INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	**MATERIALS, TESTING AND EVALUATION**
Course Code	:	**ACEB08**
Program	:	**B.Tech**
Semester	:	**IV**
Branch	:	**Civil Engineering**
Section	:	**A & B**
Academic Year	:	**2019 – 2020**
Course Faculty	:	**Mr. K. Anand Goud, Assistant Professor** **Mr. A.Jagadish Babu, Assistant Professor**

COURSE OBJECTIVES:

The course should enable the students to:	
I	Make measurements of behaviour of various materials used in Civil Engineering.
II	Provide physical observations to complement concepts learnt.
III	Introduce experimental procedures and common measurement instruments, equipment, devices.
IV	Disclose the variety of established material testing procedures and techniques.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
MODULE-I						
1	What is cement made of ?	Cement is manufactured through a closely controlled chemical combination of calcium, silicon, aluminum, iron and other ingredients.	Remember	CO 1	CLO 1	ACEB08.01
2	What is natural Cement?	Cement Rock is the term given to a limestone containing up to 25% clayey (argillaceous) material.	Remember	CO 1	CLO 1	ACEB08.01
3	Is Cement Eco-Friendly?	In its raw state concrete powder is environmentally friendly, as it is of the environment itself – a natural component. But it is in the industrial extraction of the materials, the mixing, and of course the application of concrete that is ceases to be environmentally friendly	Understand	CO 1	CLO 1	ACEB08.01
4	Why gypsum is added in cement?	Gypsum plays a very important role in controlling the rate of hardening of the cement. During	Understand	CO 1	CLO 1	ACEB08.01

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		the cement manufacturing process, upon the cooling of clinker, a small amount of gypsum is introduced during the final grinding process. Gypsum is added to control the "setting of cement".				
5	What is Sand?	The most common component of sand is silicon dioxide in the form of quartz.	Remember	CO 1	CLO 2	ACEB08.02
6	What is Concrete?	Concrete, in construction, structural material consisting of a hard, chemically inert particulate substance, known as aggregate (usually sand and gravel), that is bonded together by cement and water.	Remember	CO 1	CLO 3	ACEB08.03
7	How are Concrete made?	Concrete is made up of three basic components: water, aggregate (rock, sand, or gravel) and Portland cement.	Remember	CO 1	CLO 3	ACEB08.03
8	What do you mean by Ceramic?	A ceramic is an inorganic non-metallic solid made up of either metal or non-metal compounds that have been shaped and then hardened by heating to high temperatures. In general, they are hard, corrosion-resistant and brittle.	Remember	CO 1	CLO 3	ACEB08.03
9	What is refractories?	Refractories are usually inorganic non-metallic materials with refractoriness greater than 1500 deg C.	Remember	CO 1	CLO 2	ACEB08.02
10	What is bitumen used for?	The primary use (70%) of asphalt is in road construction, where it is used as the glue or binder mixed with aggregate particles to create asphalt concrete. Its other main uses are for bituminous waterproofing products, including production of roofing felt and for sealing flat roofs.	Remember	CO 1	CLO 3	ACEB08.03
11	How is Bitumen Formed?	Petroleum Bitumen, normally called "Bitumen" or "Asphalt" is produced by refining crude oil. Used as a binder in road-building products, it is a very viscous, black or dark brown material. Finally, Bitumen is obtained by vacuum distillation or vacuum flashing of atmospheric residue from the vacuum distillation column.	Remember	CO 1	CLO 3	ACEB08.03

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
12	What is a timber used for?	"Timber" refers to standing trees or relatively unprocessed felled trees or logs.	Remember	CO 1	CLO 4	ACEB08.04
13	What is Glass made from?	Glass is made from liquid sand. You can make glass by heating ordinary sand (which is mostly made of silicon dioxide) until it melts and turns into a liquid. You won't find that happening on your local beach: sand melts at the incredibly high temperature of 1700°C (3090°F).	Remember	CO 1	CLO 4	ACEB08.04
14	What type of material is Steel?	Steel is an alloy of iron and carbon containing less than 2% carbon and 1% manganese and small amounts of silicon, phosphorus, sulphur and oxygen. Steel is the world's most important engineering and construction material.	Remember	CO 1	CLO 4	ACEB08.04
15	What is a metal?	A metal is a material (an element, compound, or alloy) that is typically hard, opaque, shiny, and has good electrical and thermal conductivity.	Remember	CO 1	CLO 4	ACEB08.04
MODULE -II						
1	What are mechanical properties?	Mechanical properties are physical properties that a material exhibits upon the application of forces.	Understand	CO 2	CLO 5	ACEB08.05
2	What are the mechanical properties of Steel?	Mechanical properties are also used to help classify and identify material. The most common properties considered are strength, ductility, hardness, impact resistance, and fracture toughness.	Understand	CO 2	CLO 5	ACEB08.05
3	What is Elastic Behaviour?	Elasticity is the ability of a body to resist any permanent change to it when stress is applied. When stress application ceases, the body regains its original shape and size. Different materials show different elastic behaviour.	Understand	CO 2	CLO 5	ACEB08.05
4	What is Hooke's law of elasticity?	Hooke's law, law of elasticity discovered by the English scientist Robert Hooke in 1660, which states that, for relatively small deformations of an object, the displacement or size of the deformation is directly	Understand	CO 2	CLO 6	ACEB08.06

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		proportional to the deforming force or load.				
5	What is Plastic Deformation?	Plastic deformation is the permanent distortion that occurs when a material is subjected to tensile, compressive, bending, or torsion stresses that exceed its yield strength and cause it to elongate, compress, buckle, bend, or twist.	Understand	CO 2	CLO 6	ACEB08.06
6.	What is a Brittle Material?	Brittle material breaks while little to no energy is absorbed when stressed. The material fractures with no plastic deformation.	Understand	CO 2	CLO 6	ACEB08.06
7.	What is the Hardness Test?	Material Hardness Testing determines a material's strength by measuring its resistance to penetration. Hardness test results can be extremely useful when selecting materials, because the reported hardness value indicates how easily the material can be machined and how well it will wear.	Understand	CO 2	CLO 6	ACEB08.06
8.	How is the hardness of material measured?	The higher the number on the Rockwell hardness scale, the harder the material. The test is conducted by applying a minor force of 10 Kg using a diamond cone or a steel ball indenter on the surface of the material. The depth of indentation from this preliminary load is recorded and used as a reference point.	Remember	CO 2	CLO 7	ACEB08.07
9.	What is creep in structures?	In materials science, creep (sometimes called cold flow) is the tendency of a solid material to move slowly or deform permanently under the influence of persistent mechanical stresses. It can occur as a result of long-term exposure to high levels of stress that are still below the yield strength of the material.	Understand	CO 2	CLO 7	ACEB08.07
10.	What is the critical crack length?	Critical crack size is the length at which a crack becomes unstable at certain applied stress.	Understand	CO 2	CLO 6	ACEB08.06
11.	How do you calculate toughness?	Therefore, one way to measure toughness is by calculating the area under the stress strain curve from a tensile test.	Understand	CO 2	CLO 6	ACEB08.06
12.	What is toughness used	Fracture toughness is a critical mechanical property for	Remember	CO 2	CLO 6	

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	for?	engineering applications. There are several types of test used to measure fracture toughness of materials, which generally utilize a notched specimen in one of various configurations.				
13.	What is fatigue of material?	Fatigue strength is the highest stress that a material can withstand for a given number of cycles without breaking.	Understand	CO 2	CLO 8	ACEB08.08
14.	What is creep rate?	Time rate of deformation of a material subject to stress at a constant temperature. It is the slope of the creep vs. time diagram obtained in a creep test.	Understand	CO 2	CLO 8	ACEB08.08
15.	What is the purpose of fatigue testing?	The fatigue life of a material is the total number of cycles that a material can be subjected to under a single loading scheme.	Remember	CO 2	CLO 9	ACEB08.09
MODULE-III						
1	Is tension a stress or strain?	The stress applied to a material is the force per unit area applied to the material. The maximum stress a material can stand before it breaks is called the breaking stress or ultimate tensile stress.	Understand	CO 3	CLO 10	ACEB08.10
2	What is the tensile strength of steel?	The tensile strength for structural steel is 400 megapascals (MPa) and for carbon steel is 841MPa. Tensile strength is different for different densities of steel.	Remember	CO 3	CLO 10	ACEB08.10
3	What is toughness of a material?	In materials science and metallurgy, toughness is the ability of a material to absorb energy and plastically deform without fracturing.	Remember	CO 3	CLO 10	ACEB08.10
4	What is find in shear test?	A direct shear test is a laboratory or field test used by geotechnical engineers to measure the shear strength properties of soil or rock material, or of discontinuities in soil or rock masses.	Remember	CO 3	CLO 10	ACEB08.10
5	What is hardness of a material?	Material hardness and hardness testing. Material hardness is the property of the material which enables it to resist plastic deformation, usually by penetration or by indentation.	Remember	CO 3	CLO 11	ACEB08.11
6	What is mechanics of materials?	Strength of materials, also called mechanics of materials, is a subject which deals with the behavior of solid objects subject to stresses and strains .	Remember	CO 3	CLO 11	ACEB08.11
7	What is stiffness of a material?	Stiffness is the extent to which it(an object) resists deformation	Understand	CO 3	CLO 12	ACEB08.12

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		in response to an applied force.				
8	What is Q in shear stress?	τ is the (transverse) shear stress acting at a distance, y, from the neutral axis. V is the value of the shear force at the section. Q is the first moment of the area between the location where the shear stress.	Remember	CO 3	CLO 11	ACEB08.11
9	What is the shear strength of steel?	The shear strength of mild steel bar or threaded bar depends on the applications or 0.6 used to change from tensile to shear force could vary from 0.58–0.62. Mild steel has a tensile strength of 400 MPa	Remember	CO 3	CLO 10	ACEB08.10
10	What is the compressive strength of steel?	The compression strength will then be equal to the yield stress, which is approximately 250 MPa. At around -60 °C, mild steel bar or threaded rebar undergoes a ductile-to-brittle transition.	Remember	CO 3	CLO 10	ACEB08.10
11	What is shear strength of mild steel?	The factor of 0.6 used to change from tensile to shear force could vary from 0.58–0.62 and will depend on application.	Remember	CO 3	CLO 11	ACEB08.11
12	What is ultimate shear strength?	In engineering, shear strength is the strength of a material or component against the type of yield or structural failure when the material or component fails in shear .	Remember	CO 3	CLO 12	ACEB08.12
13	What material has the highest tensile strength?	Multiwalled carbon nanotubes have the highest tensile strength of any material yet measured, with labs producing them at a tensile strength of 63 GPa, still well below their theoretical limit of 300 GPa.	Remember	CO 3	CLO 13	ACEB08.13
14	Is steel better in compression or tension?	Steel is equally strong in tension and compression. Steel is weak in fires, and must be protected in most buildings.	Understand	CO 3	CLO 13	ACEB08.13
15	What is characteristic strength of material?	Compressive Strength The compressive strength of concrete is given in terms of the characteristic compressive strength of 150 mm size cubes tested at 28 days (fck).	Understand	CO 3	CLO 13	ACEB08.13
MODULE-IV						
1	Define Coping Bricks.	These bricks are manufactured in a variety of shapes to set the thickness of the wall and are throated on the underside to throw off rain water.	Remember	CO 4	CLO 14	ACEB08.14

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
2	What is meant by River sand?	This sand is obtained from beds of rivers. River sand consists of fine rounded grains. Colour of river sand is almost white. As the river sand is usually available in clean condition, it is widely used for all purposes.		CO 4	CLO 14	ACEB08.14
3	Define the term Masonry.	Stone, brick, concrete, hollow-tile, concrete-block, gypsum-block, or other similar building units or materials or a combination of the same, bonded together with mortar to form a wall, pier, buttress or similar mass.	Remember	CO 4	CLO 14	ACEB08.14
4	Define the term Water permeability.	Water permeability is the capacity of a material to allow water to penetrate under pressure. Materials like glass, steel and bitumen are impervious.	Remember	CO 4	CLO 15	ACEB08.15
5	Define Porosity.	In simple terms, porosity may be described as the amount of openings (or) interstices (or) empty spaces present in a rock.	Remember	CO 4	CLO 15	ACEB08.15
6	Define permeability.	The permeability of a rock or soil defines its ability to transmit a fluid or water . Permeability depends on the porosity and interconnected pores character of the rock, thus more porous rocks are more permeable too.	Remember	CO 4	CLO 15	ACEB08.15
7	Define Un-soiling.	The soil used for making building bricks should be processed and to be free from gravel, sand (> 2 mm) lime and kankar particles, organic matter etc. About 200 mm of the top layer of the earth, normally containing stones, pebbles.	Remember	CO 4	CLO 14	ACEB08.14
8	Define the term Efflorescence Test.	The brick is immersed in water for 24 hours. It is then taken out and allowed to dry in shade. The absence of grey or white deposits on its surface indicates the absence of soluble salts.If the white deposits cover about 10% surface, the efflorescence is said to be slight and it is considered as moderate when the white deposits cover about 50 % of surface.	Remember	CO 4	CLO 16	ACEB08.16
9	Define the term Soundness.	Stone, brick, concrete, hollow-tile, concrete-block, gypsum-block, or other similar building units or materials or a combination of the same, bonded together with mortar to	Remember	CO 4	CLO 16	ACEB08.16

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		form a wall, pier, buttress or similar mass.				
10	Define Toughness test.	Hit the stone with a hammer and find how tough it is to break it with the hammer.	Remember	CO 4	CLO 16	ACEB08.16
11	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 4	CLO 17	ACEB08.17
12	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 4	CLO 17	ACEB08.17
13	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 17	ACEB08.17
14	Which are the concrete tests?	Here are 6 common quality tests on concrete before and after completion of casting on site. • 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 4	CLO 17	ACEB08.17
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 4	CLO 17	ACEB08.17
MODULE-V						
1	What is meant by Polymer Concrete?	Polymer concrete is a composite material in which the aggregate is bound together in a matrix	Remember	CO 5	CLO 18	ACEB08.18

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		with a polymer binder. The composites do not contain a hydrated cement phase, although portland cement can be used as an aggregate or filler.				
2	What is polymer modified concrete?	Concrete with polymers added during mixing to modify properties of hardened concrete are polymer modified cement concrete (PMC).	Remember	CO 5	CLO 18	ACEB08.18
3	What are the uses of polymer concrete?	Polymer concrete may be used for new construction or repairing of old concrete. The adhesive properties of polymer concrete allow repair of both polymer and conventional cement-based concretes.	Remember	CO 5	CLO 18	ACEB08.18
4	List the various types of polymer concrete.	• Polymer impregnated concrete (PIC) • Polymer cement concrete (PCC)	Understand	CO 5	CLO 18	ACEB08.18
5	Give the various monomers used in polymer concrete.	• Mehylmethacrylate (MINS) • Styretoc	Remember	CO 5	CLO 19	ACEB08.19
6	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 5	CLO 19	ACEB08.19
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 5	CLO 19	ACEB08.19
8	What are the special concrete?	• High Alumina cement concrete. • Shrinkage compensated concrete.	Understand	CO 5	CLO 20	ACEB08.20
9	What are the overlays of polymer concrete?	• Polymer-impregnated concrete • Polymer-modified concrete • Polymer-based concrete.	Remember	CO 5	CLO 20	ACEB08.20
10	What are the types of cementitious materials?	These materials include traditional Portland cement and other cementitious materials, such as fly ash, ground granulated blast furnace slag (GGBS), limestone fines and silica fume.	Remember	CO 5	CLO 20	ACEB08.20
11	How are metals tested?	A heavy metal blood test is a group of tests that measure the levels of potentially harmful metals in the blood. The most common metals tested for are lead, mercury, arsenic, and	Understand	CO 5	CLO 20	ACEB08.20

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		cadmium. Metals that are less commonly tested for include copper, zinc, aluminum, and thallium.				
12	How is metal strengthened?	Cold Working: Because plastic deformation results from the movement of dislocations, metals can be strengthened by preventing this motion. When a metal is bent or shaped, dislocations are generated and move.	Remember	CO 5	CLO 20	ACEB08.20
13	What is Poisson's ratio used for?	The Poisson's ratio of a stable, isotropic, linear elastic material will be greater than −1.0 or less than 0.5 because of the requirement for Young's modulus, the shear modulus and bulk modulus to have positive values.	Remember	CO 5	CLO 21	ACEB08.21
14	What is the difference between compressive strength and flexural strength?	Flexural strength is the maximum amount of bending it can withstand. ... Flexural Strength is the capacity of the concrete (usually beams) to resist deformation under bending moment. It is sometimes called Bending Strength. Tensile Strength is the capacity of concrete to resist tension/stretched tight.	Understand	CO 5	CLO 21	ACEB08.21
15	What is tensile strength of a material?	Tensile strength is a measurement of the force required to pull something such as rope, wire, or a structural beam to the point where it breaks.	Understand	CO 5	CLO 21	ACEB08.21

Signature of the Faculty **HOD, CE**