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**SECOND SEMESTER 2023-2024**

**Course Handout Part II** Date: **09-01-2024**

In addition to part -I (General Handout for all courses appended to the timetable), this portion

gives further specific details regarding the course.

Course No.

Course Title

Instructor-in-charge (IC)

Instructors

: **CE F242**

: **Construction Planning and Technology**

: **Arkamitra Kar**

: **Krishnendu Sivadas, Sk Abdul Kaium**

**1. Scope and Objective of the Course:**

Any civil engineering project needs meticulous planning to achieve time bound completion without compromising on the designed safety, durability constraints and cost overrun. An engineer managing such projects should be acquainted with topics other than regular subjects based on mechanics. These include systematic approaches in project planning and its implementation, procurement and contract management, estimation and rate analysis, innovative and new methods in construction technology. This course is an introduction to the above with current planning and control techniques within the context of Indian construction industries with insights to better practices followed elsewhere.

**Course Outcomes**: After successful completion of this course, the student will be able to:

CO1. Identify and assess the building types, their construction practices and adopt guidelines/ standards relevant to them

CO2. Design proper vertical transportation systems in line with the requirements of any building

CO3. Prepare a detailed plan, elevation, 3D rendered model using Autodesk Revit Architecture and estimate for a given structure

CO4. Plan and schedule a project for efficient working and timely completion of projects with optimal utilization of resources

Student Learning Outcomes (SLOs) assessed in this course – **(a), (b), (c), (e), (f), (g), (h), (j),** and **(k).**

**2. Text Books:**

T1 Punmia, B C, Ashok K Jain and Arun K Jain. Building Construction, Eleventh Edition, Laxmi Publications Ltd, New Delhi, 2016.

**References:**

R01 Arora, S P, and S P Bindra. A textbook of Building construction. Fifth Edition, New Delhi, Dhanpatrai publications, 2010.

R02 Dutta, B N. Estimating and Costing in Civil Engineering. 28th Edition, New Delhi, UBS, 2016.

R03 Relevant B.I.S Codes including National Building code of India.

**3. Lecture wise Course Plan:**

| **Lecture** | **Topics Covered** | |  | **Learning Objectives** | | | | |  |  |  | **Reference** | **SLO** |
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| **No.** |  |  |  |  | **to TB, RB** |
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| 1 | Introduction and Overview | | | Course objectives and outline | | | | | |  |  | - |  |
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| 2-4 | Principal components of a  Building system and their inter relationships | | | List and describe the types of buildings  Identify the requirements of a building and its components  Analyze the interrelationships between various components | | | | | | | | T1 (1) |  |
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|  |
| (a), (c) |
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| 5-7 | Principal building system as affected by environmental, legal (Functional requirements  and Development control  rules), material, and industrial constraints | | | Study Climate Oriented design  Choose appropriate building materials for various purposes  Describe Functional planning, planning regulations and bylaws  Identify Important clauses in National building code | | | | | | | |  |  |
|  |  |
|  | (a), (h), |
| T1 (1, 31) |
| (k), (j) |
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| 8-11 | Substructure – Foundation systems | | | Study setting out and excavations  List and explain various types of  foundations, their choice, failure and  remedial measures  Describe construction procedure of  pile foundations, Identify pile construction problems, causes and | | | | | | | |  |  |
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| T1 (1, 2, | (a), (c), |
| 3) | (e) |
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| suggest remediation | | | |  |  |  |  |  |  |
| 12-16 | Superstructure – Building envelope | | | Study Masonry construction  List and explain the types of Walls and their construction  Define Fenestrations  Study the types and properties of floors and roofs and explain their  construction methods  Identify the various types of finishes | | | | | | | |  |  |
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| T1 (5-12; | (a), (c) |
| 15, 17) |
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| 17-20 | Access structures, Building services, Other protective systems | | | Study the various vertical transportation systems-stairs and their  types  Identify and explain the procedures  and materials involved in plumbing  and damp proofing  Describe Formwork and explain its  importance  Explain: Shoring, underpinning and scaffolding | | | | | | | |  |  |
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| T1 |  |
| (14,18- |  |
| (c) |
| 23, 26, |
|  |
| 30) |  |
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| 21-24 | Estimating and Costing; Valuation | | | Identify the raw materials (cement,  aggregates, steel, wood and others)  needed for a construction project and  quantify the amounts of each raw  material as per design.  Estimate the cost of the quantities and  prepare a budget based on costing.  Explain valuation of a building and identify the various kinds of values | | | | | | | |  |  |
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|  | (a), (b), |
| R02 |
| (d) |
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| 25-26 | Introduction to planning and scheduling of Projects | | | | | Describe the tasks and steps  necessary to plan and schedule the  activities in a project. Define and form a planning and scheduling (project management) framework. Define project activities  Identify the resources that will be  required for the particular project. | | | | | | | | | T1 (29) | (a), (h), (k) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 27-32 | Construction project network analysis | | | | | Construct a bar chart for network  analysis of a particular project  Study CPM and PERT; LOB; Precedence networks; network crashing and time cost trade off | | | | | | | | | T1 (29) | (a), (c), (e) |
| 33-34 | Contracts | | | | | Prepare a contract for a construction  project with all required details.  Prepare a tender for a construction  project with necessary details  Identify the clauses that are important while drawing a contract. | | | | | | | | |  |  |
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| R02 | (f), (g), |
| (j) |
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| 35-36 | Resource allocation and levelling | | | | | Identify the types of resources  required for a civil engineering  construction.  Analyze various allocation methods  and arrive at the most effective and  economical manner of resource allocation.  Identify the differences between resource allocation & resource levelling | | | | | | | | |  |  |
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| Class | (a), (c), |
| Notes | (e) |
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| 37 | Engineering economy and  cost benefit analysis of project | | | | | Identify and study the various types of  construction costs: direct and indirect costs | | | | | | | | | Class |  |
| (a), (c) |
| Notes |
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| 38-39 | Development of model  based planning, control  and reviewing civil engineering construction | | | | | Study in detail about how technology  and software (Building Information  modelling) aids in better planning  and control of building construction works | | | | | | | | |  |  |
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| Class | (a), (b), |
| Notes | (e), (k) |
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| 40 - 42 | Construction safety and health; acts and management | | | | | Study the basic construction safety  regulations and guidelines & its aspects | | | | | | | | | Class |  |
| (c), (f) |
| Notes |
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**\*Student Learning Outcomes (SLOs):**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

* 1. an ability to apply knowledge of mathematics, science and engineering
  2. an ability to design and conduct experiments, as well as to analyze and interpret data
  3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
  4. an ability to function on multidisciplinary teams
  5. an ability to identify, formulate, and solve engineering problems
  6. an understanding of professional and ethical responsibility
  7. an ability to communicate effectively
  8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
  9. a recognition of the need for, and an ability to engage in life-long learning
  10. a knowledge of contemporary issues
  11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

1. **Evaluation Scheme:**

| **Component** | **Duration** | **Weightage (%)** | **Date & Time** | **Open Book/** |
| --- | --- | --- | --- | --- |
| **Closed Book** |
|  |  |  |  |
| Midsem Test | 90 min | 25 |  | Closed |
| 15/03 - 9.30 - 11.00AM |
|  |  |  |  |
| Assignments (4 Nos) | Continuous | 10 | - | Open |
|  |  |  |  |  |
| Project (2 Reviews) | Continuous | 15 | - | Open |
|  |  |  |  |  |
| Classroom Interaction |  |  |  |  |
| Lecture & Tutorial | Continuous | 15 | - | Open |
| (At least 10)\* |  |  |  |  |
| Comprehensive | 180 min | 35 | 16/05 FN | Open |
| Exam |
|  |  |  |  |

* + *Best (n-2) would be considered. n is the total number of surprise quizzes conducted.*

1. **Chamber Consultation Hour:** Tuesday 04.30 PM – 05.30 PM
2. **Make up Policy:** Prior permission for all make ups are a must.
3. **Notices:** Notices concerning this course will be uploaded on CMS for this course.
4. **Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR-IN-CHARGE**

**CE F242**