

# Techno India NJR Institute of Technology



## COURSE FILE

### PROJECT PLANNING AND CONSTRUCTION MANAGEMENT (8CE4-01)

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For Techno India NJR Institute of Technology  
पंकज पौरवाल  
Dr. Pankaj Kumar Porwal  
(Principal)



# RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

IV Year- VIII Semester: B. Tech. (Civil Engineering)

## SCE4-01 Project Planning and Construction Management

Credit 3

Max. Marks: 150(IA:30, ETE:120)

3L+0T+0P

End Term Exam: 3Hours

SN	Course Content	Hours
1	<b>INTRODUCTION:</b> Objective, scope and outcome of the course	1
2	<b>FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING:</b> Capital investment proposals, criterions to judge the worthwhile of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure. Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives of construction project management.	7
3	<b>PROJECT SCHEDULING:</b> Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Sequence of construction activities, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.	8
4	<b>PROJECT COST AND TIME CONTROL:</b> Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.	8
5	<b>CONTRACT MANAGEMENT:</b> Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.	8
6	<b>SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT:</b> Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.	8
	<b>Total</b>	<b>40</b>

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Office of Dean Academic Affairs  
Rajasthan Technical University, Kota

### Course Overview:

Student will learn basics of PPCM from these 40 hours course. It introduces the basic learning requirements for the civil engineer project manager and makes the appreciation for the qualitative nature of the construction project management. The philosophy of the course is more on system approach contrary to majority of mechanics-based subject. Also, need for construction industry has been emphasized.

**PPCM** plays a significant role in ensuring that all Company's or Programme's projects are aligned with strategic vision and objectives, and meet operational, cost, budget, and time-related targets. Student should learn and develop problem solving abilities using PPCM in order to get a good job in top civil engineering company.

### Course Outcomes:

CO. NO.	Cognitive Level	Course Outcome
1	Comprehension	Students will be able to understand construction risk management, the roles and responsibilities of all constituencies involved in the design and construction process.
2	Comprehension	Students will be able to understand concept of network analysis CPM and PERT methods and network rules and regulations
3	Synthesis	Students will be able to design a network diagram to create the project schedules, Critical path, slack in between activities using CPM & PERT techniques.
4	Comprehension	Students will be able to Identify the project cost and time control using network techniques.
5	Analysis	Students be able to Analyze about the contract management.

### Prerequisites:

- Students will be able to compute construction risk management and identify the roles and responsibilities of all constituencies involved in the design and construction process.
- Students will be able to understand concept of network analysis CPM and PERT methods and network rules and regulations
- Students will be able to design a network diagram to determine the duration of project, Critical path, slack in between activities using CPM & PERT techniques.
- Students will be able to analyze the project cost and time control using network techniques.
- Students be able to Analyze about the contract management.

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### Course Outcome Mapping with Program Outcome:

Course Outcome	Program Outcomes (PO's)											
CO. NO.	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO401.1	3	2	2	2	2	2	2	1	2	1	1	1
CO401.2	2	2	2	2	1	2	2	1	2	1	2	1
CO401.3	3	2	2	2	2	2	2	1	2	1	1	1
CO401.4	2	2	2	2	2	1	1	1	2	3	3	2
CO401.5	2	2	2	2	2	1	1	1	2	3	3	2
CO401 (AVG)	2.4	2	2	2	1.8	1.6	1.6	1	2	1.8	2	1.4
1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)												

### Course Coverage Module Wise:

Lecture No.	Unit	Topic
1	1	<b>FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING:</b> Students should be able to understand of capital investment proposals, criteria to judge the worth whileness of capital projects.
2	1	Students should be able to compute net present value, benefit cost ratio, internal rate of return
3	1	Students should be able to compute risk cost management, main causes of project failure.
4	1	Students should be able to write Categories of construction projects, objectives, project development process
5	1	Students should be able to functions of project management, Project management organization and staffing
6	1	Students should be able to identify stages and steps involved in project planning
7	1	Students should be able to identify stages and steps involved in project planning
8	2	<b>PROJECT SCHEDULING:</b> Students should be able to understand Importance of project scheduling

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9	2	Students should be able to identify project work breakdown process and determine activities involved
10	2	Students should be able analyze work breakdown structures, assessing activity duration.
11	2	Students should be able write duration estimate procedure and Project work scheduling
12	2	Students should be able to apply project management techniques- CPM network analysis
13	2	Students should be able to apply PERT network analysis
14	2	Students should be able create a network diagram using PERT network analysis
15	2	Students should be able create a network diagram using PERT network analysis
16	3	<b>PROJECT COST AND TIME CONTROL:</b> Students should be able to understand monitoring the time progress
17	3	Students should be able to identify of cost controlling measures in a construction project.
18	3	Students should be able to write time cost trade-off process: direct and indirect project costs, cost slope
19	3	Students should be able to write process of crashing of activities
20	3	Students should be able to write process of crashing of activities
21	3	Students should be able to compute the optimum duration of project
22	3	Students should be able to schedule updating of project networks
23	3	Students should be able to write recourse's allocation
24	4	<b>CONTRACT MANAGEMENT:</b> Students should be able to write element of tender operation
25	4	Students should be able understand types of tenders
26	4	Students should be able write types of contracts
27	4	Students should be able write contract documents, Legal aspects of Contracts

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28	4	Students should be able practice Contract negotiation
29	4	Students should be able understand breach of contracts
30	4	Students should be able analyze the Contracts
31	4	Students should be able analyze Arbitration
32	5	<b>SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT:</b> Students should be able to identify causes and preservation of accidents at construction sites
33	5	Students should be able understand the safety management
34	5	Students should be able identify demolition of structures
35	5	Students should be able understand explosive handling
36	5	Students should be able identify hot bitumen works
37	5	Students should be able understand project management information System: Concept, frame work
38	5	Students should be able identify benefits of computerized information systems
39	5	Students should be able understand environmental aspect of various types of construction projects
40	5	Students should be able understand social aspect of various types of construction projects

### TEXT/REFERENCE BOOKS

1. Project management with CPM/PERT by B.C. Punmia, Laxmi Publication (P) Ltd.
2. Construction Project Management by K.K Chitkara, Tata Mc Graw Hills.
3. Project Management by Modder & Phillph, CBS Publishers.
4. Project Planning and Control by Punmia and Khandelwal K.K., Laxmi Publication (P) Ltd.
5. Project Management by Choudhary S., Tata McGraw Hill Publishing Company Limited, New Delhi.

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## Course Level Problems (Test Items):

CO.NO.	Problem description
1	A. Describe the net present value and benefit cost ratio. B. Write down the importance of the project planning and enlist the stages involved in project planning. C. List out the responsibilities of project manager in construction project.
2	A. Explain work breakdown structure with of an example. B. Discuss term “project scheduling and its importance in construction projects. C. Explain Programme and review technique and distinguish between positive slack, zero slack and negative slack.
3	A. Describe the cost controlling measures in a construction project. B. Write about the time cost trade-off process: direct and indirect project costs. C. Explain resource updating and discuss about its implementation.
4	A. Write down the rules for inviting and processing tenders. B. List out the required contract documents and write about Legal aspects of Contracts.
5	A. Discuss the social and environmental aspect of various types of construction projects B. Mention the safety measures for scaffolding, ladder framework.

## Assessment Methodology:

1. Assignments one from each unit.
2. Online Quiz at Google classroom
3. Midterm subjective paper where they have to write algorithms to perform different operations on different data structures as mentioned in the modules. (Twice during the semester)
4. Final paper at the end of the semester subjective.

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## **TEACHING AND LEARNING RESOURCES UNIT-WISE:**

### **1. FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING**

#### **VideoTutorials:**

<https://nptel.ac.in/courses/105/104/105104161/>

<https://nptel.ac.in/courses/110/104/110104073/>

[https://drive.google.com/drive/folders/19nJ\\_FMwWjvaFvGaoelrtNCklGrHXaAX2](https://drive.google.com/drive/folders/19nJ_FMwWjvaFvGaoelrtNCklGrHXaAX2)

#### **Theory concepts:**

[https://drive.google.com/drive/folders/10lSi6iQ3ReHDUL-6\\_Oy1h7jzKuiwxDIA](https://drive.google.com/drive/folders/10lSi6iQ3ReHDUL-6_Oy1h7jzKuiwxDIA)

[https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE\\_JJBPO](https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE_JJBPO)

#### **Sample Quiz:**

<https://global.oup.com/us/companion.websites/9780199397150/student/chapter14/multiplechoice/>

### **2. PROJECT SCHEDULING:**

#### **VideoTutorials:**

<https://nptel.ac.in/courses/105/104/105104161/>

[https://drive.google.com/drive/folders/19nJ\\_FMwWjvaFvGaoelrtNCklGrHXaAX2](https://drive.google.com/drive/folders/19nJ_FMwWjvaFvGaoelrtNCklGrHXaAX2)

#### **Theory concepts:**

[https://drive.google.com/drive/folders/10lSi6iQ3ReHDUL-6\\_Oy1h7jzKuiwxDIA](https://drive.google.com/drive/folders/10lSi6iQ3ReHDUL-6_Oy1h7jzKuiwxDIA)

[https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE\\_JJBPO](https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE_JJBPO)

<https://www.interventions.org/pertcpm.html>

#### **Sample Quiz:**

<https://www.vskills.in/practice/cpm-pert-test>

<https://www.courseya.com/pert-and-cpm-mcq/>

### **3. PROJECT COST AND TIME CONTROL**

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**VideoTutorials:**

<https://nptel.ac.in/courses/105/104/105104161/>

[https://drive.google.com/drive/folders/19nJ\\_FMwWjvaFvGaoelrtNCklGrHXaAX2](https://drive.google.com/drive/folders/19nJ_FMwWjvaFvGaoelrtNCklGrHXaAX2)

**Theory concepts:**

[https://drive.google.com/drive/folders/10ISi6iQ3ReHDUL-6\\_Oy1h7jzKuiwxDIA](https://drive.google.com/drive/folders/10ISi6iQ3ReHDUL-6_Oy1h7jzKuiwxDIA)

[https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE\\_JJBPO](https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE_JJBPO)

<https://www.interventions.org/pertcpm.html>

**Sample Quiz:**

<https://www.vskills.in/practice/cpm-pert-test>

<https://www.courseya.com/pert-and-cpm-mcq/>

**CONTRACT MANAGEMENT & SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT**

[https://drive.google.com/drive/folders/10ISi6iQ3ReHDUL-6\\_Oy1h7jzKuiwxDIA](https://drive.google.com/drive/folders/10ISi6iQ3ReHDUL-6_Oy1h7jzKuiwxDIA)

[https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE\\_JJBPO](https://drive.google.com/drive/folders/13WBog5benU3wAJ5lsyNRITyoYE_JJBPO)

[https://drive.google.com/drive/folders/19nJ\\_FMwWjvaFvGaoelrtNCklGrHXaAX2](https://drive.google.com/drive/folders/19nJ_FMwWjvaFvGaoelrtNCklGrHXaAX2)

<https://nptel.ac.in/courses/105/103/105103093/>

<https://nptel.ac.in/courses/105/104/105104161/>

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**PREVIOUS YEAR QUESTION PAPERS:**

<b>8E 8093</b>	Roll No. _____	[Total No. of Pages : 3]
	<b>8E 8093</b>	
<b>B.Tech. VIII - Semester (Main &amp; Back) Examination, April-2019</b> <b>Civil Engineering</b> <b>8CE3A Project Planning &amp; Construction Management</b>		

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

**Instructions to Candidates:**

Attempt any Five questions, selecting One question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.

**Unit - I** ✓

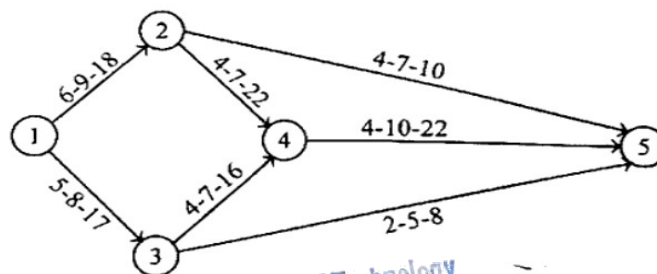
1. a) Discuss the techniques of decision making under risk and uncertainty. (8)
- b) Discuss the functions of Project Manager in construction project. (8)

(OR)

1. a) Write down the importance of project planning and enlist the stages involved in the project planning. (8)
- b) Explain different phases associated with project life cycle. (8)

**Unit - II** ✓

2. For the network shown in the figure below, the time estimates for each activity are mentioned. (16)



- a) Find EST, EFT, LFT, LST for each activity.
- b) Determine the probability of completing the project in 35 days.

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IContd....

(OR)

2. a) Explain Gantt chart and write down the limitations of it, compare it with the Milestone chart. (8)
- b) Explain programme Evaluation and Review Technique and distinguish between positive slack, zero slack and negative slack. (8)

Unit - III

3. a) Explain resource updating and discuss how this process is implemented. (8)
- b) Write down the differences between Resource levelling and Resource smoothing. <http://www.rtuonline.com> (8)

(OR)

3. A project has the following activities, duration, cost and precedence relationships.

Activity	Immediate Predecessor Activity	Normal Time (weeks)	Normal cost (Rs.)	Crast Time (weeks)	Crash cost (Rs.)
A	-	10	11,000	9	15,000
B	-	15	20,000	13	25,000
C	A	10	9,000	6	20,000
D	A	20	25,000	18	30,000
E	C	15	20,000	10	35,000
F	B	17	20,000	15	30,000
G	F	12	15,000	10	25,000
H	D, F	9	12,000	8	18,000
I	G, H	7	10,000	6	15,000

- a) Determine the critical path and the duration of completion of project.
- b) Crash the project to its minimum duration at the lowest cost. (16)

Unit - IV ✓

4. a) Write down the rules for inviting and processing tenders and note down the documents required. (12)
- b) Explain project cost in details. (4)

(OR)

4. a) Discuss the different criteria by which a contract can be terminated. (8)
- b) Discuss the case study of balanced tenders. (8)

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**Unit - V**

5. a) Explain the safety measures to be followed while handling explosive. (8)
- b) Discuss the social aspects of construction management. (8)

**(OR)**

5. a) Mention the safety measures for scaffoldings, Ladder framework. (8)
- b) Explain different features of Integrated Project Management Information system. (8)