Total No. of Questions: 25

Enrollment No : _____

MEDICAPS UNIVERSITY

Faculty of Engineering

End Semester Examination May 2025

CE3EL04 Building Maintenance & Repairs

Programme	:	B.Tech.	**Branch/Specialisation**	:	CE
Duration	:	3 hours	**Maximum Marks**	:	60

Note: *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

Section 1 (Answer all question(s))

		Marks	CO	BL
Q1.	Corrosion of steel reinforcement in concrete is mainly caused by: ○ High ambient temperature ◉ Ingress of chlorides and carbonation ○ Excessive curing ○ Use of river sand	1	1	1
Q2.	Which type of coating provides both barrier protection and cathodic protection to steel structures? ◉ Galvanizing (zinc coating) ○ Epoxy paint ○ Latex paint ○ Acrylic coating	1	1	2
Q3.	Why is maintenance important in civil structures? ○ To reduce aesthetic value ○ To weaken the structure gradually ◉ To ensure longevity, safety, and performance ○ To increase insurance premiums	1	2	1
Q4.	Which testing technique is commonly used for detecting internal cracks in concrete? ○ Schmidt rebound hammer test ◉ Ultrasonic pulse velocity test ○ Carbonation test ○ Cover meter test	1	2	1
Q5.	Which additive is typically used to enhance the bond strength between old and new concrete layers? ○ Superplasticizer ○ Retarder ◉ Bonding agent (e.g., epoxy resin) ○ Air-entraining agent	1	3	2
Q6.	What is the primary use of expansive cement in repair works? ○ To reduce setting time ○ To shrink the concrete ○ To increase permeability ◉ To counteract shrinkage and prevent cracking	1	3	1
Q7.	Which of the following techniques is most suitable for strengthening a beam with low flexural strength? ○ Shotcrete overlay ◉ External post-tensioning ○ Grouting ○ Surface painting	1	4	1
Q8.	Weathering and surface erosion of concrete is commonly repaired by- ◉ Polymer-modified mortar overlay ○ Coating with sulphur ○ Use of steel jacketing ○ Reinforcement welding	1	4	1
Q9.	What is the first and most crucial step before commencing any demolition activity? ○ Bringing explosives to the site ○ Preparing concrete mix ◉ Structural and site survey ○ Removal of debris	1	5	2
Q10.	Which demolition method is most suitable for buildings located in congested urban environments where vibrations must be minimized? ○ Explosive demolition ○ Manual demolition ◉ Controlled mechanical demolition ○ Wrecking ball demolition	1	5	2

Section 2 (Answer all question(s))

Marks CO BL

Q11. Describe the impact of chemicals on the durability of concrete structures. 2 1 2

Rubric	Marks
Minimum two impact of chemicals	2

Q12. What are the effects of wear and erosion on concrete surfaces? How can they be mitigated? 3 1 2

Rubric	Marks
Effects of wear and erosion on concrete surfaces	1.5
Minimum two mitigations	1.5

Q13. (a) Discuss corrosion inhibitors and their role in enhancing the durability of reinforced concrete. 5 1 2

Rubric	Marks
Discuss minimum two corrosion inhibitors	2.5
Role in enhancing the durability of reinforced concrete	2.5

(OR)

(b) How do coatings protect concrete and steel structures? What types are commonly used?

Rubric	Marks
Methods of coatings minimum two	2.5
Types of coating used minimum two	2.5

Section 3 (Answer all question(s))

Marks CO BL

Q14. Explain the various facets of maintenance in civil engineering structures. 2 2 1

Rubric	Marks
Two facets of maintenance	2

Q15. Define maintenance, repair, and rehabilitation. How do they differ from each other? 3 2 2

Rubric	Marks
Define maintenance, repair, and rehabilitation.	1.5
Minimum three differences	1.5

Q16. (a) Outline the inspection and assessment procedure for evaluating damaged structures. 5 2 2

Rubric	Marks
Minimum five inspection and assessment procedure for evaluating damaged structures.	5

(OR)

(b) Discuss various testing techniques used to assess the condition of structures.

Rubric	Marks
Discuss minimum five testing techniques.	5

Section 4 (Answer all question(s))

Marks CO BL

Q17. Define polymer concrete and explain its properties. **2 3 1**

Rubric	Marks
Define polymer concrete	1
Properties	1

Q18. What is expansive cement? Discuss its application in repair works. **3 3 2**

Rubric	Marks
What is expansive cement	1
Minimum two applications.	2

Q19. (a) Describe the role of concrete chemicals in repair and rehabilitation of structures. **5 3 2**

Rubric	Marks
Describe minimum five role	5

(OR)

(b) Explain the different types of special concretes and mortars used for repair works.

Rubric	Marks
Explain minimum five different types	5

Section 5 (Answer all question(s))

Marks CO BL

Q20. How are leakage issues in concrete structures repaired effectively? **2 4 1**

Rubric	Marks
Minimum two leakage issues in concrete structures repaired effectively	2

Q21. What are the typical repair strategies for cracks in concrete structures? **3 4 2**

Rubric	Marks
Minimum three typical repair strategies for cracking in concrete structures	3

Q22. (a) Discuss the various repair techniques used to overcome low member strength in structural elements. **5 4 2**

Rubric	Marks
Minimum five repair techniques used to overcome low member strength in structural elements	5

(OR)

(b) What are the recommended repairs and protection measures for structures exposed to marine environments?

Rubric	Marks
Minimum three recommended repair and two protection measures for structures exposed to marine environments	5

Section 6 (Answer all question(s))

Marks CO BL

Q23. Describe engineered demolition techniques and give examples of how they are used in dilapidated structures. **2 5 1**

Rubric	Marks
Minimum one technique	1
Minimum one example	1

Q24. What are the environmental and safety concerns during demolition? How are they addressed? **3 5 2**

Rubric	Marks
Explain environmental and safety concerns during demolition	1.5
How are they addressed	1.5

Q25. (a) Compare and contrast non-explosive and explosive methods of demolition. **5 5 2**

Rubric	Marks
Minimum five Compare and contrast non-explosive and explosive methods of demolition	5

(OR)

(b) Explain the preliminary steps that must be undertaken before demolition of a structure.

Rubric	Marks
Discuss minimum five steps that must be undertaken before demolition of a structure	5

******