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

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.	List out any four causes of deterioration of structures.	BT-1	Remember
3.	What is the cause for surface cracks on the concrete top surface?	BT-1	Remember
4.	List down the main objectives of maintenance of buildings.	BT-1	Remember
5.	Define a defect.	BT-1	Remember
6.	What do you mean by deterioration?	BT-1	Remember
7.	Outline the rapid structural assessment order.	BT-2	Understand
8.	Show the importance of maintenance of structures.	BT-2	Understand
9.	Summarize about economic appraisal of structure.	BT-2	Understand
10.	Show the effect of selecting poor quality material for construction.	BT-2	Understand
11.	Identify the meaning for the term inspection and mention its purpose.	BT-3	Application
12.	Write down the steps involved in repair aspect.	BT-3	Application
13.	Write down the various causes of distress in concrete structures.	BT-3	Application
14.	Distinguish between the terms retrofitting and rehabilitation of structures.	BT-4	Analyze
15.	List out the factors to be considered by the designer at the	BT-4	Analyze

	construction site.		
16.	Examine the possible decisions that can be made after evaluating the strength of a structure.	BT-4	Analyze
17.	How will you evaluate the cause for deterioration of concrete structure?	BT-5	Evaluate
18.	Explain why inspection is needed for damaged structure.	BT-5	Evaluate
19.	Discuss about the structural cracks.	BT-6	Create
20.	Discuss the physical inspection of damaged structure.	BT-6	Create
PART B			
1.	List any four defects in each concrete and steel structure. Explain the causes and its effects.	BT-1	Remember
2.	List outthe various types of maintenance operations and explain it in detail.	BT-1	Remember
3.	i. Define the load test method of evaluating the strength of existing structure. ii. How can we evaluate the strength of existing structure by stress analysis?	BT-1	Remember
4.	Show the assessment procedure for evaluating a damaged structure with the help of a flow chart.	BT-1	Remember
5.	Explain the steps involved in the assessment procedure for evaluating the damages and to carry out rehabilitation work.	BT-2	Understand
6.	Explain the various categories of inspection based on method and interval approach adopted pre-repair evaluation of distress concrete structures.	BT-2	Understand
7.	Explain in detail about the permeability of concrete.	BT-2	Understand
8.	Identify and briefly discuss the various causes of distress in concrete structures and mentioning its effects.	BT-3	Application
9.	Write the importance of maintenance.	BT-3	Application
10.	i. Distinguish repair and maintenance of building. ii. List the various facets of maintenance of a concrete structure.	BT-4	Analyze
11.	Classify the various repair strategies for RC buildings. Describe it	BT-4	Analyze

	briefly.		
12.	i. Examine the inspection to be carried out during and after the construction of structure. ii. Under what circumstances premature deterioration of concrete takes place? Explain it briefly.	BT-4	Analyze
13.	With graph, explain the service life behavior of a concrete structure with respect to maintenance.	BT-5	Evaluate
14.	Prepare and design a report on damage classification of the structural members based on the output of preliminary investigation.	BT-6	Create
	PART C		
1.	Describe in detail about the repair aspect of maintenance.	BT-2	Understand
2.	Write the causes, solution and preventive measures for i. Bug Holes.(8) ii. Honeycombing.(8)	BT-3	Application
3.	As a site engineer, examine the factors you would check during the day of concreting to assure quality in construction? Explain in detail.	BT-4	Analyze
4.	Explain in detail about the prevention aspect of maintenance.	BT-5	Evaluate

UNIT II- STRENGTH AND DURABILITY OF CONCRETE

Quality assurance for concrete – Strength, Durability and Thermal propertiesof 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.	Discuss the importance of quality control.	BT-6	Create
2.	Define quality assurance and mention its need in concrete structures.	BT-1	Remember
3.	Define "Durable concrete". Name any four durability properties of concrete.	BT-1	Remember
4.	What are the factors that affect the durability of concrete?	BT-1	Remember
5.	Define durability and name two tests to assess durability of concrete.	BT-1	Remember
6.	Show the importance of coefficient of thermal expansion with	BT-2	Understand

	respect to strength of concrete.		
7.	Identify how will you prevent cracks due to biological attack?	BT-3	Application
8.	Classify the types of cracks based on its thickness.	BT-2	Understand
9.	Distinguish between structural cracks and non-structural cracks with an example.	BT-4	Analyze
10.	Briefly explain the effect of climate on hardened concrete.	BT-5	Evaluate
11.	Examine how can we prevent the effect of freezing and thawing in concrete?	BT-4	Analyze
12.	Discover In what way carbonation of concrete affects the structure?	BT-4	Analyze
13.	Write any two effects due to temperature changes in structures.	BT-3	Application
14.	Discuss about the sustained elevated temperature.	BT-6	Create
15.	Define corrosion inhibitor. Give some examples for corrosion inhibitors.	BT-1	Remember
16.	What are the symptoms of design error in buildings?	BT-1	Remember
17.	Summarize the result of poor construction practices.	BT-2	Understand
18.	Summarize the faults in construction planning.	BT-2	Understand
19.	Explain the importance of cover thickness in concrete.	BT-5	Evaluate
20.	Write the need for emphasizing cover thickness for marine structures.	BT-3	Application

PART B

Q.No	Questions	BT Level	Competence
1.	Explain how quality assurance plays an important role in construction industry. Also explain the parameters affecting the quality of concrete construction.	BT-4	Analyze
2.	i. List the functions of quality control during concrete construction. ii. How materials, water-cement ratio, placement of reinforcing steel, formwork, curing, vibration and compaction influence the quality control of the structure?	BT-1	Remember
3.	What are the checks to be carried out on the day of making concreting to ensure quality of concrete? Explain them.	BT-1	Remember
4.	Show a detailed note on the property "strength" of concrete discussing its influencing factors and discuss any two methods to	BT-2	Understand

	enhance it.		
5.	Classify the different types of cracks found in concrete structures. Also list the remedial measures.	BT-2	Understand
6.	Show the behaviour of concrete structures due to faulty design and construction errors.	BT-1	Remember
7.	List various construction and design deficiency which causes distress in the RCC structures.	BT-4	Analyze
8.	Write a note on permeability of concrete with influencing factors and methods of control.	BT-3	Application
9.	Discuss the effects of temperature and climate on concrete structures.	BT-6	Create
10.	Write in detail about the effects of sustained elevated temperature on hardened reinforced concrete.	BT-3	Application
11.	With chemical equation, how will you evaluate the mechanism of corrosion?	BT-5	Evaluate
12.	Define the term corrosion and discuss its types on rebar in concrete with influencing factors.	BT-1	Remember
13.	List the various types of corrosion in concrete discussing its phenomena, causes and effects. Also suggest any one method of protection against each type of corrosion.	BT-4	Analyze
14.	Summarize the importance of concrete cover in RCC structures. Give recommendations of IS456-2000 for nominal cover.	BT-2	Understand
	PART C		
1.	i. List out the durability properties of concrete and describe it in detail.(8) ii. Write short note on structural cracks.(8)	BT-1	Remember
2.	Discuss in detail about the thermal properties of concrete. Explain how concrete structure is affected by thermal condition.	BT-6	Create
3.	Describe the various corrosion prevention techniques.	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.	Recall the information do you receive from 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.	What is meant by aspect ratio?	BT-1	Remember
6.	What do you mean by critical length of Fibre?	BT-1	Remember
7.	Show the disadvantages of fibre reinforced concrete.	BT-2	Understand
8.	Outline the various types fibres used in FRC.	BT-2	Understand
9.	Illustrate the effect of volume fraction on fresh concrete properties.	BT-2	Understand
10.	Summarize the salient features and an application of polymer concrete	BT-2	Understand
11.	Identify the any two important types of concrete widely used nowadays.	BT-3	Application
12.	Select the concrete made with industrial wastes.	BT-3	Application
13.	Construct a note 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.	List any two industrial wastes used as an alternative ingredient in concrete.	BT-4	Analyze
16.	Examine the properties of 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.	Justify the properties of ferro cement.	BT-5	Evaluate
19.	Discuss about types of reinforcement used in ferro cement	BT-6	Create

20.	Predict the advantages of geo polymer concrete and high infiltrated concrete.	BT-6	Create
	PART B		
1.	Summarize the different types of polymer concrete composites with their advantages.	BT-2	Understand
2.	Explain the following type of concrete i) High performance concrete(7) ii) Sulphur infiltrated concrete(6)	BT-2	Understand
3.	i. Examine the behavior of steel fibre reinforced concrete as a repair material. (7) 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 usesof 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(7) ii.Vacuum concrete(6)	BT-2	Understand
7.	Examine the types of fibres used in concrete with its advantages and disadvantages.	BT-4	Analyze
8.	Identify the behaviour and properties of Self compacting concrete	BT-3	Application
9.	Select the manufacturing process and applications of Sulphur infiltrated concrete.	BT-3	Application
10.	Describe on concrete made with industrial wastes.	BT-1	Remember
11.	Give the importance of Geopolymer concrete.	BT-5	Evaluate
12.	Elaborate in detail about fibre reinforced polymeric meshes.	BT-6	Create
13.	Describe in detail the properties and applications of polymer concrete.	BT-1	Remember
14.	i.Describe in detail about the reactive powder concrete. (7) ii.Write a note on polymer impregnated concrete. (6)	BT-1	Remember

PART - C			
1	Explain in detail about special material manufacturing procedure and application of polymer modified concrete	BT-5	Evaluate
2	Elaborate the method of manufacture ,properties and uses of fibre reinforced concrete	BT-6	Create
3	Prepare a case study on various thermal behaviour on conventional concrete.	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 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.	Outline the properties of corrosion inhibitors.	BT-2	Understand
11.	Write short note on epoxy injection.	BT-3	Application
12.	Construct the mechanism of cathodic protection.	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.	Prioritize the role of inhibitors in resisting corrosion in reinforcement?	BT-4	Analyze
17.	Rewrite the term autogenous healing.	BT-5	Evaluate
18.	Evaluate the types of surface protection methods.	BT-5	Evaluate
19.	Define shoring and write its purpose.	BT-6	Create
20.	Formulate any two non-destructive test used for assessing the quality of concrete.	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.	(i) What is vacuum concrete? Explain its application. (ii) Explain the various methods of polymer coating applied on the surface of rebar.	BT-1	Remember
5.	Summarize about the Ultrasonic pulse velocity test.	BT-2	Understand
6.	Explain about (i) Impact echo test (7) (ii) Carbonation test (6)	BT-2	Understand
7.	Illustrate 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 (7) (ii) Gunite (6)	BT-3	Application
9.	Develop the mechanism of the following corrosion protection methods. (i) Corrosion inhibitors (7)	BT-3	Application

	(ii) Cathodic protection (6)		
10	List the importance of: (i) Protective coatings for reinforcement (7) (ii) Types of corrosion resistant steels (6)	BT-4	Analyze
11	(i) Examine the method of preventing corrosion in the structure. (7) (ii) Explain how cracks may be sealed by using epoxy Injection. (6)	BT-5	Analyze
12	List the features of dry pack and mortar pack with neat sketches.	BT-4	Evaluate
13	Classify the types of corrosion protection methods.	BT-4	Analyze
14	Discuss 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 short notes on the mechanism of (i) epoxy Injection (ii) underpinning	BT-3	Application
3	Define the term underpinning. Discuss any two of its methods mentioning its applicability.	BT-6	Create
4	Estimate the following NDT techniques as per IS (i) Rebound hammer test (ii) ultrasonic pulse velocity.	BT-5	Analyze

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.	What are 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.	Outline the preventive measures taken during demolition.	BT-2	Understand
8.	Explain 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.	Demonstrate the case when 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.	List two techniques of demolition used in construction projects.	BT-4	Analyze
15.	Compare dormant cracks and active cracks.	BT-4	Analyze
16.	List 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.	Conclude the reasons for demolition of structures.	BT-5	Evaluate
19.	How will you determine the temperature attained by concrete during fire?	BT-6	Create
20.	Discuss any two methods of retrofitting of concrete structures subjected to leakage.	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 (5)	BT-1	Remember
3.	Briefly explain the measure to be taken during construction to minimize the damages due to earthquake.	BT-1	Remember
4.	Demonstrate 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-1	Remember
6.	Write short notes and its application on : i) Non-explosive demolition agents (4) ii) Saw cutting (3) iii) Water jet (3) iv) Explosive (3)	BT-3	Application
7.	Show the repair technique for a structure distressed due to marine exposure.	BT-2	Understand
8.	Analyse a case-study about 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	Prove do you repair and rehabilitate a structure distressed due to fire.	BT-5	Evaluate
12	Classify crack repairing techniques with neat sketch.	BT-2	Understand
13	Discuss the impulsion method of demolition of a structure.	BT-6	Create
14	Develop the procedure for demolishing main structural elements like slab, beam and column with the help of neat sketch.	BT-3	Application

PART-C

1	Show how the building is affected by. (i) High Temperature (8) (ii) Marine exposure (7)	BT-1	Remember
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	Examine a Case study about repair a structure distressed due to corrosion.	BT-4	Analyze

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

TOTAL NO. OF QUESTIONS IN EACH PART

PART-A	100
PART-B	70
PART-C	20
TOTAL	190


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