



SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203.



DEPARTMENT OF CIVIL ENGINEERING QUESTION BANK

SUBJECT : CE6021 REPAIR AND REHABILITATION OF STRUCTURES

SEM / YEAR: VIII/IV

UNIT 1- MAINTENANCE AND REPAIR STRATEGIES

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

PART – A

Q.No	Questions	BT Level	Competence
1.	Define Maintenance. What are the facets of maintenance?	BT-1	Remember
2.	What are the physical inspections of damaged structure?	BT-1	Remember
3.	List out the factors to be considered by the designer at the construction site.	BT-1	Remember
4.	Describe any four cases of deterioration of structures.	BT-1	Remember
5.	List out the steps involved in selecting a repair procedure.	BT-1	Remember
6.	Show the possible decisions that can be made after evaluating the strength of a structure.	BT-1	Remember
7.	Discuss about the environment effects which leads to deterioration of concrete structure.	BT-2	Understand
8.	Discuss about the effect of selecting poor quality material for construction.	BT-2	Understand
9.	Differentiate between the terms maintenance and rehabilitation.	BT-2	Understand
10.	List the quality of supervision to be followed at a site.	BT-2	Understand
11.	Write the importance of maintenance of structures.	BT-3	Application
12.	Classify the types of maintenance.	BT-3	Application
13.	Illustrate the causes of deterioration and explain how it occurs due to corrosion.	BT-3	Application
14.	Analyze the design and construction errors leading to deterioration of a Structure.	BT-4	Analyze
15.	Compare preventive maintenance and routine maintenance with	BT-4	Analyze

	example.		STUCOR APP
16.	Explain why inspection is needed for damaged structure.	BT-4	Analyze
17.	How will you evaluate the cause for deterioration of concrete structure?	BT-5	Evaluate
18.	Criticize about weekly and monthly maintenance.	BT-5	Evaluate
19.	Assess the various aspects to be investigated during inspection of existing building.	BT-6	Create
20.	Under what circumstance premature deterioration of concrete takes place? Summarize.	BT-6	Create
PART – B			
1.	i. What is maintenance? List out the importance of maintenance. ii. Discuss about the necessity of maintenance.	BT-1	Remember
2.	List out the various types of maintenance operations and explain it in detail.	BT-1	Remember
3.	Describe the various repair strategies for RC buildings.	BT-1	Remember
4.	i. Differentiate between repair and maintenance of building. ii. List out the causes which necessitate the maintenance.	BT-1	Remember
5.	Describe about the inspection to be carried out during and after the construction of structure.	BT-2	Understand
6.	i. Discuss about the various aspects of inspection. ii. Classify the types of repair works.	BT-2	Understand
7.	With graph explain the service life behavior of a concrete structure with respect to maintenance.	BT-2	Understand
8.	Identify the various steps involved in the systematic approach of investigations and the factors to be ascertained.	BT-3	Application
9.	i. Discuss about the facets of maintenance. ii. Write down the types of inspection carried out for concrete structure.	BT-3	Application
10.	Examine the various causes of distress in concrete structures mentioning its effects.	BT-4	Analyze
11.	As a site engineer examine what are the factors you would check during the day of concreting to assure quality in construction? Explain in detail.	BT-4	Analyze
12.	With the flow chart analyze the steps involved in the assessment	BT-4	Analyze

	procedure for evaluate damages in a structure and to carry out rehabilitation work.		STUCOR APP
13.	Criticize in detail about the preventive aspects of maintenance.	BT-5	Evaluate
14.	Develop a flow chart for structural appraisal and economic appraisal of a building.	BT- 6	Create
PART-C			
1.	Describe in detail about the repair aspect of maintenance.	BT-2	Understand
2.	Construct a flow diagram for repair and maintenance during material selection, construction and service life period of a structure.	BT-3	Application
3.	Analyze the work involved in rehabilitation work of a structure.	BT-4	Analyze
4.	Elaborate the steps involved in diagnosing the problem in a structure.	BT-6	Create

UNIT II- STRENGTH AND DURABILITY OF CONCRETE			
Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness.			
PART – A			
Q.No	Questions	BT Level	Competence
1.	Define the term “Quality assurance” in concrete structures.	BT-1	Remember
2.	Discuss the importance of quality control.	BT-2	Understand
3.	How thermal variations affect the durability of structures?	BT-4	Analyze
4.	Write note on structural cracks with examples.	BT-3	Application
5.	What are the factors affect the durability of concrete?	BT-1	Remember
6.	Classify the types of cracks based on its thickness.	BT-4	Analyze
7.	Write downthe result of poor construction practices.	BT-3	Application
8.	Distinguish between structural cracks and non-structural cracks.	BT-3	Application
9.	Define aggregate splitting.	BT-1	Remember
10.	Name the various types of spalling.	BT-1	Remember
11.	How does a concrete structure get affected by heat?	BT-2	Understand
12.	Discuss briefly the effect due to climate.	BT-2	Understand
13.	Tabulate the cover to be provided for various exposure conditions to concrete as per IS codes.	BT-1	Remember
14.	Define corrosion.	BT-1	Remember

15.	Discuss about the sustained elevated temperature.	BT-2	Understand
16.	How can we prevent the effect of freezing and thawing in concrete?	BT-4	Analyze
17.	Examine the methods to control the cracks.	BT-5	Evaluate
18.	State the importance of cover thickness in concrete.	BT-6	Create
19.	Define durability and name two tests to assess durability of concrete.	BT-5	Evaluate
20.	Define corrosion inhibitor. Give some examples for corrosion inhibitors.	BT-6	Create
PART - B			
1.	Why quality assurance for structure is needed? List out the components of quality assurance for building and explain it in detail.	BT-1	Remember
2.	List the various parameters affecting the quality of concrete construction. Explain any three in detail.	BT-1	Remember
3.	How the properties of aggregate – both fine and coarse, and cement, affect the relationship of water demand on slump, and the water-cement ratio and compressive strength?	BT-1	Remember
4.	Discuss in detail about the thermal properties of concrete. Explain how concrete structure is affected by thermal condition.		
5.	Give a detailed note on the property "strength" of concrete discussing its influencing factors and discuss any two methods to enhance it.	BT-2	Understand
6.	What is crack? Explain the classification and causes of cracks.	BT-2	Understand
7.	Identify the checks you will make on the day of concreting to assure quality of concrete.	BT-1	Remember
8.	Explain about the design and constructional errors for concrete building.	BT-2	Understand
9.	i. Illustrate the significance of the carbonation of concrete, passivity of steel and state of oxidation of iron with respect to the corrosion of steel in concrete.(6) ii. What are the effects of corrosion and give the preventive measures for corrosion?(7)	BT-3	Application
10.	i. Write a brief note on permeability of concrete. (7) ii. Discuss the various factors influencing the corrosion. (6)	BT-3	Application

11.	Elaborately explain about the effect of temperature on concrete.	BT-4	Analyze
12.	Analyse the various methods of corrosion in protection of rebar.	BT-4	Analyze
13.	Explain in detail the effects on durability and strength of concrete due to i. Climate(7) ii. Sustained elevated temperature.(6)	BT-4	Analyze
14.	i. With chemical equation how will you evaluate the mechanism of corrosion.(9) ii. Write short note on structural cracks(4)	BT-5	Evaluate

PART-C

1.	Explain different types of cracks found in concrete structures. Also list the remedial measures.	BT-1	Remember
2.	i. Ideally, from the standpoint of crack resistance, a concrete should have low shrinkage and high extensibility. Give examples to show why this may not be possible to achieve in practice. (8) ii. Illustrate the significance of the carbonation of concrete, Passivity of steel and state of oxidation of iron with respect to the corrosion of steel in concrete. (7)	BT-6	Create
3.	List the various types of corrosion in concrete discussing its phenomena, causes and effects. Also suggest any one method of protection against each types of corrosion	BT-2	Understand
4.	Write short notes on effect of cover thickness.	BT-3	Application

UNIT 3- SPECIAL CONCRETE

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

PART - A

Q.No	Questions	BT Level	Competence
1.	Mention a salient feature and an application of polymer concrete.	BT-1	Remember
2.	Name the various monomers used in polymer concrete.	BT-1	Remember
3.	List the various types of polymer concrete.	BT-1	Remember
4.	List out the applications of Sulphur infiltrated concrete.	BT-1	Remember
5.	Define aspect ratio.	BT-1	Remember

6.	What do you mean by critical length of fibre.	BT-1	Remember
7.	Discuss about the disadvantages of FRP.	BT-2	Understand
8.	Describe the various types fibres used in FRC.	BT-2	Understand
9.	What is mean by Geopolymer concrete? List the materials used for making geopolymer concrete.	BT-2	Understand
10.	Discuss about FRC.	BT-2	Understand
11.	Differentiate filling ability and passing ability of self-compacting concrete.	BT-3	Application
12.	Write notes on concrete made with industrial wastes.	BT-3	Application
13.	Write notes on vacuum concrete and self-compacting concrete.	BT-3	Application
14.	Differentiate between polymer impregnated concrete and Polymer partially impregnated concrete.	BT-4	Analyze
15.	What are the applications of special concretes.	BT-4	Analyze
16.	Give short notes about the reactive powder concrete.	BT-4	Analyze
17.	Enumerate the methods of producing high strength concrete.	BT-5	Evaluate
18.	Formulate the properties of ferro cement.	BT-5	Evaluate
19.	List two industrial wastes used as an alternative ingredient in concrete.	BT-6	Create
20.	Write down the uses of ferro cement.	BT-6	Create

PART – B

1.	How polymerization is achieved in polymer concrete? Explain in detail.	BT-2	Understand
2.	Describe the following type of concrete i. High performance concrete(7) ii.Sulphur infiltrated concrete(6)	BT-2	Understand
3.	i. Explain the behavior of steel fibre reinforced concrete as a repair material. (8) ii. Discuss about the aspect ratio and critical length of fibre.(5)	BT-4	Analyze
4.	i. How Ferro cement can be used as a material for repair.(7) ii.List out the properties and usesof Ferro cement.(6)	BT-1	Remember
5.	With respect to fibre reinforced concrete explain aspect ratio and volume fraction. Also explain their effects on fresh and hardened concrete properties. Explain with its stress-strain curve.	BT-4	Analyze
6.	Explain the following	BT-2	Understand

	i. High strength concrete(7) ii. Vacuum concrete(6)		STUCOR APP
7.	Explain the types of fibres used in concrete with its advantages and disadvantages.	BT-4	Analyze
8.	Write short notes on Self compacting concrete and its applications.	BT-3	Application
9.	Write short notes on the manufacturing process and applications of Sulphur infiltrated concrete.	BT-2	Understand
10.	Explain the manufacturing process, properties and uses of High Performance concrete.	BT-2	Understand
11.	Write short notes on Geopolymer concrete.	BT-5	Evaluate
12.	Illustrate about Fiber reinforced concrete.	BT-6	Create
13.	Describe in detail the properties and applications of polymer concrete.	BT-4	Analyze
14.	i. Describe in detail about the reactive powder concrete. (7) ii. Write a note on polymer impregnated concrete. (6)	BT-2	Understand
PART - C			
1.	Explain in detail about special material manufacturing procedure and application of polymer modified concrete	BT-5	Evaluate
2.	List the methods of testing self compacting concrete and explain the methods in detail.	BT-6	Create
3.	Why it is advantage to use fiber reinforced concrete for the following construction works: (i) Water retaining structures (3) (ii) Blast resistant structures (3) (iii) Precast products (3) (iv) Pavement and floors (3) (v) Repair and rehabilitation works (3)	BT-6	Create
4.	Illustrate the behaviour of vacuum concrete and Geopolymer concrete by comparing the properties on uses, manufacturing processes and its advantages.	BT-2	Understand

UNIT IV- TECHNIQUES FOR REPAIR AND PROTECTION METHODS

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

PART - A

Q.No	Questions	BT Level	Competence
1.	Define shoring and write its purpose.	BT-1	Remember
2.	List out some of the corrosion protection methods.	BT-1	Remember
3.	Classify the types of shoring.	BT-1	Remember
4.	Brief the mechanism of cathodic protection.	BT-1	Remember
5.	List out the types of corrosion inhibitors.	BT-1	Remember
6.	Name two non-destructive tests used for assessing the quality of concrete.	BT-1	Remember
7.	Discuss about the process of gunite and shotcrete.	BT-2	Understand
8.	Explain the types of corrosion resistant steel.	BT-2	Understand
9.	Describe the properties of coating materials.	BT-2	Understand
10.	Discuss about stitching.	BT-2	Understand
11.	Write the typical ranges of Thermal conductivity, Thermal diffusivity, Specific heat, coefficient of thermal expansion of ordinary concrete.	BT-3	Application
12.	Illustrate an example for corrosion inhibitor and corrosion coating.	BT-3	Application
13.	Write short note on dry pack.	BT-3	Application
14.	Differentiate between shoring and underpinning.	BT-4	Analyze
15.	Distinguish between gunite and shotcrete.	BT-4	Analyze
16.	What do you mean by weathering corrosion?	BT-4	Analyze
17.	Rewrite the term autogenous healing.	BT-5	Evaluate
18.	Evaluate the types of surface protection methods.	BT-5	Evaluate
19.	Write note on jacketing.	BT-6	Create
20.	Summarize the characteristics of good coatings.	BT-6	Create

PART - B

1.	Identify the Non-destructive testing equipments and describe in detail.	BT-1	Remember
2.	State the uses of surface hardness method and explain it with neat	BT-1	Remember

	sketch.		
3.	Define shoring and explain the types of shoring with neat sketch.	BT-1	Remember
4.	State the purpose of underpinning and explain its method with neat sketch.	BT-1	Remember
5.	Explain the various methods of polymer coating applied on the surface of rebar.	BT-2	Understand
6.	Discuss about (i) Impact echo test (7) (ii) Carbonation test (6)	BT-2	Understand
7.	Describe the procedure of fusion bonded epoxy coating of rebars with a simple sketch. Also give the advantages and disadvantages.	BT-2	Understand
8.	Estimate the following NDT techniques as per IS (i) Rebound hammer test. (7) (ii) Ultrasonic pulse velocity. (6)	BT-3	Application
9.	Write short notes on: (i) Protective coatings for reinforcement (7) (ii) Types of corrosion resistant steels (6)	BT-3	Application
10.	Analyse the mechanism of the following corrosion protection methods. (i) Corrosion inhibitors (7) (ii) Cathodic protection (6)	BT-4	Analyze
11.	(i) Examine the method of preventing corrosion in the structure. (8) (ii) Explain how cracks may be sealed by using epoxy Injection. (5)	BT-4	Analyze
12.	Enumerate the types of shoring and describe the use of raking shore under the following : (1) To support unsafe walls for a building, with the height of 12 m. (7) (2)) To support unsafe walls of a building, with height of 8 metres. (6)	BT-5	Evaluate
13.	Explain in detail the types of corrosion protection methods.	BT-4	Analyze
14.	Summarize the process of epoxy injection. Also explain routing and sealing with sketches.	BT-6	Create

PART-C

1.	Explain the process of rebar corrosion in concrete. Also discuss the various techniques of its corrosion protection.	BT-2	Understand
2.	Write notes on the following : (i) Epoxy injection technique (4) (ii) Polymer coating for rebars (4) (iii) Vaccum concrete in repairs (4) (iv) Plate bonding technique. (3)	BT-3	Application
3.	Define the term underpinning. Discuss any two of its methods	BT-6	Create

	mentioning its applicability.		
4.	(i) List the significance of performance and integrity test on concrete and explain any one method in detail. (7) (ii) How to estimate the strength of concrete in existing structure? Explain the method in which the longitudinal pulse velocity (km/s) is used to predict the quality of concrete. (8)	BT-5	Analyze

UNIT V- REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Demolition techniques - Engineered demolition methods - Case studies.

PART - A

Q.No	Questions	BT Level	Competence
1.	List the methods to overcome low member strength in concrete structures.	BT-1	Remember
2.	State the need of accelerated strength.	BT-1	Remember
3.	List the pre-planning activities to be done before demolition of a structure.	BT-1	Remember
4.	List out types of demolition techniques.	BT-1	Remember
5.	Name any two atmospheric agents responsible for corrosion.	BT-1	Remember
6.	List out the repairing methods of excessive deflection of beams.	BT-1	Remember
7.	Discuss about the external post tensioning.	BT-2	Understand
8.	Describe the types of crack repairing techniques.	BT-2	Understand
9.	With a simple curve discuss the effect of temperature on compressive strength of concrete.	BT-2	Understand
10.	What are the effects of fire on concrete?	BT-2	Understand
11.	Illustrate the term weathering corrosion.	BT-3	Application
12.	Write short notes on leakage in structure.	BT-3	Application
13.	Illustrate the term dilapidated structures.	BT-3	Application
14.	Demonstrate crack repair by routing and sealing with neat sketch.	BT-4	Analyze
15.	Differentiate between dormant cracks and active cracks.	BT-4	Analyze
16.	Explain the major factors in selecting the demolition procedure.	BT-4	Analyze

17.	How do you determine the temperature attained by concrete during fire?	BT-5	Evaluate STUCOR APP
18.	Suggest the guidelines for construction in different seismic zones.	BT-5	Evaluate
19.	Explain the preventive measure to be adopted to make the structure stable against marine exposure.	BT-6	Create
20.	When do you demolish a building?	BT-6	Create
PART - B			
1.	With simple sketch explain the methods of improving the load carrying capacity of existing column and beams.	BT-1	Remember
2.	i) State and explain the various options for strengthening a concrete with low member strength. (7) ii) How do you strengthen a heavily corroded RCC beam in structure (6)	BT-1	Remember
3.	Briefly explain the measure to be taken during construction to minimize the damages due to earthquake.	BT-1	Remember
4.	Illustrate how the building is affected by, (i) High Temperature (7) (ii) Marine exposure (6)	BT-2	Understand
5.	How do you repair a structure distressed due to corrosion. Explain in detail.	BT-2	Understand
6.	Write notes on: i) Non-explosive demolition agents(3) ii) Saw cutting(3) iii)Water jet (3) iv)Explosive(4)	BT-3	Application
7.	How do you repair a structure distressed due to marine exposure?	BT-1	Remember
8.	Explain different methods of strengthening the concrete structures against earthquake.	BT-4	Analyze
9.	With simple sketches explain the methods of improving the strength of existing columns and beams.	BT-4	Analyze
10.	Discuss the following methods of crack repair. (i) concrete replacement (5) (ii) mortar replacement (4) (iii) Resin based repairs. (4)	BT-4	Analyze
11.	How do you repair and rehabilitate a structure distressed due to fire?	BT-5	Evaluate
12.	Describe the types of crack repairing techniques with neat sketch.	BT-2	Understand
13.	Explain briefly about the demolition techniques.	BT-6	Create

14.	Under what condition strengthening of foundation is required? Explain how columns strengthened by section enlargement technique with the help of neat sketch.	BT-3	Application
PART-C			
1.	(i) How cracked reinforced concrete elements are repaired by providing additional steel? (8) (ii) Illustrate the stitching procedure to repair the flexural cracks in slab and beam with help of neat sketch. (7)	BT-3	Application
2.	Discuss the different methods of strengthening the concrete structures against earthquake.	BT-6	Create
3.	Demonstrate a case study of a building affected by fire and discuss its various effects. Also suggest suitable methods of remedy.	BT-2	Understand
4.	(i) Explain the procedure for demolishing main structural members like columns, beams and slabs with the help of neat sketch. (12) (ii) What are the allied activities accompanying the demolition process? (3)	BT-4	Analyze

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S.no	Subject		BT1	BT2	BT3	BT4	BT5	BT6	Total Question
1	Unit-1	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C		1	1	1		1	4
2	Unit-2	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C							4
3	Unit-3	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C							4
4	Unit-4	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C							4
5	Unit-5	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C							4

TOTAL NO.OF QUESTIONS IN EACH PART

PART A	100
PART B	70
PART C	20
TOTAL	190