

## **Course File**

***Subject Title/Subject Code: Repair and Rehabilitation of Structures***

***5CE5-14***

Semester: V Year: III

Name of the Faculty: Mr. Gourav Purbia

E-mail id: [gourav.purbia@technonjr.org](mailto:gourav.purbia@technonjr.org)

### **Class Schedule**

**Total Number of Lectures: 28**

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

The course "Repair and Rehabilitation of Structures" equips students with the skills to diagnose, prevent, and repair structural deterioration. It covers damage assessment, modern repair techniques like grouting and jacketing, and case studies on structural rehabilitation, preparing students to ensure the durability and safety of concrete and masonry structures.

# Techno India NJR Institute of Technology

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# Techno India NJR Institute of Technology

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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.

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## 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.

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## **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).

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## 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
CO35514.1	<b>Remembering</b>	Student will be able to Plan and understand the repair strategies for buildings and Rehabilitation of structure
CO35514.2	<b>Understanding</b>	Student will be able to analyse the serviceability and Durability of concrete
CO35514.3	<b>Applying</b>	Students will be able to Able to choose the materials and repair techniques or method.
CO35514.4	<b>Analyzing</b>	Students will be able to Able to Develop of "DEMOLITION TECHNIQUES" Engineered demolition techniques for Dilapidated structures – case study
CO35514.5	<b>Evaluating</b>	Students will be able to apply method of repairs, rehabilitation and retrofitting of Structures.

## COS MAPPING WITH POs AND PSOs

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO35514.1	0	0	0	1	0	1	1	0	0	1	1	0	2	2	3
CO35514.2	0	0	0	1	0	1	1	0	0	1	1	0	2	2	2
CO35514.3	0	0	0	1	0	1	1	0	0	1	1	0	2	2	3
CO35514.4	0	0	0	1	0	1	1	0	0	1	1	0	3	3	1
CO35514.5	0	0	0	1	0	1	1	0	0	1	1	0	3	3	1
CO35514 (AVG)	0	0	0	1	0	1	1	0	0	1	1	0	2.4	2.4	2

## 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 <u>Mid Term</u> 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



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## Evaluation Scheme

### FACULTY DETAILS:

Name of the Faculty : Gourav Purbia  
Designation : Technical Assistant  
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)**

**SCE5-14: REPAIR AND REHABILITATION OF STRUCTURES**

**Credit: 2**

**Max. Marks: 100(IA:20, ETE:80)**

**2L+0T+0P**

**End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	<b>Deterioration of Concrete Structures:</b> Penetrability of concrete- permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfate attack. Alkali - Aggregate Reaction. Corrosion- mechanism. <b>Factors affecting and Preventive measures :</b> for all the above, including water - proofing techniques for various conditions, sacrificial anode, corrosion resistant steel, corrosion inhibitors, protective coatings etc.	8
3	<b>Cracks in Concrete and Masonry Structures-</b> Types, patterns, measurement and preventive measures	3
4	<b>Assessment of Risk/Damage in Structures:</b> <i>Preliminary investigation-</i> visual, history collection etc. <i>Detailed Investigation:</i> core cutting, rebar locator, corrosion meter, penetration resistance, pull out tests, half-cell potential, concrete resistivity etc. Interpretation of non destructive test data from all the above tests as well as rebound hammer number and ultra sonic pulse velocity. Destructive and chemical tests- on material samples from site.	5
5	<b>Materials for Repair:</b> polymers and resins, self curing compounds, FRP, ferro-cement- properties, selection criterion, cement based and polymer modified mortars etc	4
6	<b>Repair Techniques:</b> Grouting, Jacketing, External bonded plates- processes, limitations, design computations etc. including numerical problems. <b>Under Water Repair:</b> Processes	6
7	<b>Case Studies:</b> related to rehabilitation of bridge piers, heritage structures, masonry structures etc.	2
	<b>TOTAL</b>	<b>28</b>

**PRESCRIBED BOOKS**

1. Properties of Concrete by A.M. Neville, Pearson.
2. Concrete Technology by M.S. Shetty, S. Chand & Comp.
3. Handbook of Analytical Techniques in Concrete Tech by V.S. Ram Chandran,

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## WEEKLY TIME TABLE OF THE TEACHER

First Time Table: with effect from (Date):

Day	1	2	3	4	5	6	7
Monday							
Tuesday							
Wednesday							
Thursday							
Friday			RRS				
Saturday			RRS				

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## COURSE-PLAN

UNIT	Lect. No.	TOPICS	Teaching Methods/ Teaching Aids
1	1	<b>INTRODUCTION:</b> Objective, scope and outcome of the course	White Board
2	2	<b>DETERIORATION OF CONCRETE STRUCTURES:</b> Penetrability of concrete- permeability	White Board
2	3	Sportively, diffusion. Physical processes- abrasion, erosion	White Board
2	4	Chemical - carbonation, chloride and sulfate attack	White Board
2	5	Alkali – Aggregate Reaction. Corrosion- mechanism.	White Board
2	6	Factors affecting and Preventive measures: for all the above	White Board
2	7	Water – proofing techniques for various conditions	White Board
2	8	Sacrificial anode, corrosion resistant steel	White Board
2	9	Corrosion inhibitors, protective coatings etc.	White Board
3	10	CRACKS in Concrete and Masonry Structures- Types of cracks	White Board
3	11	Patterns of cracks	White Board
3	12	Measurement and preventive measures	White Board
4	13	<b>ASSESSMENT OF RISK/DAMAGE IN STRUCTURES:</b> Preliminary investigation- visual, history collection etc	White Board
4	14	Detailed Investigation: core cutting, rebar locator, corrosion meter, penetration resistance,	White Board
4	15	Pull out tests, half–cell potential, concrete resistivity etc	White Board
4	16	Interpretation of nondestructive test data from all the above tests as well as rebound hammer number and ultra-sonic pulse velocity	White Board
4	17	Destructive and chemical tests- on material samples from site.	White Board

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5	18	MATERIALS FOR REPAIR: Polymers and resins	White Board
5	19	Self-curing compounds, FRP	White Board
5	20	Ferro-cement- properties, selection criterion	White Board
5	21	Cement based, and polymer modified mortars etc	White Board
6	22	REPAIR TECHNIQUES: Grouting	White Board
6	23	Jacketing	White Board
6	24	External bonded plates- processes, limitations	White Board
6	25	Design computations etc	White Board
6	26	Design computations etc. Including numerical problems	White Board
6	27	Under Water Repair: Processes	White Board
6	28	CASE STUDIES: Related to rehabilitation of bridge piers, heritage structures, masonry structures etc	White Board

**Signature of Faculty:**

**Signature of HOD**

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## **Assignment – 1**

### **B. TECH 3rd – YEAR (V SEM.)**

#### **Subject: - Repair and Rehabilitation of Structures (RRS)**

1. What are the construction errors? Explain.
2. Write the principle of minimizing of risk of Aggregate-Silica reaction (ASR).
3. Discuss the term Carbonation. How it affects the durability of concrete.
4. What are the causes of thermal Cracking? Write the preventive measures.
5. Write down the preventive measure of Drying Shrinkage Cracks.

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## **Assignment – 2**

### **B. TECH 3rd – YEAR (V SEM.)**

#### **Subject: - Repair and Rehabilitation of Structures (RRS)**

1. Discuss the Alkali-Silica reaction (ASR) and its effect on concrete.
2. Explain the mechanism of Sulphate attack. Factor affecting Sulphate resistance
3. Explain the effect of corrosion in reinforcement and their preventions
4. What are the causes of thermal Cracking? Write the preventive measures.
5. Write short note on
  - A. Grouting
  - B. Rebound hammer test

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## SAMPLE QUIZ QUESTIONS

**1) Rehabilitation of structures may be required due to several reasons. Choose the correct reason.**

- a) Tensile effects
- b) Environmental effects
- c) Compressive effects
- d) Range effects

**Answer:** (b) Environmental effects

**2) What is the problem of rehabilitation:**

- a) Unique
- b) Submerged
- c) Lined
- d) Layered

**Answer:** (a) Unique

**3) The structural concrete slab panels can be repaired by \_\_\_\_\_:**

- a) Internal bonding
- b) External bonding
- c) Stress bonding
- d) Layered bonding

**Answer:** (b) External bonding

**4) How many types of damages are present in classification of damage?:**

- a) 1
- b) 2
- c) 3
- d) 4

**Answer:** (C) 3

**5) If the loss of prestress is excessive resulting in tensile cracks, which method should be used?:**

- a) Preloading method
- b) Hollow method
- c) Transparent method
- d) Layered method

**Answer:** (a) Preloading method



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Mid Term 1

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR

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

REPAIR AND REHABILITATION OF STRUCTURES

(5CE5-14)

Time: 2 Hr

Max. Marks:70

Note:

- 1) The paper is divided into 2 parts: Part-A and, Part-B.
- 2) Part-A contains 10 questions and carries 2 mark each.
- 3) Part-B contains 5 questions. Each question is having two options and carries 10 marks each.

Part- A (20 Marks)

A.	Define Corrosion?	CO1
B.	Define abrasion?	CO1
C.	Explain the diffusion process?	CO1
D.	Explain Carbonation?	CO1
E.	What is role of Alaklies in Concrete?	CO2
F.	Explain Sulphate attack on concrete?	CO2
G.	What do you understand by FRP?	CO2
H.	What do you understand by Pull out test?	CO2
I.	How abrasion of concrete can be minimised?	CO3
J.	Define term “errosion”?	CO3

Part- B (50 Marks)

1. What are factor affecting deterioration of concreete?	CO1
OR	
1. Give detail study about Alkali aggregate reaction. Also write mechanism of AAR.	CO1
2. Explain different type of cracks?	CO1
OR	
2. Explain different type of pattern of cracks?	CO1
3. Explain “Ferro cement” and properties	CO2
OR	
3. Explain FRP?	CO2

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4. Explain Rebound Hammer test.	CO2
OR	
4. Explain Pull out test?	CO2
5. Describe Sulphate attack	CO3
OR	
5. Explain process of carbonation?	CO3

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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	47	N
3.	21ETCCE004	Naved khan	43	N
4.	21ETCCE006	Pushpendra gehlot	50	N
5.	21ETCCE007	Shalin Dak	45	N
6.	21ETCCE009	Tamanna kumawat	63	N
7.	21ETCCE300	Muniraj Sharma	65	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**

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## 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**

# Techno India NJR Institute of Technology

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## Mid Term Paper-II

### TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR

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

#### Repair and Rehabilitation of Structure

(5CE5-14)

**Time:** 3 Hr

**Max. Marks:** 70

**Note:**

- 1) The paper is divided into 2 parts: Part-A, Part-B and Part-C.
- 2) Part-A contains 10 questions and carries 2 mark each.
- 3) Part-B contains 7 questions. Each question carries 4 marks each. Attempt any 5 Questions
- 4) Part-C contains 5 questions. Each question carries 10 marks each. Attempt any 3 Questions

#### Part- A (20 Marks)

A.	Describe the measure to increase sulphate resistance of concrete.	CO1
B.	What are the main reasons for cracking of concrete.	CO1
C.	How Penetration resistance and pull out test different from the core cutting test?	CO2
D.	Write down comparison between destructive testing and non destructive testing?	CO2
E.	Explain Fiber-Reinforced Plastic?	CO3
F.	Write down the properties of Resin?	CO3
G.	Write down Raw material for cement?	CO4
H.	Write down Limitation of cement	CO4
I.	Write Short note on core cutting process.	CO5
J.	write short note on mapping of data	CO5

#### Part- B (20 Marks)

1. Explain The followings: <ul style="list-style-type: none"><li>● Carbonation</li><li>● Chloride ingress</li><li>● Alkali Aggregate reaction</li><li>● Sulphate Attack</li></ul>	CO1
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2. Explain Active and Dormat Crack	CO1
3. Describe the Importance of NDT in Building Material Assessment.	CO2
4. What do you mean by Ferrocement? Explain its construction techniques	CO3
5. Explain FRP in detail	CO3
6.Explain Shotcrete in detail	CO4
7. write short note on preliminary test method	CO5

## Part C (30 Marks)

1. A. What are different type of cracks in concrete? explain with neat Sketch the preventive measure of cracks B. Explain Effect of corrosion of concrete	CO1
2. A. Explain Pull Out test? B. Explain Core cutting test?	CO2
3. A. Explain Properties of Repair material and their importance? B. Explain Different type of Polymer used for Repair	CO3
4. A. Write Short Note on Underwater Repair B. Write Short Note On Jacketting	CO4
5. A. Write Short Note on Preliminary test method B. Discuss how canal can be rehabilitated	CO5

## Marks and Gap Analysis of Mid-Term II

S.No.	University Roll No.	Name of Student	Mid-Term I MM-70	Remark ( Remedial Class need or not – Y/N )
1.	21ETCCE001	Dev vaishnav	46	N
2.	21ETCCE002	Hitesh Sutradhar	46	N
3.	21ETCCE004	Naved khan	42	N
4.	21ETCCE006	Pushpendra gehlot	49	N
5.	21ETCCE007	Shalin Dak	44	N
6.	21ETCCE009	Tamanna kumawat	62	N
7.	21ETCCE300	Muniraj Sharma	64	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**

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## 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**

<http://www.rtuonline.com>

0180973

<b>5E1349</b>	Roll No. _____	Total No. of Pages : <b>2</b>
	<div style="border: 1px solid black; display: inline-block; padding: 2px;"><b>5E1349</b></div> <p><b>B.Tech. V - Semester (Main) Examination, Nov. - 2019</b> <b>PCC/PEC Civil Engg.</b> <b>5CE5-14 Repair and Rehabilitation of Structures</b></p>	

Time : 2 Hours

Maximum Marks : 80  
Min. Passing Marks : 28

**Instructions to Candidates:**

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

*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.*

**Part - A**

(Answer should be given up to 25 words only)

All questions are compulsory

(5×2=10)

1. What is the role of alkalies in concrete?
2. Define "Guniting" and "Bonding Aspect".
3. Write about self curing compound.
4. Explain the diffusion process.
5. Write the effect of chloride on concrete.

**Part - B**

(Analytical/Problem solving questions)

Attempt any four questions

(4×10=40)

1. Give the detail study about the alkali reactions. Also write the Mechanism of AAR.
2. Write the factor affecting and respective preventive measures of corrosion. Brief the corrosion Mechanism.
3. Explain different types of cracks.
4. What do you mean by ultra sonic pulse velocity? What are the equipments used in this test. Write its principle and its procedure of testing.
5. How Penetration resistance and pull out test are different from core cutting test.
6. What is the application of shotcreting? How it is done?

5E1349 /2019

(1)

[Contd....

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## Part - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any two questions

(2×15=30)

(3×5=15)

1. Write notes on :
  - i) Grouting
  - ii) Under water repair
  - iii) Externally bonded plates.
2. Write notes on :
  - i) Mapping of data
  - ii) Rebound hammer test.
  - iii) A Case study of rehabilitation of dam.
3. a) Discuss properties and selection criteria of epoxy, polyester and resins. (7)  
b) Explain the material, advantages, and applications of FRP and ferro - cement. (8)



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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	47	46	46.5
21ETCCE004	Naved khan	43	42	42.5
21ETCCE006	Pushpendra gehlot	50	49	49.5
21ETCCE007	Shalin Dak	45	44	44.5
21ETCCE009	Tamanna kumawat	63	62	62.5
21ETCCE300	Muniraj Sharma	65	64	64.5
22ETCCE200	Moiz Udaipurwala	52	51	51.5
22ETCCE201	Vikas Suthar	58	57	57.5

**Signature of Faculty:**

**Signature of HOD**

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## RESULT ANALYSIS

S.NO.	RTU ROLL NUMBER	NAME OF STUDENT	END TERM MARKS	SESSIONAL MARKS	TOTAL
		MAX MARKS	70	30	100
1.	21ETCCE001	Dev vaishnav	31	21	52
2.	21ETCCE002	Hitesh Sutradhar	30	21	51
3.	21ETCCE004	Naved khan	27	19	46
4.	21ETCCE006	Pushpendra gehlot	23	22	45
5.	21ETCCE007	Shalin Dak	22	20	42
6.	21ETCCE009	Tamanna kumawat	46	28	74
7.	21ETCCE300	Muniraj Sharma	41	29	70
8.	22ETCCE200	Moiz Udaipurwala	31	23	54
9.	22ETCCE201	Vikas Suthar	30	26	56

TOTAL	PASS	FAIL	ABSENT	PASS %
9	9	0	0	100 %

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## **Indirect Assessment:**

### **Overall Teacher Self-Assessment (at the completion of course) in terms of course objective and outcomes**

#### **Course Objectives:**

The course "Repair and Rehabilitation of Structures" equips students with essential knowledge and skills to address the deterioration of concrete and masonry structures. Students will learn about the causes of structural deterioration, such as penetration mechanisms, chemical attacks, and corrosion, and explore preventive measures like water-proofing, corrosion-resistant materials, and protective coatings. The course covers techniques for identifying and assessing structural cracks, risk and damage assessment using non-destructive and destructive tests, and the selection of modern repair materials. Students will also study advanced repair techniques, including grouting and jacketing, and analyze case studies on structural rehabilitation to apply their knowledge in real-world scenarios.

#### **Course Outcomes:**

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

CO1: Student will be able to Plan and understand the repair strategies for buildings and Rehabilitation of structure

CO2: Student will be able to analyse the serviceability and Durability of concrete

CO3: Students will be able to Able to choose the materials and repair techniques or method.

CO4: Students will be able to Able to Develop of "DEMOLITION TECHNIQUES"  
Engineered demolition techniques for Dilapidated structures – case study

CO5: Students will be able to apply method of repairs, rehabilitation and retrofitting of Structures.

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## 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.

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## **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.