



SUMMER- 19 EXAMINATION

SubjectName: BUILDINGCONSTRUCTION

ModelAnswer

SubjectCode:

17308

**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 judgment 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.	Answers	Marking Scheme
Q.1	(A) a) Ans	<b><i>Attempt any Six of the following:</i></b> <b>Give four components of superstructure.</b> Following are the Components of superstructure– 1. Plinth 2. Floor 3. Walls 4. Roofs 5. Windows 6. Doors 7. Beam 8. Columns 9. Sill 10. Staircase 11. Parapet 12. Lintels	(12) 2 M  ½ M for each (any four components)
Q.1 (A)	b) Ans	<b>What is timbering and strutting for foundation trenches.</b> <b>Timbering and strutting</b> - A method of giving the temporary support to the side of deep trench, when subsoil is loose or very soft is known as timbering and strutting. It consists of timber planks and strut to give temporary support to the side of trench.	2 M  2M
Q.1 (A)	c) Ans	<b>State any four points considered while preparing job layout for building work.</b> Points to be considered while preparing job layout for building work : i) Method of consideration ii) Nature & type of work iii) Location, area & topography of the site. iv) To get proper co-relation & co-ordination of different units to increase efficiency, safety & speed in construction work.	2 M  ½ M for each



		v) Requirements of site office, store rooms, labour quarter, godowns, first aid etc.	
Q.1 (A)	d) Ans	<b>State the purpose of foundation.</b> The purpose of foundation are- 1) To support the structure. 2) To distribute load of the entire structure over a wide spread area. 3) To increase the stability of the structure. 4) To minimize the chances of unequal settlement by distributing the load over wide area. 5) To provide a level surface for building operation of structure . 6) To provide the structural safety against undermining or souring due to animals, flood water etc. 7) To prevent or minimize the cracks due to movement of moisture in case of weak or poor soils etc.	<b>2 M</b>  ½ M for each (Any four)
Q.1 (A)	e) Ans	<b>List any four component part of staircase.</b> <b>Component part of staircase –</b> 1. Step 2. Rise 3. Tread 4. Flight 5. Landing 6. Newel post 7. Hand rail 8. Baluster 9. Balustrade 10. Going 11. Nosing 12. Strings 13. Scotia 14. Waist 15. Run	<b>2 M</b>  ½ mark each (Any four)
Q.1 (A)	f) Ans	<b>Enlist four causes of cracks.</b> <b>The important causes responsible for cracks in building are :</b> 1. Due to movement of ground. 2. Due to temperature variation. 3. Due to moisture changes. 4. Due to effect of chemical reaction. 5. Due to creep and elastic deformation. 6. Due to vegetation	<b>2 M</b>  ½ M for each (any four causes)
Q.1 (A)	g) Ans	<b>State two advantages of prestressed concrete.</b> Following are the advantages of prestressed concrete: 1) This provides a type of construction which is always free from cracks under full working loads. Due to this such type of construction is suitable where corrosion is dangerous. 2) Deflection of structure can be reduced. 3) The time of construction is much less if prestressed members are used. 4) The amount of steel required is very less as compared to the ordinary reinforced concrete. 5) The sections are smaller compared to reinforced concrete sections hence they can also be used for longer spans. 6) It has long-term durability.	<b>2 M</b>  1M for each (for any two)
Q.1 (A)	h) Ans	<b>Write any four components of door.</b> <b>Components of door –</b> 1.Head 2.Horn 3.Style	<b>2 M</b>  ½ M for each

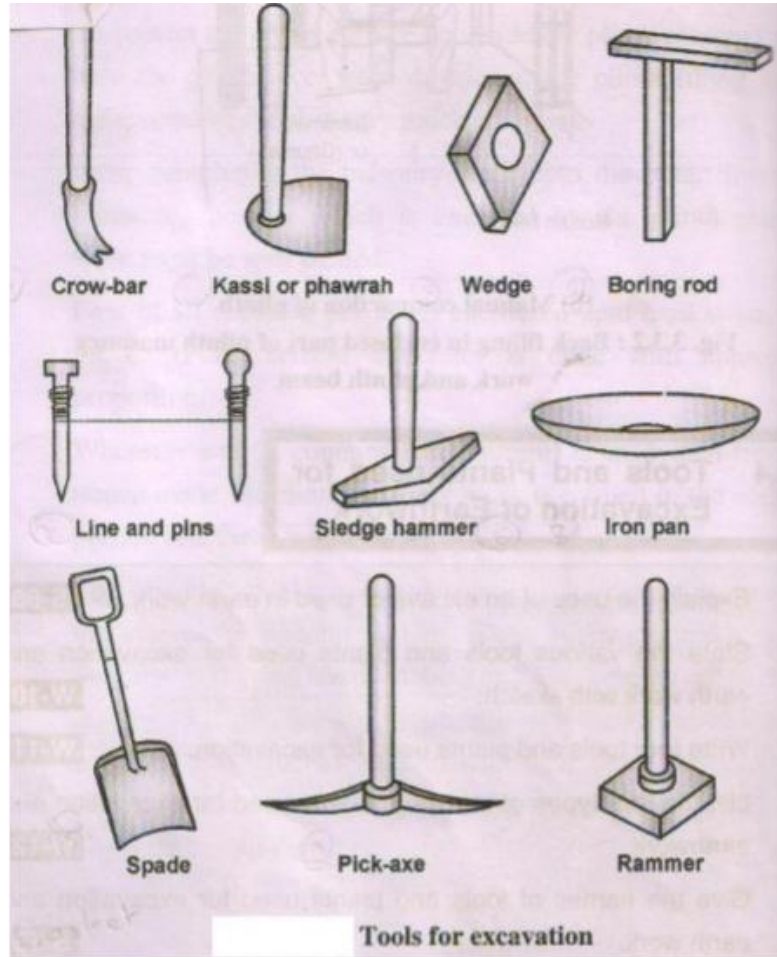
- 4.Top rail
- 5.Lock rail
- 6.Bottom Rail
- 7.Panel
- 8.Hold fast
- 9.Post or jamb

(any four)

Q.1 (B)  
a)  
ans

**Attempt any TWO of the following:**

**State four types of tools used for excavation with sketch of each.**



(08)

4 M

1 mark each (Any four)

Q.1 (B)  
b)  
ans

**Distinguish between framed and load bearing structure with any eight parameters.**

Description	Load bearing structure	Framed Structure
Sub soil condition	Suitable only when hard strata are available at shallow depth	Suitable for any type of soil
Number of storeys	3 to 4 storey buildings can only be constructed	Multi storey buildings can be constructed.
Load transfer mechanism	In load bearing structure, load transfer path is from slab to walls and walls to footing and footing to sub soil	In framed structure, load transfer path is from slab to beam, beam to column and column to footing and footing to sub soil
Resistance to vibrations	Load bearing structure is less resistant to Earthquake.	Framed structure is more resistant to Earthquake

4 M

½ mark each (Any eight)



		Carpet area	Carpet area available is less	Carpet area available is more.	
		Possibility of openings	Limitations for openings in walls.	Large openings in walls are possible.	
		Thickness of wall	More	Less	
		Time of construction	More	Less	
		Maintenance cost	More	Less	
		Flexibility	It is not flexible in design as you can't remove/shift walls.	It is flexible in design as you can shift the location of walls	
		Materials	Load Bearing walls can be of Brick, Stone, concrete block etc	The frame can be RCC( beam/ Column) frame, I- Section Steel frame, Wood frame etc.	
Q.1 (B)	c) ans	<p><b>Write procedure of vacuum dewatering concreting for construction of floors.</b></p> <p><b>Procedure:</b> 1. This process is equipment oriented. It requires form work in the form of channels , internal vibrators , double beam screed board vibrator for full width , bull float , filter pads , vacuum pump, disc floater and power trowel</p> <p>2. First concrete with relatively higher water cement ratio to facilitate full compaction with needle vibrator is poured then concrete is further compacted by double beam screed vibrator. This makes the surface smooth</p> <p>3. Filter map is placed and it is pressed on all the four sides and effectively sealed. Within about 30 minutes, the vacuum pumps are started which sucks the unwanted water</p> <p>4. Vacuum pump is run for about 20 to 30 minutes depending upon thickness of concrete floor. Vacuum dewatered become stiff and workable. The top surface may undergo a depression of about 3% , with loss of about 20% of original water.</p> <p>5. Then the concrete is skim floated and further power troweled and finished. Often surface hardeners are used in conjunction with dewatering process</p> <p>6. After vacuum dewatering , it gives the ideal condition for application of surface hardeners in power form</p> <p>7. The application of disc float and power trowelling may act like reverberation of concrete to eliminate or segment the continuous capillaries of channels formed in suction of water.</p>			4 M
Q.2		<b>Attempt any FOUR of the following:</b>			(16)
	a) ans	<p><b>Explain four general design principles of earthquake resistant building.</b></p> <p>The building or structures which come under seismic or earthquake zones are required to resist the earthquake or seismic forces. There are some design principles generally considered while constructing the structures in earthquake zones.</p> <p><b>1. Continuity in the construction of a structure:</b> The structures come in the seismic zone should be constructed in such a way that the total structure act as a single unit.</p> <p><b>2. Sufficient space between adjacent structures:</b> To avoid collision during an earthquake it is advisable to keep some space between the adjacent structures. The recommended gap width varies from 15 mm to 30 mm per storey.</p> <p><b>3. Foundation:</b> Loose soil settles easily during an earthquake. So avoid constructing a structure on loose soil. And proper parameters of earthquake design should be adopted while designing foundation.</p> <p><b>4. Avoid unnecessary projections:</b> The unnecessary projections such as balconies, canopies, etc should be avoided and if they are in the structure they should be firmly tied with the main part of structure.</p> <p><b>5. Shape of structure:</b></p> <p>a. Shape of structure plays very important role while resisting the earthquake forces.</p> <p>b. Simple rectangular structure is considered good in this case.</p> <p>c. Also some ratio of length to width is required to maintain. The length of the building should not exceed three times its width.</p> <p>d. Symmetrical designed structure with respect to mass and rigidity is also preferred. Because of this,</p>			4 M
					1 mark each (Any four)

Centre mass of rigidity of building coincide with each other in which case no separate sections other than expansion joints are necessary.

**6. Structural design:** Proper design considering the earthquake design parameters plays the important role. The design should be such that there should not be sudden collapse of a structure.

**7. Weight of structure:** The light weight structures are preferred to resist the seismic forces. The building should be as light as possible. This practice is adopted in Japan since the earthquake is frequent there.

**8. Avoid addition and alteration:** Addition and alteration in the structure is not recommended if the structure come in the seismic region.

**9. Strength in various directions:** The structures should be designed to have adequate strength against earthquake effect along both the horizontal axes.

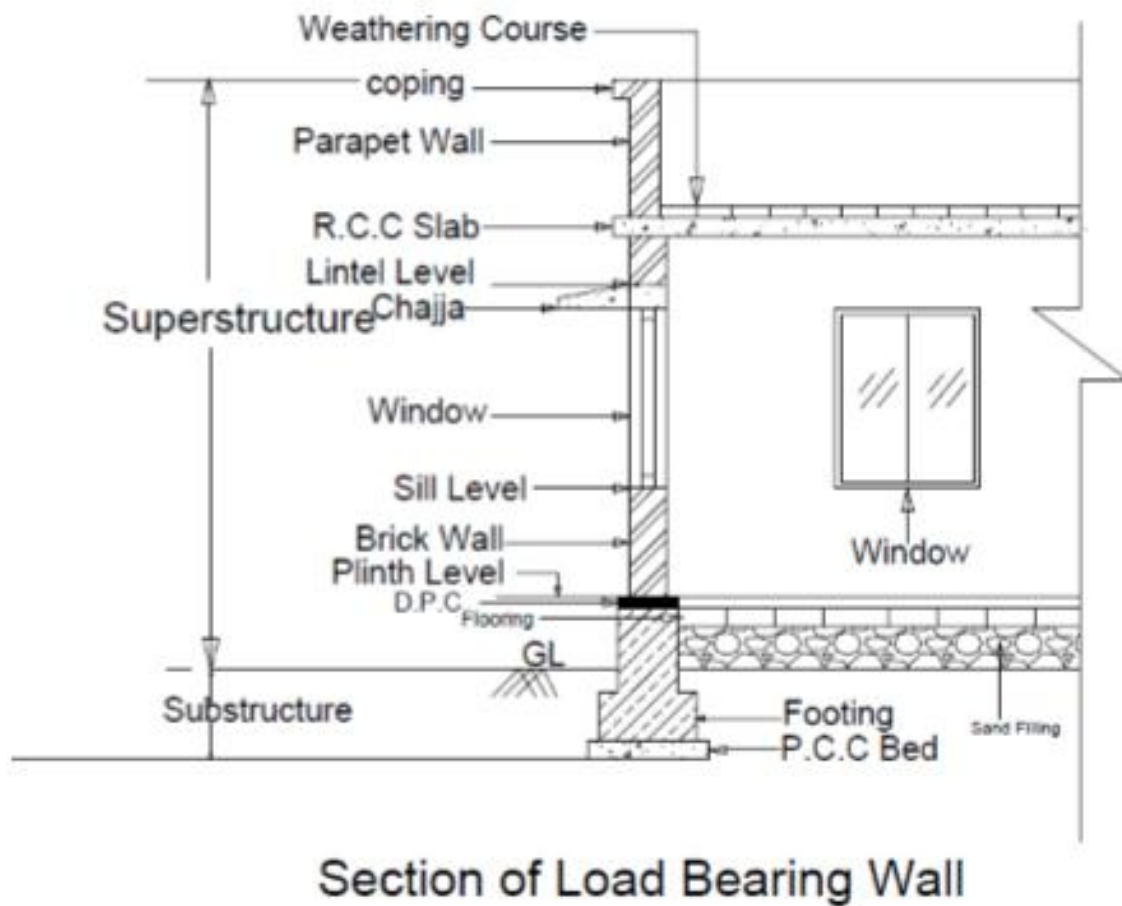
**10. Ductility:** Provide reinforcing steel in masonry to increase the strength and stability.

**11. Fire safety:** Building should be constructed to make it fire resistant.

Q.2  
b)  
ans

**Draw a neat sketch of section of load bearing wall from foundation to parapet.**

4 M



2 M for fig.  
& 2 M for  
labeling

Q.2  
c)  
ans

**State the types of bond in brick masonry and describe any one.**

4 M

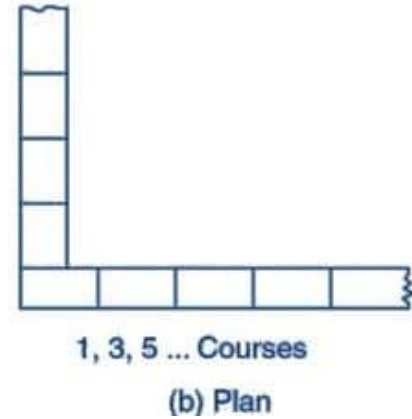
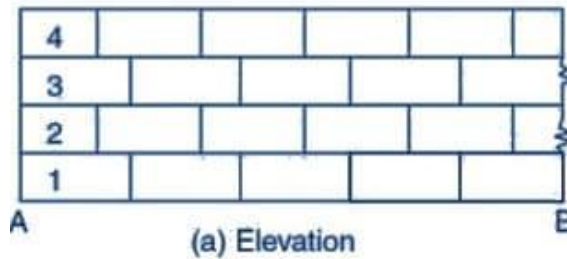
**The most commonly used types of bonds in brick masonry are:**

1. Stretcher bond
2. Header bond
3. English bond and
4. Flemish bond

½ M for  
each types

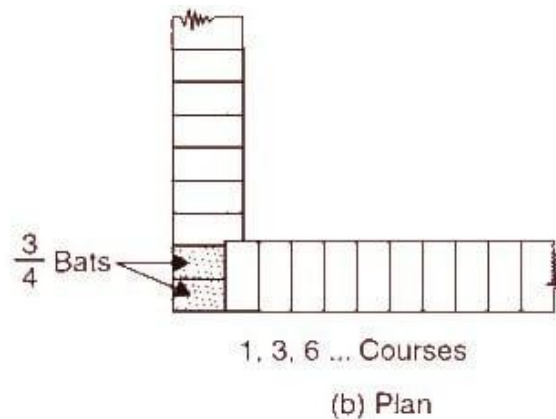
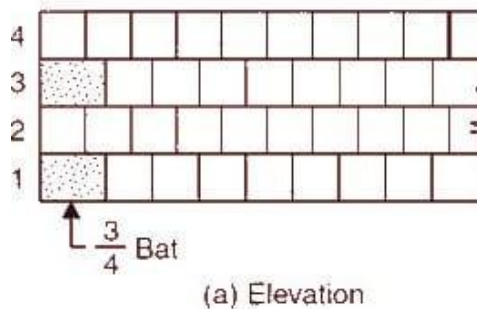
**1. Stretcher bond:** Stretcher bond, also called as running bond, is created when bricks are

laid with only their stretchers showing, overlapping midway with the courses of bricks below and above. Stretcher bond in the brick is the simplest repeating pattern. But the limitation of stretcher bond is that it cannot make effective bonding with adjacent bricks in full width thick brick walls. They are suitably used only for one-half brick thick walls such as for the construction half brick thick partition wall.

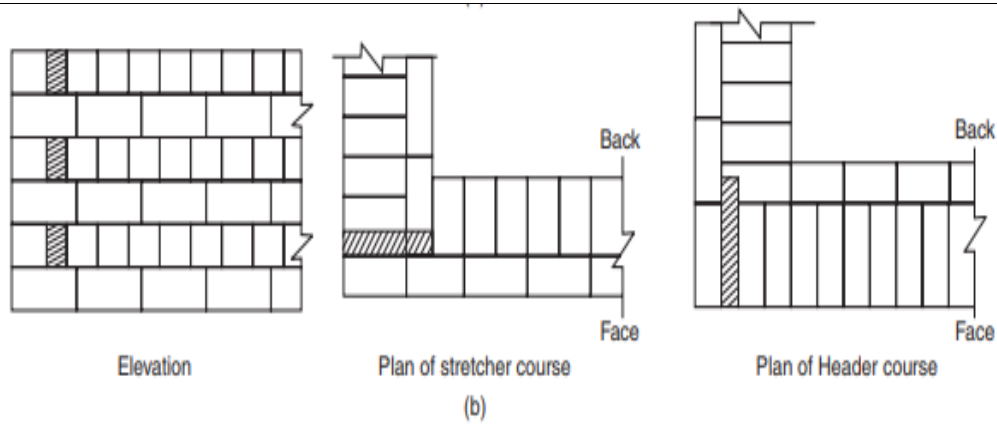


1M for explanation & 1m for diagram (any one type)

2. **Header bond:** Header is the shorter square face of the brick which measures 9cm x 9cm. Header bond is also known as heading bond. In header bonds, all bricks in each course are placed as headers on the faces of the walls. Header bond is used for the construction of walls with full brick thickness. In header bonds, the overlap is kept equal to half width of the brick. To achieve this, three quarter brick bats are used in alternate courses as quoins.



3. **English Bond:** English bond in brick masonry has one course of stretcher only and a course of header above it, i.e. it has two alternating courses of stretchers and headers. Headers are laid centered on the stretchers in course below and each alternate row is vertically aligned. To break the continuity of vertical joints, quoin closer is used in the beginning and end of a wall after first header. A quoin closer is a brick cut lengthwise into two halves and used at corners in brick walls.



**4.Flemish Bond:**Flemish bond, also known as Dutch bond, is created by laying alternate headers and stretchers in a single course. The next course of brick is laid such that header lies in the middle of the stretcher in the course below, i.e. the alternate headers of each course are centered on the stretcher of course below. Every alternate course of Flemish bond starts with header at the corner.

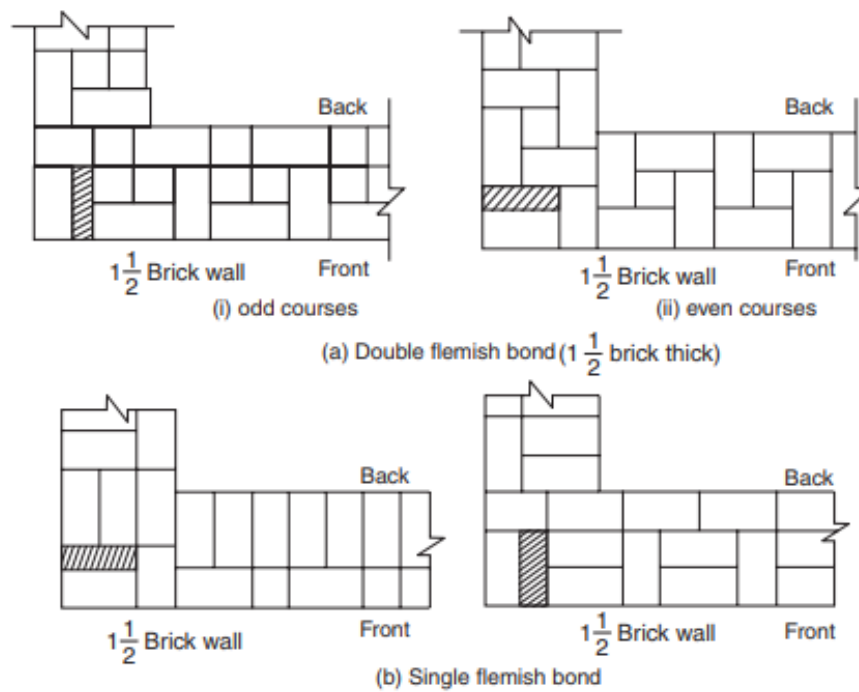


Fig. 8.7. Flemish bond

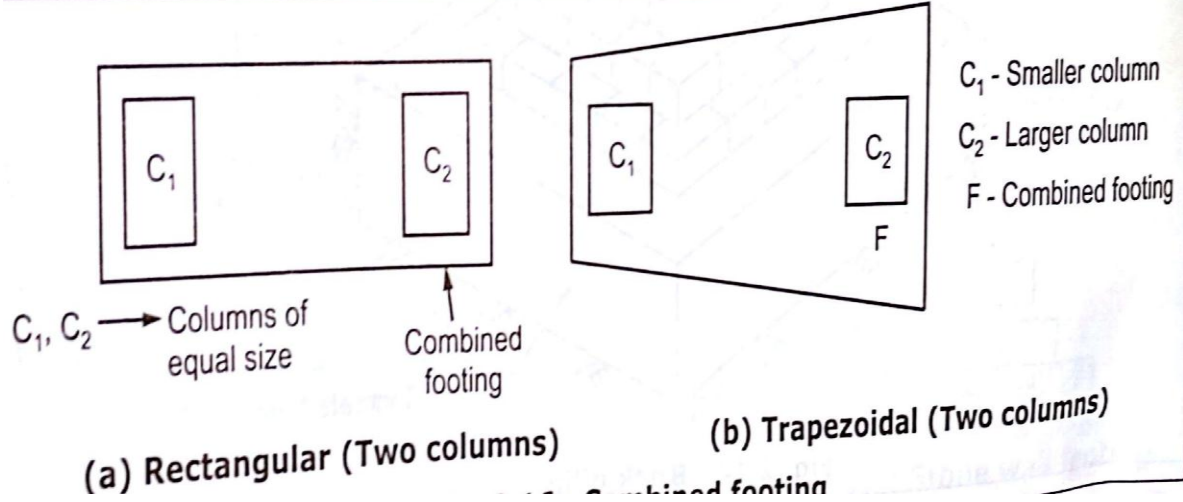
Q.2

d)  
ans

Draw the labeled sketch of i) combined footing ii) raft footing.

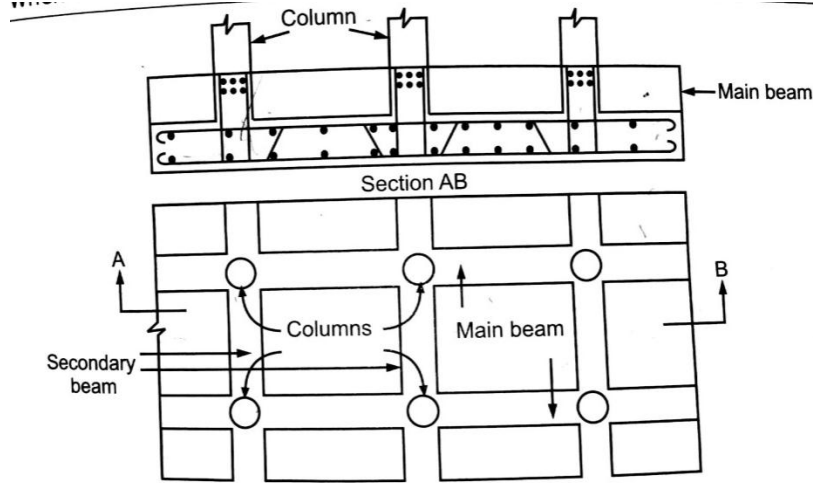
4 M

i) combined footing :



2m for  
diagram

ii) raft footing:



2m for  
diagram

Q.2

e)  
ans

Draw the labeled sketch of Queen post truss.

4 M





		<p>2m for diagram &amp; 2m for labeling</p>
<p>Q.2 f) ans</p>	<p><b>What is scaffoldings? State any two types of it with their function.</b>  <b>Scaffoldings:</b> It is temporary structure given to the building when the height of wall or other structural member is more than 1.5m for construction, repair or dismantling purpose.  <b>Type of scaffolding :-</b></p> <ol style="list-style-type: none"> <li><b>1. Brick – Layers scaffolding or single scaffolding:</b> It is used for brick laying</li> <li><b>2. Masons scaffolding or double scaffolding:</b> It is used in case of stone masonry because it is very difficult to make holes into the wall.</li> <li><b>3. Needle scaffolding or cantilever scaffolding:</b> It is generally used if a) Ground is weak to support the standards. b) Constitution is done in busy street or road or over crowded area.</li> <li><b>4. Steel scaffolding:</b> Quick erecting Usable for more height</li> <li><b>5. Trestle scaffolding:</b> It is used for painting of repair works inside the room.</li> <li><b>6. Suspended scaffolding:</b> It is used for repair works such as pointing, washing, painting etc.</li> </ol>	<p>4 M 1M 1 M each type( any two) 1M for function</p>
<p>Q.3</p>	<p><b>Attempt any FOUR of the following:</b></p>	<p><b>16</b></p>
<p>a) ans</p>	<p><b>Define prefabricated structure. Enlist any four advantages and disadvantages</b>  <b>Prefabricated structure:</b> Various components of building such as column, beam, slab are casted in factory or in workshop &amp; then transported to the site where it is assembled or connected with each other to construct the structure. This structure is called as prefabricated structure.</p> <p><b>Advantages:</b></p> <ol style="list-style-type: none"> <li>1) Large production of units &amp; building components makes it affordable.</li> <li>2) Reduction in time &amp; cost due to factory made material.</li> <li>3) Minimize erection time.</li> <li>4) High quality of individual elements as they are factory made.</li> <li>5) Has better surface finish &amp; appearance.</li> <li>6) Does not require framework.</li> <li>7) Labour on site is reduced.</li> <li>8) Reduce delays due to adverse weather conditions.</li> </ol> <p><b>Disadvantages:</b></p> <ol style="list-style-type: none"> <li>1) Design needs to be complete before casting commences.</li> </ol>	<p>4 M 2M 1M for any two advantages</p>

- 2) Last minute alterations to the structure are impossible.
- 3) It is costlier than in – situ work; especially for small scale works.
- 4) Unsuitable if structural alteration might be needed in the future.
- 5) Units require care & protection while in storage, during transport & while handling on site.
- 6) Prestressed floor panels or beams can create problems with uneven camber in different units.
- 7) Unsuitable in case of structure which cannot be satisfactorily divided into small components.
- 8) Precast component may require excessively large site handling, hoisting equipment.

1M for any two disadvantages

Q.3

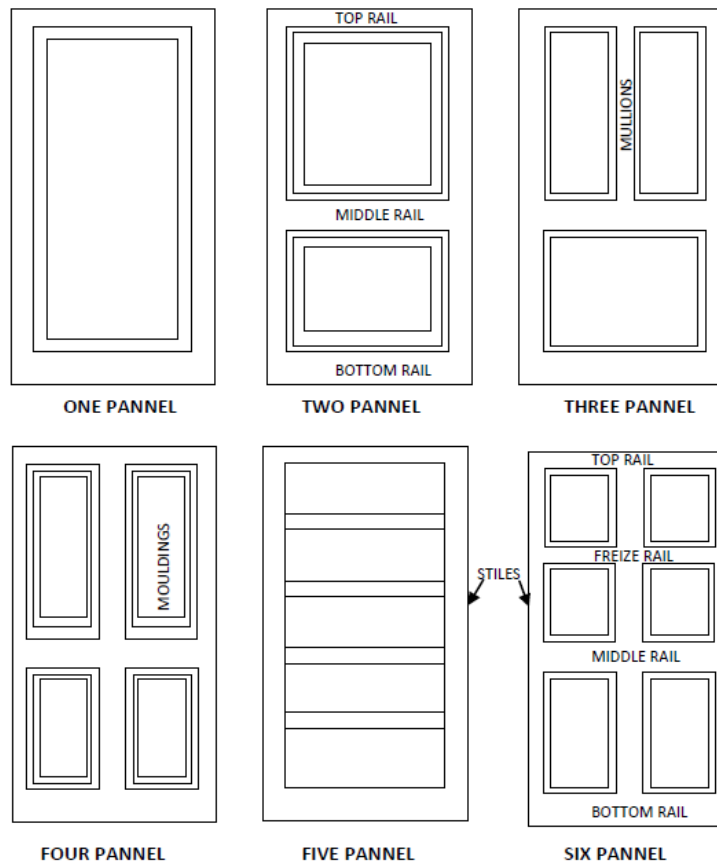
b)  
ans

**Mention four types of doors and draw a sketch of any one.**

**Types of doors:**

1. Paneled Doors
2. Battened Doors
3. Flush Doors
4. Collapsible Doors
5. Rolling Shutters
6. Revolving Doors
7. Glazed Doors

**1. Paneled Doors**



**2. Battened Doors**

4 m

½ mark each (Any four)

2 marks (Any one sketch)

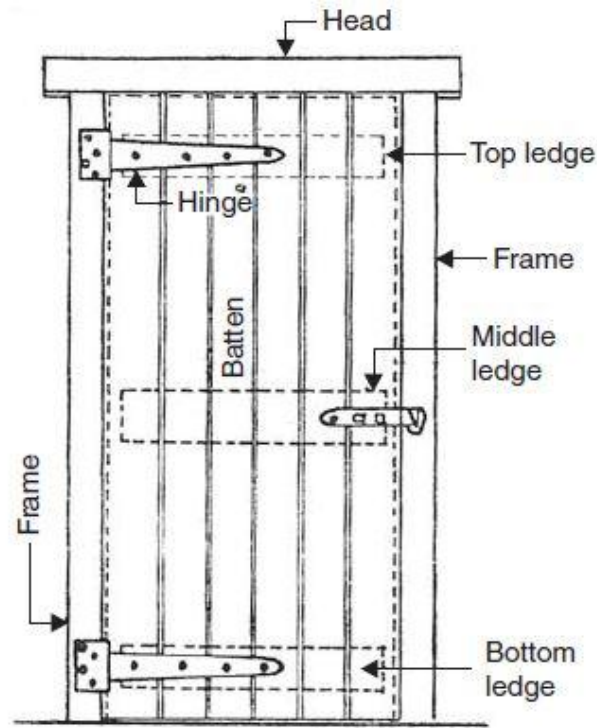
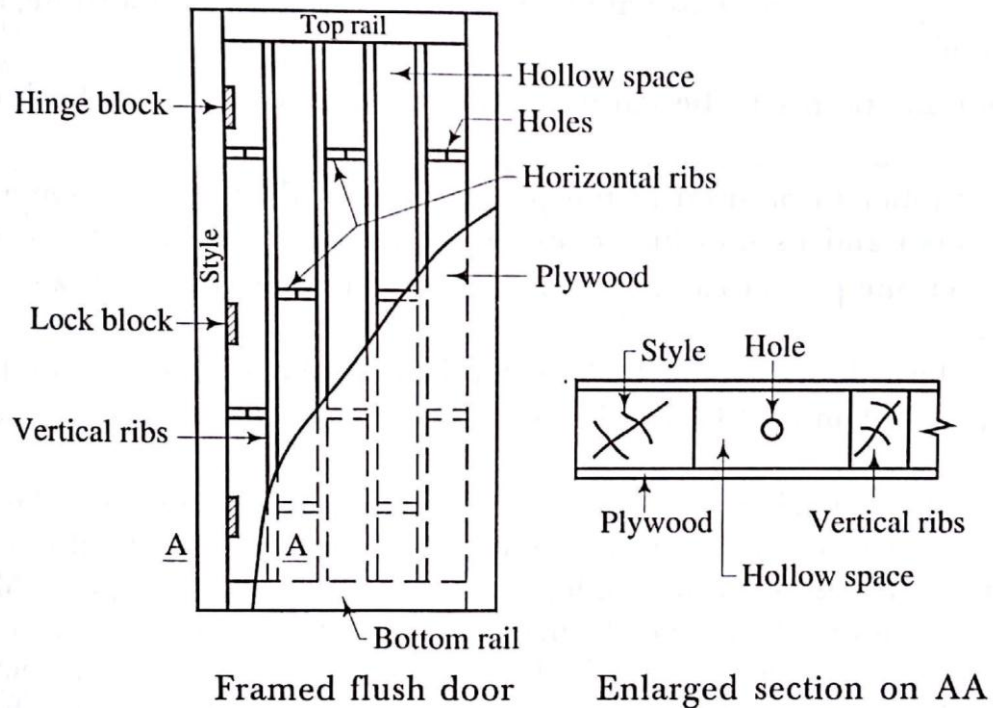
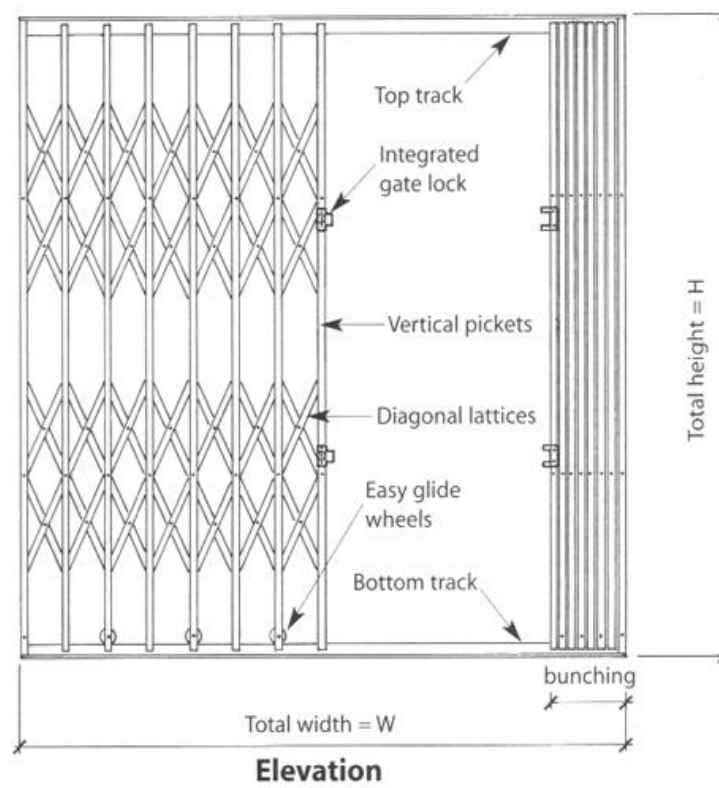


Fig. 8.21. Batted and ledged door

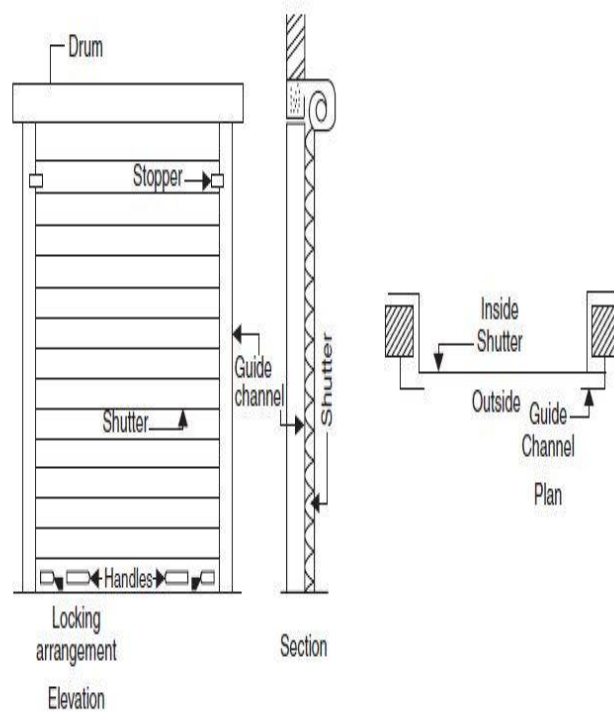
3. Flush Doors :



#### 4. Collapsible Doors:



#### 5. Rolling Shutters



## 6. Revolving Doors

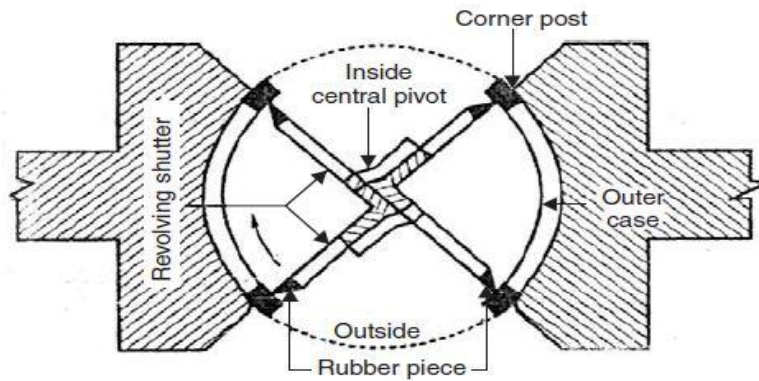
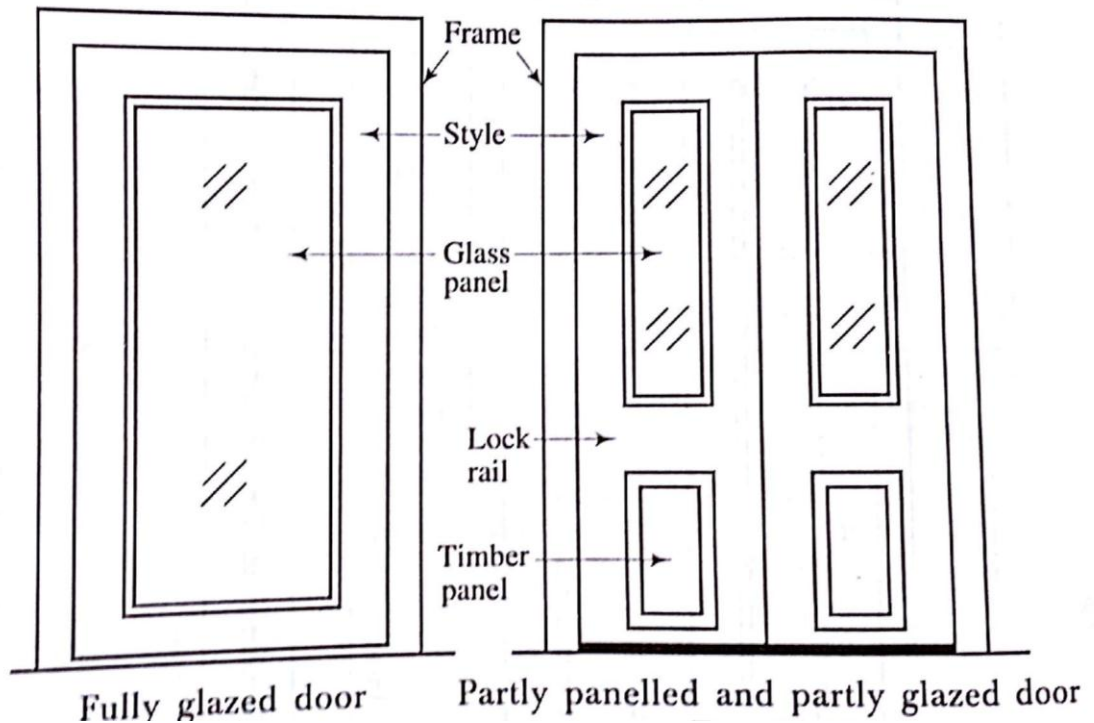


Fig. 8.26. Revolving door

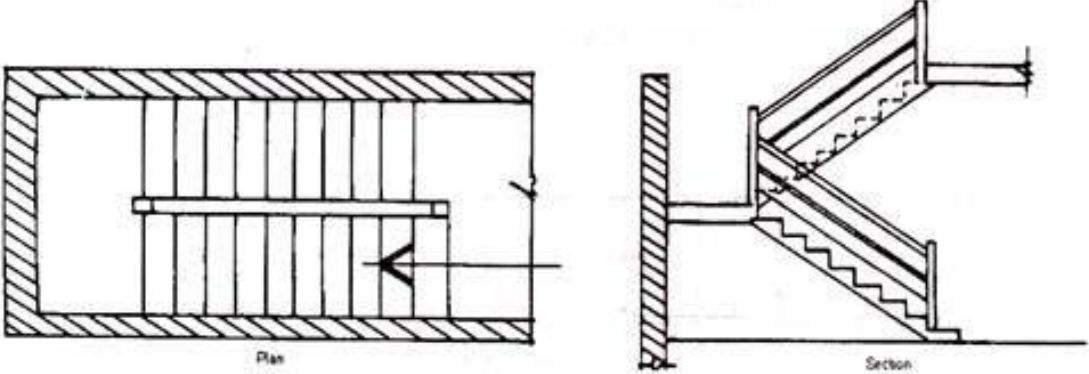
## 7. Glazed Doors :



Fully glazed door

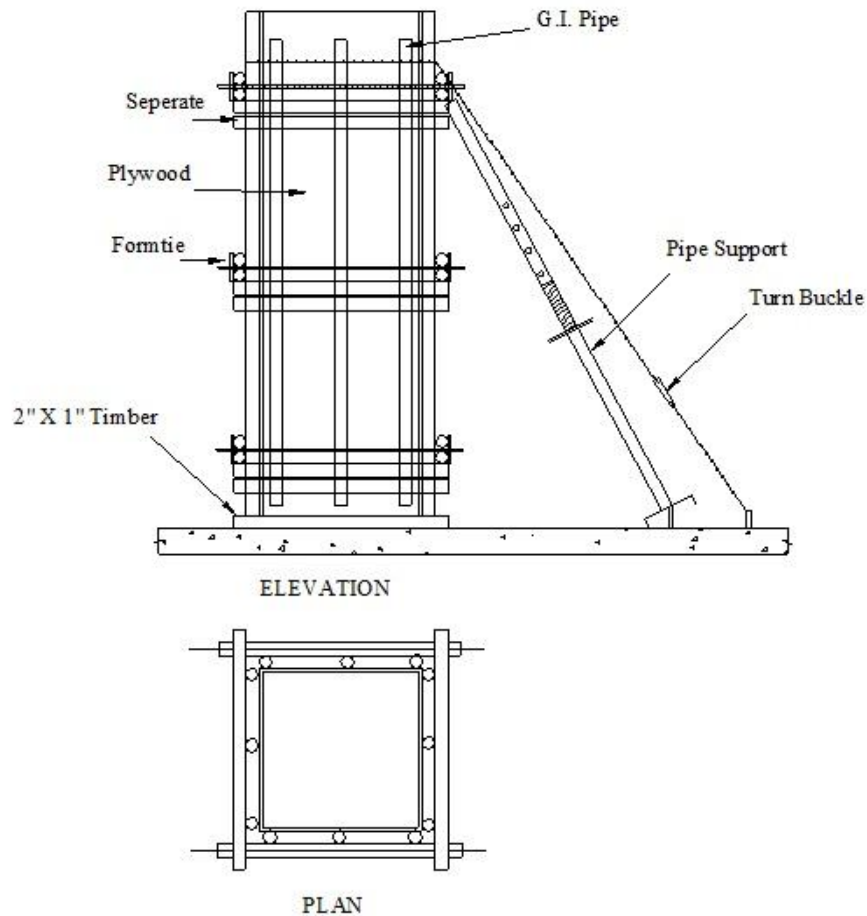
Partly panelled and partly glazed door



Q.3	c) ans	<p><b>Explain doglegged stair with neat sketch.</b></p> <p>Dog-legged stairs – It consists of two straight flights of steps with abrupt turn between them. The flights run in opposite direction and there is no space between them. Usually, a level landing is placed across the two flights at the change of direction. These stairs are useful where total width of space available for staircase is equal to twice the width of steps.</p>  <p>a. Dog legged stair Fig. 6.5 Half turn stair</p>	4 M 2 marks      2 marks
Q.3	d) ans	<p><b>Define skirting and dado with its suitability.</b></p> <p><b>Skirting</b> –The tiles put on the lower side of walls, near the flooring is skirting. <b>Suitability:</b>It is placed vertically inside the room at the joint of wall and floor on the entire length. It is helpful at the time of washing and cleaning the floor and not allowing the water on painted surface of wall and thus it protects the painted wall.</p> <p><b>Dado</b> –If the glazed tiles or any other tiles are placed and fixed to the vertical wall in between window sill and floor of bathroom and W.C. and in kitchen then it is termed as dado. <b>Suitability:</b>Dado protects the painted wall surface from sprinkling water at the time of bath.</p>	4 M  2 mark For each  2 mark For each
Q.3	e) ans	<p><b>Suggest a type of window for following building:</b></p> <ol style="list-style-type: none"><li>1) Residential bungalow</li><li>2) Cinema hall</li><li>3) Enclosed R.C.C. staircase</li><li>4) School</li></ol> <p>1) Residential bungalow – Paneled window / Casement windows / Sliding window 2) Cinema hall – Fixed window 3) Enclosed R.C.C. staircase – Fixed window / Metal window 4) School – Metal window / Sliding window</p>	4 M      1 mark For each
Q.3	f) ans	<p><b>Explain the process of surface preparation and painting a wall.</b></p> <p>The correct preparation of surface plays an important role in preserving the properties and life of the paint. For these the procedure is as follows:</p> <ol style="list-style-type: none"><li>1.If the receiving surface is rough, it should be made smooth by rubbing with sand paper.</li><li>2.The surface should be perfectly dry before applying the paint.</li><li>3.In a case of newly plastered surface, the surface is damp then it should be allowed to dry for at least one month.</li><li>4.If the walls are old, then all dirt, dust and rust should be removed from the surface. by HCL.</li><li>5.If oily materials are available on surface it should be removed by HCL.</li><li>6.All the nail hole's in the wall should be filled with mortar so that the surface become smooth.</li><li>7.If the surface is having efflorescence patches they should be cleaned with dry cloth.</li><li>8.The surface should be thoroughly rubbed with sand paper, washed clean and allowed to dry before applying the paint.</li></ol>	4 M       4M

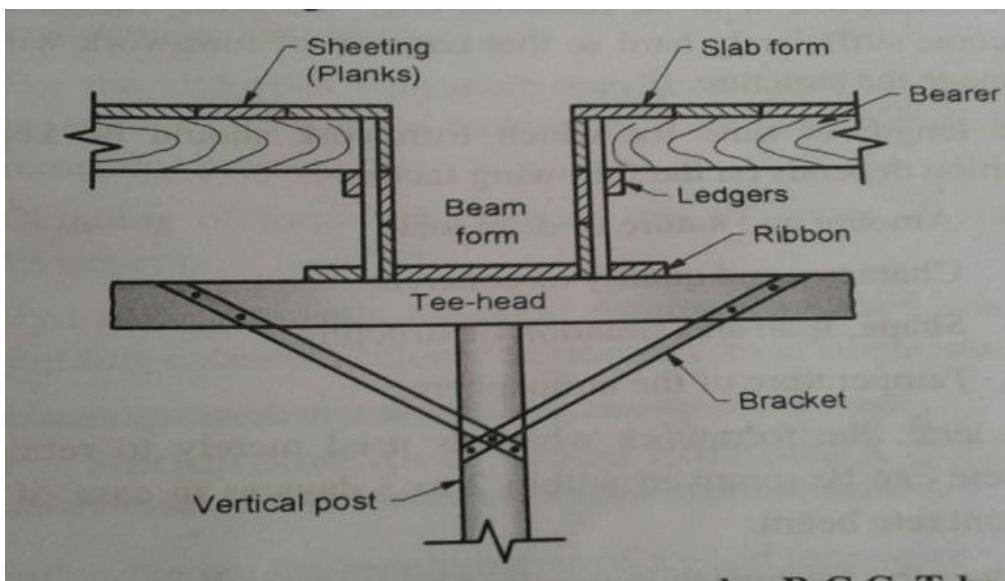


4		<b>Attempt any <u>FOUR</u> of the following :</b>	<b>(16 M)</b>
	<b>(a)</b>	<b>Suggest the suitability of Shahabad, Kota, Marble and Granite flooring.</b>	<b>4 M</b>
	<b>Ans:</b>	<b>i) Shahabad</b> is suitable for paving the floors of basement, parking, go downs etc <b>ii) Kota</b> is suitable for paving the floors, steps in residential buildings. <b>iii) Marble</b> is used for paving the flooring, facing work, columns, ornamental work and for steps. <b>iv) Granite</b> is used for ornamental work, steps facing work, walls, column etc. It is also used for paving the floors in commercial building.	1M each
	<b>(b)</b>	<b>Explain pointing with its necessities.</b>	<b>4 M</b>
	<b>Ans.</b>	<b>Pointing: -</b> The term pointing is applied to the finishing of mortar joints in masonry. In exposed masonry, joints are considered to be the weakest and most vulnerable spots from which rain water or dampness can enter. Pointing consists of raking the joints to a depth of 10 to 20 mm and filling it with better quality mortar in desired shape. <b>Necessity of pointing:-</b> i) Joints on the face of stone or brick masonry are roughly filled in, while the walls are being raised. These joints are considered to be weakest spots for giving access to rain water or dampness, therefore they need protection. ii) Pointing is necessary for protecting the joint from the adverse effect of atmosphere. iii) To magnify the appearance of the surface by exhibiting the pattern of the joints, their thickness, colors and texture.	2 M  2 M (Any two)
4	<b>(c)</b>	<b>Draw a neat sketch of formwork for beam and column.</b>	<b>4 M</b>
	<b>Ans.</b>	<b>Formwork of column</b>	



2 Mark

**Formwork of beam**



2 Mark

4 (d) Explain termite proofing with its necessity and importance.

4

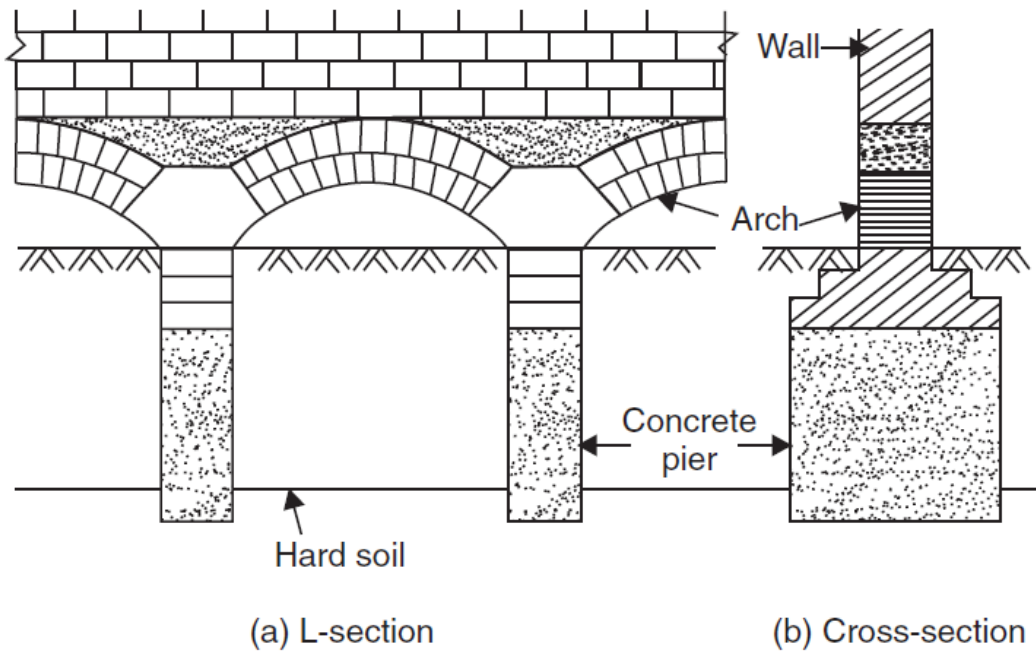
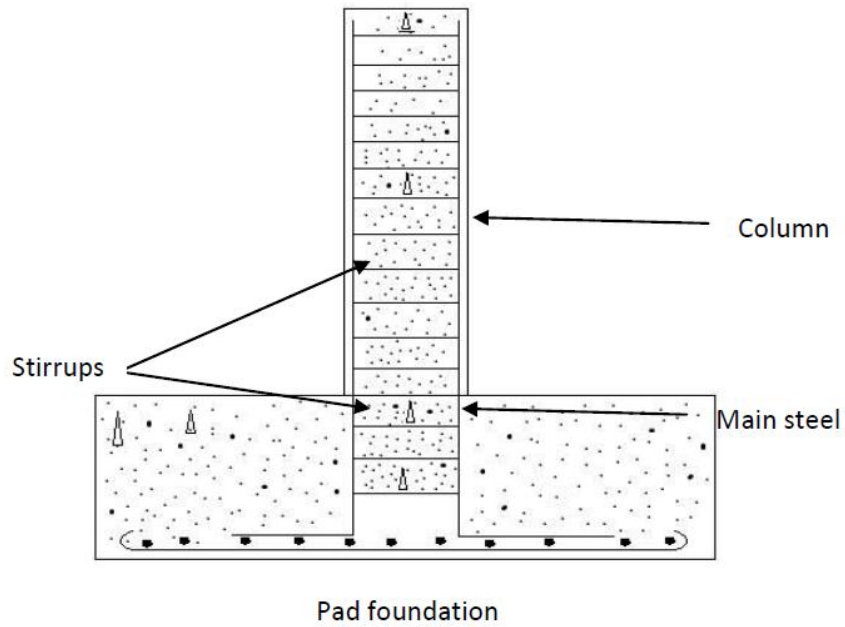
**Ans** Termites popularly known as 'white ants' are found in abundance in tropical and sub-tropical regions. They are capable of survival under most adverse conditions and environments and are very fast in eating wood and other cellulosic materials

1 mark





		<p>as food, etc. Subterranean termites are mainly responsible for causing damage to the buildings and its contents. These termites build their nests underground and form mud walls tunnels which serve as protected shelter for their movements.</p> <p><b>Necessity and Importance of termite proofing:</b></p> <ul style="list-style-type: none"><li>• To protect the substructure from white ants/ termites.</li><li>• To avoid damage of wooden structure.</li><li>• Dry wood termites cause great damage to buildings in coastal areas. They live in dry wood by building nests and destroy the wood gradually.</li><li>• The termites enter the building through foundations on floors, destroying everything that comes within their reach.</li><li>• Termites may also enter the building through the joints in contact with the ground. These termites require adequate moisture and it is supplied either from soil through tunnels or through wet spots in building or through among other available source.</li></ul>	1 mark each (Any three)
4	(e)  <b>Ans.</b>	<p><b>Explain the process of Grouting and Guniting, to repair concrete work.</b></p> <p><b>Guniting</b></p> <ol style="list-style-type: none"><li>1) It means throwing mixed concrete with force on the crack with the help of a pump &amp; gun.</li><li>2) Concrete of high workability is pumped under pressure by special concrete Pump.</li><li>3) This concrete is pumped through pipe at the end of which there is a steel nozzle also known as gun.</li><li>4) This throws the concrete on the surface to be repaired with such a force that mortar sticks to the surface.</li></ol> <p><b>Grouting</b></p> <ol style="list-style-type: none"><li>1) Grouting means drilling holes or using the existing cracks for forcing rich cement slurry or rich cement mortar made up of very fine sand under pressure.</li><li>2) In grouting, pumps may be used to pressurize the slurry.</li><li>3) The grout under pressure penetrates in the cracks &amp; even deep in the branches and sub – branches of cracks.</li></ol>	4  2 Mark    2 Mark
4	(f)  <b>Ans</b>	<p><b>Suggest the suitable and economic foundation for 2 m depth of black cotton Soil for a building with neat sketch.</b></p> <p>Here the depth of black cotton soil is more i.e. 2 m. Hence following type of foundations may be provided :-</p> <ol style="list-style-type: none"><li>1) Strip or pad foundation.</li><li>2) Pier foundation with arches</li><li>3) Under reamed pile foundation.</li><li>4) Raft foundation</li></ol>	4M  1M

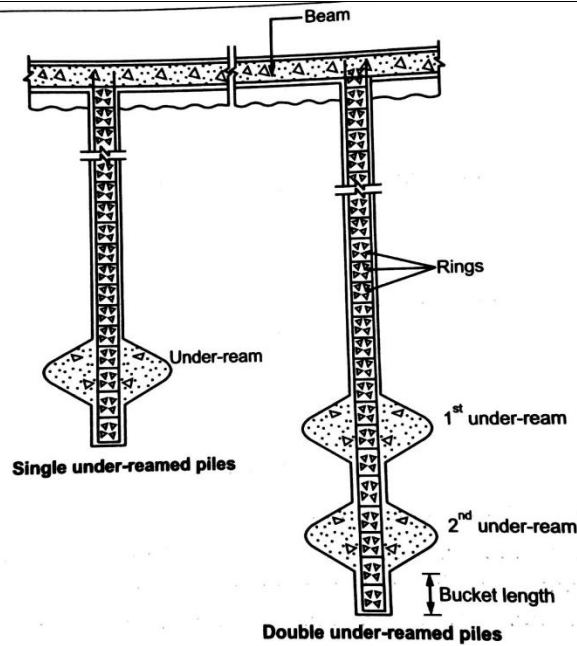


**Pier foundation with arches**

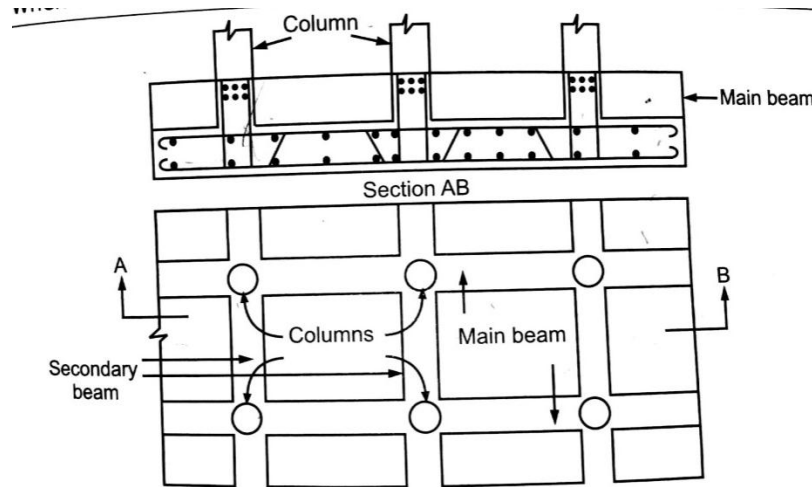
3M

( NOTE:  
Any one  
type of  
foundation  
may be  
suggested.

Suggested  
foundation  
1 mark,  
Any one  
sketch 2  
marks,  
labelling 1  
mark )



**Under reamed pile foundation**



**Raft foundation**

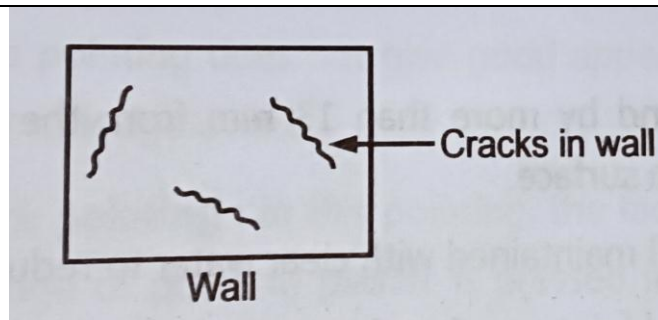
( NOTE: Any one type of foundation may be suggested  
Suggested foundation 1 mark, Any one sketch 2 marks, labelling 1 mark )

5	Attempt any <b>FOUR</b> of the following:	(16 M)
<p>(a)</p> <p><b>Ans.</b></p>	<p>State any four causes of settlement of structure and remedial measures for it.</p> <p><b>The causes of settlement of structure are:-</b></p> <ol style="list-style-type: none"> <li>1. Uneven bearing capacity of soil at foundation level</li> <li>2. Different loads on different parts of foundation</li> <li>3. Varying ground water table height</li> <li>4. Compressible foundation soil</li> <li>5. Pockets of different type of soil under the foundation level</li> <li>6. Expansive soils such as black cotton soil</li> </ol>	<p>4M</p> <p>1 mark each (Any three)</p>

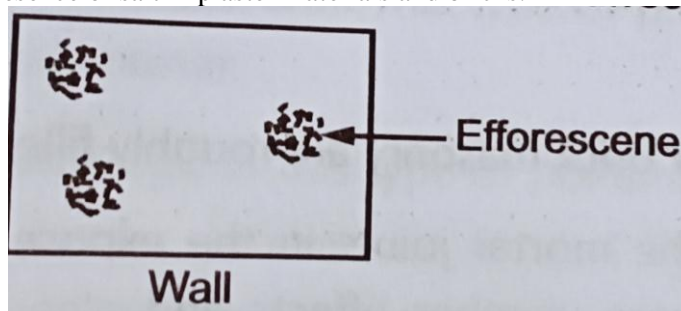


		<p>7. Vibrations, if it is factory foundation, or a building very near to railway tracks 8. Liquefaction during Earthquakes and floods 9. Elastic compression, plastic flow or consolidation under static load 10. Excessive expansion and contraction of swelling soils.</p> <p><b>Remedial measures:-</b></p> <ol style="list-style-type: none"><li>Compaction of soil over the complete area at foundation level.</li><li>Proper design so that large load difference does not exist on different parts of the foundation.</li><li>Dewatering of foundations if ground water table interferes with construction of foundation.</li><li>Stabilization of soil foundation level if it is excessively compressible.</li><li>Proper investigation of soil strata by trial pits and borehole data</li><li>Special type of foundations for expansive soils such as black cotton soil.</li></ol>	1 mark (Any one)
5	<p><b>(b)</b></p> <p><b>Ans.</b></p>	<p><b>Define RMC and enlist any four equipments of RMC.</b></p> <p><b>Ready mix concrete-</b> Concrete which is mixed at central batching plant and transported at the site by suitable means like conveyor belt, transit mixer and chute is called ready mix concrete.</p> <p><b>Equipment's of RMC-</b></p> <ol style="list-style-type: none"><li>Concrete mixing plants (Mixer and batchers)</li><li>Transportation equipment's<ol style="list-style-type: none"><li>Mortar pan</li><li>Crane</li><li>bucket</li><li>ropeway</li><li>Belt conveyor</li><li>Pump and pipeline</li><li>Wheel barrow</li><li>Chute</li><li>Transit mixer</li><li>Helicopter</li></ol></li></ol>	<p><b>(4M)</b></p> <p>2 mark</p> <p>½ mark each (Any four)</p>
5	<p><b>(c)</b></p> <p><b>Ans.</b></p>	<p><b>Explain Tremie method of underwater concreting</b></p> <p>Underwater concreting using Tremie method is convenient for pouring large amount of high flowable concrete. The concrete is moved to the hopper by either pumping, belt conveyer or skips. Tremie pipe, with upper end connected to a hopper and lower end continuously submerged in fresh concrete, is used to place concrete at the exact location from a hopper at the surface. The reason to immerse the Tremie pipe lower end is to prevent intermixing of both concrete and water.</p>	<p><b>4M</b></p> <p>2 mark</p>

		<p style="text-align: center;"><b>Typical Arrangement of Tremie Method of Underwater Concreting</b></p>	2 mark
5	<p><b>(d)</b></p> <p><b>Ans.</b></p>	<p><b>Explain any four defects observed in plastering.</b></p> <p><b>Following are the defects in plastering:</b></p> <p>1) <b>Blistering of plastered surface:</b> it is the defect in which small patches of plaster are swelled out from the plastered surface.</p> <p>2) <b>Crazing:</b> it is the defect in which a series of hair cracks on plastered surface are formed due to improper proportion of ingredients.</p> <p>3) <b>Cracking:</b> it is the defect in which cracks are developed because of following reason-</p> <ol style="list-style-type: none"> <li>Improper preparation of surface to be plastered.</li> <li>Structure defects</li> <li>Lack of curing</li> <li>Faulty workmanship</li> </ol>	<p><b>(4M)</b></p> <p>1 marks each (any four)</p>



- 4) **Efflorescence:** it is the defect in which the whitish crystalline substances appears on the surface due to presence of salt in plaster materials and bricks.



- 5) **Popping:** it is the defect in which conical holes are formed in the plastered surface due to presence of some particles which expand on setting.
- 6) **Flaking:** it is the defect in which very loose mass of plastered surface is formed due to poor adhesion between successive coats.
- 7) **Rust strains:** it is the defect in which rust strains are formed on the plastered surface done on metal laths.
- 8) **Uneven surface:** it is the defect caused by poor workmanship.
- 9) **Peeling:** it is the defect in which there is complete dislocation of some portion of plastered surface which forms the patches.

5	(e)	<p><b>What is meant by composite masonry? State its different types.</b></p>	<b>(4M)</b>
	<p><b>Ans.</b></p>	<p><b>Composite masonry</b> Composite masonry is the one which is constructed out of two or more types of Building units or different types of building materials.</p> <p><b>Types of composite masonry</b></p> <ol style="list-style-type: none"> <li>1) Stone-composite masonry.</li> <li>2) Brick-stone composite masonry.</li> <li>3) Hollow clay tile</li> <li>4) Reinforced brick masonry</li> <li>5) Glass block masonry</li> <li>6) Brick-cement concrete block masonry.</li> </ol>	<p>2M</p> <p>½ M Each (any four)</p>
5	(f)	<p><b>State any four types of stone masonry. Explain Ashlar chamfered masonry with sketch.</b></p> <p><b>Ans</b></p> <p><b>Various types of stone masonry are as follows:</b></p>	<b>4M</b>



**Pile classification:-**

Friction Pile – Load Bearing Resistance derived mainly from skin friction

End Bearing Pile – Load Bearing Resistance derived mainly from base

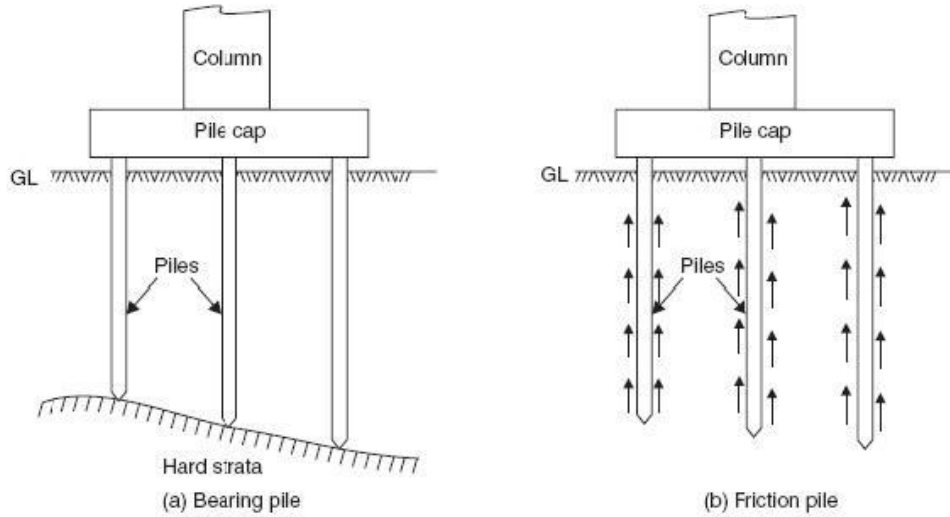


Fig. Pile foundations

1 M

**Well foundation-**

Well foundation is a type of deep foundation which is generally provided below the water level for bridges.

Caisson or well have been in use for foundations of bridges and other structures.

Caisson is water tight structure preferably made of wood ,steel , RCC constructed in connection with excavation for the foundation of bridges, piers, in rivers, dock structures

1 M

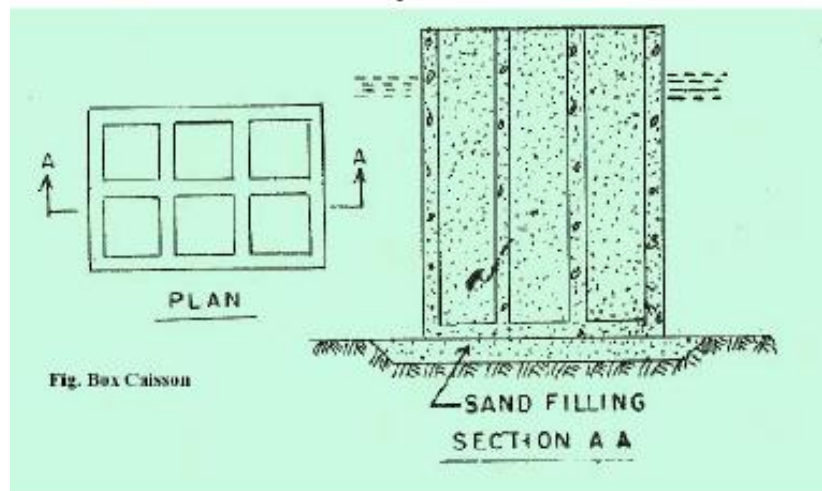
**Types of caissons-**

1. Open caisson-

Single wall open caisson , cylindrical open caisson, open caisson with dredging wells

2. Box caisson

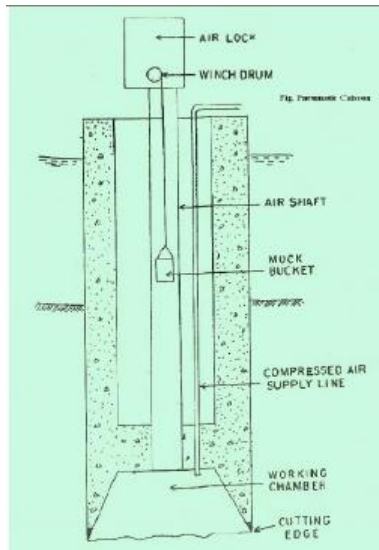
3. Pneumatic caisson



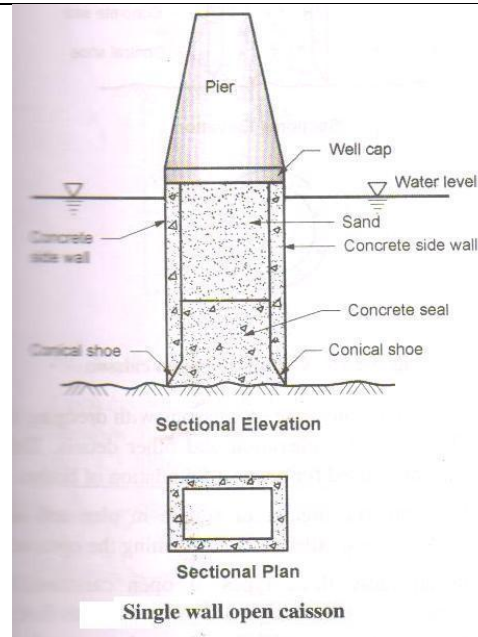
Box Caisson

1 M  
(Any one Dia)





Pneumatic caisson



Open caisson

6(a)

(ii)

**Distinguish between stone masonry and brick masonry.**

**4 M**

Ans.

**Differentiate between brick masonry and stone masonry**

Sr. no.	Brick masonry	Stone masonry
1.	It is cheaper than stone masonry	It is stronger than Brick masonry
2	It is cheaper in places where clay is available	It is cheaper in places where stone is available in abundance
3	Brick masonry gives less aesthetic view.	Stone masonry gives more aesthetic view than brickwork.
4	Brick masonry offer better fire resistance than stone	Stone masonry offers less fire resistance
5	Mortar joint in brick work are more	Mortar joint in stone work are less
6	Bricks are uniform in size so much skill is not required for proper bond	The size of stone is not uniform therefore greater care and skill is required
7	Plastering increases the life of brick from decaying.	Plaster does not stick nicely to a stone surface. It is difficult to apply any finishing to the stone surface
8	Brick masonry is light weight.	Stone masonry is heavier
9	Thickness of wall upto 10 cm	Thickness of wall more than 30 cm

1 mark each  
(Any four)

6

(b)  
Ans.

**Explain in details “prestressed concreting methods”.**

**8 M**

Prestressed concrete is a form of concrete used in construction. It is substantially compressed during its fabrication that strengthens it against tensile forces.

This compression is produced by the tensioning of high-strength tendons located within or adjacent to the concrete and is done to improve the performance of the concrete in service. Tendons may consist of single wires, multi-wire strands or threaded bars that are most commonly made from steels. The essence of prestressed concrete is that once the initial compression has been applied, the resulting material has the characteristics of high-strength concrete when subject to any subsequent compression forces and of

4M



		<p>ductile high-strength steel when subject to tension forces. This can result in improved structural capacity serviceability compared with conventionally reinforced concrete in many situations.</p> <p>Prestressed concrete is used in a wide range of building and civil structures where its improved performance can allow for longer spans, reduced structural thicknesses, and material savings compared with simple reinforced concrete.</p> <p><u>Prestressed concrete is classified as:-</u></p> <p>i) <b>Pre-tensioned concrete</b> uses tendons directly bonded to the concrete</p> <p>ii) <b>Post-tensioned concrete</b> can use either bonded or unbonded tendons.</p> <p><b>Applications:-</b></p> <p>High-rise buildings, residential slabs, foundation systems, bridge and dam structures and tanks, industrial pavements and nuclear containment structures.</p>	<p>2M</p> <p>2M</p>
6	(c)	<p><b>Explain soil reinforcing techniques with its four necessities and strengthening of embankment.</b></p>	<p><b>8M</b></p>
	<b>Ans.</b>	<p>Depending on the type of soil considered and the type of structure to be built, it is important to choose appropriate reinforcement techniques. Soil improvement techniques can increase the compactness of the existing soil, either by reducing the volume of voids, Soil reinforcement techniques themselves involve vertical or horizontal reinforcement elements in the soil. The objective of all these techniques is to allow the construction of a structure without excessive surface deformation or stability defects. In these techniques, they do not require excavation of the soil in place, thus reducing pollution related to the transport of materials and the risk of moving polluted soil.</p> <p><b>Necessity of soil reinforcing techniques:-</b></p> <p>i) To build a high-speed line (HSL) in an area of compressible ground, when this is more economical than diverting the line.</p> <p>ii) To install warehouses in a port area in which the soils are often highly compressible due to coastal geology.</p> <p>iv) To build an airport on an artificial island in a marine environment.</p> <p>v) To ensure the stability of the foundations, retaining walls, road embankments, railways etc.</p>	<p>4M</p> <p>4M (1M each)</p>