



LOGY

III SEMESTER

CE6401 – CONSTRUCTION MATERIALS

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QUESTION BANK

SUBJECT : CE6401 - CONSTRUCTION MATERIALS

SEM / YEAR: IV/II

UNIT I -STONES – BRICKS – CONCRETE BLOCKS

STONE AS BUILDING MATERIAL – CRITERIA FOR SELECTION – TESTS ON STONES – DETERIORATION AND PRESERVATION OF STONE WORK – BRICKS – CLASSIFICATION – MANUFACTURING OF CLAY BRICKS – TESTS ON BRICKS – COMPRESSIVE STRENGTH – WATER ABSORPTION – EFFLORESCENCE – BRICKS FOR SPECIAL USE – REFRACTORY BRICKS – CEMENT, CONCRETE BLOCKS – LIGHT WEIGHT CONCRETE BLOCKS.

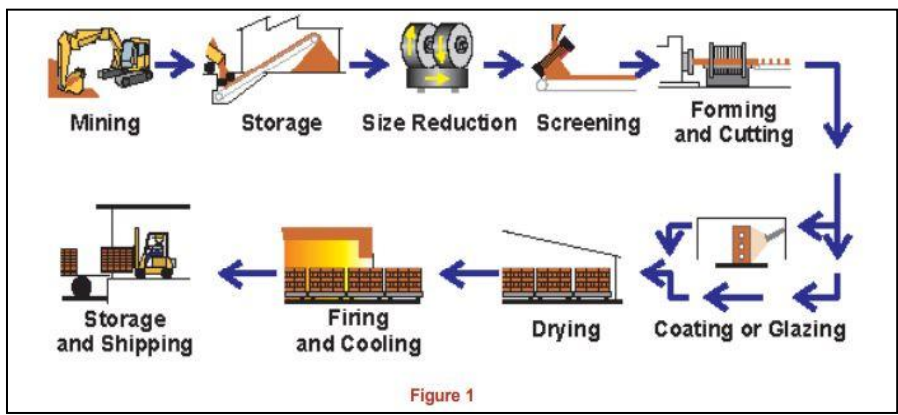
PART A

Q.No	Questions	K Level	Competence
1	What are the uses of stone in construction? <ul style="list-style-type: none">• Masonry• Pavements• Flooring• Facing work in buildings• Concrete aggregates	K1	Remember
2	List the characteristics to be considered in selection of stones. <ul style="list-style-type: none">• Crushing strength• Appearance• Density• Durability• Easiness of dressing• Fire resistance• Fracture• Impact resistance• Hardness• Resistance to wear	K1	Remember

3	<p>List some causes for deterioration of stones.</p> <ul style="list-style-type: none"> • Alternate wetting and drying. • Alternate freezing and thawing. • Deleterious substances present in the atmosphere near the seashores and industrial areas. • Movement of chemicals between materials. • Nature of mortar. • Wind. 	K1	Remember
4	<p>List some methods of conservation of granite.</p> <ul style="list-style-type: none"> • Consolidation using consolidates • Injection using injection materials and • Filling using filling materials. 	K1	Remember
5	<p>What are the field tests to be conducted on stones?</p> <ul style="list-style-type: none"> • Absorption test • Smith's test • Toughness test • Moh's scale of hardness test • Acid test • Crystallization test 	K1	Remember
6	<p>Name the laboratory tests to be conducted on stones.</p> <ul style="list-style-type: none"> • Attrition test • Crushing test • Freezing and thawing test • Hardness test • Impact test • Microscopic test 	K1	Remember
7	<p>Classify minerals based on abrasion.</p> <ul style="list-style-type: none"> • Talc • Gypsum • Calcite • Fluorspar • Apatite • Orthoclase feldspar • Quartz • Topaz • Corundum (Sapphire) • Diamond 	K2	Understand
8	<p>Explain a short notes Acid test on stone. This is to test the presence of poorly weathering calcium carbonates in sandstones. The test consists of placing a cube of the stone weighing about 50 to 100 gm in one per cent hydrochloric acid for 7 days. A good building stone should be free from powder formation on the surface of the cube and the sharp edges should not be broken up after the above immersion.</p>	K2	Understand

9	<p>Explain a short note on Crystallization test.</p> <p>This test consists of immersing a sample of stone (cubes of say 40 mm) in 14 % sodium sulphate solution for two hours and then drying it in an oven at 100°C. This procedure is repeated for at least five times. The loss of weight and the presence of cracking are noted. There should not be any visible defect formed, and the loss in weight should be minimal.</p>	K2	Understand
10	<p>Classify bricks according to their use.</p> <ul style="list-style-type: none"> • Common bricks • Engineering bricks (special bricks for carrying heavy loads) • Facing bricks • Fire bricks • Specials (special shapes) 	K2	Understand
11	<p>List the tests made on bricks.</p> <ul style="list-style-type: none"> • Compressive strength • Water absorption • Efflorescence • Dimensional tolerance • Hardness • Soundness. • Structure 	K1	Remember
12.	<p>Why do you choose stone as a building material?</p> <p>Stone is immensely popular, partly because it has countless applications as a building material like,</p> <ul style="list-style-type: none"> • Low environmental impact • The low-maintenance material • Durable and resistant • Aesthetic Appeal 	K1	Remember
13.	<p>Classify the characteristics of good building stone.</p> <ul style="list-style-type: none"> • Strength • Durability • Hardness • Toughness • Specific gravity • Porosity and Absorption 	K2	Understand
14.	<p>How to identify the quality of stones.</p> <ul style="list-style-type: none"> • Attrition test • Crushing test • Freezing and thawing test • Hardness test • Impact test • Microscopic test 	K1	Remember

15	<p>List out the tests on bricks and their purposes.</p> <ul style="list-style-type: none"> • Compressive strength • Water absorption • Efflorescence • Dimensional tolerance • Hardness • Soundness. • Structure 	K1	Remember
16	<p>Define the term frog. Frog is defined as depression in the bed surface of a masonry unit that is sometimes called a panel and provides a key for the mortar at the joint.</p>	K1	Remember
17	<p>List the names of bricks for special use.</p> <ul style="list-style-type: none"> • Common bricks • Engineering bricks (special bricks for carrying heavy loads) • Facing bricks • Fire bricks • Specials (special shapes) 	K1	Remember
18	<p>Explain shortly about light weight concrete blocks. A lightweight concrete block is an engineering control that may help reduce heavy lifting and carrying. The lightweight concrete block is a concrete masonry unit (CMU) made of expanded aggregate to reduce the density and weight compared to standard concrete block.</p>	K2	Understand
20	<p>Recall the standard size of brick used for construction A brick of standard size 190 mm x 90 mm x 90 mm is recommended by the BIS. Thus, the nominal size of brick includes the mortar thickness.</p>	K3	Apply
21	<p>How will you classify bricks? Write down the types of bricks. The bricks are classified based on the availability, construction methods, size, shape, handling, cost. The types of bricks are</p> <ul style="list-style-type: none"> • Un burnt bricks • Burnt bricks <ul style="list-style-type: none"> ○ First class ○ Second class ○ Third class ○ Fourth class 	K1	Remember
22	<p>Recall the processes in manufacturing of clay bricks in a neat sketch</p>		



K3

Apply

23 **Define efflorescence in bricks.**
 Efflorescence is a crystalline deposit of salts that can form when water is present in or on brick, concrete, stone, stucco or other building surfaces. It has a white or greyish tint and consists of salt deposits left behind when water evaporates.

K1

Remember

24 **Recall the applications of hollow blocks.**
 Hollow blocks are often used to build large structures like boundary fences. The reduced volume of concrete used to make each block adds up to a significant savings in cost for the materials for the whole wall. Their lighter weight also makes them easier to lift

K1

Remember

25 **Recall any four advantages of bricks as compared with stones.**

1. Since shape and size of bricks are uniform, it do not need skilled labour for the construction.
2. Bricks are light in weight and hence handling them is easy.
3. Bricks are easily available around cities and their transportation cost is less because their weight is less. Stones are to be brought from quarries which are located only at few places.
4. It is possible to use all types of mortar in brick masonry. For unimportant buildings even mud mortar can be used.
5. Thinner walls can be constructed with bricks but it is not so with stones.

K1

Remember

26 **List the different types of refractory bricks.**

- Alumino-silicates
- Silicon carbides
- Ceramic bricks

K1

Remember

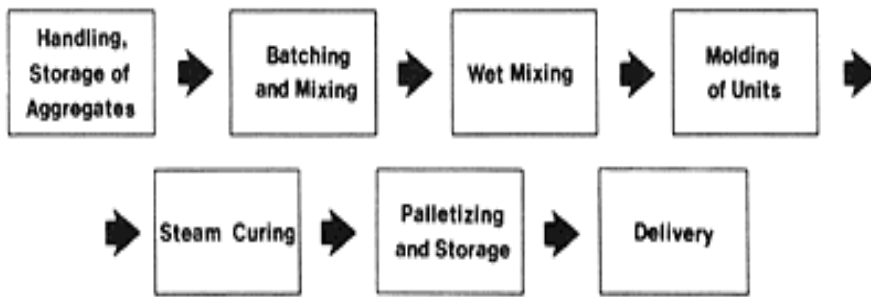
27 **Why Bricks are more preferred than stones.**

- Cost Effectiveness
- Balanced Air Humidity
- Stores Heat and cold air

K1

Remember

28 **Show the manufacturing processes of concrete blocks.**



		K1	Remember
29	<p>Show the dimensions and tolerances in the concrete blocks according to B.I.S.</p> <p>Aggregate concrete blocks are typically available in two standard face sizes (length x height) of 440 x 215mm and 390 x 190mm. Other face sizes are available to aid manual handling. To obtain the co-ordinating dimensions add the specified joint thickness (normally 10mm) to the height and length of the block.</p>	K1	Remember
31	<p>List out the tests usually prescribed for concrete blocks.</p> <ul style="list-style-type: none"> • Appearance • Dimensions • Block Density • Compressive Strength • Water Absorption 	K1	Remember
32	<p>Explain in short about the removal of efflorescence in bricks.</p> <p>Several methods are suggested. One is to use water under pressure or one of a number of products available from stone dealers; another is muriatic acid with subsequent flushing with water. Acid applied to brick masonry, without previous wetting, may cause "burning" or discoloration of the brick and may also eat into the mortar</p>	K2	Understand
<u>PART B</u>			
1.	Explain the various types of stones which are used for building works and give in brief the specifications of a good building stones.	K2	Understand
2.	Develop a flow chart of various operations involved in the making of bricks. Explain them.	K2	Understand
3.	Explain the characteristics to be considered for selection of stones for various civil engineering works.	K2	Understand
4.	Explain the classification of rocks in detail.	K2	Understand
5.	Explain Briefly the tests conducted on bricks for their suitability for construction work?	K2	Understand
6.	List out the types of special bricks? Briefly explain any four of them.	K2	Understand
7.	Demonstrate the varieties of refractory bricks in brief.	K2	Understand
8.	Summarize in detail about the manufacturing of concrete	K2	Understand

	blocks. Also tell the advantages.		
9.	What are the simple field tests that you can carry out to determine the suitability of stone to determine quality of stones?	K1	Remember
10.	Explain the recent advancements in bricks.	K2	Understand
11.	Explain in brief methods used for quarrying stones for building work.	K2	Understand
12.	Explain in details of qualities of good bricks.		
13.	Explain the testing of concrete blocks in detail.	K2	Understand
14.	Explain the characteristics to be considered for selection of stones for various civil engineering works.	K2	Understand
15.	Classify the types of bricks based on use, general physical requirements and IS classifications.	K2	Understand

PART C

1.	What are the different tests conducted on stones? Explain in detail with neat sketches.	K1	Remember
2.	Identify the defects and preservation of stones.	K3	Apply
3.	Summarize with neat sketches the manufacturing process of conventional bricks.	K2	Understand
4.	Explain the various tests on bricks.	K2	Understand

UNIT II -LIME – CEMENT – AGGREGATES – MORTAR

LIME – PREPARATION OF LIME MORTAR – CEMENT – INGREDIENTS – MANUFACTURING PROCESS – TYPES AND GRADES – PROPERTIES OF CEMENT AND CEMENT MORTAR – HYDRATION – COMPRESSIVE STRENGTH – TENSILE STRENGTH – FINENESS– SOUNDNESS AND CONSISTENCY – SETTING TIME – INDUSTRIAL BYPRODUCTS – FLY ASH – AGGREGATES – NATURAL STONE AGGREGATES – CRUSHING STRENGTH – IMPACT STRENGTH – FLAKINESS INDEX – ELONGATION INDEX – ABRASION RESISTANCE – GRADING – SAND BULKING.

PART A

Q.No	Questions	K Level	Competence
1	<p>What is curing? State its importance.</p> <p>It is absolutely essential that moisture should be present in the initial stages for the development of strength of cement. This process of supplying moisture environment is known as curing. Thus, curing of the products of cement is very important in all the works connected with cement like construction of masonry. Plastering, concreting. etc.</p>	K1	Remember
2	<p>What is white cement and where is it used?</p> <p>White cement is made from chalk or limestone or shell lime free from impurities and white clays like china clay free from oxides of iron, manganese, etc. White cement is very much used for making of mosaic tiles, coloured cements, etc.</p>	K1	Remember
3	<p>What are the types of cement produced in India?</p> <ul style="list-style-type: none">• Ordinary portland cement (OPC)• Portland pozzolana cement (PPC)	K1	Remember
4	<p>What are the IS specifications of Cement?</p> <ul style="list-style-type: none">• Ordinary portland cement (OPC) in 3 grades• Grade 33 IS 269-1989 designated as C-33• Grade 43 — IS 8112-1989 designated as C-43• Grade 53 — IS 12269-1987 designated as C-53• Portland pozzolana cement (PPC) (a mixture of OPC and Pozzolanas)• IS 1489 (Pan 0-1991 (flyash-based)• IS 1489 (Part II) -1991 (calcined clay -based)• Sulphate -resisting cement—IS 12330-1988• Portland slag cement—IS 455-1989 (PSC)	K1	Remember

	<ul style="list-style-type: none"> • Low -heat cement—IS 12600-1989 • Rapid -hardening cement—IS 8041-1990 		
5	<p>List the physical tests on Cement.</p> <ul style="list-style-type: none"> • Fineness test • Consistency test • Soundness test • Setting time test 	K1	Remember
6	<p>What is hydration of cement? Hydration of cement is a chemical reaction that happens when cement is introduced to water and it produces heat. In very massive construction, this effect can raise the temperature of concrete as much as 50°C. In such cases, we should use low—heat cements or adopt cooling methods.</p>	K1	Remember
7	<p>List the tests conducted on aggregates.</p> <ul style="list-style-type: none"> • Particle Size,(grading) shape and flakiness (3tests) • Organic impurities • Moisture content • Percent fines value • Water absorption and specific gravity • Aggregate crushing value • Aggregate impact value • Aggregate abrasion value • Bulk density and void ratio 	K1	Remember
8	<p>Classify aggregates based on their shape.</p> <ul style="list-style-type: none"> • Rounded • Irregular or partly -rounded • Angular • Flaky 	K2	Understand
9	<p>Define flakiness index. The flakiness or elongation index of an a aggregate is defined as the percentage weight of particles in the given aggregate which has its length greater than 1.8 times and its least dimension (thickness) is less than 3/5 (or 0.6) times its mean dimension</p>	K1	Remember
10	<p>What is Impact test? This test is for aggregates in concrete that undergoes impact as in runways in airports. Materials passing through 12.5 mm and retained as 10 mm are tilled in the standard cylinder in three layers, each layer tamped with 25 strokes of an iron rod. A hammer weighing 14 kg is dropped from a height of 380 mm 15 times and the resulting material is sieved through a 2.36 mm I.S. sieve. The percentage fine is the aggregate impact test value.</p>	K1	Remember

11	Write notes on Abrasion test. This test is for the stones used in road construction. We use the Deval's abrasion testing machine or the Los Angeles abrasion machine for this purpose. It should not be more than 16 per cent for a good aggregate.	K1	Remember		
12	Explain in short note about the procedure of Los Angeles Abrasion test. A sample of specified grading which varies with the maximum size of aggregate to be tested is placed in the machine with steel or cast iron spheres of 48 mm diameter and 390 to 445 gm weight. The machine is rotated for specified revolutions depending on the grading (500 to 1000 revolutions). The resulting material is sieved through 1.7 mm sieve. The percentage of wear is called the Los Angeles aggregate abrasion value.	K2	Understand		
13	Why gypsum is used in cement? Gypsum is used for retarding the setting time of cement.	K1	Remember		
14	What are the two methods of manufacture of cement? Wet process Dry process	K1	Remember		
15	Name the different kinds of lime available for use in construction works. <ul style="list-style-type: none"> • Quick Lime • Slaked Lime • Hydraulic Lime • Fat Lime 	K1	Remember		
16	What is meant by hydration of cement? What is its importance? Hydration of cement is chemical process between cement particles and water which process start when water is add in cement which produce certain amount of heat (during setting of cement) and cause shrinkage of cement. for to avoid this hydration of cement curing is very much important.	K1	Remember		
17	Why Bulking occurs in fine aggregate (Sand). The volume of dry sand increases due to absorption of moisture. These volume increase of dry sand is known as bulking of sand. When dry sand comes in contact with moisture, a thin film is formed around the particles, which causes them to get apart from each other.	K1	Remember		
18	List the ingredients of cement with composition.	K1	Remember		
	<table border="1"> <thead> <tr> <th>Ingredient</th> <th>Percentage in cement</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			Ingredient	Percentage in cement
Ingredient	Percentage in cement				

Lime	60-65
Silica	17-25
Alumina	3-8
Magnesia	1-3
Iron oxide	0.5-6
Calcium Sulfate	0.1-0.5
Sulfur Trioxide	1-3
Alkaline	0-1

19	<p>Explain the composition of Ordinary Portland cement. Portland cement consists essentially of compounds of lime (calcium oxide, CaO) mixed with silica (silicon dioxide, SiO₂) and alumina (aluminum oxide, Al₂O₃). The lime is obtained from a calcareous (lime-containing) raw material, and the other oxides are derived from an argillaceous (clayey) material.</p>	K2	Understand				
20	<p>Show the functions of sand in a mortar. The main role of sand (aggregate) in mortar or plaster is to provide core strength, but it has other benefits too. If water is mixed with binder without adding sand to the mixture, both compressive and tensile strength of the mixture would be drastically lower than in mixture with added sand</p>	K1	Remember				
21	<p>What are Bogue's compounds in cement? 1. Tri-Calcium Aluminate (3CaO.Al₂O₃ or C₃A) -8-12% 2. Tetra Calcium Alumino Ferrate (4CaO.Al₂O₃.Fe₂O₃ or C₄AF)-6-10% 3. Tri-Calcium Silicate (3CaO.SiO₂ or C₃S) --30-50% 4. Di-Calcium Silicate (2CaO.SiO₂ or C₂S) -20-45%</p>	K1	Remember				
22	<p>Compare Fat lime from Hydraulic lime.</p> <table border="1"> <thead> <tr> <th>Hydraulic lime.</th> <th>Fat lime</th> </tr> </thead> <tbody> <tr> <td>Natural hydraulic lime (NHL) is produced by heating (calcining) limestone that naturally contains clay and other impurities: no materials may be added to create the hydraulicity.</td> <td>When water is poured over quicklime it almost immediately cracks, swells and falls into powder with a hissing and creaking sound, slight explosions and considerable evolution of heat and steam. The process is called slaking or hydration, and the powder produced is called hydrated lime or Fat lime (calcium hydroxide).</td> </tr> </tbody> </table>	Hydraulic lime.	Fat lime	Natural hydraulic lime (NHL) is produced by heating (calcining) limestone that naturally contains clay and other impurities: no materials may be added to create the hydraulicity.	When water is poured over quicklime it almost immediately cracks, swells and falls into powder with a hissing and creaking sound, slight explosions and considerable evolution of heat and steam. The process is called slaking or hydration, and the powder produced is called hydrated lime or Fat lime (calcium hydroxide).	K2	Understand
Hydraulic lime.	Fat lime						
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23	<p>Compare lime putty, quicklime and slaked lime. Lime putty is a high calcium, non-hydraulic material slaked from the finest Buxton quicklime and matured for a minimum of three months Calcium oxide (CaO), commonly known as quicklime or burnt lime, is a widely used chemical compound. It is a white, caustic, alkaline, crystalline solid at room temperature. Calcium hydroxide (traditionally called slaked lime) is an inorganic compound with the chemical formula Ca(OH)₂. It is a colorless crystal or white powder and is obtained when calcium oxide (called lime or quicklime) is mixed, or slaked with water.</p>	K2	Understand				

24	<p>What is bulking of sand? Why it is important?</p> <p>The volume of dry sand increases due to absorption of moisture. These volume increase of dry sand is known as bulking of sand. When dry sand comes in contact with moisture, a thin film is formed around the particles, which causes them to get apart from each other.</p>	K1	Remember
25	<p>Define Elongation index.</p> <p>Elongation index of an aggregate is the percentage by weight of particles whose greatest dimension (length) is greater than one and four-fifth times their mean dimension.</p>	K1	Remember
26	<p>List out the types of tests for lime.</p> <ul style="list-style-type: none"> ○ Loss on ignition test (LOI) on lime ○ Reactivity assessment of quick lime ○ Rapid sugar test of lime ○ Volume yield test of quicklime ○ Consistency test of putty 	K1	Remember
27	<p>List out the various grades of cement in India.</p> <ul style="list-style-type: none"> • 33-Grade Ordinary Portland Cement: • 43-Grade Ordinary Portland Cement: • 53-Grade Ordinary Portland Cement: 	K1	Remember
28	<p>Define the term setting time of cement.</p> <p>Setting time is the time required for stiffening of cement paste to a defined consistency. Indirectly related to the initial chemical reaction of cement with water to form aluminum-silicate compound. ... Final setting time is the time when the paste completely loses its plasticity</p>	K1	Remember
29	<p>What do you understand by Transition Zone?</p> <p>The interfacial transition zone (ITZ) that exists in the cement paste near sand particles and rocks in concrete require concrete to be considered as a (at least) three-phase composite: (1) bulk cement paste, (2) ITZ cement paste, and (3) rock and sand, collectively called aggregates.</p>	K1	Remember
30	<p>Compare the initial and final setting time of cement.</p> <ul style="list-style-type: none"> • Initial setting time duration is required to delay the process of hydration or hardening. 	K2	Understand

	<ul style="list-style-type: none"> • Final setting time is the time when the paste completely loses its plasticity. It is the time taken for the cement paste or cement concrete to harden sufficiently and attain the shape of the mould in which it is cast 		
31	<p>List out the chemical and physical characteristics of fly ash.</p> <ul style="list-style-type: none"> • Physical <ul style="list-style-type: none"> ○ Size and Shape ○ Colour ○ Fineness ○ Specific Gravity • Chemical <ul style="list-style-type: none"> ○ Combustion ○ Insolubility 	K1	Remember
32	<p>Name the tests for coarse aggregate.</p> <ul style="list-style-type: none"> ○ Crushing test ○ Abrasion test ○ Impact test ○ Soundness test ○ Shape test ○ Specific gravity and water absorption test ○ Bitumen adhesion test 	K1	Remember
33	<p>What are the tests prescribed for mortar?</p> <ol style="list-style-type: none"> 1. Fineness 2. Soundness 3. Consistency 4. Initial And Final Setting Time Of Cement 	K1	Remember
<u>PART B</u>			
1.	Explain with a flow diagram for dry and wet process of manufacture of cement with brief explanation.	K2	Understand
2.	Summarize the methods of preparation of lime mortar. Describe any two major tests to determine the quality of lime.	K2	Understand
3.	Describe the procedure of manufacture of lime mortar.	K1	Remember
4.	List out the different types of lime mortar? Mention their properties.	K1	Remember
5.	Explain with codal provisions for testing of conventional coarse aggregate.	K2	Understand

6.	Compare and contrast the advantages and disadvantages of using lime and cement in engineering works.	K2	Understand
7.	Outline the various ingredients required for manufacturing cement? State their functions.	K2	Understand
8.	Compare the various types of cement produced in India.	K2	Understand
9.	How do you perform the compression strength of cement mortar cube? Also explain the procedure for the fineness of cement.	K2	Understand
10.	Explain how the following tests are conducted on aggregate; as per IS Standards (a) Water Absorption and Specific gravity (b) Flakiness Index and Elongation Index (c) Aggregate Abrasion Value	K2	Understand
11.	What do you understand by pozzolanic materials? Explain briefly their properties and uses.	K2	Understand
12.	Infer the different tests for quality of sand.	K2	Understand
13.	Explain the usual tests prescribed for mortars.	K2	Understand
14.	Outline are different sources of obtaining sand?	K2	Understand

PART C

1.	(a) Explain the process of hydration of cement. (b) How do you perform the soundness test of cement? Why it is important?	K2	Understand
2.	Summarize the manufacturing process of cement.	K2	Understand
3.	What are the tests to be conducted for conventional coarse aggregates? Explain any four tests in detail.	K2	Understand
4.	Explain briefly about (a) Consistency test on cement (b) Soundness of cement (c) Crushing strength of aggregate (d) Impact strength of aggregate	K2	Understand

UNIT 3- CONCRETE

CONCRETE – INGREDIENTS – MANUFACTURING PROCESS – BATCHING PLANTS – RMC – PROPERTIES OF FRESH CONCRETE – SLUMP – FLOW AND COMPACTION FACTOR – PROPERTIES OF HARDENED CONCRETE – COMPRESSIVE, TENSILE AND SHEAR STRENGTH – MODULUS OF RUPTURE – TESTS – MIX SPECIFICATION – MIX PROPORTIONING – BIS METHOD – HIGH STRENGTH CONCRETE AND HPC – SELF COMPACTING CONCRETE – OTHER TYPES OF CONCRETE – DURABILITY OF CONCRETE.

PART A

Q.No	Questions	K Level	Competence
1	What are the stages of concrete? 1.Fresh concrete 2.Hardened concrete	K1	Remember
2	What is Fresh concrete? The fresh concrete or plastic concrete is the initial stage of concrete period and it is counted from the mixing stage till it is transported, placed, compacted and finished in the position.	K1	Remember
3	Define workability. It is defined as the property of freshly mixed concrete or mortar which determines the ease and homogeneity with which it can be mixed, placed, compacted and finished. The degree of ease in working with concrete is called workability.	K1	Remember
4	List some tests to measure workability. <ul style="list-style-type: none">➤ Slump test➤ Compacting Factor test➤ Flow test➤ Vee-Bee test➤ Kelly Ball test	K1	Remember
5	What are the limitations of slump test? It is not suitable for concrete made with aggregate size more than 40 mm Not suitable for harsh mixes	K1	Remember

7	<p>List the factors affecting workability</p> <ul style="list-style-type: none"> ➤ Water content ➤ Mix proportion ➤ Size of aggregate ➤ Shape of aggregate ➤ Surface texture of aggregate ➤ Grading of aggregate ➤ Use of admixtures 	K1	Remember
8	<p>What is a good concrete? A good concrete is one in which the ingredients are properly distributed to make a homogenous mixture and it should not show any sign of segregation or bleeding.</p>	K1	Remember
9	<p>Define segregation. Segregation can be defined as the separation of coarse aggregate from the main mass of concrete in the plastic stage and it occurs in case of dry mix of insufficient and non - uniform mixing.</p>	K1	Remember
10	<p>Define bleeding. Bleeding is a form of segregation in which some of water in the mix tends to rise the surface of freshly placed concrete. This is because of the inability of the solid constituents of the mix to hold all the mixing water in the place when they settle downwards.</p>	K1	Remember
11	<p>List the factors affecting compressive strength of concrete.</p> <ul style="list-style-type: none"> ➤ The characteristics of cement. ➤ The characteristics and properties of aggregates. ➤ The degree of compaction ➤ The efficiency of curing ➤ Age at the time of testing. ➤ Conditions of testing 	K1	Remember
12	<p>List the factors affecting compressive strength of concrete.</p> <ul style="list-style-type: none"> ➤ The characteristics of cement. ➤ The characteristics and properties of aggregates. ➤ The degree of compaction ➤ The efficiency of curing ➤ Age at the time of testing. ➤ Conditions of testing 	K1	Remember
13.	<p>Define concrete. Concrete is a composite material composed of coarse aggregate bonded together with a fluid cement that hardens over time. Most concretes used are lime-based concretes such as Portland cement concrete or concretes made with other hydraulic cements</p>	K1	Remember
14	<p>Name the methods of mix proportioning of concrete. The determination of the proportions of cement, aggregates and water to obtain the required strengths shall be made as follows:</p>	K1	Remember

	a) By designing the concrete mix, such concrete shall be called design mix concrete, or b) By adopting nominal mix, such concrete shall be called nominal mix concrete.						
15	Recall the list of special concrete. <ul style="list-style-type: none"> ➤ Lightweight Concrete ➤ High Density Concrete ➤ Mass Concrete ➤ No-Slump and Roller-Compacted Concrete ➤ Soil-Cement ➤ Shotcrete ➤ Pervious Concrete ➤ White and Colored Concrete ➤ Photocatalytic Concrete 	K1	Remember				
16	List the steps involved in concrete manufacturing process. <ul style="list-style-type: none"> ➤ Batching ➤ Mixing ➤ Transporting ➤ Placing ➤ Compacting ➤ Curing ➤ Finishing 	K1	Remember				
17	Define compaction factor. The ratio of the weight of partially compacted concrete to the weight of the concrete when fully compacted in the same mould. The Compacting Factor Apparatus is used to determine the compaction factor of concrete with low, medium and high workability.	K1	Remember				
18	Define durability. Durability of concrete may be defined as the ability of concrete to resist weathering action, chemical attack, and abrasion while maintaining its desired engineering properties.	K1	Remember				
19	Outline SCC. Self-consolidating concrete is a highly flowable type of concrete that spreads into the form without the need for mechanical vibration. Self-compacting concrete is a non-segregating concrete that is placed by means of its own weight	K2	Understand				
20	Compare HSC and HPC.						
	<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%; text-align: center;">HSC</th> <th style="width: 50%; text-align: center;">HPC</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • High-strength concrete is defined based on its compressive strength at a given age. • It is purely on the basis of its </td> <td> <ul style="list-style-type: none"> • Concrete mixtures possessing high workability, high durability and high ultimate strength. • concrete meeting special combinations of performance and </td> </tr> </tbody> </table>	HSC	HPC	<ul style="list-style-type: none"> • High-strength concrete is defined based on its compressive strength at a given age. • It is purely on the basis of its 	<ul style="list-style-type: none"> • Concrete mixtures possessing high workability, high durability and high ultimate strength. • concrete meeting special combinations of performance and 	K2	Understand
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	compressive strength,	uniformity requirements that cannot always be achieved routinely using conventional constituents and normal mixing, placing, and curing practice.		
21	<p>Infer the cause for bleeding in concrete</p> <p>Segregation is the cause of bleeding in the concrete mix. Segregation is the phenomena in which heavy aggregate particles settles down, due to settling of heavy particles, water rises up to the surface and forms a layer. This upward movement of water also carries fine particles of cement with it. The top surface of slabs and pavements will not have good wearing quality.</p>		K2	Understand
22	<p>Outline the compressive test on concrete cube.</p> <p>Compressive strength of concrete cube test provides an idea about all the characteristics of concrete. By this single test one judge that whether Concreting has been done properly or not. Compressive strength of concrete depends on many factors such as water-cement ratio, cement strength, quality of concrete material, quality control during production of concrete etc. Test for compressive strength is carried out either on cube or cylinder. Various standard codes recommend concrete cylinder or concrete cube as the standard specimen for the test.</p>		K2	Understand
23	<p>Identify the material quantity required for M20 grade concrete for per cubic metre.</p> <ul style="list-style-type: none"> • Volume of Dry Concrete = 1.54 To 1.57 Times Volume of Wet Concrete. • Ratio Sum = $1+1.5+3=5.5$ • Shrinkage or Safety Factor =1.57 (You Can Take 1.54 Also) • So Total Volume Of Wet Concrete Required is:- 1.57cum • Volume of Broken Stone Require = $(3/5.5) \times 1.57 = 0.856$ M3 • Volume of Sand Require = $(1.5/5.5) \times 1.57 = 0.471$ M3 • Volume of Cement = $(1/5.5) \times 1.57 = 0.285$ M3 • = $0.285 \times 1440 = 411$ Kg • For 1m³ Of M20 (1:1.5:3) • Broken Stone = 0.856 M3 • Sand = 0.472 m³ • Cement = 8.22 bag 		K3	Apply
24	<p>Name the properties of fresh concrete.</p> <ul style="list-style-type: none"> • Workability. • Setting. • Segregation. • Plastic Shrinkage. • Thermal Shrinkage. 		K1	Remember

	<ul style="list-style-type: none"> • Thermal Expansion. • Water Cement Ratio. 						
25	<p>Explain the properties of hardened concrete.</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 	K2	Understand				
26	<p>Compare nominal mix with design mix.</p> <table border="1"> <thead> <tr> <th>Nominal Mix</th> <th>Design Mix</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> ➤ It is used for relatively unimportant and simpler concrete works. ➤ In this type of mix, all the ingredients are prescribed and their proportions are specified. ➤ Therefore, there is no scope for any deviation by the designer. Nominal mix concrete may be used for concrete of M-20 or lower </td> <td> <ul style="list-style-type: none"> ➤ It is a performance based mix where choice of ingredients and proportioning are left to the designer to be decided. The user has to specify only the requirements of concrete in fresh as well as hardened state. ➤ The requirements in fresh concrete are workability and finishing characteristics, whereas in hardened concrete these are mainly the compressive strength and durability. </td> </tr> </tbody> </table>	Nominal Mix	Design Mix	<ul style="list-style-type: none"> ➤ It is used for relatively unimportant and simpler concrete works. ➤ In this type of mix, all the ingredients are prescribed and their proportions are specified. ➤ Therefore, there is no scope for any deviation by the designer. Nominal mix concrete may be used for concrete of M-20 or lower 	<ul style="list-style-type: none"> ➤ It is a performance based mix where choice of ingredients and proportioning are left to the designer to be decided. The user has to specify only the requirements of concrete in fresh as well as hardened state. ➤ The requirements in fresh concrete are workability and finishing characteristics, whereas in hardened concrete these are mainly the compressive strength and durability. 	K2	Understand
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27	<p>Recall composition of concrete.</p> <p>Composition of concrete. ... Aggregate consists of large chunks of material in a concrete mix, generally a coarse gravel or crushed rocks such as limestone, or granite, along with finer materials such as sand. Cement, most commonly Portland cement, is associated with the general term "concrete."</p>	K1	Remember				
28	<p>What happens to the strength of concrete if water content is increased for achieving required workability?</p> <p>The higher the water/cement ratio, the greater the initial spacing between the cement grains and the greater the volume of residual voids not filled by hydration products. A lower water cement ratio means less water, or more cement and lower workability if the workability becomes too low the concrete becomes difficult to compact and the strength reduces.</p>	K1	Remember				

29	<p>What is meant by the term RMC</p> <p>The name ready mixed concrete comes because concrete is ready mixed before being transported to the site where it will be used. The equipment for making ready mix concrete or RMC concrete is called as a concrete plant. A ready mixed plant consists of weighing system for aggregates, sand, cement, additives and water</p>	K1	Remember
30	<p>Outline the type of curing for vertical and horizontal member of a framed structure.</p> <ul style="list-style-type: none"> ▪ Shading concrete work ▪ Covering concrete surfaces with hessian or gunny bags ▪ Sprinkling of water ▪ Ponding method ▪ Membrane curing ▪ Steam curing 	K2	Understand

PART B

1.	Explain manufacture of concrete in detail.	K2	Understand
2.	Explain the test on workability of concrete.	K2	Understand
3.	Summarize the mixing of concrete.	K2	Understand
4.	Infer the importance of quality control of concrete.	K2	Understand
5.	Explain the curing methods and its importance	K2	Understand
6.	Summarize the methods of transport of concrete.	K2	Understand
7.	Explain the types of concrete.	K2	Understand
8.	Explain briefly the test on fresh concrete.	K2	Understand
9.	Demonstrate the test on hardened concrete.	K2	Understand
10.	Explain the design procedure for IS method of concrete.	K2	Understand
11	Develop the concrete mix for the following data: characteristic compressive strength=20mpa, maximum size of aggregate =20mm(angular), degree of workability =0.9CF, degree of quality control (angular), degree of workability =0.9CF, degree	K3	Apply

	of quality control good and type of exposure=severe. Water absorption by CA =0.5% and moisture content FA=2.0%. Assume any suitable missing data.		
12.	Explain in details about i)HSC ii)HPC.	K2	Understand
13.	Explain slump test in detail.	K2	Understand
14.	Explain manufacture of concrete in detail.	K2	Understand

PART C

1.	Explain SCC in detail.	K2	Understand
2.	With neat sketches explain the efficient manufacturing process of concrete	K2	Understand
3.	Identify and make a comparative study on the various tests on hardened concrete.	K3	Apply
4.	Make use of the various factors to be considered during transportation of concrete.	K3	Apply

UNIT 4- TIMBER AND OTHER MATERIALS

TIMBER – MARKET FORMS – INDUSTRIAL TIMBER– PLYWOOD – VENEER – THERMACOLE – PANELS OF LAMINATES – STEEL – ALUMINUM AND OTHER METALLIC MATERIALS – COMPOSITION – ALUMINUM COMPOSITE PANEL – USES – MARKET FORMS – MECHANICAL TREATMENT – PAINTS – VARNISHES – DISTEMPERS – BITUMENS.

PART A

Q.No	Questions	K Level	Competence
1	<p>Recall about Veneer. In woodworking, veneer refers to thin slices of wood, usually thinner than 3 mm, that typically are glued onto core panels (typically, wood, particle board or medium-density fiberboard) to produce flat panels such as doors, tops and panels for cabinets, parquet floors and parts of furniture.</p>	K1	Remember
2	<p>Define Plywood. Plywood is a laminate made of thin layers of wood.</p>	K1	Remember
	<p>What are the types of Veneer?</p> <ul style="list-style-type: none"> ➤ Raw veneer ➤ Paper backed veneer ➤ Phenolic backed veneer ➤ Laid up veneer ➤ Reconstituted veneer ➤ Wood on Wood or 2-ply veneer 	K1	Remember
3	<p>What are the Advantages of using veneer? Furniture made with wood veneer uses less wood than the same piece of furniture made with solid wood. Some projects built using wood veneer would not be possible to construct using solid lumber, owing to expansion and contraction caused by fluctuation of temperature and humidity.</p>	K1	Remember
4	<p>List the applications of Thermocol.</p> <ul style="list-style-type: none"> ➤ Its high thermal insulation makes it an excellent material to use in the construction of walls and ceilings and its high sound absorption makes it the ideal choice for sound-proofing. ➤ Another recent application of Thermocol (EPS) is as Geofomll in landfills. This application is made possible because of Thermocol's (EPS's) light weight, water resistance, dimensional stability and inert nature. 	K1	Remember

5	<p>List the application of Aluminium composites.</p> <p>A popular application for aluminium composite is folded structures. From sign trays to fascia panels and column cladding aluminium composite is easy to form and light enough to install easily. Using the correct type of tooling aluminium composite can be scored and then folded.</p>	K1	Remember
6	<p>Outline a short note on Paint.</p> <p>Paint is any liquid, liquefiable, or mastic composition that, after application to a substrate in a thin layer, converts to a solid film. It is most commonly used to protect, color, or provide texture to objects.</p>	K2	Understand
7	<p>What is a binder?</p> <p>The binder is the film-forming component of paint. It is the only component that must be present. The binder imparts adhesion and strongly influences properties such as gloss, durability, flexibility, and toughness.</p>	K1	Remember
8	<p>What is the purpose of a diluent?</p> <p>The main purposes of the diluents are to dissolve the polymer and adjust the viscosity of the paint. It is volatile and does not become part of the paint film. It also controls flow and application properties, and in some cases can affect the stability of the paint while in liquid state. Its main function is as the carrier for the non volatile components</p>	K1	Remember
9	<p>What are pigments? How are they classified?</p> <p>Pigments are granular solids incorporated in the paint to contribute color.</p> <p>Pigments can be classified as either natural or synthetic. Natural pigments include various clays, calcium carbonate, mica, silicas, and talcs. Synthetics would include engineered molecules, calcined clays, blanc fixe, precipitated calcium carbonate, and synthetic pyrogenic silicas.</p>	K1	Remember
10	<p>Outline a short note on Varnishes.</p> <p>Varnish is a transparent, hard, protective finish or film primarily used in wood finishing but also for other materials. Varnish is traditionally a combination of a drying oil, a resin, and a thinner or solvent. Varnish finishes are usually glossy but may be designed to produce satin or semi-gloss sheens by the addition of "flatting" agents.</p>	K2	Understand
11	<p>What is bitumen?</p> <p>Bitumen is a sticky, black and highly viscous liquid or semi-solid form of petroleum. It may be found in natural deposits or may be a refined product; it is a substance classed as a pitch. Bitumen is an oil based substance.</p>	K1	Remember

12.	Define seasoning of timber. Wood drying (also seasoning lumber or wood seasoning) reduces the moisture content of wood before its use. When the drying is done in a kiln, the product is known as kiln-dried timber or lumber, whereas air drying is the more traditional method. The equilibration must be controlled to prevent damage to the wood	K1	Remember		
13.	Define annealing of steel. Annealing is a process by which the properties of steel are enhanced to meet machinability requirements. Annealing is a process of heating the steel slightly above the critical temperature of steel (723 degrees Centigrade) and allowing it to cool down very slowly	K1	Remember		
14	Define distemper. Distemper is a paint used in decorating and an historical medium for painting pictures, and contrasted with temperature Soft distemper is not abrasion resistant and may include binders such as chalk, ground pigments, and animal glue.	K1	Remember		
15	What is blown bitumen? Blown Bitumen is industrial bitumen which is dark, petroleum residue modified by the oxidation process. Blown Bitumen is produced by passing air through bitumen under controlled temperature conditions.	K1	Remember		
16	Name the methods through which galvanized coatings is given to GI sheets. <ul style="list-style-type: none"> ➤ Hot Dip Process ➤ Electroplating ➤ Heating with zinc dust 	K1	Remember		
17	List the market forms of steel According to the American Iron and Steel Institute (AISI), steel can be broadly categorized into four groups based on their chemical compositions: <ul style="list-style-type: none"> • Carbon Steels. • Alloy Steels. • Stainless Steels. • Tool Steels 	K1	Remember		
18	Compare dry distemper and oil distemper.	K2	Understand		
	<table border="1"> <thead> <tr> <th>Dry Distemper</th> <th>Oil Distemper</th> </tr> </thead> <tbody> <tr> <td>➤ Dry Distemper is a water based wall paint and its main constituents are chalk lime, glue and water</td> <td>➤ Oil based distemper is a normal distemper or water based paint, as you may call it, with some added on</td> </tr> </tbody> </table>			Dry Distemper	Oil Distemper
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	<p>➤ Dry Distemper Paint (which come in powder form) are not washable.</p>	<p>drying oils that help the paint to spread and dry with ease.</p> <p>➤ Oil based distemper is ideal for interior usage and is also used for ceiling</p>		
19	<p>Outline the causes of decay of wood work. Some species of wood-decay fungi attack dead wood, such as brown rot, and some, such as Armillaria (honey fungus), are parasitic and colonize living trees. Excessive moisture above the Fiber Saturation Point (FSP) in wood is required for fungal colonization and proliferation</p>		K2	Understand
20	<p>Infer the defects in timber. Natural defects: Present in a growing tree, such as growth defects, grain irregularity, shakes and knots. Artificial defects: Caused by careless handling, incorrect conversion and seasoning techniques and inadequate protection of timber.</p>		K2	Understand
21.	<p>Infer penetration of bitumen. Penetration Grade Bitumen is a standard bitumen usually used as a Paving Grade Bitumen essential for road construction and for the production of asphalt pavements with superior properties, and it's very important once it bounds the aggregates and creates a unique cohesion and stability to the bituminous mix.</p>		K2	Understand
22.	<p>List out various rolled steel sections.</p> <ul style="list-style-type: none"> ○ Angle sections ○ Channel sections ○ T- sections ○ I-sections ○ Round bars ○ Square bars ○ Flat bars ○ Corrugated sheets ○ Expanded metal ○ Plates ○ Ribbed bars (HYSD) ○ Ribbed bars (mild steel) ○ Thermo-mechanically treated bars ○ Welded wire fabrics 		K1	Remember
23.	<p>Describe about the corrosion in Iron and other atmospheric agents Corrosion is an electrochemical reaction that appears in several forms, such as chemical corrosion and atmospheric corrosion, the latter of which is the most common form. When acidic substances (including water) come in contact with metals, such as iron and/or steel, rust begins to form.</p>		K1	Remember

24.	<p>Outline the consideration to be made in choosing paints</p> <ul style="list-style-type: none"> ➤ Colour Richness ➤ Coverage ➤ Washability ➤ Light sources ➤ Room Orientation ➤ Surface of the wall 	K2	Understand
25.	<p>Show in order the type of steel based on their carbon content.</p> <ul style="list-style-type: none"> • Mild steel: Mild (low carbon) steel: approximately 0.05% to 0.25% carbon content. • Carbon Steel: Medium carbon steel: approximately 0.29% to 0.54% carbon content • Hardened Steel: High carbon steel: approximately 0.55% to 0.95% carbon content • Silver Steel: Very high carbon steel: approximately 0.96% to 2.1% carbon content. 	K1	Remember
26.	<p>List out the characteristics of an ideal paint.</p> <ul style="list-style-type: none"> ➤ When applied to the surface, paint should form a thin film of uniform nature. ➤ The colour of the paint should withstand the adverse environmental conditions for a long time. ➤ It should be easily applicable with a brush or spraying devices. 	K1	Remember
27.	<p>Recall the composition of duralumin.</p> <p>The name is a contraction of Dürener and aluminum. The original composition has been varied for particular applications; it may contain about 4 percent copper, 0.5–1 percent manganese, 0.5–1.5 percent magnesium, and, in some formulations, some silicon.</p>	K1	Remember
28.	<p>Outline a flow chart for the manufacturing process of paint.</p> <pre> graph TD subgraph Mixing_of_Paint [Mixing of Paint] R[Resins] --> FJ[Feed Jack] O[Oils] --> FJ P[Pigments] --> FJ end FJ --> WJ[Weigh Jack] WJ --> PS[Platform Scale] PS --> ATM[Agitated Tank Mixer] ATM --> M[Mills] TT[Tints & Thinners] --> TJ[Tinting Jack] TJ --> H[Hopper] H --> FM[Filling M/c.] FM --> C[Conveyor] C --> CPS[Cartoon Packing & Shipping] M --> CPS </pre>	K2	Understand

29.	Show the importance of pigment volume concentration As the ratio of binder to pigment changes, one reaches a sweet spot where the pigment is at its maximum loading while still having all the air between the particles completely filled with binder. This optimal point is known as the Critical Pigment Volume Concentration, or CPVC	K2	Understand
30.	List the methods for painting on surfaces. 1. Surface preparation 2. Knotting 3. Priming 4. Stopping 5. Under coating 6. Finishing	K2	Understand

PART B

1.	List and explain the various methods of seasoning of timber.	K2	Understand
2.	Name the various methods of manufacture of steel and explain the bessemer process	K2	Understand
3.	Explain the types of hot rolled steel sections and cold formed steel sections.	K2	Understand
4.	Interpret the various uses of aluminum with respect to construction works.	K2	Understand
5.	Summarize the various causes of decay of wood work and their preservation.	K2	Understand
6.	Illustrate with diagram for various defects in timber	K2	Understand
7.	Explain the various considerations to be made in choosing paints and also explain about the types of paints.	K2	Understand
8.	Explain in detail the heat treatment of steel.	K2	Understand
9.	Prepare a flowchart and explain step by step the manufacture of TMT bars.	K2	Understand
10.	Explain the tests made for steel which is used in RCC construction.	K2	Understand
11.	Explain the characteristic features of varnishes.	K2	Understand
12.	Summarize the various forms of steel in detail.	K2	Understand
13.	Infer the various applications of aluminum.	K2	Understand
14.	Explain the mechanical treatment of paint in detail.	K2	Understand

PART C

1.	Explain the various test performed on timber as per Indian standards.	K2	Understand
2.	Infer the commonly used industrial timber products.	K2	Understand
3.	Explain in detail about the principle process involved in heat treatment of steel.	K2	Understand
4.	List out the paints commonly used in buildings? Explain.	K2	Understand

UNIT V MODERN MATERIALS

GLASS – CERAMICS – SEALANTS FOR JOINTS – FIBRE GLASS REINFORCED PLASTIC – CLAY PRODUCTS – REFRACTORIES – COMPOSITE MATERIALS – TYPES – APPLICATIONS OF LAMINAR COMPOSITES – FIBRE TEXTILES – GEOMEMBRANES AND GEOTEXTILES FOR EARTH REINFORCEMENT

<u>PART A</u>			
Q.No	Questions	K Level	Competence
1	<p>What is a geofabric? These are synthetic fabrics which are sufficiently durable to last a good length of time in soil environment used in geotechnical engineering. Some geofabrics are polyester, nylon, polyethylene and geotechnical engineering.</p>	K1	Remember
2	<p>List the functions of geofabric.</p> <ul style="list-style-type: none"> ➤ Drainage paths for water for soil consolidation ➤ Separation of different types of soil materials ➤ Soil reinforcement in reinforced earth construction ➤ Filtration of water from soil. 	K1	Remember
3	<p>What are the classifications of geofabrics?</p> <ul style="list-style-type: none"> ➤ Geo textiles ➤ Geo grids ➤ Geo membranes ➤ Linear strips for soil reinforcement 	K1	Remember
4	<p>List some properties of Glass.</p> <ul style="list-style-type: none"> ➤ It absorbs, refracts or transmits light. It can be made transparent or translucent. ➤ It can take excellent polish. ➤ It is an excellent electrical insulator. ➤ It is strong and brittle. ➤ It is not affected by atmosphere. ➤ It has excellent resistance to chemicals. 	K1	Remember
5	<p>List the types of Glass</p> <ul style="list-style-type: none"> ➤ Soda Lime Glass 	K1	Remember

	<ul style="list-style-type: none"> ➤ Potash Lime Glass ➤ Potash Lead Glass ➤ Common Glass ➤ Special Glasses 		
6	<p>What is a Fibre-Reinforced Plastic? Fibre-reinforced plastic (FRP) (also fibre-reinforced polymer) is a composite material made of a polymer matrix reinforced with fibres. The fibres are usually glass, carbon, basalt or aramid, although other fibres such as paper or wood or asbestos have been sometimes used.</p>	K1	Remember
7	<p>Name some structural clay products.</p> <ul style="list-style-type: none"> ➤ Building brick ➤ Paving brick ➤ Terra-cotta facing tile ➤ Roofing tile ➤ Drainage pipe. 	K1	Remember
8	<p>What is a laminar composite? A laminar composite is a composite material that consists of two or more layers of different materials that are bonded together. They are also called laminated composites or laminates. A laminate usually consists of two or more layers of planar composites in which each layer (also called lamina or ply) may be of the same or different materials.</p>	K1	Remember
9	<p>Define Refractories. Refractories are defined as non-metallic materials having those chemical and physical properties that make them applicable for structures, or as components of systems, that are exposed to environments above 1,000 °F. A refractory material is one that retains its strength at high temperatures.</p>	K1	Remember
10	<p>What is a sealant? Sealants are typically lower strength, yet flexible, bonding agents used between substrates of differing physical properties to form a seal between the materials. A sealant may be viscous material that has little or no flow characteristics and which stay where they are applied.</p>	K1	Remember
11	<p>What is a ceramic? A ceramic is an inorganic, nonmetallic solid prepared by the action of heat and subsequent cooling. Ceramic materials may have a crystalline or partly crystalline structure, or may be amorphous (e.g., a glass)</p>	K1	Remember
12	<p>What are the constituents of Glass? The most familiar, and historically the oldest, types of glass are</p>	K1	Remember

	"silicate glasses" based on the chemical compound silica (silicon dioxide , or quartz), the primary constituent of sand.		
13.	<p>What are the properties of Glass?</p> <ul style="list-style-type: none"> ➤ Density= 2.5 ➤ Compressive strength-: 1000 N/mm² ➤ Elasticity ➤ Young's modulus, $E = 7 \times 10^{10} \text{ Pa} = 70 \text{ GPa}$ ➤ Poisson's ratio, μ (lateral contraction coefficient) 	K1	Remember
	<p>the value of coefficient μ is 0.22.</p> <ul style="list-style-type: none"> ➤ Thermal characteristics ➤ Linear expansion ➤ Thermal stress 		
14	<p>What are the uses of Glass?</p> <ul style="list-style-type: none"> • Packaging (jars for food, bottles for drinks, flacon for cosmetics and pharmaceuticals) • Tableware (drinking glasses, plate, cups, bowls) • Housing and buildings (windows, facades, conservatory, insulation, reinforcement structures) 	K1	Remember
15	<p>What is the characteristic feature of ceramic materials?</p> <p>Ceramics and glasses are inorganic, nonmetallic materials consisting of metallic and nonmetallic elements bonded primarily with ionic and covalent bonds. These high strength bonds give rise to the special characteristics of these materials. Some of the highly desirable properties of, ceramic alloys, are: High Strength. High Fracture Toughness. High Hardness.</p>	K1	Remember
16	<p>What is Sealant and where it is used?</p> <p>Sealant is a substance used to block the passage of fluids through the surface or joints or openings in materials, a type of mechanical seal. In building construction sealant is sometimes synonymous with caulking and also serve the purposes of blocking dust, sound and heat transmission.</p>	K1	Remember
17	<p>List the uses of ceramics?</p> <p>Ceramic products are hard, porous, and brittle. As a result, they are used to make</p> <ul style="list-style-type: none"> ➤ Pottery ➤ Bricks ➤ Tiles ➤ Cements ➤ Glass 	K1	Remember
18	<p>Outline a short note on FGRP?</p> <p>Fibre Glass-Reinforced Plastic (FRP) (also called fibre-reinforced polymer, or fiber-reinforced plastic) is a composite material made of a polymer matrix reinforced with fibres. The fibres are usually glass (in fibre glass), carbon (in carbon-fiber-reinforced polymer), aramid, or basalt. Rarely, other fibres such as paper, wood, or asbestos have been used. The polymer is usually an epoxy, vinylester, or polyester thermosetting plastic, though phenol formaldehyde resins are still in use. FRPs are</p>	K2	Understand

	commonly used in the construction industries.		
19	What are the uses of FGRP? <ul style="list-style-type: none"> ➤ For the shear strengthening of a beam and column. ➤ Slabs may be strengthened by applying FRP ➤ FRP wrap works are done for restraining the lateral expansion of the column 	K1	Remember
20	What are the properties of clay products? Ceramics are broadly defined as inorganic, nonmetallic materials that exhibit such useful properties as <ul style="list-style-type: none"> ➤ high strength and hardness ➤ high melting temperatures ➤ chemical inertness 	K1	Remember
21	What are the uses of Clay products? Clay is used for making pottery, both utilitarian and decorative, and construction products, such as bricks, wall and floor tiles. Different types of clay, when used with different minerals and firing conditions, are used to produce earthenware, stoneware, and porcelain.	K1	Remember
22	List out the properties of Refractories? <ul style="list-style-type: none"> ➤ Bulk Density ➤ Porosity ➤ Cold Crushing Strength ➤ Reversible Thermal Expansion ➤ Abrasion Resistance ➤ Creep ➤ Thermal Conductivity 	K1	Remember
23	Explain a short note on Refractories? A refractory material is a material that retains its strength at high temperatures. Refractory materials are used in for furnaces, kilns, incinerators, and reactors. They are also used to make crucibles and moulds for casting glass and metals and for surfacing flame deflector systems for rocket launch structures.	K2	Understand
24	What do you mean by composite materials? A composite material (also called a composition material or shortened to composite, which is the common name) is a material made from two or more constituent materials with significantly different physical or chemical properties that, when combined, produce a material with characteristics different from the individual	K1	Remember
25	What are the types of composite materials? <ul style="list-style-type: none"> ➤ The first level of classification is usually made with respect to the matrix constituent. <ul style="list-style-type: none"> ○ Organic Matrix Composites (OMCs), ○ Metal Matrix Composites (MMCs) ○ Ceramic Matrix Composites (CMCs) ➤ The second level of classification refers to the reinforcement form <ul style="list-style-type: none"> ○ Fibre Reinforced Composites, ○ Laminar Composites 	K1	Remember

	<ul style="list-style-type: none"> ○ Particulate Composites. ○ Fibre Reinforced Composites (FRP) can be further divided into those containing discontinuous or continuous fibres. 		
26	<p>What are laminar composites? Laminar composites include plywood which is a laminated composite of thin layers of wood in which successive layers have different grain or fiber orientations. The result is a more-or-less isotropic composite sheet that is weaker in any direction than it would be if the fibers were all aligned in one direction.</p>	K1	Remember
27	<p>What are the applications of laminar composites? Some examples of composite materials: (a) Plywood is a laminar composite of layers of wood veneer, (b) Fiberglass is a fiber-reinforced composite containing stiff, strong glass fibers in a softer polymer matrix ($\times 175$), (c) Concrete is a particulate composite containing coarse sand or gravel in a cement matrix</p>	K1	Remember
28	<p>What is Geo Membrane? A geomembrane is very low permeability synthetic membrane liner or barrier used with any geotechnical engineering related material so as to control fluid (or gas) migration in a human-made project, structure, or system.</p>	K1	Remember
29	<p>What are the uses of Geo membrane? Geomembranes have been used in the following environmental, geotechnical, hydraulic, transportation, and private development applications: ➤ As liners for potable water. ➤ As liners for reserve water (e.g., safe shutdown of nuclear facilities) ➤ As liners for waste liquids (e.g., sewage sludge)</p>	K1	Remember
30	<p>What do you mean by Earth reinforcement? Mechanically stabilized earth (MSE or reinforced soil) is soil constructed with artificial reinforcing. It can be used for retaining walls, bridge abutments, seawalls, and dikes. ... MSE is the term usually used in the USA to distinguish it from the trade name "Reinforced Earth".</p>	K1	Remember

PART B

1.	What is Glass? Explain the various properties of Glass?	K2	Understand
2.	Explain the process of manufacturing of Glass? What are the Uses of glass in construction industry?	K2	Understand
3.	What are the classifications of Glass?	K1	Remember
4.	Write a short note on Ceramic products? Explain the various applications of ceramic products?	K2	Understand
5.	Explain in detail about Reinforced Plastics? What are the properties and uses?	K2	Understand
6.	Explain in detail about Composite materials and its Uses?	K2	Understand
7.	Explain in detail about Refractories? What are the different	K2	Understand

	types of refractory Bricks?		
8.	What are Geosynthesis? How are they classified? What are the advantages & applications?	K1	Remember
9.	What is Terra cotta? How it is manufactured?	K1	Remember
10	Explain in detail about Earth reinforcement using Geomembrane?	K2	Understand
11	What is Glass? Explain the various properties of Glass?	K2	Understand
12	Summarize the process of manufacturing of Glass? What are the Uses of glass in construction industry?	K2	Understand
13	What are the classifications of Glass?	K1	Remember
14	Write a short note on Ceramic products? Explain the various applications of ceramic products?	K2	Understand
<u>PART C</u>			
1.	What are the properties and uses of glasses? Explain the different forms available.	K2	Understand
2.	Explain in detail about refractories.	K2	Understand
3.	What are composite materials? Explain its role and uses in construction industry.	K2	Understand
4.	Explain about geotextiles with neat sketches	K2	Understand