Link / Portal | Description |
|-------|---|--|
| 3 | https://www.youtube.com/watch?v=j6VillXT0Vs&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs&index=22 | Accidents in Construction Industry |
| 4 | https://www.youtube.com/watch?v=EVsi1QamfU0&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs&index=26 | Safety Organization and Safety Officer |
| 5 | https://www.youtube.com/watch?v=QoXvRBrFWyI&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs&index=25 | Implications of Construction Accidents |
| 6 | https://archive.nptel.ac.in/courses/105/104/105104161/ | Introduction to planning and scheduling, resource levelling and allocation, crashing of networks |
| 7 | http://www.cidc.in/ | Construction Industry Development Council (CIDC) |
| 8 | https://onlinecourses.nptel.ac.in/noc22_ce39/preview | Safety in Construction Industry |
| 9 | https://www.youtube.com/watch?v=Tm2HhqMu5Jg | PERT and CPM |
| 10 | https://www.youtube.com/watch?v=GAGoqqZSP4&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs&index=3 | Overview of steps in execution of a project |
| 11 | https://www.youtube.com/watch?v=kuCHsNXeNMc&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs&index=5 | Resource Management in Construction Projects |
| 12 | https://www.youtube.com/watch?v=Bh_LYZh3KH4&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs&index=21 | Introduction to construction safety |

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

MSBTE Approval Dt. 02/07/2024**Semester - 3, K Scheme**