Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2024

CE3EL04 Building Maintenance & Repairs

Programme: B.Tech. Branch/Specialisation: CE

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. Which of the following climate factors can significantly impact building serviceability and durability? **1**

(a) Temperature (b) Wind speed

(c) Humidity (d) All of these

ii. Which climate condition is most likely to accelerate the corrosion of metal structures? **1**

(a) High humidity (b) Low temperatures

(c) Strong winds (d) Dry climate

iii. The purpose of preventive maintenance is to: **1**

(a) Wait until failure occurs before acting

(b) Minimize costs by addressing issues after they occur

(c) Perform regular inspections and maintenance to prevent failures

(d) Wait for major failures to occur before acting

iv. Which of the following is NOT considered a facet of maintenance? **1**

(a) Preventive maintenance

(b) Corrective maintenance

(c) Marketing maintenance

(d) Predictive maintenance

v. Which repair technique is specific to expansion joints in structures? **1**

(a) Epoxy Injection (b) Grouting

(c) Sealant application (d) Expansion joint repair

vi. What method involves filling cracks with a cementitious or polymeric material? **1**

(a) Epoxy Injection (b) Grouting

(c) Sealant application (d) Crack stitching

vii. Which repair method is most suitable for addressing low member strength in a concrete structure? **1**

(a) Crack stitching (b) Epoxy injection
(c) Carbon fibre wrapping (d) Retrofitting with steel plates

viii. Which repair method is suitable for addressing weathering wear on exposed concrete surfaces? **1**

(a) Grouting (b) Shotcrete
(c) Epoxy coating (d) Crack stitching

ix. Demolition in civil engineering refers to the process of: **1**

(a) Constructing new buildings
(b) Repairing existing structures
(c) Dismantling or destroying buildings and structures
(d) Maintaining infrastructure assets

x. Which of the following is a common piece of equipment used in mechanical demolition? **1**

(a) Explosives (b) Sledgehammers
(c) Excavators (d) Detonators

Q.2 i. What role do inhibitors play in preventing or reducing corrosion in various industrial applications? **2**

ii. How do different chemicals present in the environment affect the corrosion resistance and durability of materials? **3**

iii. How does climate affect the service life and durability of materials used in outdoor structures or equipment? **5**

OR iv. What are the primary mechanisms of corrosion? How do they impact the durability of materials? **5**

Q.3 Attempt any two:

i. What procedures are involved in assessing and evaluating damaged structures to determine the extent of deterioration and required repairs? **5**

ii. How do environmental factors, such as weather conditions or exposure to corrosive substances, contribute to deterioration? What measures can be taken to mitigate their effects? **5**

iii. How can a comprehensive maintenance and repair strategy be developed and implemented to ensure the reliability and safety of critical infrastructure and assets over their lifecycle? **5**

Q.4 i. How is ferrocement utilized in repair projects? What unique properties does it offer compared to other repair materials? **2**

ii. What are the characteristics and advantages of polymer concrete compared to traditional concrete in repair applications? **3**

iii. What are special concretes and mortars? How are they formulated to meet specific repair requirements? **5**

OR iv. What factors should be considered when selecting the most appropriate repair material for a specific application or environment? **5**

Q.5 i. What are the key challenges in repairing structures exposed to marine environments? **4**

ii. What are the key considerations in determining the appropriate placement and type of additional supports to address deflection issues in structural members? **6**

OR iii. What are the advantages and limitations of using chemical-resistant coatings or linings in protecting structural elements from chemical degradation? How do they differ from traditional repair methods? **6**

Q.6 i. Explain the primary objectives of demolition and its significance in various industries, including construction, urban planning, and redevelopment. **4**

ii. Why is a stability report essential before initiating demolition activities? What factors are evaluated to ensure the structural integrity and safety of surrounding structures? **6**

OR iii. How is explosive demolition executed? What safety precautions and regulatory requirements must be adhered to ensure the safe and controlled demolition of structures? **6**

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Marking Scheme

Building Maintenance & Repairs (T) - CE3EL04 (T)

Q.1	i)	Which of the following climate factors can significantly impact building serviceability and durability? d) All of the above	**1**
	ii)	Which climate condition is most likely to accelerate the corrosion of metal structures? a) High humidity	**1**
	iii)	The purpose of preventive maintenance is to: c) Perform regular inspections and maintenance to prevent failures	**1**
	iv)	Which of the following is NOT considered a facet of maintenance? c) Marketing maintenance	**1**
	v)	Which repair technique is specific to expansion joints in structures? d) Expansion joint repair	**1**
	vi)	What method involves filling cracks with a cementitious or polymeric material? b) Grouting	**1**
	vii)	Which repair method is most suitable for addressing low member strength in a concrete structure? d) Retrofitting with steel plates	**1**
	viii)	Which repair method is suitable for addressing weathering wear on exposed concrete surfaces? c) Epoxy coating	**1**
	ix)	Demolition in civil engineering refers to the process of: c) Dismantling or destroying buildings and structures	**1**
	x)	Which of the following is a common piece of equipment used in mechanical demolition? c) Excavators	**1**
Q.2	i.	What role do inhibitors play in preventing or reducing corrosion in various industrial applications? Minimum two Industrial application 2 Marks	**2**
	ii.	How do different chemicals present in the environment affect the corrosion resistance and durability of materials? Corrosion resistance 1.5 Marks Durability of materials 1.5 Marks	**3**
	iii.	How does climate affect the service life and durability of materials used in outdoor structures or equipment? Service life 2.5 Marks Durability 2.5 Marks	**5**
OR	iv.	What are the primary mechanisms of corrosion, and how do they impact the durability of materials? Mechanisms of corrosion 2.5 Marks Impact on the durability of materials 2.5 Marks	**5**
Q.3	i.	What are the definitions of maintenance, repair, and rehabilitation in the context of infrastructure and asset management? Definitions of maintenance, repair 1 Marks Definitions of rehabilitation 1 Marks	**2**
	ii.	What procedures are involved in assessing and evaluating damaged structures to determine the extent of deterioration and required repairs? Assessing and evaluating damaged structures 1.5 Marks Determine the extent of deterioration and required repairs 1.5 Marks	**3**
	iii.	How do environmental factors, such as weather conditions or exposure to corrosive substances, contribute to deterioration, and what measures can be taken to mitigate their effects? Weather conditions or exposure to corrosive substances, contribute to deterioration 2.5 Marks Measures can be taken to mitigate their effects 2.5 Marks	**5**
OR	iv.	How can a comprehensive maintenance and repair strategy be developed and implemented to ensure the reliability and safety of critical infrastructure and assets over their lifecycle? Maintenance and repair strategy be developed and implemented 2.5 Marks Reliability and safety of critical infrastructure and assets over their lifecycle 2.5 Marks	**5**
Q.4	i.	How is ferrocement utilized in repair projects, and what unique properties does it offer compared to other repair materials? Ferrocement utilized in repair projects 1 Marks Unique properties does it offer 1 Marks	**2**
	ii.	What are the characteristics and advantages of polymer concrete compared to traditional concrete in repair applications? Characteristics and advantages of polymer concrete 1.5 Marks Compared to traditional concrete in repair applications 1.5 Marks	**3**
	iii.	What are special concretes and mortars, and how are they formulated to meet specific repair requirements? Special concretes and mortars 2.5 Marks Specific repair requirements 2.5Marks	**5**

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OR	iv.	What factors should be considered when selecting the most appropriate repair material for a specific application or environment? Factors considered for repair material 2.5 Marks Specific application or environment 2.5 Marks	**5**
Q.5	i.	What are the key challenges in repairing structures exposed to marine environments? 4 Marks	**4**
	ii.	What are the key considerations in determining the appropriate placement and type of additional supports to address deflection issues in structural members? Determining the appropriate placement 3 Marks Type of additional supports to address deflection issues in structural members 3 Marks	**6**
OR	iii.	What are the advantages and limitations of using chemical-resistant coatings or linings in protecting structural elements from chemical degradation, and how do they differ from traditional repair methods? Advantages and limitations of using chemical-resistant coatings 3 Marks Differ from traditional repair methods 3 Marks	**6**
Q.6	i.	Explain the primary objectives of demolition and its significance in various industries, including construction, urban planning, and redevelopment? Primary objectives of demolition 1 Marks Significance in various industries, including construction, urban planning, and redevelopment 3 Marks	**4**
	ii.	Why is a stability report essential before initiating demolition activities, and what factors are evaluated to ensure the structural integrity and safety of surrounding structures? Stability report essential before initiating demolition activities – 3 Marks factors are evaluated to ensure the structural integrity and safety of surrounding structures 3 Marks	**6**
	iii.	How is explosive demolition executed, and what safety precautions and regulatory requirements must be adhered to ensure the safe and controlled demolition of structures? Explosive demolition executed 1 Marks Safety precautions and regulatory requirements 2 Marks Safe and controlled demolition of structures 3 Marks	**6**

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