INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	**REHABILITATION & RETROFITTING OF STRUCTURES**
Course Code	:	**ACE505**
Program	:	**B.Tech**
Semester	:	**VIII**
Branch	:	**Civil Engineering**
Section	:	**A& B**
Course Faculty	:	**Ms. P Sruthilaya, Assistant Professor**

COURSE OBJECTIVES:

The course should enable the students to:	
I	Explain different types of deterioration of structures, distress in structures and damage mechanism.
II	Understand the aspects of repair and rehabilitation and facets of maintenance.
III	Apply the various techniques of repair for corrosion protection in structures.
IV	Illustrate different methods for strengthening the existing structures and methods of demolition of structures using engineered and non-engineered techniques.

DEFINITIONS AND TERMINOLOGYQUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
UNIT-I						
1	Describe about Deterioration of Structures?	A defect that has occurred during a period of time.	Understand	CO 1	CLO 1	ACE505.01
2	What is meant by distress in structures?	Distress means damage	Remember	CO 1	CLO 5	ACE505.05
3	What is mechanism of Damage?	Mechanism of damage is due to Corrosion of steel in reinforced concrete	Understand	CO 1	CLO 3	ACE505.03
4	What are the types of damages in a structure?	Types of Damages: • Sliding of Roofs off the Supports • Falling of Infill Walls	Remember	CO 1	CLO 3	ACE505.03
5	What is meant by damage under accidental condition?	Damage due to fire/explosion.	Remember	CO 1	CLO 4	ACE505.04
6	What is meant by cyclic loading?	The application of repeated or fluctuating stresses or strains on a structure.	Remember	CO 1	CLO 3	ACE505.03

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7	How cracks are formed in a structure?	Cracks are formed due to ground motion.	Understand	CO 1	CLO 1	ACE505.01
8	What are the causes for distress in a structure?	Causes of Distress: • Construction errors • Erosion • Freezing and thawing etc.,	Remember	CO 1	CLO 5	ACE505.05
9	How evaluation of damage is done?	Evaluation of damage is done by inspection.	Remember	CO 1	CLO 4	ACE505.04
10	What is meant by Rehabilitation?	Rehabilitation is the process of restoring the structure to service level, once it had and now lost, strengthening consists in endowing the structure with a service level, higher than that initially planned by modifying the structure not necessarily damaged structure.	Remember	CO 1	CLO 1	ACE505.01
11	What is meant by Retrofitting?	Retrofitting is the modification of existing structures.	Remember	CO 1	CLO 1	ACE505.01
12	What are the causes for deterioration of structures?	• Spalling • Cracking • Corrosion of Concrete Through Chemical Attack	Remember	CO 1	CLO 2	ACE505.02
13	Describe about Types of cracks?	• Cracks in Fresh Concrete • Thermal Cracks • Shrinkage Cracks • Durability Cracks	Remember	CO 1	CLO 5	ACE505.05
14	How do you stop concrete from deteriorating?	Deterioration can be prevented by testing the sulfate content of the water and soil.	Understand	CO 1	CLO 2	ACE505.02
15	How does reinforced concrete prevent corrosion?	Water tight concrete and by using proper cover.	Understand	CO 1	CLO 2	ACE505.02
UNIT-II						
1	Define Maintenance?	Maintenance is the act of keeping something in a good condition by checking or repairing it regularly.	Understand	CO 2	CLO 6	ACE505.06
2	Define Repair?	Repair is a process of restoring something that is damaged or deteriorated or broken to a good condition.	Understand	CO 2	CLO 7	ACE505.07
3	Define Rehabilitation?	Rehabilitation is a process of returning a building or an area to its previous good conditions.	Understand	CO 2	CLO 6	ACE505.06
4	What are the two facets of maintenance?	The two facets of maintenance are i) Prevention and ii) Repair	Remember	CO 2	CLO 7	ACE505.07
5	Why maintenance is so important?	The cost of regular maintenance isvery small when it is compared to the cost of a major breakdown at which time there is no production.	Understand	CO 2	CLO 7	ACE505.07

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6.	What is meant by inspection?	Careful examination or scrutiny.	Remember	CO 2	CLO 8	ACE505.08
7.	How inspection of a structure is done?	Experimental inspection, visual inspection, comprehensive inspection.	Understand	CO 2	CLO 8	ACE505.08
8.	What is meant by visual inspection?	Inspection done by raw human senses such as vision, hearing, touch etc.,	Remember	CO 2	CLO 8	ACE505.08
9.	What are the causes for concrete failure in a structure?	Structural deficiency arising out of faulty design and detailing as well as wrong assumptions in the loading criteria.	Remember	CO 2	CLO 10	ACE505.10
10.	Need for Repair and Rehabilitation of structure?	Due to faulty design of the structure.	Understand	CO 2	CLO 6	ACE505.06
11.	How repairing techniques can be classified?	The repairing techniques can be classified into three major groups: • Injection into cracks, voids or honey-combed areas. • Removal and replacing of defective or damaged material / area.	Remember	CO 2	CLO 9	ACE505.09
12.	What are the materials used for Repairs and Rehabilitation of Concrete Structures?	• Cement, Cement Grouts, etc. • Epoxy Resins for Concrete Repair	Remember	CO 2	CLO 7	ACE505.07
13.	What is construction failure?	Construction failures are structural failures occurring during the course of construction.	Understand	CO 2	CLO 10	ACE505.10
14.	Why do some structures fail?	Structural failure occurs because of forces acting on the structure.	Remember	CO 2	CLO 10	ACE505.10
15.	Write Assessment Procedure for Evaluating Damages in Structure and Repair techniques?	• Physical inspection of damaged structure. • Presentation and documenting the damage. • Collection of samples and carrying out tests both in situ and in lab. • Studying the documents including structural aspects. • Estimation of loads acting on the structure. • Diagnosis	Remember	CO 2	CLO 9	ACE505.09
UNIT-III						
1	Define corrosion?	The gradual deterioration of concrete by chemically aggressive agent is called "corrosion"	Remember	CO 3	CLO 11	ACE505.11

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2	Give some examples for corrosion inhibitors?	• Anodic inhibitors • Cathodic inhibitors • Mixed inhibitors • Dangerous & safe inhibitors	Remember	CO 3	CLO 12	ACE505.12
3	Define corrosion inhibitor?	Corrosion inhibitor is an admixture that is used in concrete to prevent the metal Embedded in concrete from corroding.	Remember	CO 3	CLO 12	ACE505.12
4	What is corrosion of reinforcement in concrete?	The corrosion of steel reinforcement in concrete is complex, but basically it is an electrochemical reaction similar to that of a simple battery.	Remember	CO 3	CLO 11	ACE505.11
5	How is stainless steel corrosion resistant?	Stainless steel contains iron, chromium, manganese, silicon, carbon and, in many cases, significant amounts of nickel and molybdenum.	Understand	CO 3	CLO 13	ACE505.13
6	What are the methods to prevent corrosion?	• Turn to non-corrosive metals such as aluminum and stainless steel. • Keep the area around the metal surface dry.	Remember	CO 3	CLO 13	ACE505.13
7	What is meant by Cathodic protection?	Cathodic protection is a technique used to control the corrosion of a metal surface by making it the cathode of an electrochemical cell.	Understand	CO 3	CLO 14	ACE505.14
8	How do you stop concrete from deteriorating?	By testing sulphate content in concrete.	Remember	CO 3	CLO 14	ACE505.14
9	What can damage concrete?	Concrete can be damaged by fire, aggregate expansion, sea water effects, bacterial corrosion, calcium leaching, physical damage and chemical damage	Understand	CO 3	CLO 15	ACE505.15
10	What are the major causes of deterioration in historic masonry structures?	• Moisture Infiltration • Movement or Settlement • Incompatibility of Secondary Materials	Remember	CO 3	CLO 14	ACE505.14
11	How does timber deteriorate?	Timber deterioration is due to fungus.		CO 3	CLO 13	ACE505.13
12	What causes efflorescence?	Efflorescence is caused when soluble salts and other water dispersible materials come to the surface of concrete and mortars.	Remember	CO 3	CLO 14	ACE505.14
13	Does efflorescence have a smell?	Efflorescence has a smell and taste of salts, perhaps the type commonly found by the ocean on rocks.	Remember	CO 3	CLO 14	ACE505.14
14	What is embedded steel?	Steel Embed Plates are used to attach concrete structures to steel framework.	Understand	CO 3	CLO 13	ACE505.13

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15	What causes concrete to deteriorate?	Corrosion of reinforcing steel and other embedded metals is the leading cause of deterioration in concrete.	Understand	CO 3	CLO 13	ACE505.13
UNIT-IV						
1	What is expansive cement?	A slight change in volume on drying is known as expansion with time will prove to be advantage for grouting purpose. This type of cement which suffers no overall change in volume on drying is known as "Expansive cement".	Remember	CO 4	CLO 19	ACE505.19
2	What is the action of shrink comb in expansive cement?	Shrink comb grout acts like a Portland cement. It (shrinks) sets and hardens.	Understand	CO 4	CLO 19	ACE505.19
3	List the various types of polymer concrete.	• Polymer impregnated concrete (PIC) • Polymer cement concrete (PCC)	Remember	CO 4	CLO 17	ACE505.17
4	Give the various monomers used in polymer concrete.	• Mehylmethacrylate (MINS) • Styretoc	Remember	CO 4	CLO 17	ACE505.17
5	Define polymer concrete?	Polymer concrete is a aggregate bound a polymer binder instead of Portland cement as in Conventional concrete pc is normally use to minimize voids volume in aggregate mars.	Understand	CO 4	CLO 17	ACE505.17
6	What are the uses of Polymer concrete?	During curing Portland cement form mineral voids. Water can be entrapped in these voids which are freezing can readily attack the concrete.	Remember	CO 4	CLO 17	ACE505.17
7	What is sulphur infiltrated concrete?	New types of composition have been produced by the recently developed techniques of impregnating porous material like concrete with sulphur.	Understand	CO 4	CLO 20	ACE505.20
8	What are the applications of sulphur infiltrated concrete?	Sulphur – (impregnated) infiltration can be employed in the precast industries.	Understand	CO 4	CLO 20	ACE505.20
9	What are the special concrete?	• High Alumina cement concrete. • Shrinkage compensated concrete.	Remember	CO 4	CLO 16	ACE505.16
10	Write a short note on Expansive cement?	Expansive cement, when mixed with water, forms a paste that, after setting, tends to increase in volume to significantly greater degree than Portland cement paste.	Remember	CO 4	CLO 16	ACE505.16

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11	Define Gunite or Short Crete?	Gunite can be defined as mortar conveyed through a hose and pneumatically a high velocity on to a surface.	Understand	CO 4	CLO 18	ACE505.18
12	What are the methods involved in Epoxy injection?	There are three methods of providing entry ports. i. Drilled holes with fittings inserted and bonded, with the adhesive used for sealing. ii. Bonded flush fittings, attached by means of the sealing adhesive.	Understand	CO 4	CLO 18	ACE505.18
13	What are the four steps to built up the epoxy system?	• The surface is primed with a low viscosity epoxy. • A 50 mil thick coat of the filled epoxy is then placed • A woven glass fabric is then applied.	Remember	CO 4	CLO 18	ACE505.18
14	What are the overlays of polymer concrete?	• Polymer-impregnated concrete • Polymer-modified concrete • Polymer-based concrete.	Remember	CO 4	CLO 17	ACE505.17
15	What is meant by epoxide resins?	The formulators market epoxide resins and have the special properties required for the specific use to which they will be put.	Understand	CO 4	CLO 18	ACE505.18
		UNIT-V				
1	What are the techniques required for repairing cracks?	• Bonding with epoxies • Routing and sealing • Stitching • Blanketing	Understand	CO 5	CLO 22	ACE505.22
2	Define stitching.	The tensile strength of a cracked concrete section can be restored by stitching in a manner similar to sewing cloth.	Remember	CO 5	CLO 22	ACE505.22
3	What do you mean by blanketing?	This is the simplest and most common technique for sealing cracks and is applicable for sealing both fine pattern cracks and larger isolated. The cracks should be dormant unless they are opened up enough to put in a substantial paten in which case the repair may be more property termed as “Blanketing”.	Remember	CO 5	CLO 22	ACE505.22
4	Define external stressing?	Development of cracking in concrete is due to tensile stress and can be arrested by removing these stresses.	Understand	CO 5	CLO 22	ACE505.22
5	What is meant by Autogenous healing?	The inherent ability of concrete to heal cracks within “autogenous healing”.	Understand	CO 5	CLO 22	ACE505.22
6	Give short note on Jacketing.	Jacketing consists of restoring or increasing the section of an existing member by encasing it in a new concrete	Remember	CO 5	CLO 21	ACE505.21

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7	Define grouting?	Grouting can be performed in a similar manner as the injection of an epoxy.	Remember	CO 5	CLO 21	ACE505.21
8	What is caging with steel?	A steel caging is prepared and made to surround the existing masonry so that lateral expansion when it is loaded in compression.	Understand	CO 5	CLO 23	ACE505.23
9	What is mean by weathering?	Many bridges and parking structures in cold climates have been severely damaged by de-icing salt causing corrosion of reinforcement and required repair.	Remember	CO 5	CLO 21	ACE505.21
10	What are the preliminary investigations before demolition of a structure?	The demolition contractor should have ample experience of the type of work to be offered; 1. Fully comprehensive insurance against all risks must be maintained at all times; 2. An experienced supervisor should be continuously in charge of the work	Understand	CO 5	CLO 23	ACE505.23
11	Write about protective clothing given before demolition?	Buildings where chemicals have been stored or where asbestos, lead paint, dust or fumes may be present will require specialized protective clothing.	Understand	CO 5	CLO 23	ACE505.24
12	Write short notes on demolition by hand?	Demolition of buildings or structure by hand-held tools such as electric or pneumatic breakers, sometimes as a preliminary to using other methods, should be carried out, where practicable, in the reverse order to the original construction sequence.	Remember	CO 5	CLO 24	ACE505.24
13	What are the Principles of dismantling?	Primary Dismantling, Secondary dismantling	Remember	CO 5	CLO 25	ACE505.25
14	What are the modern demolition techniques?	• Hydraulic Rock breakers • Diamond sawing and drilling.	Remember	CO 5	CLO 25	ACE505.25
15	What are the types of Hand Held Machine?	• Electrical Operated • Battery Operated • Pneumatic • Hydraulic	Remember	CO 5	CLO 25	ACE505.25

Signature of the Faculty **HOD, CE**