MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2013 Certified)

WINTER– 18 EXAMINATION

Subject Name: Construction Materials **Model Answer** Subject Code: 17209

Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q.N.	Answer	Marking Scheme
Q.1		***Attempt any TEN of the following***	**(20)**
Q.1	(a) Ans.	**State any two applications of Construction management** Construction management has the following applications: 1) Project management and systematically completion of a construction work. 2) Maximization and optimization of material, labour, money and time required for construction. 3) Use of modern methods or techniques and construction machines. 4) Use of smart and alternative materials of construction. 5) Achieving good quality of work with economy, efficiency and factor of safety as guiding principles. 6) Scheduling and phasing of works for managing the operations and stages involved in the construction. 7) Ensuring expected strength, durability and workmanship of the constructions, following rules and bye-laws, specifications regarding construction work and materials of construction.	Any two 01 M for each
Q.1	(b) Ans.	**Enlist any four basic areas of civil engineering** The basic areas in civil Engineering include the following different branches of knowledge: 1) Surveying 2) Construction Engineering 3) Transportation Engineering 4) Fluid Mechanics 5) Irrigation Engineering 6) Structural Engineering 7) Geo-technical Engineering 8) Foundation Engineering 9) Environmental Engineering 10) Quantity Surveying 11) Earthquake Engineering 12) Infrastructure Development etc.	Any four 1/2 M for each

Q.1	(c) Ans.	**State constituents of good quality bricks.** The main constituents or ingredients of a good quality brick earth are: 1) Alumina (20 to 30%) 2) Silica (50 to 60%) 3) Lime 4) Magnesia 5) Iron Oxide.	Any four 1/2 M for each
Q.1	(d) Ans.	**Given standard dimension of i) Conventional Bricks ii) Standard Bricks** 1) Conventional Bricks- The commonly adopted size of conventional brick is 23 x 11.4 x 7.5 cm. 2) Standard Bricks – The nominal size of modular brick or standard brick is 20 x 10 x 10 cm and actual size of brick is 19 x 9 x 9 cm.	01 M 01 M
Q.1	(e) Ans.	**List any four different types of cement** cement , generally can be classified into the following classes : 1. Natural cement 2. Pozzolanic Cement 3. High Alumina Cement 4. Portland Cement i)Ordinary Portland cement ii) Rapid Hardening cement i) Extra- Rapid Hardening Portland cement ii) White Portland cement iii) Coloured Portland cement iv) Low heat Portland cement v) Portland blast furnace cement vi) Sulphate resisting Portland cement 5. Super Sulphate cement 6. Special Sulphate cement i) Expanding cement ii) Quick setting cement ii) Masonry cement iv) Sand cement v) Water proofing cement vi) Acid resistant cement a) vii) Sorel Cement viii) Slag cement	Any four 1/2 M for each
Q.1	(f) Ans.	**Write any two advantages of pre-cast block.** Following are the various advantages of hollow concrete blocks i) These blocks are more cost effective as compared to the other traditional walling system ii) It has high quality, high strength, uniform shape and size. iii) It is totally energy efficient and does not require any nonrenewable resources or its production. iv) It does not disturb the environmental system or eco-balance, hence they are eco-friendly or environmental friendly. v) Structural performance can be engineered as per application. vi) It can be constructed in both factory and on site as well and hence production can be decentralized.	Any two 01 M for each

Q.1 (g) Ans. **Enlist any four different types of paints.** — Any four 1/2 M for each

Depending upon their constituents paints are classified into following types

1) Aluminimum paint
2) Oil paint
3) Enamel paint
4) Bituminous paint
5) Emulsion paint
6) Cement paint

Q.1 (h) Ans. **State any two situations where lime mortar can be used.** — Any two 01 M for each

Following are the situations where lime mortar can be used.

1) For the construction work in waterlogged areas and exposed positions.
2) For the construction of partition walls and parapet walls.
3) For the construction of stone masonry
4) For the construction of joints in brickwork.

Q.1 (i) Ans. **Distinguish between stone and rock** — Any two 01 M for each

Stone	Rock
1. Stone is obtained from rock, which is solid to portion of Earth's crust	1. Rocks are formed due to cooling of exposed magma.
2. Stones are smaller in size than rock	2 Rocks are larger in size than stones.
3. Stones are hard material and not at all soft.	3 Rocks can both hard and soft.

Q.1 (j) Ans. **Define Green timber and Converted timber**

Green timber: It is the freshly felled tree which has not lost much of its moisture or the timber which still contains free water in its cells. — 01 M

Converted timber: It is the timber which has been sawn into various market sizes such as beams, battens, planks. etc. — 01 M

Q.1 (k) Ans. **List any four types of fibres.** — Any four 1/2 M for each

Fiber is a class of materials that are continuous filaments or are in discrete elongated pieces, similar to lengths of thread.

Fibers may be natural or synthetic

Types: 1) Jute 2) Coir 3) Steel fibers 4) Carbon fibers 5) Class fibers 6) Plastic fibers 7) Asbestos fibers.

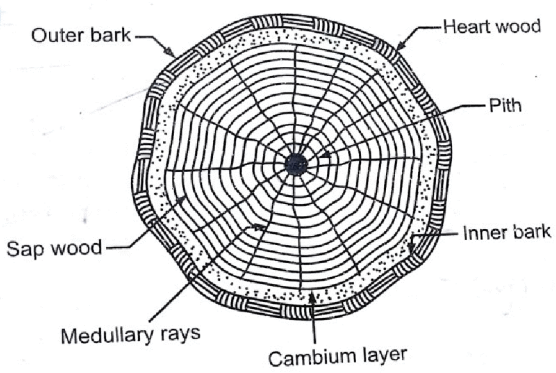
Q.1 (l) Ans. **List any four types of buildings where sound insulation is necessary.** — Any four 1/2 M for each

Following are the building where sound insulation is necessary-

1) Audio visual studio
2) Photographic studios
3) Cinema Theatre
4) Auditorium
5) Library
6) Reading hall
7) Class room
8) Operation Theatre etc.

Q.1 (m) Ans. **Define water proofing and Damp proofing** — 01 M

Water proofing: Waterproofing of a surface is the treatment of the surface to prevent the passage of water like rainwater or ground water from one side of a structure to the other under normal pressure.

		Damp proofing: Damp proofing is the treatment of a surface to stop the rise of water by capillary action. It is the process of prevention or extension of dampness in the components of a structure.	01 M
Q.2		***Attempt any FOUR of the following***	**(16)**
Q.2	(a) Ans.	**Give any four properties of eco-friendly materials.** Following are the various properties of eco-friendly materials. 1) It is biodegradable 2) It is renewable source 3) It is reused and recycled 4) It increases durability and life span of living bodies 5) It aids energy efficiency in building. 6) It reduces air pollution, land pollution and water pollution 7) It is locally available.	Any four 01 M for each
Q.2	(b) Ans.	**Draw a cross section of trunk of tree.**  	03 M for fig. 01 M for labeling.
Q.2	(c) Ans.	List any four criteria for selection of construction materials. Following are the criteria for selection of construction materials- 1) Criteria for selection of construction materials on the basis of load sustaining capacity. 2) Criteria for selection of construction materials on the basis of serviceability. 3) Criteria for selection of construction materials on the basis of aesthetically pleasing appearance. 4) Criteria for selection of construction materials on the basis of economics. 5) Criteria for selection of construction materials on the basis of environmental friendliness.	Any four 01 M for each
Q.2	(d) Ans.	**Enlist any four defects in timber.** Various defects which are likely to occur in timber may be grouped into the following three classes: 1) Defects due to natural forces The following defects are caused by natural forces: a) Knots b)Shakes c) Wind cracks d) Upsets 2) Defects arising due to conversions : a) Radial shake b) Case hardening c) Twisting and bowing d) Honey combing 3) Defects due to defective seasoning: a) Warp b) Cup c) Bow d) Twist. 4) Defects due to attack by fungi and insects attack.	01 M for each

Q.2	(e) Ans.	**Enlist types of bituminous material used in construction and explain any one.** Bituminous materials include primarily asphalts and tars Asphalts are – 1) Natural Asphalt- i) Rock Asphalt ii) Lake asphalt 2) Petroleum asphalt 3) Rolled asphalt 4) Hot mix asphalt concrete 5) Mastic 6) Warm mix asphalt concrete Tars are – 1) Coal tar 2) Wood tar 3) Mineral tar Rock asphalt : It is bituminous lime stone containing lime stone and bitumen in low or high proportion e.g. 25 to 40%. It is insoluble in water but soluble in carbon disulphide. It is solid, semi-solid, black or dark-brownish and sticky residue. It becomes hard at ordinary temperature and can be converted into liquid by heating, but becomes soft at high temperature and becomes inflammable at about 440°F. Rock asphalts with low bitumen content are used directly in construction of roads, as a binding material for san stones etc. while rock asphalt with high bitumen yields bitumen, on heating the crushed rock asphalt, bitumen is refined, stored in drums and dispatched for use.	02 M 02 M for explaination
Q.2	(f) Ans.	Explain the manufacturing process of fat lime. Following are the three operations which are involved in the manufacturing of fat lime: 1) Collection of limestone: The lime stones of required quality are collected at site of work. For fat lime, the percentage of impurities in lime stones should not exceed 5%. It is desirable to use comparatively pure carbonate of lime in the manufacturing process of fat lime. 2) Calcination of Lime stones: The calcination or burning of limestones to bright red heat is the next important operation. The fuel required for calcination of limestones may consist of charcoal, coal, firewood or coal ashes. The burning of limestones can be achieved either in clamps or kilns. 3) Slaking of burnt lime: The quick lime which is obtained by burning of limestones slakes when exposed to the atmosphere is known as the natural slaking or air slaking and it is a very slow process. Hence the slaking is achieved by adding water to quick lime.	01 M 1.5 M 1.5 M
Q.3		***Attempt any FOUR of the following***	**(16)**
Q.3	(a) Ans.	**Enlist any four field test conducted on cement.** 1) Open the bag and take a good look at the cement. There should not be any visible lumps. The colour of the cement should normally be greenish grey. 2) Thrust your hand into the cement bag. It must give you a cool feeling. 3) Take a pinch of cement and feel between the fingers. It should give a smooth and not a gritty feeling. 4) Take a hand full of cement and throw it on a bucket full of water, the particles should float for some time before they sink 5) Take about 100 gms of cement and small quantity of water and make its stiff paste. From the stiff paste, pat a cake with sharp edges. Put it on a glass plate and slowly take it under water in bucket. See that the shape of the cake is not disturbed while taking it down to the bottom of the bucket. After 24 hr the cake should retain its original shape and the same time it should also set and attain some strength.	Any four 01 M for each

Q.3	(b) Ans.	**Write any Four characteristics of good tiles:** 1. Tile should have no cracks or bends 2. It should be well burned, dense, compact 3. It should be regular in size and shape 4. It should be uniform in colour and should resist wear and tear and atmospheric action 5. It should be easy to fix. 6. It should be water proof, chemical proof, weather proof and fire proof. 7.It should be non-slippery when used for flooring.	Any four 01 M for each
Q.3	(c) Ans.	**List any four common field test carried on bricks.** 1) Strength and durability or crushing strength. 2) Shape and size or dimensional stability. 3) Colour test 4) Soundness test. 5) Hardness test.	Any four 01 M for each
Q.3	(d) Ans.	**Explain wet process of manufacturing of cement** **Various stages in wet process of manufacturing of cement:** The manufacturing of cement by wet process can be divided into three stages. **Stage-I Mixing of raw materials:** In this stage, 10% of chalk and 30% of clay which contains some sand, iron oxide, magnesia, etc. are crushed, grounded and mixed uniformly. Generally the ingredients are crushed in a crushing mill and carried by water into large tanks where it is allowed to settle for weeks. The water is then taken out and the slurry is then dug out and dried in an oven. **Stage-II Burning:** Burning of the above dried slurry is carried out in a rotary kiln. Kiln rotates at a rate of 1RPM about its longitudinal axis. The slurry is injected the upper end whereas the hot gasses are forced through the lower end of the kiln. As the slurry moves down nodules are formed, which after gets converted into clinkers. The cooled clinkers are collected into containers of suitable size. **Stage-III Grinding:** In this process, the clinkers are ground to very fine powder in ball mills and tube mills. The powder is then spread over a dry floor for some days for air slacking and then 5% Gypsum is added to improve the quality of cement. The finely ground cement is stored in silos. It is then weighed and packed in bags of 50kg by weight	1½ M 1½ M 01 M
Q.3	(e) Ans.	**State the Properties of fine aggregate and coarse aggregate.** **Properties of Fine Aggregate:** 1) Size: The largest size which comes under the range of fine aggregate is 4.75 mm. 2) Shape: Fine aggregate should have a rounded shape. 3) Surface texture: Generally smooth in surface texture. 4) Water absorption: Water absorption is kept low. **Properties of Course Aggregate:** 1) Size: The smallest size which comes over the range of course aggregate is 4.75 mm. 2) Shape: In general, angular aggregate is preferable to rounded and smooth aggregate. 3) Surface texture: The surface of the aggregate may be smooth, polished, rough or dull *4)* Water absorption: Water absorption is kept low. The water absorption is depending upon	Any two 01 M for each Any two 01 M for each

<table>
<tr><td></td><td></td><td>the porosity of aggregate</td><td></td></tr>
<tr><td>Q.3</td><td>(f)
Ans.</td><td>State any four types of glass with its suitability.
<table>
<tr><th>Sr. no.</th><th>Types of Glass</th><th>Suitabality</th></tr>
<tr><td>1</td><td>Soda-lime or Crown Glass</td><td>For making window panels, glass tubes, simple glass, electric bulbs, bottles etc.</td></tr>
<tr><td>2</td><td>Bottle or Common Glass</td><td>For making Medicine bottles</td></tr>
<tr><td>3</td><td>Potash-Lime Glass</td><td>For making Combustion tubes</td></tr>
<tr><td>4</td><td>Boro-silicate or Pyrex Glass</td><td>For making high quality laboratory equipment's and cooking utensils</td></tr>
<tr><td>5</td><td>Structural Glass</td><td>For making panel walls, partition wall, facing daylight opening, stair way enclosures</td></tr>
<tr><td>6</td><td>Flat Draw sheet Glass</td><td>For all type of engineering works</td></tr>
<tr><td>7</td><td>Fibre Glass</td><td>Suitable in air filters</td></tr>
<tr><td>8</td><td>Wired Glass</td><td>For skylights & roof, also due to to fire resistant property suitable in doors and window</td></tr>
<tr><td>9</td><td>Foam Glass</td><td>Suitable in Air-conditioning and refrigeration industries</td></tr>
<tr><td>10</td><td>Shielding Glass</td><td>Suitable for radiation in windows</td></tr>
<tr><td>11</td><td>Bullet-Proof Glass</td><td>Suitable for protection in jewelry stores, glazing bank teller, cashier booths</td></tr>
<tr><td>12</td><td>Tinted Glass</td><td>Suitable only for decoration</td></tr>
<tr><td>13</td><td>Glass Blocks</td><td>Suitable for partition and for insulatio</td></tr>
<tr><td>14</td><td>Potash-Lead of Flint Glass</td><td>For making lenses, radio valves, table ware</td></tr>
</table></td><td>Any four 01 for each</td></tr>
<tr><td>Q.4</td><td></td><td>Attempt any FOUR of the following</td><td>(16)</td></tr>
<tr><td>Q.4</td><td>(a)
Ans.</td><td>State the various safety precautions to be taken while performing blasting Operation
The following precaution should be taken in blasting:
1. Around the site likely to be affected by blast, it is mandatory to place signboards cautioning passer-by about blasting.
2. The LLR plays an important part in determining the quantity of explosives and it should be carefully decided.
3. Only copper, brass or bronze needle and tamper should be used. Steel needle and tamper should never be used.
4. Blast holes should be carefully filled with stiff sandy clay in number of layers and tampered properly so that after blast gas does not come out of boreholes.
5. The work of blasting should carry out under the supervision of expert.
6. Sometimes a charge fails to explode. The fresh hole should not be too closer to the failed hole.</td><td>Any four 01 M for each</td></tr>
<tr><td>Q.4</td><td>(b)
Ans.</td><td>Define asphalt and state any three properties of asphalt.
Definition: asphalt is a natural or artificial mixture in which bitumen is associated with inert mineral matter. In fact, it is the native mixture of hydrocarbons-a product of the decomposition of animal a vegetable substances.
Properties:</td><td>02 M</td></tr>
</table>

		1) It is black or brownish black in colour. 2) At temperature between 50 -100 C it is in liquid state. 3) Whereas at temp. Less than 50-100 C it remains in solid state. 4) It is thermoplastic material. 5) It softens as it is heated. 6) It hardens as it is cooled. 7) It is the tough and durable material. 8) It is a waterproof material and can be easily cleaned. 9) It is the good insulator of electricity, heat & sound. 10) It a non-inflammable and non-absorbent. 11) It is affected by acids and is safe against vermin. *12)* It is resilient and reasonably elastic.	Any four 1/2 M for each
Q.4	(c) Ans.	**State the requirements of good building stone.** 1) It should have high crushing strength more than 100 N/mm2. 2) It should have high durability. 3) Water absorption should be less than 0.6% by weight after 24 hours. 4) It should be easy for cutting and dressing. 5) It should have good fire resistance. 6) Specific gravity should be more than 2.7. 7) It should be economical and easily available. 8) It should have good weathering resistance. 9) It should have high impact value and high toughness index. 10) The stone should have fine compact texture and light color as dark color may fade in due course of time. It should have pleasing appearance and should retain its colour for longer time. 11) It should be free from cavities, cracks and patches of loose and soft materials. Stratifications should not be visible to naked eye. 12) The stone should be strong and durable. Compressive strength should be 60-200 N/mm2. 13) Weight is indication of porosity and density. For dams and retaining walls heavy stones are used and for arches and domes light stones are used. 14) Hardness property is important for floors, pavements and bridges. It is resistance to scratching. Hardness should be more than 14. 15) The stone should be well seasoned.	Any eight 1/2 M for each
Q.4	(d) Ans.	**Enlist any four properties of good timber.** 1) Colour- Colour of timber should be dark and uniform. 2) Odour- Odour should be pleasant when freshly cut. 3) Soundness- Clear ringing sound indicates good timber. 4) Texture- Texture of good timber is fine and even. 5) Density- Higher the density, stronger is the timber. 6) Timber should be capable to offer resistance to shock due to vibration. 7) Fire resistance-Dense wood offers good fire resistance. 8) Strength- Timber should be strong to take loads.	Any four 01 M for each
Q.4	(e) Ans.	**List any four properties of plywood.** 1) It is light in weight and many times stronger than solid wood of same thickness. 2) It is resistant to cracking, warping, splitting, and has uniform strength In all directions. 3) It is available in many sizes and variety of decorative finishes.	Any four 01 M for

<table>
<tr><td></td><td></td><td>4) It is defect free and easy to cut and bend.
5) Movement due to changes in moisture is negligible.</td><td>each</td></tr>
<tr><td>Q.4</td><td>(f)
Ans.</td><td>State the advantages of artificial sand over natural sand

<table><tr><th>Sr. no.</th><th>Natural sand</th><th>Artificial sand</th></tr><tr><td>1.</td><td>Sand obtained from pits, shores river bed, sea bed is known as natural sand.</td><td>Sand obtained by crushing stone and grading properly through sieve is known as artificial sand.</td></tr><tr><td>2.</td><td>Silt is present in more percentages.</td><td>Silt is negligible.</td></tr><tr><td>3.</td><td>Natural sand is not available during rainy season when river are flooded.</td><td>It is available during rainy season.</td></tr><tr><td>4.</td><td>It gives less compressive strength than natural sand.</td><td>It gives high compressive strength.</td></tr></table></td><td>01 M for each</td></tr>
<tr><td>Q.5</td><td></td><td>Attempt any FOUR of the following</td><td>(16)</td></tr>
<tr><td>Q.5</td><td>(a)
Ans.</td><td>Write any four properties of Damp proofing materials.
Properties:
1) It should be impervious in nature
2) It should be strong and durable
3) Material must be able to withstand dead as well as live load without damages
4) It should be dimensionally stable
5) It should be free from deliquescent salts like sulphates, chlorides and nitrates</td><td>Any four
01 M for each</td></tr>
<tr><td>Q.5</td><td>(b)
Ans.</td><td>Write short notes on Asbestos fiber.
Asbestos is a mineral fiber and has proved to be most successful of all fibers as it can be mixed with Portland cement.
The composite product called asbestos cement has considerably higher flexural strength than the Portland cement paste.
Asbestos loses water of crystallization at 400-500^{0}C.
It is a good sound, heat and electric insulator.
Properties:
1) They have good tensile strength.
2) They possess good elasticity.
3) They are chemically stable.
4) They possess high bond strength
Uses:
1) Asbestos fibers are used for manufacturing insulating cement.
2) They are used for manufacturing insulating blocks.
3) They are used in fire bricks.
4) They are used in floor tiles.
5) They are used for making textiles.</td><td>02 M

Any two 1/2 M for each

Any two 1/2 M for each</td></tr>
<tr><td>Q.5</td><td>(c)
Ans.</td><td>Write any four uses of termite proofing materials
i. EPS sandwich panels
Uses:
a. Interior and exterior partition on steel or concrete
b. For various buildings like banks, offices, hospitals, schools, hotels, etc.</td><td></td></tr>
</table>

		ii. Termite resistance wood plastic composite floor **Uses:** a. Used for outside walls b. Used for decking board **iii. Taixi wood** **Uses:** a. Used in offices, hotels, public buildings, commercial premises **iv. Termotar:** **uses :** a.Termortar used in brickwork construction	01 M for each
Q.5	(d) Ans.	**Geo-synthetic materials:** • Geo-synthetics are man-made materials used to improve soil conditions. 'Geo' means earth or soil and synthetic means man-made • They are made petro- chemical based polymers (plastics) that are biologically inert and do not decompose from bacterial or fungal action However they may be damaged by petro chemicals and susceptibility to ultra-violet light. **Properties of geo-synthetics**: 1) Geo-synthetics are visco-elastic 2) They have better resistant to atmospheric weathering action. 3) They have high tensile strength. 4) They are more flexible. **Uses of geo-synthetic materials**: 1) Geo-synthetics are used for filtration. 2) They are used as reinforcement in road pavements, earthen dams etc. 3) They can be used as moisture barrier. 4) They are used for seepage control. 5) They are used for soil stabilization. 6) They are used for water proofing.	02 M Any two 1/2 M for each Any two 1/2 M for each
Q.5	(e) Ans.	**Suggest the treatment for following:** **i)** Water leakages in the slabs: **Water Proofing Course** ii) Building to save from white ants: **Termites Proofing Course** iii) To reduce unwanted heat: **Thermal Insulating Materials** iv) To reduce noise in particular area: **Sound Insulating Materials**	01 M for each
Q.5	(f) Ans.	**List any four properties of thermal insulating materials.** Properties of thermal insulating materials: 1) Thermal insulating should be bio resistant and dry. 2) Thermal resistant should be chemically resistant and fire proof. 3) Thermal resisting material should have bulk density below 600Kg/m3. 4) Thermal insulating material should have more pores as the entrapped air or any other gases within the pores decreases the thermal conductivity of material. 5) The pores in thermal insulating material should be closed so that water vapor does not enter in the material. 6) With increase in the moisture content in the material, the coefficient of thermal conductivity rises greatly.	Any four 01 M for each
Q.6		***Attempt any FOUR of the following***	**(16)**

Q.6	(a) Ans.	**Write any four applications of construction waste.** 1) Resue of bricks ,stone slab, timber conduct, piping railing ,etc to the extent possible and depending upon their condition 2) Plastics, broken glass, scrap metal etc can be used by recycling industries 3) Large unusual pieces can be sent for filling up low lying areas 4) Fine material,such as sand dust etc can be used as cover material over sanitary landfill 5) Sale/auction of material which cannot be used at the site due to design constraints or changes in design 6) Rubble brick bats, broken plaster/concrete piece etc can be used for building activities such as leveling under coat of lanes where the traffic does not constitute of heavy.	Any four 01 M for each
Q.6	(b) Ans.	**Explain in details linoleum.** Linoleum is also called as lino, is a floor covering made from materials such as solidified linseed oil, pine rosin, ground cork dust, wood floor and mineral fillers such as calcium carbonate, most commonly on a canvas backing. Pigments are added to the materials to create the desired color finish. This finest linoleum floors, known as "inlaid", are extremely durable, and were made by joining and inlaying solid pieces of linoleum. **Properties of linoleum:** 1) It is washable and dustproof. 2) It reduces noise effectively. 3) It forms a long-wearing and durable surface. 4) It gives a decorative floor finish which looks very attractive 5) It is economical. **Uses of linoleum –** 1) Linoleum is most suitable decorative floor covering for wood and concrete floors 2) It is largely used in residential buildings, offices, schools, hospitals, libraries, restaurants 3) It is also used for railway carriages and buses etc.	02 M Any two 1/2 M for each Any two 1/2 M for each
Q.6	(c) Ans.	**Define Mortar, state any two properties of good mortar.** **Mortar:** Mortar is a paste prepared by adding required quantity of water to a mixture of binding material such as cement or lime and sand. **Properties of mortar:** 1) It should be workable 2) It should be tough, hard durable and economical 3) It should be capable of resisting weathering effect 4) It should be easily transported and placed in site 5) It should set quickly	02 M Any four 1/2 M for each
Q.6	(d) Ans.	**What is rice husk? State its importance in construction.** **Rice Husk: -** The outer most layer of paddy grain is called as rice husk. It is separated from brown rice in rice mill. It has high silica content. Rice Husk is highly resistant to moisture penetration and fungal decomposition. **Importance of Rice Husk in construction:** 1. The ash obtained after burning of rice husk has pozzolonic properties. Hence, it can be used as an alternative to cement and concrete in construction work. 2. Rice husk ash is used in the manufacture of refractory bricks because of its insulating properties. 3. RHA is used during the production of high quality flat steel. 4. Improving residual soil properties by mixing RHA and cement in suitable proportions	02 M 1/2 M for each

		as stabilizing agents.	
Q.6	(e) Ans.	**State any two properties and any two uses of fly ash.** **Properties of fly ash:** 1. Fly ash contains silicon dioxide (SiO_2), Al_2O_3, Fe_2O_3, calcium oxide (CaO), some toxic elements such as arsenic, boron, manganese, mercury etc. 2. Fly ash together with bottom- ash is a non hazardous material 3. It is heterogeneous material. **Uses of fly ash:** 1. It is used a geo polymers 2. It is used as substitute for aggregate in brick production. 3. It is used in concrete production, as a substitute for Portland cement and sand. 4. It used land reclamation.	Any two 01 M for each Any two 01 M for each
Q.6	(f) Ans.	**State the importance of flooring tiles and roofing tiles in Building and give two names of it.** **Importance of flooring tiles and roofing tiles:** i) Gives good appearance or attractive look. ii) Easy to clean iii) These are cost effective iv) Longer life span v) They do not require polishing. **Names of Flooring Tiles:** 1) Vitrified Tiles 2) Granomite Tiles 3)MarboniteTiles 4) Glazed Tiles 5) Spartex Tiles **Names of Rooring Tiles:** 1) Allahabad Tiles 2) Corrugated Tiles 3) Guna Tiles 4) Manglore Tiles 5) Flemish Tiles 6) Ranigunj Tiles 7) Country Tiles	Any three 1/2 M for each Any three 1/2 M for each Any two 1/2 M for each