

## **Course File**

***Subject Title/Subject Code:* CONSTRUCTION TECHNOLOGY AND EQUIPMENT**

***5CE3-01***

Semester: V Year: III

Name of the Faculty: Mr. Rakesh Yadav

E-mail id: [rakesh.yadav@technonjr.org](mailto:rakesh.yadav@technonjr.org)

### **Class Schedule**

**Total Number of Lectures: 28**

#### **i) Course Objective**

The course "Construction Technology and Equipment" introduces students to key concepts of construction technology and the use of various equipment in civil engineering. It covers engineering economy principles, focusing on cost-effective management through cost analysis and equipment depreciation. Emphasizing safety, the course addresses hazard identification, safety measures, and fire safety standards. Students will also learn to plan and manage construction projects, covering resource allocation, scheduling, and quality control, along with effective materials management. The course familiarizes students with selecting and managing equipment for tasks like earth-moving, hauling, and drilling.

**INDEX - COURSE FILE**

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## VISSION & MISSION OF INSTITUTE

### Vision

Empowering student with recent and emerging technologies to create innovative technical leaders capable of contributing to industrial and societal needs for betterment of mankind across the globe.

### Mission

**M1:** To provide dynamic learning environment to students by providing constant exposure to latest technologies by linking closely with the industries.

**M2:** To establish effective interface with industry to obtain live problems to enhance critical thinking and problem-solving skills among students and consultancy projects for faculty.

**M3:** To provide avenues and opportunities to faculty for domain specific trainings and qualification upgradation.

**M4:** To develop ethical leaders with strong communication skills.

## VISION & MISSION OF DEPARTMENT

### Department Vision

To increase students learning of fundamentals for designing and planning of buildings and latest technologies through industry-aligned project-based learning which will help in transforming students to be good civil engineering professionals leading to innovation and incubation of new ideas.

### Department Mission

**M1:** To create experimental learning through solving problems of Government, Society, Smart Cities, Industry and other entities.

**M2:** To teach the latest technologies to the students as beyond the syllabus activity so that they are updated and industry ready.

**M3:** To enable engineering students, understand industry-aligned technologies and learn to find solutions from their early engineering days and this is the only way to produce globally relevant engineers solving real-life problems applying current technologies.

**M4:** To enable students to generate projects through problem faced by and requirement of Smart cities, industry, Government and other entities whereby those outlined problem statements are to be studied deeply by a group of faculty members to convert them into real-time project format.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

**PEOs 1:** To provide an in-depth understanding of the fundamentals of Civil Engineering and create a foundation for lifelong learning to facilitate a progressive career in the construction Industry, as an entrepreneur and in pursuit of higher studies.

**PEOs 2:** To equip the students with technical and analytical skills to develop innovative solutions to complex real-life problems using existing and novel technologies. To equip the students with good communication and interpersonal skills, inter-disciplinary teamwork and leadership skills to enable them to fulfill professional responsibilities.

**PEOs 3:** To expose them to various contemporary issues which will enable them to become ethical and responsible towards themselves, co-workers, Society and the Nation.

**PEOs 4:** To make the student's industry ready by imparting education related to the latest technologies so that they can grab future industry jobs.

### **PROGRAM SPECIFIC OUTCOMES (PSO's)**

**PSO1:** To be aware of and initiate some-work on future technologies and new developments which may impact the future Industry 4.0.

**PSO2:** Hands on training on upcoming technologies and project-based learning.

**PSO3:** Get exposure to BIM (Building Information Modeling).

## **PROGRAMME OUTCOMES (POs)**

### **A student will develop:**

**PO01. ENGINEERING KNOWLEDGE:** An ability to apply knowledge of Mathematics, Science and Engineering Fundamentals in Electronics and Communication Engineering.

**PO02. PROBLEM ANALYSIS:** Ability to analyze and interpret data by designing and conducting experiments. Develop the knowledge of developing algorithms, designing, implementation and testing applications in electronics and communication related areas.

**PO03. DESIGN/ DEVELOPMENT OF SOLUTION:** 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.

**PO04. CONDUCTION OF INVESTIGATION OF COMPLEX PROBLEMS:** Ability to Identify, formulate and solve engineering problems.

**PO05. MODERN TOOL USAGE:** An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

**PO06. THE ENGINEERING AND SOCIETY:** Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.

**PO07. ENVIRONMENT & SUSTAINABILITY:** Understand the impact of professional engineering solution in societal and environmental contexts, and demonstrate the knowledge of, and need of sustainable development.

**PO08. ETHICS:** An ability to understand the professional, social and ethical responsibility.

**PO09. INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. COMMUNICATION:** An ability to Communicate effectively in order to succeed in their profession such as, being able to write effective reports and design documentation, make effective presentations.

**PO11. PROJECT MANAGEMENT & FINANCE:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environment.

**PO12. LIFE-LONG LEARNING:** Recognize the need and an ability to engage in life-long learning.

## COURSE OUTCOMES (COs) OF THE SUBJECT

CO No.	Mapping	Statement
<b>CO35301.1</b>	<b>Remembering</b>	Understand the objective, scope, and fundamental concepts of construction technology and equipment.
<b>CO35301.2</b>	<b>Understanding</b>	Apply principles of engineering economy to evaluate cost efficiency in construction projects, including minimum cost point analysis, breakeven point analysis, and equipment depreciation.
<b>CO35301.3</b>	<b>Applying</b>	Analyze safety concerns in construction, including accident causes and classifications, and implement safety measures for building construction, material handling, demolition, and fire safety as per NBC guidelines.
<b>CO35301.4</b>	<b>Analyzing</b>	Develop construction planning strategies by understanding the constructional resources, team roles, scheduling, job layout, and quality control, along with effective materials management.
<b>CO35301.5</b>	<b>Evaluating</b>	Identify and manage various construction equipment, including earth-moving equipment, hauling equipment, drilling, blasting, tunneling, and pile driving equipment, to optimize construction operations.

## COS MAPPING WITH POs AND PSOs

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO35301.1</b>	0	0	0	0	0	0	1	2	3	1	1	1	0	0	0
<b>CO35301.2</b>	0	0	0	0	0	0	1	2	3	1	1	1	0	0	0
<b>CO35301.3</b>	0	0	0	0	0	0	1	2	3	1	1	1	0	0	0
<b>CO35301.4</b>	0	0	0	0	0	0	1	2	3	1	1	1	0	0	0
<b>CO35301.5</b>	0	0	0	0	0	0	1	2	3	1	1	1	0	0	0
<b>CO35301 (AVG)</b>	0	0	0	0	0	0	1	2	3	1	1	1	0	0	0

# UNIVERSITY ACADEMIC CALENDAR

## Academic Calendar for odd Semester for Session

RAJASTHAN TECHNICAL UNIVERSITY KOTA				
Course: Bachelor of Technology (B.TECH.) for Odd Semester				
Semester	I	III	V	VII
Induction Program	17.08.2023			
Commencement of Classes	11.09.2023	24.08.2023	04.09.2023	04.09.2023
Commencement of First Mid Term	02.11.2023	03.10.2023	05.10.2023	05.10.2023
Commencement of Second Mid Term	07.12.2023	16.11.2023	20.11.2023	20.11.2023
Last Working Day	23.12.2023	02.12.2023	02.12.2023	30.11.2023
Commencement of Practical Exams	02.01.2024	04.12.2023	23.12.2023	14.12.2023
Commencement of Theory Exams	18.01.2024	14.12.2023	08.12.2023	07.12.2023
Winter Break				

## Academic Calendar of Institute

### Academic Calendar for odd semester for session 2023-24

Academic Calendar Odd Semester 2022-23				
Particulars	B.Tech-I	B.Tech- III	B.Tech- V	B.Tech- VII
Commencement of classes	09-11-2022	08-08-2022	19-09-2022	17-08-2022
Last Working Day	25-02-2023	24-12-2022	07-01-2023	03-12-2022
Course Progression Report-I	10-12-2023	22-09-2022	01-11-2022	17-09-2022
First Mid Term Exam	15-12-2022	29-09-2022	07-11-2022	22-09-2022
Remedial Class-I	26-12-2022	10-10-2022	17-11-2022	06-10-2022
Course Progression Report-II	04-02-2023	26-11-2022	17-12-2022	11-11-2022
Second Mid Term Exam	09-02-2023	01-12-2022	22-12-2022	16-11-2022
Remedial Class-II	20-02-2023	10-12-2023	05-01-2023	25-11-2022
Commencement of Theory Exam	16-03-2023	17-01-2023	18-01-2023	07-12-2022
Commencement of Practical Exam	27-02-2023	03-01-2023	30-01-2023	12-12-2022



## Evaluation Scheme

### FACULTY DETAILS:

Name of the Faculty : Rakesh Yadav Designation : Assistant Professor

Department : Civil Engineering

### 1. TARGET

a) Percentage Pass: 100%  
b) Percentage I class: 60 %

### 2. METHOD OF EVALUATION

Continuous Assessment Examinations (Mid-Term 1, Mid-Term 2)

Assignments / Seminars

Mini Projects

Quiz

Semester Examination

Others \_\_\_\_\_

3. List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this Semester.

4. Take the help of creative tools to stimulate creativity. Include slide presentations, demonstration or forms of visual exercises that will excite the young minds and capture their interest.

**Signature of Faculty:**

**Signature of HOD**

## UNIVERSITY SYLLABUS



### RAJASTHAN TECHNICAL UNIVERSITY, KOTA Syllabus

3<sup>rd</sup> Year - V Semester: B.Tech. (Civil Engineering)

#### 5CE3-01: CONSTRUCTION TECHNOLOGY AND EQUIPMENT

Credit: 2  
2L+0T+0P

Max. Marks: 100(IA:30, ETE:70)  
End Term Exam: 3 Hours

SN	Contents	Hours
1	<b>Introduction:</b> Objective, scope and outcome of the course.	1
2	<b>Engineering Economy</b> Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion.	6
3	<b>Safety in construction</b> Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings; Safety lacuna in Indian scenario. Fire safety provisions as per NBC.	8
4	<b>Construction Planning</b> Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control; <b>Materials Management:</b> Objective and functions of material management.	7
5	<b>Construction Equipment and Management</b> Earth Moving Equipment-Bull dozers tractor pulled scrapers Power shovels Draglines clamshells; cranes; Hoes, Trenching machine types Hauling Equipment; Drilling, Blasting and Tunnelling Equipment; Pile Driving Equipment.	6
	<b>TOTAL</b>	<b>28</b>

#### PRESCRIBED BOOKS

- 1.
2. Construction Planning, Equipment and Methods by Robert Peurifoy and Clifford J Schexnayder. Concrete Technology by M.S. Shetty, S. Chand & Comp.
3. Construction Technology and Management by Gaurav K Sagar & Arvind K Sagar.

**WEEKLY TIME TABLE OF THE TEACHER**

<b>Day</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
Monday							
Tuesday							
Wednesday							
Thursday							
Friday			CTE				
Saturday			CTE				

## COURSE-PLAN

UNIT	Lect. No.	TOPICS	Teaching Methods/ Teaching Aids
1	1	INTRODUCTION: Objective, scope and outcome of the course	White Board
2	2	INTRODUCTION ON ENGINEERING ECONOMY	White Board
2	3	Student Should be able to write about Principle of Engineering Economy	White Board
2	4	Student Should be able to write about Minimum cost point analysis	White Board
2	5	Student Should be able to write about Breakeven point analysis	
2	6	Student Should be able to write about Depreciation	White Board
2	7	Student Should be able to write about Depletion./Depreciation &Depletion	White Board
3	8	SAFETYIN CONSTRUCTION: Causes, classification	White Board
3	9	Student Should be able to write about Cost and measurement of an accident ,safety programmed for construction	White Board
3	10	Student Should be able to write about Safety in construction: Protective equipment, accident report	White Board
3	11	Student Should be able to write about Safety measure:(a) For storage and handling of building materials	White Board
3	12	Student Should be able to write about Safety measure:(b)Construction of elements of a building	White Board
3	13	Student Should be able to write about Safety measure: (c) In demolition of buildings	White Board

3	14	Student Should be able to write about Safety lacunain Indian scenario	White Board
3	15	Fire safety provisions as per NBC	White Board
4	16	CONSTRUCTION PLANNING : Need of construction planning	White Board
4	17	Student Should be able to write about Constructional Resources, Construction team	White Board
4	18	Student Should be able to write about Stages in construction	White Board
4	19	Student Should be able to write about Preparation of construction schedule	White Board
4	20	Student Should be able to write about Job layout, inspection and quality control	White Board
4	21	Student Should be able to write about Job layout, inspection and quality control	White Board
4	22	Student Should be able to write about Materials Management :Objective of Material Management	White Board
4	23	Student Should be able to write about Materials Management: Functions of Material Management	White Board
5	24	Earthmoving Equipment-Bulldozers	White Board
5	25	Student Should be able to write about Tractor pulled scrapers Powers hovels Dragline's clam shells ;cranes ;Hoes	White Board
5	26	TRENCHING MACHINE TYPES HAULING EQUIPMENT; Drillin	White Board
5	27	Student Should be able to write about Blasting and Tunneling Equipment	White Board
5	28	Student Should be able to write about Pile Driving Equipment	White Board

**Signature of Faculty:**

**Signature of HOD**

**Assignment – 1**  
**B. TECH 3rd – YEAR (V SEM.)**

1. Explain the principles of engineering economy in construction projects. Discuss how minimum cost point analysis and breakeven point analysis are applied in construction equipment management.
2. Identify and discuss the main causes of accidents on construction sites. What safety measures can be implemented during the storage and handling of building materials to prevent such accidents?
3. Describe the process of construction planning. What are the key stages involved in preparing a construction schedule, and why is materials management crucial in this process?
4. Discuss the safety provisions for fire safety in construction as per the National Building Code (NBC). How do these provisions impact the construction and design of buildings?
5. Compare and contrast different types of earth-moving equipment used in construction, such as bulldozers, power shovels, and trenching machines. Discuss the factors that influence the selection of equipment for a specific construction task.

**Assignment – 2**  
**B. TECH 3rd – YEAR (V SEM.)**

1. Describe the role of construction equipment in modern construction projects. How does the selection of the right equipment impact the overall efficiency and cost of a construction project?
2. Analyze the importance of safety programs in construction. Develop a brief safety plan for handling and storing hazardous building materials on a construction site.
3. Explain the concept of depreciation and depletion in the context of construction equipment. Why is understanding equipment depreciation important for construction project managers?
4. Outline the steps involved in preparing a job layout for a construction site. What factors must be considered to ensure an effective job layout that supports both efficiency and safety?
5. Discuss the various types of cranes used in construction. What are the key factors to consider when selecting a crane for different types of construction projects?

## SAMPLE QUIZ QUESTIONS

1. Which of the following is the primary purpose of engineering economy analysis?

- A) Determine the best construction material
- B) Minimize the construction project timeline
- C) Evaluate the cost-effectiveness of construction decisions
- D) Maximize the project's profit margin

**Answer:** C) Evaluate the cost-effectiveness of construction decisions

2. What type of equipment is commonly used for lifting and placing heavy materials at construction sites?

- A) Bulldozer
- B) Crane
- C) Excavator
- D) Scraper

**Answer:** B) Crane

3. Which safety measure is crucial for handling and storing hazardous building materials?

- A) Increasing work hours
- B) Using proper protective equipment
- C) Reducing material inventory
- D) Minimizing training sessions

**Answer:** B) Using proper protective equipment

4. What is the main function of a bulldozer in construction?

- A) Drilling holes
- B) Lifting and transporting materials
- C) Moving and grading earth
- D) Tunneling underground

**Answer:** C) Moving and grading earth

5. Which of the following is NOT a common type of construction equipment for earth-moving?

- A) Excavator



- B) Power shovel
- C) Crane
- D) Scraper

**Answer:** C) Crane

6. What does the term 'depreciation' refer to in the context of construction equipment?

- A) Increase in equipment value
- B) Reduction in equipment value over time
- C) Purchase cost of equipment
- D) Cost of repairs and maintenance

**Answer:** B) Reduction in equipment value over time

7. In construction planning, what is the purpose of a job layout?

- A) To increase the project budget
- B) To optimize space and equipment use
- C) To reduce the project timeline
- D) To enhance aesthetic design

**Answer:** B) To optimize space and equipment use

8. Which principle of engineering economy involves analyzing when the cost of producing an additional unit equals the revenue it generates?

- A) Minimum cost point analysis
- B) Breakeven point analysis
- C) Depreciation analysis
- D) Cost-benefit analysis

**Answer:** B) Breakeven point analysis

9. What is a key consideration when selecting construction equipment for a specific task?

- A) Equipment color
- B) Manufacturer's reputation
- C) Task requirements and equipment capability
- D) Equipment age

**Answer:** C) Task requirements and equipment capability

10. Which safety standard provides guidelines for fire safety in construction?

A) ASTM

B) ISO

C) NBC (National Building Code)

D) OSHA

**Answer:** C) NBC (National Building Code)

Mid Term 1

**TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR**

**B. TECH 3<sup>rd</sup> – YEAR (V SEM.) – MT-I**

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## Marks and Gap Analysis of Mid-Term I

S.No.	University Roll No.	Name of Student	Mid-Term 1 MM-70	Remark ( Remedial Class need or not – Y/N )
1.	21ETCCE001	Dev vaishnav	47	N
2.	21ETCCE002	Hitesh Sutradhar	45	N
3.	21ETCCE004	Naved khan	45	N
4.	21ETCCE006	Pushpendra gehlot	54	N
5.	21ETCCE007	Shalin Dak	43	N
6.	21ETCCE009	Tamanna kumawat	65	N
7.	21ETCCE300	Muniraj Sharma	67	N
8.	22ETCCE200	Moiz Udaipurwala	52	N
9.	22ETCCE201	Vikas Suthar	58	N

(Y, if obtained marks are <50%)

**Signature of Faculty:**

**Signature of HOD**

## **Remedial Action Taken to Remove the Gaps (After Mid-Term 1)**

S.no.	University Roll no.	Name of Student	Topics to be discussed in Remedial Class	Schedule Date of Remedial Class	Outcome Achieved
1.	NIL				
2.					

**Signature of Faculty:**

**Signature of HOD**

**Mid Term Paper-II**

**TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR**

**B. TECH 3<sup>rd</sup> – YEAR (V SEM.)**

## Marks and Gap Analysis of Mid-Term II

S.No .	University Roll No.	Name of Student	Mid-Term 1 MM-70	Remark ( Remedial Class need or not – Y/N )
1.	21ETCCE001	Dev vaishnav	46	N
2.	21ETCCE002	Hitesh Sutradhar	44	N
3.	21ETCCE004	Naved khan	44	N
4.	21ETCCE006	Pushpendra gehlot	53	N
5.	21ETCCE007	Shalin Dak	42	N
6.	21ETCCE009	Tamanna kumawat	64	N
7.	21ETCCE300	Muniraj Sharma	66	N
8.	22ETCCE200	Moiz Udaipurwala	51	N
9.	22ETCCE201	Vikas Suthar	57	N

(Y, if obtained marks are <50%)

**Signature of Faculty:**

**Signature of HOD**

## **Remedial Action Taken to Remove the Gaps (After Mid- Term 1I)**

S.no.	University Roll no.	Name of Student	Topics to be discussed in Remedial Class	Schedule Date of Remedial Class	Outcome Achieved
1.	NIL				
2.					

**Signature of Faculty:**

**Signature of HOD**



# Model Question Paper

Total No of Pages: **2**

**5E1341**

**B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021**  
**ESC Civil Engineering**  
**SCE3 - 01 Construction Technology & Equipment's**

**5E1341**

Time: 2 Hours

[To be converted as per scheme]  
Max. Marks: 65  
Min. Marks: 23

*Instructions to Candidates:*

*Attempt all five questions from Part A, four questions out of six questions from Part B and one questions out of three from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL

2. NIL

## **PART - A**

**(Answer should be given up to 25 words only)**

**[5×2=10]**

**All questions are compulsory**

- Q.1 Write the scope of construction technology. [2]
- Q.2 Explain the breakeven point analysis. [2]
- Q.3 Write the safety measures in demolition of buildings. [2]
- Q.4 What are the objectives of material management? [2]
- Q.5 How can scrapers help in increasing speed of construction? [2]

**PART – B**

**(Analytical/Problem solving questions)**

**[4×10=40]**

**Attempt any four questions**

- Q.1 Explain the minimum cost point analysis. [10]  
Q.2 Describe the depreciation and depletion. ✓ [10]  
Q.3 What are the causes of an accident? How the accidents can be classified? ✓ [10]  
Q.4 How the construction schedule is prepared? [10]  
Q.5 Describe the quality control measures in construction. [10]  
Q.6 What are the various forms of earth movers? What are the major earth moving operations? [10]

**PART – C**

**(Descriptive/Analytical/Problem Solving/Design Questions)**

**[1×15=15]**

**Attempt any one questions**

- Q.1 (a) What are the safety measures for storage and handling of building materials? [8]  
(b) Describe the various stages in construction. [7]  
Q.2 (a) Describe the principles of engineering economy. [7]  
(b) What are the basic functions of material management? [8]  
Q.3 (a) What is pile driving? Explain the various equipments for pile driving. [8]  
(b) Describe the different equipments used for tunneling. [7]

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## **STUDENT PERFORMANCE REPORT**

Roll No.	Name of Student	I Mid-Term	II Mid-Term	Average
21ETCCE001	Dev vaishnav	47	46	46.5
21ETCCE002	Hitesh Sutradhar	45	44	44.5
21ETCCE004	Naved khan	45	44	44.5
21ETCCE006	Pushpendra gehlot	54	53	53.5
21ETCCE007	Shalin Dak	43	42	42.5
21ETCCE009	Tamanna kumawat	65	64	64.5
21ETCCE300	Muniraj Sharma	67	66	66.5
22ETCCE200	Moiz Udaipurwala	52	51	51.5
22ETCCE201	Vikas Suthar	58	57	57.5

**Signature of Faculty:**

**Signature of HOD**

## RESULT ANALYSIS

S.N O.	RTU ROLL NUMBER	NAME OF STUDENT	END TERM MARK S	SESSIONA L MARKS	TOTA L
		MAX MARKS	70	30	100
1.	21ETCCE001	Dev vaishnav	28	21	49
2.	21ETCCE002	Hitesh Sutradhar	41	20	61
3.	21ETCCE004	Naved khan	43	20	63
4.	21ETCCE006	Pushpendra gehlot	AB	24	AB
5.	21ETCCE007	Shalin Dak	30	19	49
6.	21ETCCE009	Tamanna kumawat	40	29	69
7.	21ETCCE300	Muniraj Sharma	43	30	73
8.	22ETCCE200	Moiz Udaipurwala	44	23	67
9.	22ETCCE201	Vikas Suthar	42	26	68

TOTAL	PASS	FAIL	ABSENT	PASS %
9	9	1	1	88.89%

**Indirect Assessment:****Overall Teacher Self-Assessment (at the completion of course) in terms of course objective and outcomes****Course Objectives:**

The course "Construction Technology and Equipment" introduces students to key concepts of construction technology and the use of various equipment in civil engineering. It covers engineering economy principles, focusing on cost-effective management through cost analysis and equipment depreciation. Emphasizing safety, the course addresses hazard identification, safety measures, and fire safety standards. Students will also learn to plan and manage construction projects, covering resource allocation, scheduling, and quality control, along with effective materials management. The course familiarizes students with selecting and managing equipment for tasks like earth-moving, hauling, and drilling.

**Course Outcomes:**

At the end of this course students will be able to:

CO1: Understand the objective, scope, and fundamental concepts of construction technology and equipment.

CO2: Apply principles of engineering economy to evaluate cost efficiency in construction projects, including minimum cost point analysis, breakeven point analysis, and equipment depreciation.

CO3: Analyze safety concerns in construction, including accident causes and classifications, and implement safety measures for building construction, material handling, demolition, and fire safety as per NBC guidelines.

CO4: Develop construction planning strategies by understanding the constructional resources, team roles, scheduling, job layout, and quality control, along with effective materials management.

CO5: Identify and manage various construction equipment, including earth-moving equipment, hauling equipment, drilling, blasting, tunneling, and pile driving equipment, to optimize construction operations.

### **Methodology to identify bright student**

It is done by considering a range of criteria, including academic performance, creativity, critical thinking, problem-solving skills, and enthusiasm for learning. Bright students often excel in multiple areas. Observed how students perform in the classroom. In terms of active participation, engagement in discussions, leadership, and the ability to grasp complex concepts.

### **Efforts to keep students engaged**

1. **Active Learning:** Incorporate active learning strategies, such as group discussions, problem-solving activities, and hands-on projects. Active participation keeps students engaged and encourages critical thinking.
2. **Varied Teaching Methods:** Use a variety of teaching methods, including lectures, group work, multimedia presentations, and interactive activities to cater to different learning preferences.
3. **Technology Integration:** Leverage technology, such as online platforms, educational apps, and interactive software, to make lessons more engaging and interactive.

### **Methodology to identify weak student**

It is done by considering a range of criteria, including classroom observation, formative assessment, summative assessment, assignment review etc. Weak students are struggling students with sensitivity and a desire to support their learning. Some measures, such as additional tutoring, personalized assignments, or alternative assessment methods, to help students succeed.

## **Targeted interventions for weak student**

### **1. Additional Resources**

Offer supplementary learning materials, such as textbooks, online resources, or multimedia content, to provide alternative explanations and reinforce key concepts.

### **2. Remedial classes**

Establish a tutoring program where students can receive extra help from teachers.

### **3. Flipped classroom**

Students are assigned pre-class learning materials, often in the form of videos, readings, or online modules, to cover the foundational concepts before coming to class.