



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	CONCRETE TECHNOLOGY
Course Code	:	ACE010
Program	:	B.Tech
Semester	:	V
Branch	:	Civil Engineering
Section	:	A&B
Academic Year	:	2019– 2020
Course Faculty	:	Mr. N.Venkat Rao, Associate Professor Mrs. B.Bhavani , Assistant Professor

COURSE OBJECTIVES:

The course should enable the students to:	
I	Discuss the physical and chemical properties of cement and admixtures
II	Understand the workability of concrete, manufacturing processes of concrete and the behavior of the hardened concrete
III	Identify, formulate and solve problems in concrete mix design
IV	Enrich the practical knowledge on mix design principles, concepts and methods.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.NO	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
MODULE-I						
1	How do plasticizers work?	Plasticizers are used to make a material like PVC softer and more flexible. They are small molecules that can dissolve into liquids that come into contact with them. The most common plasticizers used for PVC are phthalates.	Understand	CO 1	CLO 2	ACE010.02
2	How can I make concrete cure faster?	1. Pour the concrete during warmer, sunnier weather. It will dry faster than it would in cooler weather. 2. Add calcium chloride, an accelerating compound, to the concrete before pouring while it is still wet.	Understand	CO 1	CLO 1	ACE010.01
3	Does retarder weaken concrete?	The common way to slow the hardening of concrete is to employ an admixture termed a retarder. Retarders are primarily intended to counteract the harmful results of heat on the concrete mix; they lower the water/cement ratio only as a side effect.	Understand	CO 1	CLO 4	ACE010.04

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4	What does super plasticizer do in concrete?	<p>Water reducers, retarders, and super plasticizers are admixtures for concrete, which are added in order to reduce the water content in a mixture or to slow the setting rate of the concrete while retaining the flowing properties of a concrete mixture.</p> <p>Strength of concrete can be increased by numerous methods:</p> <ol style="list-style-type: none"> 1. Using cement of a higher grade. 2. Using mineral admixtures like GGBS. 3. Using a low water to cement ratio (W/C). 4. Using well graded angular aggregates. 5. Proper compaction. 	Remember	CO 1	CLO 2	ACE010.02
5	What are the purposes of concrete admixtures?	<p>The most often used admixtures are air-entraining agents, water reducers, water-reducing retarders and accelerators. Admixtures are used to give special properties to fresh or hardened concrete. Admixtures may enhance the durability, workability or strength characteristics of a given concrete mixture.</p>	Remember	CO 1	CLO 2	ACE010.02
6	Why slump test is done?	<p>The concrete slump test measures the consistency of fresh concrete before it sets. It is performed to check the workability of freshly made concrete, and therefore the ease with which concrete flows. It can also be used as an indicator of an improperly mixed batch.</p>	Remember	CO 1	CLO 5	ACE010.05
7	How do you slow concrete cure?	<p>How to Slow the Curing of Concrete</p> <ol style="list-style-type: none"> 1. Perform the final finish on the concrete, then allow it to cure until you can walk on it without leaving an imprint. This should take an hour or so; depending on the climate. 2. Cover the wet concrete slab with a sheet of plastic. This will help hold the moisture in the concrete. 3. Put a concrete curing agent in a sprayer. 	Understand	CO 1	CLO 4	ACE010.04
8	How do you increase the strength of concrete?	<p>Strength of concrete can be increased by numerous methods:</p> <ul style="list-style-type: none"> • Using cement of a higher grade. • Using mineral admixtures like GGBS. • Using a low water to cement ratio (W/C). • Using well graded angular aggregates. • Proper compaction. 	Understand	CO 1	CLO 4	ACE010.04
9	How does admixture work in concrete?	<p>Water-reducing admixtures are primarily used to reduce the water-cementitious content of concrete, thus increasing strength. High-range water reducers, commonly called super plasticizers, were developed for high-strength and high-performance concrete applications.</p>	Understand	CO 1	CLO 2	ACE010.02

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10	Why admixtures are added to concrete?	Water-reducing admixtures are chemical products that when added to concrete can create a desired slump at a lower water-cement ratio than what it is normally designed. Water-reducing admixtures are used to obtain specific concrete strength using lower cement content	Remember	CO 1	CLO 2	ACE010.02
11	How do you use super plasticizer in concrete?	Use of Water Reducers, Retarders, and Super plasticizer. Many important characteristics of concrete are influenced by the ratio (by weight) of water to cementitious materials (w/cm) used in the mixture. By reducing the amount of water, the cement paste will have higher density.	Understand	CO 1	CLO 2	ACE010.02
12	What is a 4 inch slump?	Simply defined, slump is a measure of the consistency of fresh concrete. The slump test is a very simple test. The slump cone is a right circular cone that is 12 inches high. The base of the cone is 8 inches in diameter and the top of the cone is 4 inches in diameter.	Remember	CO 1	CLO 5	ACE010.05
13	How does a super plasticizer affect the slump of concrete?	Water reducers, retarders, and super plasticizers are admixtures for concrete, which are added in order to reduce the water content in a mixture or to slow the setting rate of the concrete while retaining the flowing properties of a concrete mixture.	Understand	CO 1	CLO 2	ACE010.02
14	What are additives in concrete?	Concrete additives are added to the mixture of water cement and aggregate in small quantities to increase the durability of the concrete, to fix concrete behavior and to control setting or hardening. They can either be liquid or powdered additives	Remember	CO 1	CLO 3	ACE010.03
15	How many types of admixtures are there?	Five Functions. Admixtures are classed according to function. There are five distinct classes of chemical admixtures: air-entraining, water-reducing, retarding, accelerating, and plasticizers.	Understand	CO 1	CLO 3	ACE010.03
MODULE –II						
1	What are the properties of hardened concrete?	<p>Hardened concrete has a number of properties, including:</p> <ul style="list-style-type: none"> • Mechanical strength, in particular compressive strength. The strength of normal concrete varies between 25 and 40 MPa. • Durability. • Porosity and density. • Fire resistance. • Thermal and acoustic insulation properties. • Impact resistance. 	Remember	CO 2	CLO 7	ACE010.07

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2	Can concrete cure in freezing temperatures?	Use a good quality curing compound if you are unable to maintain concrete temperatures above 50° degrees Fahrenheit for three to seven days. Maintain the concrete temperature above 40° degrees Fahrenheit for at least four more days after the use of the insulation blankets or heated enclosures.	Remember	CO 2	CLO 10	ACE010.10
3	What is the different type of slump test indications?	Slump tests are performed to empirically measure the workability of fresh concrete. They are as follows: > True Slump >Shear Slump >Collapse Slump True Slump: This type of slump is characterized by the general drop of the concrete mass evenly without visible signs of deterioration or disintegration.	Remember	CO 2	CLO 6	ACE010.06
4	How is water cement ratio calculated?	If we need to calculate Water quantity for concrete, first find the cement content for the volume. Therefore, Required amount of water = $0.5 \times 50 \text{ kg} = 25 \text{ litres} / 50 \text{ kg cement bag}$. For Design mix, the W/C Ratio will depend upon the workability, strength requirements.	Understand	CO 2	CLO 10	ACE010.10
5	What should be the temperature of concrete?	The simple truth of the matter is that concrete placed and cured at a moderate temperature (60° to 80° F) will outperform +90° F concrete in strength and durability.	Remember	CO 2	CLO 9	ACE010.09
6	What are properties of fresh concrete?	Workability: Workability, in the simplest language, is the ease with which freshly prepared concrete can be transported and placed for the job and compacted to a dense mass.	Remember	CO 2	CLO 6	ACE010.06
7	Which are the concrete tests?	<ul style="list-style-type: none"> • Slump test before leaving the batching plant and on arrival on site. • Compressive strength test. • Water Permeability test. • Rapid Chloride Ion Penetration Test. • Water Absorption Test. • Initial Surface Absorption Test. 	Remember	CO 2	CLO 7	ACE010.07
8	How cold is too cold to pour concrete?	Fresh concrete frozen during the first 24 hours can lose 50% of its potential 28-day strength! Maintain the concrete temperature above 40° degrees Fahrenheit for at least four more days after the use of the insulation blankets or heated enclosures.	Understand	CO 2	CLO 10	ACE010.10
9	What is a 4 inch slump?	Simply defined, slump is a measure of the consistency of fresh concrete. The slump test is a very simple test. The slump cone is a right circular cone that is 12inches high. The base of the cone is 8 inches in diameter and the top of the cone is 4 inches in diameter.	Remember	CO 2	CLO 7	ACE010.07

S.NO	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
10	What is the best temp to pour concrete?	Use insulation blankets or heated enclosures to maintain concrete temperatures above 50° degrees Fahrenheit for three to seven days.	Remember	CO 2	CLO 9	ACE010.09
11	What is a zero slump concrete?	According to ACI's Cement and Concrete Terminology (ACI 116R-90), no-slump concrete is freshly mixed concrete exhibiting a slump of less than 1/4 inch. Zero-slump concrete is defined in the same document, as concrete of stiff or extremely dry consistency showing no measurable slump after removal of the slump cone	Remember	CO 2	CLO 7	ACE010.07
12	How is workability of concrete measured?	The shape of the concrete after the cone removal is then assessed to determine the workability. The slump is then interpreted by the following shapes: True Slump – the only slump that can be measured in the test. The measurement is taken between the top of the cone and the top of the concrete after the cones removal.	Understand	CO 2	CLO 6	ACE010.06
13	What is the ideal value of slump?	In case of a dry sample, slump will be in the range of 25-50 mm. But in case of a wet concrete, the slump may vary from 150-175 mm. So the value of slump is specifically mentioned along the mix design and thus it should be checked as per your location.	Remember	CO 2	CLO 7	ACE010.07
14	How many types of slump tests are there?	There are three types of slump that may occur in a slumps test, namely, true slump, shear slump and collapse slump. True slump refers to general drop of the concrete mass evenly all around without disintegration. Shear slump indicates that the concrete lacks cohesion.	Understand	CO 2	CLO 7	ACE010.07
15	Why slump test is done?	The concrete slump test measures the consistency of fresh concrete before it sets. It is performed to check the workability of freshly made concrete, and therefore the ease with which concrete flows. It can also be used as an indicator of an improperly mixed batch.	Remember	CO 2	CLO 6	ACE010.06
MODULE –III						
1	What are the properties of hardened concrete?	Hardened concrete has a number of properties, including: <ul style="list-style-type: none"> • Mechanical strength, in particular compressive strength. The strength of normal concrete varies between 25 and 40 MPa. • Durability. • Porosity and density. • Fire resistance. • Thermal and acoustic insulation properties. • Impact resistance. 	Remember	CO 3	CLO 11	ACE010.11

S.NO	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
2	What do you mean by hardened concrete?	Hardened: Refers to cement paste or concrete that has gained enough strength to bear some load. ... Curing/Hardening: Essentially interchangeable terms that mean the process of continued strength gain after the cement paste has set due to chemical reactions between cement and water.	Remember	CO 3	CLO 12	ACE010.12
3	Does concrete harden over time?	Concrete does not need to dry out in order to harden as commonly thought. The concrete (or specifically, the cement in it) needs moisture to hydrate and cure (harden). When concrete dries, it actually stops getting stronger.	Understand	CO 3	CLO 13	ACE010.13
4	What are the factors affecting durability of concrete?	Factors affecting durability of Concrete. Concrete durability has been defined by the American Concrete Institute as its resistance to weathering action, chemical attack, abrasion and other degradation processes. Durability is the ability to last a long time without significant deterioration.	Remember	CO 3	CLO 11	ACE010.11
5	How long will it take for the concrete to achieve 100% of its strength?	Throughout the construction industry, the common belief is that concrete takes 28 days to cure and reach 100% of its strength. This evolved from a misunderstanding of what curing actually means	Understand	CO 3	CLO 11	ACE010.11
6	Definition of Hardened Concrete -	Hardened concrete is a concrete which must be strong enough to withstand the structural and service loads which will be applied to it and must be durable enough to the environmental exposure for which it is designed. It will be the strongest and durable building material.	Remember	CO 3	CLO 11	ACE010.11
7	What is a compression test in concrete?	Strength usually gives an Overall Picture of the quality of concrete because it is directly related to the structure of cement-paste. Compression Test of the Concrete Specimen is most widely used test to measure its compressive strength	Remember	CO 3	CLO 14	ACE010.14
8	What is the strength of concrete after 7 days?	The table below shows the compressive strength gained by concrete after 1, 3, 7, 14 and 28 days with respect to the grade of concrete we use. From above table, we see that, concrete gains 16 percent strength in one day, 40 percent in 3 days, 65% in 7 days, 90% in 14 days and 99% strength in 28 days.	Remember	CO 3	CLO 12	ACE010.12
9	What determines the strength of concrete?	Factors Affecting Strength of Concrete. Concrete strength is affected by many factors, such as quality of raw materials, water/cement ratio, coarse/fine aggregate ratio, age of concrete, compaction of concrete, temperature, relative humidity and curing of concrete.	Remember	CO 3	CLO 12	ACE010.12

S.NO	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
10	Does concrete get harder with age?	Roman concrete is especially resistant to seawater. As to modern concrete hardening with age - it seems to get harder for a period of several decades, then it begins to degrade. ... The hydration reaction between water and cement which hardens concrete is finite, but the result is complex.	Understand	CO 3	CLO 13	ACE010.13
11	What is added to concrete to make it stronger?	Add too much water and you'll ruin the concrete. You can add more Portland cement to bagged concrete to make it stronger. You can also add hydrated lime. To make the strongest concrete, the sand should be sourced from volcanic lava that has high silica content.	Remember	CO 3	CLO 12	ACE010.12
12	Which are the concrete tests?	Here are 6 common quality tests on concrete before and after completion of casting on site. <ul style="list-style-type: none"> • Slump test before leaving the batching plant and on arrival on site. • Compressive strength test. • Water Permeability test. • Rapid Chloride Ion Penetration Test. • Water Absorption Test. • Initial Surface Absorption Test. 	Remember	CO 3	CLO 14	ACE010.14
13	What is fresh and hardened concrete?	Properties of Fresh and Hardened Concrete. ... The purpose of slump test Is to determine the water content in concrete and its workability Consistency: Consistency or fluidity of concrete is an important component of workability and refers in a way to the wetness of the concrete.	Remember	CO 3	CLO 11	ACE010.11
14	What are the factors affecting strength of hardened concrete?	Concrete strength is affected by many factors, such as quality of raw materials, water/cement ratio, coarse/fine aggregate ratio, age of concrete, compaction of concrete, temperature, relative humidity and curing of concrete.	Remember	CO 3	CLO 12	ACE010.12
15	What is the highest strength concrete?	High-strength concrete is typically recognized as concrete with a 28-day cylinder compressive strength greater than 6000 psi or 42 Mpa.	Remember	CO 3	CLO 12	ACE010.12
MODULE- IV						
1	What is nominal mix and design mix?	Nominal mix specifies the proportion of the cement , sand and aggregates without making special effort to know their individual properties. Nominal mix has Volumetric batching. However , design mix is a process where each and every ingredient of the concrete is first tested in the laboratory.	Remember	CO 4	CLO 17	ACE010.17

2	What type of concrete is used for footings?	C25 standardized mix concrete or ST2 Concrete is widely versatile and used in numerous commercial and domestic projects. It is commonly used for footings and foundations, including mass concrete fill, trench fill and reinforced fill, as well as general groundwork's.	Remember	CO 4	CLO 20	ACE010.20
3	Do footings need rebar?	Footings with large bearing areas or unstable soil can benefit from adding rebar to prevent cracking. When rebar is placed within a footing, it should be completely encased in concrete by a minimum of 3 inches on all sides. When rebar is allowed to project out of the footings, it is susceptible to more rapid corrosion.	Understand	CO 4	CLO 19	ACE010.19
4	IS code for water/ cement ratio?	First of all, what is Water Cement Ratio?? Water cement ratio is the ratio of weight of water to the weight of cement. It's normal value lies between 0.4 to 0.6 as per IS code 10262 (2009) for nominal mixes. Concrete is a macro content and contains cement, sand, coarse aggregate, fine aggregate and water.	Remember	CO 4	CLO 17	ACE010.17
5	IS code for design mix of concrete?	The code illustrates this with an M40 concrete with and without fly ash. A typical mix design (first mix) for commonly used M20 grade is illustrated in the paper based on the properties of the ingredients using the new BIS and ACI methods. Coarse aggregate is substantially more with BIS method.	Remember	CO 4	CLO 17	ACE010.17
6	Why is concrete mix design needed?	The purpose of concrete mix design is to ensure the most optimum proportions of the constituent materials to fulfill the requirement of the structure being built. Mix design should ensure following objectives. To achieve the designed/ desired workability in the plastic stage.	Understand	CO 4	CLO 20	ACE010.20
7	What is the strength of concrete after 7 days?	The table below shows the compressive strength gained by concrete after 1, 3, 7, 14 and 28 days with respect to the grade of concrete we use. From above table, we see that, concrete gains 16 percent strength in one day, 40 percent in 3 days, 65% in 7 days, 90% in 14 days and 99% strength in 28 days.	Remember	CO 4	CLO 18	ACE010.18
8	What happens to the water in concrete?	Hydration is a chemical reaction in which the major compounds in cement form chemical bonds with water molecules and become hydrates or hydration products. The water needs to be pure in order to prevent side reactions from occurring which may weaken the concrete or otherwise interfere with the hydration process	Remember	CO 4	CLO 20	ACE010.20

9	What is the design mix of concrete?	Concrete mix design is the process of finding right proportions of cement, sand and aggregates for concrete to achieve target strength in structures.	Remember	CO 4	CLO 17	ACE010.17
10	What is the mix for M30 concrete?	In M30 grade mix 380 kg of cement is used for 1 cubic meter. The mix ratio of C30 concrete refers to the proportion of the components in concrete (cement, water, sand, and stone). We have nominal mix or standard mix only up to M25 or C25 as you call and that is 1:1:2, cement: sand: aggregate.	Remember	CO 4	CLO 19	ACE010.19
11	What is water/cement ratio calculation?	The water to cement ratio is calculated by dividing the water in one cubic yard of the mix (in pounds) by the cement in the mix (in pounds). ... But for workability extra water is added which gets evaporated in later stage and leaves behind voids. More water cement ratio causes porousness in concrete.	Remember	CO 4	CLO 12	ACE010.12
12	What is water cement ratio and how it is related to the strength of concrete?	The water cement ratio is the ratio of the weight of water to the weight of cement used in a concrete mix and has an important influence on the quality of concrete produced. A lower water-cement ratio leads to higher strength and durability, but may make the mix more difficult to place.	Remember	CO 4	CLO 20	ACE010.20
13	What is M20 concrete mix design?	In this designation the letter M refers to the mix and the number to the specified 28 day cube strength of mix in N/mm ² . The mixes of grades M10, M15, M20 and M25 correspond approximately to the mix proportions (1:3:6), (1:2:4), (1:1.5:3) and (1:1:2) respectively.	Remember	CO 4	CLO 19	ACE010.19
14	What is a lean mix of concrete?	Lean concrete is a mix where the amount of cement is lower than the amount of liquid present in the strata. This makes it ideal as a base layer where other kinds of concrete are placed on top.	Remember	CO 4	CLO 20	ACE010.20
15	What is the ratio for mixing concrete?	A concrete mixture ratio of 1 part cement, 3 parts sand, and 3 parts aggregate will produce a concrete mix of approximately 3000 psi. Mixing water with the cement, sand, and stone will form a paste that will bind the materials together until the mix hardens.	Remember	CO 4	CLO 19	ACE010.19
MODULE-V						
1	What are the 4 main ingredients in concrete?	There are three basic ingredients in the concrete mix: <ul style="list-style-type: none"> • Portland cement. • Water. • Aggregates (rock and sand) 	Remember	CO 5	CLO 22	ACE010.22

2	How do you cure concrete?	Curing is the process of controlling the rate and extent of moisture loss from concrete during cement hydration. Curing by continuously wetting the exposed surface thereby preventing the loss of moisture from it. Ponding or spraying the surface with water are methods typically employed to this end.	Understand	CO 5	CLO 23	ACE010.23
3	What is 4000 psi concrete used for?	In general, 3000 psi is usually used for concrete walls and footings and 3500 psi is used for flat work such as floors and walkways. However, a good contractor who wants to avoid call-backs will use at least a 4000 psi mix for a driveway.	Remember	CO 5	CLO 22	ACE010.22
4	What is meant by special concrete?	Special types of concrete are those with out-of-the ordinary properties or those produced by unusual techniques. Concrete is by definition a composite material consisting essentially of a binding medium and aggregate particles, and it can take many forms	Remember	CO 5	CLO 22	ACE010.22
5	What determines the strength of concrete?	Factors Affecting Strength of Concrete. Concrete strength is affected by many factors, such as quality of raw materials, water/cement ratio, coarse/fine aggregate ratio, age of concrete, compaction of concrete, temperature, relative humidity and curing of concrete.	Remember	CO 5	CLO 22	ACE010.22
6	What causes concrete to harden?	The water causes the hardening of concrete through a process called hydration. Hydration is a chemical reaction in which the major compounds in cement form chemical bonds with water molecules and become hydrates or hydration products.	Remember	CO 5	CLO 12	ACE010.12
7	What are the 5 types of cement?	<ul style="list-style-type: none"> • Rapid Hardening Cement: Rapid hardening cement is very similar to ordinary Portland cement (OPC). • Low Heat Cement. • Sulphate Resisting Cement. • White Cement. • Portland Pozzolana Cement. • Hydrophobic Cement. 	Remember	CO 5	CLO 22	ACE010.22
8	What is the purpose of concrete?	Its uses range from structural applications, to pavements, kerbs, pipes and drains. Concrete is a composite material, consisting mainly of Portland cement, water and aggregate (gravel, sand or rock). When these materials are mixed together, they form a workable paste which then gradually hardens over time.	Remember	CO 5	CLO 22	ACE010.22
9	What is the highest strength concrete?	High-strength concrete is typically recognized as concrete with a 28-day cylinder compressive strength greater than 6000 psi or 42 Mpa.	Remember	CO 5	CLO 23	ACE010.23

10	What is 5000 psi concrete used for?	Typically, reinforced concrete ranging between 3,500 to 4,000 psi is used on footing and slabs on grade; between 3,500 to 5,000 psi on suspended slabs, beams and girders; and walls and columns normally require between 3,000 to 5,000 psi.	Remember	CO 5	CLO 22	ACE010.22
11	How many types of concrete are there?	There are 9 main types of concrete, namely as: Normal Concrete. High Strength Concrete. High Performance Concrete.	Understand	CO 5	CLO 22	ACE010.22
12	Where did the name concrete come from?	The word concrete comes from the Latin word "concretus" (meaning compact or condensed), the perfect passive participle of "concrecere", from "con-" (together) and "crescere" (to grow).	Remember	CO 5	CLO 22	ACE010.22
13	What is the difference between PPC and OPC cement?	Difference Between OPC Cement and PPC Cement. Portland Pozzolana Cement is a variation of Ordinary Portland Cement. Pozzolana materials namely fly ash, volcanic ash, are added to the OPC so that it becomes PPC. PPC has low initial setting strength compared to OPC but hardens over a period of time with proper curing.	Remember	CO 5	CLO 11	ACE010.11
14	What chemicals are used in concrete?	Admixtures are natural or manufactured chemicals added to the concrete before or during mixing. The most often used chemical admixtures are air- entraining agents, water reducers, water-reducing retarders, and accelerators.	Remember	CO 5	CLO 23	ACE010.23
15	What is the strength of Class A concrete?	High-strength concrete has a compressive strength greater than 40 MPa (5800 psi). In the UK, BS EN 206-1 defines High strength concrete as concrete with a compressive strength class higher than C50/60. High-strength concrete is made by lowering the water-cement (W/C) ratio to 0.35 or lower.	Remember	CO 5	CLO 22	ACE010.22

Signature of the Faculty

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