Important Instructions to examiners:

1) The answer should be examined by keywords 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 error such as grammatical, spelling errors should not be given more importance. (Not applicable for subject English and communication skill).

4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figure 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 the some cases, the assumed constants values may vary and there may be some difference in the candidates answer and model answer.

6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidates understanding

Question and Model Answers	Marks
Q.1. Attempt ANY Ten of the following	**20M**
a) State the role of Civil Engineering in Human Life.	
1. Civil Engineer manages all activities related to construction to make the construction work smooth. 2. Civil Engineer surveys the land or location of project before starting the construction work. 3. Civil Engineer designs the structural members of the Building to make the building strong.	**1M each for any Two Points**
b) Define Environmental Engineering.	
Environmental Engineering is a branch or basic area of the civil engineering which deals with water supply, disposal of waste water from domestic & industrial use & environmental pollution control.	**2M**
c) Distinguish between stone and rock.	

Stone	Rock	
1. Stone is obtained from rock, which is solid portion of Earth's crust.	1. Rocks are formed due to cooling of exposed magma.	**1M each for any Two Points**
2. Stones are smaller in size than rocks.	2. Rocks are larger in size than stones.	
3. Stones are hard material & not at all soft.	3. Rocks can be both hard & soft.	

d) State i) Green timber ii) Converted timber	
1) Green Timber - Green timber means that the timber is relatively freshly cut, from timber in the round, and has much higher moisture content by percentage than seasoned timber. **2) Converted Timber** - The conversion of timber is a phrase usually used in reference to turning a log into a pile of boards/planks.	**1M each**
e) State suitability of clays as a construction material.	
1. As a impermeable core of earthen dam to reduce/stop seepage of stored water. 2. As a binding material in mortar in masonary construction. 3. To manufacture tiles, bricks, sewer pipes. 4. To make flat terrace water proofing. 5. For construction of water bound macadam road.	**1M each any two**
f) Enlist major ingredients of cement	
1) Lime -CaO 2) Silica -SiO_2 3) Alumina -Al_2O_3 4) Iron Oxide- Fe_2O_3 5) Magnesia –MgO	**½ mark for each (any four)**
g) Enlist any two advantages of pre-cast concrete blocks.	
1. It has high quality, high strength, uniform shape & size. 2. It is totally energy efficient. 3. They are eco-friendly. 4. Machine production provides smooth finish. 5. They are durable & economical. 6. These blocks can be made in any design & desired shape & size	**1M each for any Two Points**
h) State the standard dimension of **i) Conventional brick ii) Standard brick**	
i) Conventional bricks- Size of conventional brick is 23×11.0×7.5cm (9”x4.25”x3”) **ii). Standard bricks-**Size of standard bricks is19cm×9cm×9cm	**1M each**
i) List four types of fibers.	
1. Carbon fibers 4. Asbestos fibers 2. Glass fibers 5. steel fibers 3. Plastic fibers 6. Jute fibers	**½ mark for each (any four)**
j) List any four types of building where sound insulation is necessary.	
1. Libraries 2. Theatre 3. Auditorium 4. Recording rooms 5. Restaurant 6. School 7. Health care Centre 8. Radio & T.V. Centers	**½ mark for each (any four)**
k) Define Water-proofing and Damp-proofing	
Damp-proofing: Damp proofing is a treatment given to the building components during Construction to prevent entry of moisture. **Water-proofing:** In building construction, mortar brick, stone and concrete are having tendency to get deteriorated due to passage of time. Due to which cracks and pores are formed in this material and water leakage occurs. This leakage of water is stopped by using special materials called as water proofing materials.	**1M** **1M**

l)List any two properties of rice husk	
(1) Rice husk is difficult to ignite. (2) It is bulky & dusty. (3) When burned the ash content is 17-26 %, a lot higher than fuels like wood. (4) Because of the high silica contents rice husk is very abrasive & wears conveying elements very quickly.	**1M each for any Two Points**
Q. 2. Attempt Any Four of the following	**16M**
a) List any four Criteria for selection of Construction material.	
1) **Load taking capacity or design load**:- Material must be selected for their ability to support the loads imposed on them. 2) **Serviceability of material**:- The material selected should be useful till the life of the structure. 3) **Aesthetically pleasing**:- Material selected should increase appearance of structure. 4) **Economy and availability of material**:- Material to be selected should be economical for purchase, maintenance, replacement, demolition and disposal. It should be easily available. 5) **Environmental friendly material**:- Material selected should not be harmful to environment and occupants of structure ***Note: if Only Point is written ½ mark each and respective explanation ½ mark***	**1 mark for each (any four)**
b) State one example of the following of construction material. 1) Natural 2) Artificial 3) Special 4) Finishing	
1) Natural construction material a) **Stone-** stone is naturally available from rocks by quarrying process. It is dressed to be used for foundation, walls, floorings, kitchen otta etc. It is most strong and durable material. b) **Timber-** timber is used worldwide as construction material. It is useful for formwork, centering, scaffolding, doors and window frames, shutters, for furniture, as roofing materials, for making railway sleepers, temporary bridges. c) **Bituminous materials and mixtures:-** asphalt, bitumen and tar are widely used materials. They are obtained from petroleum and used in road construction and for water proofing. They can be used in the form of emulsion, cutback, mastics, sheet rolls etc. d) **Lime-** lime is obtained from limestone by process of calcination in which carbon dioxide and moisture is removed. $CaCO_3 \xrightarrow{\text{heating}} CaO+CO_2\uparrow$ e) **Soil-** soil is naturally obtained from disintegration of rocks when they are exposed to atmosphere by weathering agents like sun, wind, rain, frost etc. Soil is used as construction and foundation material. It is used for making earthen dams, canals, embankments. WBM roads. Clay is used in manufacturing of bricks and tiles. Sand is used in filter bed. **2) Artificial construction material** **a) Bricks-** Bricks are made up of clay. They are used in brick masonry construction. **b) Tiles-** Tile is used for Flooring and roofing. Varies types of tiles are available in market like Vitrified, Shahabad, Mosaic etc **c) Cement**- Cement is a fine grey powder which forms a paste with addition of water .With due time it sets and becomes hard. It is mixture of calcareous, argillaceous or siliceous material burnt in a furnace which forms stone like mass. It is then grinded to fine powder called cement. **d) Aggregate-** Aggregates are the materials basically used as filler with binding material	**1 mark for each (any four)**

in the production of mortar and concrete. They are derived from igneous, sedimentary and metamorphic rocks

e) Precast concrete product- These are the units casted or manufactured in industries or on site. They are ready to use materials thus going speedy Construction

f) Artificial Sand- The sand which is obtained from stone crusher after crushing the natural stone.

g) Particle board -Particle board is manufactured using chips or particles of low grade wood or sawdust mixed with strong adhesive and then compressed together under high pressure.

h) Veneers- Veneers are thin sheets of wood or slices of wood of superior quality obtained by rotating a log a wood against a sharp cutter or saw. The thickness of veneers varies from 0.4mm to 0.6mm or more.

3) Special construction material

a) Damp-proofing: Damp proofing is a treatment given to the building components during
Construction to prevent entry of moisture.

b) Water-proofing- In building construction, mortar brick, stone and concrete are having tendency to get deterioted due to passage of time. Due to which cracks and pores are formed in this material and water leakage occurs. This leakage of water is stopped by using special materials called as water proofing materials.

c)Termite proofing material- The thermal insulating material is used to conserve a constant heat or temperature inside the building, irrespective of the temperature changes outside.

d) Artificial Timber - The timber which is converted in a factory by some mechanical processes is termed as 'Artificial timber'. And such timber possesses desired shape, appearance, strength and durability. It is a wood substitute made from solid waste like fly ash, silica, bituminous, and other bio-degradable material.

e) Geo-synthetic materials- Geo-synthetics are man-made materials used to improve soil conditions. 'Geo' means earth or soil and synthetic means man-made

f) Fibre: Fibre is a class of materials that are continuous filaments or are in discrete elongated pieces, similar to length of thread.

4) Finishing construction material

a) Plaster of Paris-A white powder that sets to a hard solid when mixed with water, used for making sculptures and casts, as an additive for lime plasters, and for making casts for setting Broken limbs.

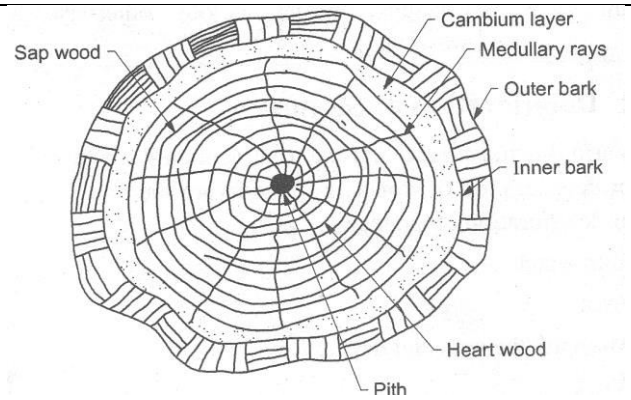
b) Mortar- when some binding materials such as cement or lime is mixed with inert material such as sand, surkhi or cinder and lubricating material such as water is added to it, a paste is formed which is plastic in nature, this paste is known as mortar.

c) Wall Cladding- Wall cladding is a process of finishing the surface with tiles.

d) Paints- paints are applied on the surfaces of timber, metals and plastered surface as a protective layer and at the same times to get pleasant appearance

e) Tiles- Tile is used for Flooring and roofing. Varies types of tiles are available in market like Vitrified, Shahabad, Mosaic etc

(Note: Only Point if written ½ mark each and respective explanation ½ mark)

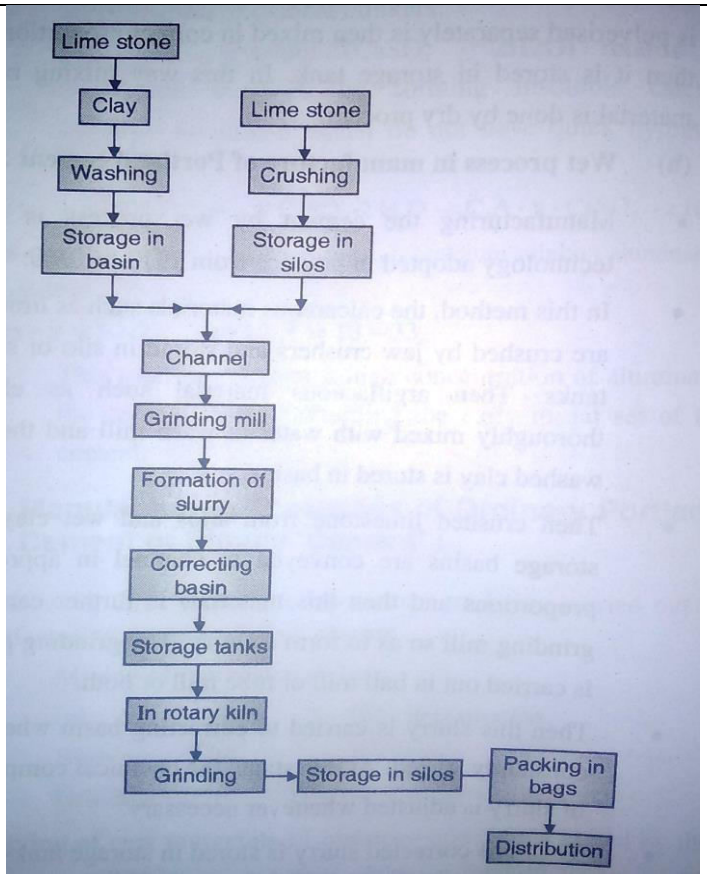
c) State the various safety precautions to be taken while performing blasting operation.	
The following precaution should be taken in blasting: 1. Around the site likely to be affected by blast, it is mandatory to place signboards cautioning passer-by about blasting. 2. The LLR plays an important part 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. Sometimes a charge fails to explode. The fresh hole should not be too closer to the failed hole.	**1 mark for each (any four)**
d) Draw C/S of trunk of tree	
 **Figure - cross-section of Tree Trunk**	**2M for sketch** **And** **2M for correct labelling**
e) Give any four properties of eco-friendly materials.	
1. It is bio-degradable. 2. It is renewable source. 3. It is reused & recycled. 4. It increases durability & life span of living bodies. 5. It aids energy efficiency in building. 6. It reduces air pollution, land pollution & water pollution. 7. It is locally available.	**1 mark for each (any four)**
f) Define bitumen and state different forms of bitumen	
Definition - Bitumen is a non-crystalline solid or viscous material derived from petroleum, by natural or refinery process. It is black or brown in colour and it is soluble in carbon disulphide. It is asphalt in solid state and mineral tar in semi fluid state **Different forms of bitumen** 1. Straight run bitumen 2. Blown bitumen3. Cutback bitumen 4. Plastic bitumen5. Bitumen emulsion.	**1 mark** **1 mark for each (any Three)**
Q.3. Attempt any FOUR	**16M**
a) State the various methods of seasoning of timber. Explain any one in brief.	
Ans - <u>Methods of seasoning of timber</u> 1) Natural, UV, AIR 2) Artificial i) Water, Boiling ii) Kiln iii) Chemical	**2M**

iv) Salt v) Electric vi) Mc Neill's Process **Explanation of any one method** – Natural – Stacked rounder covered shed free air is permitted, rate of Drying is very slow moisture reduction is only 12-15%. Water Seasoning – Logs are kept in water in running stream. Then is dried outside But elastic property & strength is reduced. Boiling - Steam is spread, process very quick but expensive. Kiln Rapid seasoning, two tubes of kilns are used a) progressive & b) Compartment timber is brought to high temperatures. Chemical or Salt – An aquaen solution of certain chemicals have lower vapour pressure than pure water. Timber is treated with such chemicals. Chemically treated timber will exhibit fewer defects. Common salt or ura are generally used. Electric - Two ends of logs are connected to two electrodes, Current is passed heat is generated as wood is bad conductor of current. Drawback is that the wood may split. Mc Neill's Process – No adverse effect. Best method, Expensive, Logs are kept in chamber with containing products of combustion of fuels in the fire place. Time 15 to 60 days.	**2M**
b) Explain manufacturing process of fat lime.	
Ans – Manufacturing process of fat lime – Obtained from burning limestone in the Kiln. Bituminous coal & limestone are fed into the top of the kiln in layers, Limestone is not brought in contact with fuel. It is heated initially up to $1000^{o}C$ and then up to $1300^{0}C$. Lump lime has porous structure on burning. Modern furnace fired lime kilns yield about 25-35 Cu M per day. The process consists of heating calcite $CaCO_3$ or Magnesia Lime stone $CaCO_3$+ $MgCO_3$ to the above mentioned temperature to drive off impurities, and CO_2. As burning injuries the setting properties, High Magnesia lime should not be heated beyond $1000^{o}C$ and High Calcium lime should not be heated beyond $1300^{0}C$.	**4M**
c) Enlist the requirement of good sand.	
Ans – Requirements of good sand - 1. It Should be granular, 2. It should be of quartz, Light grey or Whitish colour free from silt and organic impurities, 3. It Should pass through 850 µm sieve and not more than 10% passing through 600 µm sieve. 4. Its mortar should possess 85% strength.	**1M each**
d) List any four properties of plywood.	
Ans – Properties of plywood 1) It is glued under pressure from veneers of 0.4 to 0.6mm. 2) Outer sheet is called Face & Inner sheet is called Core 3) Perpendicular piles are called cross bands 4) If water based soluble glue is used it is interior type & if bonded with phenol formaldehyde adhesive it is called exterior type grade or water proof.	**1M each**
e) Enlist the various harmful ingredient of a brick earth and state the adverse effects of each constituent on the bricks.	
Ans – Harmful ingredient of a brick earth & their adverse effect **1) Lime-** Changes colour if it is in excess (red or yellow), It absorbs moisture, Swells & Causes disintegration of bricks. **2) Pebbles, Granules & Grits** – These don't allow the clay to mix thoroughly & spoil appearance of brick. They may crack the bricks. **3) Iron pyrites** – Tend to Oxidise & Decompose the brick during burning. **4) Alkalies-** When present in excess, it makes clay unstable for bricks. They can cause the efect of efflorescence.	**1M each (1/2 M for ingredient**

5) <u>Organic Matter</u> – Pores are formed, Water absorption is increased & Strength is Reduced. **6) <u>Carbonaceous Material</u>** – Affects the colour. Brick is likely to have a black core. **7) <u>Sulphur</u>**– It may cause the formation of spongy, Swollen structure & the brick will be decoloured by white blotches. **8) <u>Water</u>**- More water may shrink the brick.	**And** **½ M for effect)**
f) Describe various common field test carried out on cement.	
Ans – Common field test carried out on cement 1. **Colour** -Can be tested on field easily, It should be grey. 2. **Physical Properties** – Coolness- Smoothness If small quantity is thrown in bucket of water, It should sink. Thin plate of cement with water should feel sticky between fingers. If mixed with the clay it gives earthy smell. 3. **Present of Lumps** - It should be free from lumps. These are formed by water. 4. **Strength**-The cement briquettes are kept in water for 3 days of proportion 1:6, If cement is of sound quality it will not be broken easily. - A block of cement 25mm X 25mm X 200mm is prepared & kept for 7 days in water then placed on support of 150mm apart & loaded with 340 N. The block should not fail. 5. **Date of Packing** - Date of packing should be checked. Generally cement should be used 90 days before the date of manufacturers.	**1M each**
Q.3. Attempt any FOUR	**16M**
a) List various special bricks, also state their uses.	
Ans – Special bricks & Their uses **1) Burnt brick perforated bricks** – High compressive, less water absorption. The direction of perforation may be horizontal or vertical. The area of perforation should not exceed 30 to 45%. **2) Burnt clay paving brick**s – The iron content is more. It makes more resistance to abrasion. **3) Burnt clay soling bricks** – Used for soling of roads. Compressive strength $\leq 5 N/mm^2$ **4) Burnt clay hollow blocks** – These manufactured from thoroughly ground, Lump free, well mixed clay. Weight is reduced. **5) Burnt clay jalis** – **6) Clay tiles** – These are thin slabs of low melting clay.	**1M each (1/2 M for name And ½ M for use)**
b) Enumerate the characteristics of good tiles.	
Ans – Characteristics of good tiles – (roofing) **1)** Uniform texture, accurate size & shape. **2)** Free from defects like flaws, cracks & non uniform burning. **3)** Water absorption (Less than 15%) **4)** Resistant to atmosphere & dampness. **5)** Durability.	**1M each**
c) Suggest the type of glass to be used for the following :	
i) Making panel wall on partition wall Ans – Block glass , Sheet Glass. **ii) <u>Laboratery apparatus</u>** Ans – Borosilicate glass. **iii) <u>Sky light roofs.</u>** Ans – Wired glass. **iv) <u>Jwellery store or cashier booth.</u>** Ans – Bullet proof glass	**1M each**

d) Enlist the uses of ceramic material.	
Ans - The use of ceramic material 1) These are polycrystalline material & products formed by baking natural clay & mineral admixtures at high temperature Can be used as brick. 2) Stone, Concrete, Glass, Abrasives, Porcelain, High temperature refractories. 3) Can be used as thermal & Electric insulators. 4) Alumina & boron carbide are used in ballistic armored vests to repel large caliber rifle fire. 5) Used for making pottery. 6) Used in gas turbine engines. 7) Bio ceramics are used in dental implants & synthetic bones. 8) Can be used as white wares in spark plugs, Crucibles, Dishes	**1M each (any four)**
e) Enlist the properties of ferrocrete	
Properties of Ferrocrete- ➢ Composite building material made from combination of concrete and iron. ➢ It is high resistive to wear and tear ➢ It can be in construction of roads and walkways. ➢ It has higher early strength ➢ Quick setting ➢ Early demoulding, handling and use of precasat units ➢ More finely grounded than Portland cement ➢ Chemically similar to Portland cement ➢ Does not contain any added accelerators or admixtures ➢ Colour similar to OPC.	**1M each Any four**
f) Explain various Method of moulding of bricks	
1. Hand moulding- Used on small scale, where manpower is cheap. They are ground moulded & table moulded bricks. Mould, pallet, strike & clay are used. **2. Machine moulding-** Used when requirement is large It is economical & save time Two types of machine can be used a) Plastic clay machines & b) dry clay machines Machine moulded bricks are well shaped than hand moulding **3. Sand moulding**- is a drier method of shaping bricks which helps prevent many of the problems found in traditional method. In this a drier stiffer clay mixture is used.	**1M** **2M** **1M**
Q.5 Attempt any FOUR of the following:	**16M**
a) Explain any four properties of geosynthetic material and its application in construction.	
Properties of Geosynthetic Material: - ➢ It is high tensile strength and low strain. ➢ Light weight. ➢ Impervious in nature. ➢ High modulus of deformation. ➢ Non-degradable. ➢ Geo grids have low strength but takes heavy loads. ➢ Geo membranes have low permeability and are used to control fluid moments.	**1/2M Each (Write any Four)**

Application of Geosynthetic Material: - ➢ Geo synthetic are used to improve level grade soil situations such as roads, valley. ➢ They are used to improve property of soil. ➢ They are used to improve slope grade situations such as banks, hill side. ➢ Geosynthetic control water pressure allowing flow in the plane of material such as foundation walls. ➢ Geosynthetic material prevents soil movements.	**1/2M Each (Write any Four)**
b) Write the need of termite proofing and sound insulating material.	
Needs of Termite Proofing :- 1. Foundation will not get damaged. 2. Furniture will not get damaged. 3. Doors and windows which is made by wood will not get affected. 4. Concrete will not get damaged. **Need of Sound Insulating Material:** 1. It absorbs sound up to certain limit in required areas. 2. Sound insulation is carried out to minimize the indoor/outdoor noise. 3. It reduces the echoes inside the room. 4. It reduces the reverberation of sound.	**2M** **2M**
c) List four uses of glass fiber as construction material.	
Uses of glass fibre: 1. it is used for heat insulation. 2. It has been used for medical purposes in casts. 3. Uses for regular glass fiber include mats and fabrics for thermal insulation, electrical insulation, sound insulation, high-strength fabrics or heat- and corrosion-resistant fabrics. 4. It is also used to reinforce various materials, such as tent poles, translucent roofing panels, automobile bodies and hockey sticks, etc. 5. Fibre glass reinforced plastic can widely be used in the construction of furniture, bathroom fitting, lamp shade etc.	**1M each for any Four**
d) Enlist the uses of rice husk.	
1) It can be used as alternative to cement. 2) It can be used with cement as stabilizing agent for improving residual soil properties. 3) It can be mixed with hydrated lime or cement and can be used as binder for masonry, foundation or concreting. 4) In manufacturing of bricks. 5) In thermal insulation of building, rice husk is used. 6) The ash produced after burning of rice husk is used in production of aggregates and fillers for concrete and board. 7) Used in generation of heat energy, steam energy and electricity generation.	**1M each for any Four**
e) State the advantage of artificial sand over natural sand	
1. The transportation cost will be minimum as artificial sand can be produce within a city. 2. The sand of required size particles can be produced as per the demand of builder. 3. All the sand particles have higher crushing strength. 4. Artificial sand has free from organic impurities. 5. Artificial sand widely used as fine aggregate for concrete. 6. Artificial sand is produced by proper machines, it can be a better substitute to river sand 7. Artificial sand can reduces quantity of cement when fine particles are in proper	**1M each for any Four**

proportion so that the sand will have fewer voids 8. Artificial sand can be produce within a short period of time where as natural sand takes millions of years to form.	
f) Draw a flow diagram of manufacturing process of cement.	
	**2M for units** **2M for correct sequencing**
Q.6 Attempt any FOUR of the following:	**16M**
a) Enlist four properties of good paint.	
Properties of Paints: - 1. Paint should have enough resisting power. 2. It should be durable, should not crack, and should not shrink. 3. A paint should possess good covering power or spreading power 4. It should have such consistency so that it can be applied easily and freely on the surface 5. It should adhere well to the surface to which it is applied 6. Paint colour should neither fade nor change 7. The film produce by paint must be washable. 8. Paint should be able to resist atmospheric condition to which it is exposed. 9. The paint should produce glossy film.	**1M each for any Four**
b) Define wall cladding? Describe the process of wall cladding.	
Def.- Wall cladding is a process of finishing the surface with tiles. **Process:** 1. Firstly plaster the wall with lime morter 2. Take the tiles which are immersed in water for one hour and that are covered with a paste of cement on back 3. Laid the tiles flat against the wall surface true to line and plumb 4. Pressed this tiles with light strokes of a wooden mallet 5. The joints should be as thin as possible	**1M** **3M**

c) Give stepwise procedure of fixing linoleum to floor.	
Procedure of fixing Linoleum to floor: Step1 : Remove the dirt and debris from underside the area that needs to fixed. Step2 : Place a line of liquid nails along the edge of the tear or the area that needs repairing. Push back into place and remove any excess adhesive with a rug. Step3 : Place a heavy flat object over the sheet. Allow the area to dry. Step4 : Apply seam sealer to keep dirt and debris away from working underneath floor. Step5 : Clean and maintain the flooring as recommended by the manufacturer.	**1M for each**
d) State any two artificial timber based product.	
Plywood:- 1) Plywood are formed by gluing together thin sheet of odd number veneers. 2) These sheets are placed in such a way that grains of one layer are at right angle to each other. 3) The outer plies are decorative in nature and are called face plies and the inner ones are called cross bands. 4) Arranging plies in layers which are right angled to one another advantages such as strength of sheet in both directions is same and shrinkage is less. 5) Plywood is light weight. 6) It is resistant to cracking 7) It is available in many sizes. **Particle Boards:-** 1. They are obtained from low grade wood are randomly mixed with strong adhesives and arcompressed together under high pressure to form particle board. 2. Particle board is much weaker than plywood, because adhesive joint between the individual chips involve end grain surface. 3. In particle board movement is randomly oriented in all direction and restraint is dependent on strength and concentration of adhesives. 4. Properties of particle board depend upon adhesives and particle shape. 11 **Veneer** 1.Veneers are thin sheets of superior quality of wood.The thickness of veneers varies from 0.4 mm to 6 mm. 2.Veneers are cut from wood at high moisture content and dried in kiln to remove moisture content. 3.Veneers are used in the manufacture of plywood. 4.Veneers are also used in making the interior furniture. **Sunmica** 1.The timber which is completely or partly covered with resin called as impreg timber. This timber is available under trade name such as sunmica, Formica. 2.It's give attractive, pleasant and smooth appearance. 3.It is strong and durable. It is not affected by whether condition. **Formica** 1. Formica is also impreg timber. It is also same as to sunmica but only difference is that thickness of Formica is more than sunmica. 2. Formica is more strong and durable than sunmica.	**2M each any two product**

e) List any four Application of construction waste.	
Application of construction waste:- 1. They are used for Pavement filling. 2. They are used for Plinth filling. 3. They can be use as low grade fresh concrete 4. Use such concrete in casting conventional type of bricks and using them in place of burnt clay bricks. 5. Highway construction for casting curve, chute drain, median drain and side drain components of highway 6. Waste from the timber such as saw dust can be used for making light weight concrete. 7. Metal pieces can be recycled and send to metal industries for manufacturing of new product. 8. Making benches for park and pedestrian paths etc.	**1mark for any Four**
f) Write the objectives of using fly ash in cement or concrete.	
1. To increase strength & durability of concrete by water content & cement content. 2. Reduce disposal problem by using industrial waste a concrete ingredient. 3 Reduced heat of hydration, resulting in reduced thermal cracking. 4.Fly ash in the mix replaces Cement, producing big savings in concrete materials costs. 5.To Decreased permeability in the concrete. 6.To Increased workability of concrete.	**1mark for any Four**