

VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK



VIII SEMESTER

CE6021 - REPAIR AND REHABILITATION OF STRUCTURES

Regulation – 2013

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SUBJECT : CE6021 REPAIR AND REHABILITATION OF STRUCTURES

SEM / YEAR : VIII / IV

<u>UNIT 1- MAINTENANCE AND REPAIR STRATEGIES</u>			
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.	State the physical inspection 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.	Define the load test method of evaluating the strength of existing structure.	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.	Discuss the possible decisions after evaluating the strength of a structure.	BT-2	Understand
10.	Explain 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.	Write about economic appraisal of structure.	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.	Explain the fixed percentage method of evaluating the strength of existing structure.	BT-4	Analyze
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.	How can we evaluate the strength of existing structure by stress analysis?	BT-5	Evaluate
19.	Write notes on weekly and monthly maintenance.	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. (8) ii. Discuss about the necessity of maintenance. (8)	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. (8) ii. List out the causes which necessitate the maintenance. (8)	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. (10) ii. Classify the types of repair works. (6)	BT-2	Understand
7.	With graph explain the service life behavior of a concrete structure with respect to maintenance.	BT-2	Understand

8.	Illustrate the different types of maintenance to the structural elements.	BT-3	Application
9.	i. Discuss about the facets of maintenance. (8) ii. Write down the types of inspection carried out for concrete structure. (8)	BT-3	Application
10.	Write the causes, solution and preventive measures for i Bug Holes. (8) ii Honey combing. (8)	BT-3	Application
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 analyse the steps involved in the assessment procedure for evaluate damages in a structure and to carry out rehabilitation work.	BT-4	Analyze
13.	Evaluate the various causes for deterioration of concrete structures.	BT-5	Evaluate
14.	Write the causes and effects of any four defects in concrete structures.	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.	Explain the importance of coefficient of thermal expansion with respect to strength of concrete.	BT-4	Analyze
4.	Write note on structural cracks with examples.	BT-3	Application
5.	List any four durability parameters.	BT-1	Remember
6.	Classify the types of cracks based on its thickness.	BT-4	Analyze
7.	Write down the result of poor construction practices.	BT-3	Application

8.	Illustrate the causes of cracks.	BT-3	Application
9.	Define aggregate splitting.	BT-1	Remember
10.	Name the various types of spalling.	BT-1	Remember
11.	Discuss the effect of temperature on concrete.	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.	Write short notes on effective cover.	BT-6	Create
19.	Summarise the faults in construction planning.	BT-5	Evaluate
20.	Define corrosion inhibitor. Give some examples for corrosion inhibitors.	BT-6	Create

PART B

Q.No	Questions	BT Level	Competence
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.	List the various components of quality control and explain it in detail.	BT-1	Remember
4.	Discuss in detail about the thermal properties of concrete. Explain how concrete structure is affected by thermal condition.	BT-2	Understand
5.	Describe in detail about the causes and effects of cracks in concrete structure.	BT-2	Understand
6.	Identify the checks you will make on the day of concreting to assure quality of concrete.	BT-1	Remember
7.	Explain about the design and constructional errors for concrete building.	BT-2	Understand
8.	i. Illustrate the effects of corrosion. (10)	BT-3	Application

	ii. What are the preventive measures for corrosion? (6)		
9.	i. List out the durability properties of concrete and describe it in detail. (8) ii. Write short note on structural cracks. (8)	BT-3	Application
10.	Elaborately explain about the effect of temperature on concrete.	BT-4	Analyze
11.	Analyse the various methods of corrosion in protection of rebar.	BT-4	Analyze
12.	Explain in detail the effects on durability and strength of concrete due to i. Climate (8) ii. Sustained elevated temperature. (8)	BT-4	Analyze
13	i With chemical equation how will you evaluate the mechanism of corrosion. (10) ii Discuss the various factors influencing the corrosion. (6)	BT-5	Evaluate
14.	Write short notes on effect of cover thickness.	BT-6	Create

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.	Define 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.	Explain the effect of volume fraction on fresh concrete properties.	BT-2	Understand
10.	Discuss about FRC.	BT-2	Understand
11.	Illustrate any two important types of concrete widely used.	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.	Analyze the applications of special concretes.	BT-4	Analyze
16.	Explain about the reactive powder concrete.	BT-4	Analyze
17.	Show the various reasons for the suitability of geo-polymer concrete in civil engineering structures.	BT-5	Evaluate
18.	Formulate the properties of ferro cement.	BT-5	Evaluate
19.	Summarize the types of reinforcement used in ferro cement	BT-6	Create
20.	Write down the uses of ferro cement.	BT-6	Create
PART B			
1.	Discuss the types of polymer concrete composites with their advantages.	BT-2	Understand
2.	Describe the following type of concrete i. High performance concrete (8) ii. Sulphur infiltrated concrete (8)	BT-2	Understand
3.	i. Explain the behavior of steel fibre reinforced concrete as a repair material. (10) ii. Discuss about the aspect ratio and critical length of fibre. (6)	BT-4	Analyze
4.	i. How Ferro cement can be used as a material for repair. (8) ii. List out the properties and uses of Ferro cement. (8)	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 i. High strength concrete (8)	BT-2	Understand

	ii. Vacuum concrete (8)		
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	BT-3	Application
9.	Write short notes on the manufacturing process and applications of Sulphur infiltrated concrete.	BT-3	Application
10.	Explain about the concrete made with industrial wastes.	BT-4	Analyze
11.	Write short notes on Geopolymer concrete.	BT-5	Evaluate
12.	Explain in detail about fibre reinforced polymeric meshes.	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. (8) ii. Write a note on polymer impregnated concrete. (8)	BT-2	Understand

UNIT 4- 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.	List out some of the Non-Destructing testing methods.	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.	State the limitations of cathodic protection.	BT-1	Remember
5.	List out the types of corrosion inhibitors.	BT-1	Remember
6.	What is the purpose of underpinning.	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 short note on epoxy injection.	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.	Explain about the blanketing technique.	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 sketch.	BT-1	Remember
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.	Describe about the Ultrasonic pulse velocity test.	BT-2	Understand
6.	Discuss about (i) Impact echo test (8) (ii) Carbonation test (8)	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.	Write notes on the following terms with its applications: (i) Shortcreting (8) (ii) Gunite (8)	BT-3	Application
9.	Write short notes on: (i) Protective coatings for reinforcement (8) (ii) Types of corrosion resistant steels (8)	BT-3	Application
10	Analyse the mechanism of the following corrosion protection	BT-4	Analyze

	methods. (i) Corrosion inhibitors (8) (ii) Cathodic protection (8)		
11	(i) Examine the method of preventing corrosion in the structure. (10) (ii) Explain how cracks may be sealed by using epoxy Injection. (6)	BT-4	Analyze
12	Integrate the features of dry pack and mortar pack with neat sketches.	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

UNIT 5- 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.	Identify the effects of fire on hardened concrete.	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.	In what cases demolition by machine can be done.	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.	Analyse the preventive measure taken during demolition.	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
18.	Generalise the reasons for demolition of structures.	BT-5	Evaluate
19.	Explain the preventive measure to be adopted to make the structure stable against marine exposure.	BT-6	Create
20.	Summarize about the Engineered demolition.	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. (8) ii) How do you strengthen a heavily corroded RCC beam in structure (8)	BT-1	Remember
3.	Briefly explain the measure to be taken during construction to minimize the damages due to earthquake.	BT-1	Remember
4.	Discuss a case study on engineered demolition technique.	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 (4) ii) Saw cutting (4) iii) Water jet (4) 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.	Analyse a case study on leakages from terraces	BT-4	Analyze
10	How will you demolish a overhead water tank? Explain in detail.	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	Write notes on demolition techniques.	BT-6	Create
14	Write note on Case study on patch repair in RCC slab.	BT-3	Application



BT-ALLOTMENT

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
2	Unit-2	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
3	Unit-3	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
4	Unit-4	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
5	Unit-5	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14

TOTAL NO. OF QUESTIONS IN EACH PART

PART-A	100
PART-B	70
TOTAL	170

