



**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**  
(Autonomous)

(ISO/IEC -270001 – 2005 certified)

**WINTER -2016 EXAMINATION**

**Subject code: 17308**

**Model Answer**

**Page No: 01/21**

**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

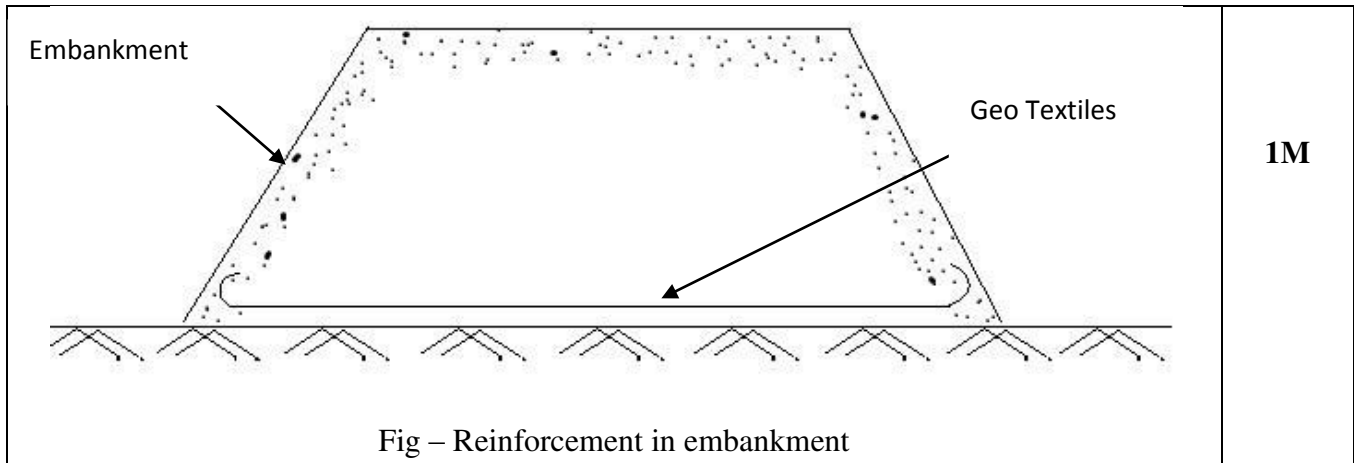
<b>Question and Model Answers</b>	
<b>Q.1. a ) Attempt any SIX of the following</b>	<b>12</b>
<b>a) State any four points considered while preparing job layout for building work.</b>	
Ans - Points to be considered while preparing job layout for building work i) Method of consideration ii) Nature & type 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. v) Requirements of site office, store rooms, labour quarter, godowns, first aid etc.	<b>½ M each</b>

<b>b) What is timbering and strutting?</b>	
Ans – <b><u>Timbering &amp; Strutting</u></b> – A method of giving temporary supports to the sides of deep trenches or when the subsoil is loose or very soft, is known as timbering & strutting.	<b>2M</b>
<b>c) Write any four tools and plants used for excavation.</b>	
Ans – Tools & plants used for excavation i) Spade ii) Phawrah iii) Crow bar iv) Pick - axe v) Rammer vi) Boning rod vii) Wedge viii) Sledge hammer ix) Iron pan x) Line & pins xi) Back trench hoe excavator xii) Dragline excavator xiii) Skimmer excavator	<b>½ M each</b>
<b>d) State the purpose of foundation</b>	
Ans – <b><u>Purpose of foundation</u></b> 1) The foundation provides a level surface for building operations. 2) To distribute the load of the superstructure over wider area . 3) To minimize the chances of unequal settlement by distributing the load over wider area. 4) To take the structure deep into the ground to provide stability and to prevent overturning.	<b>1 M each Any two</b>
<b>e) State various types of stone masonry</b>	
Ans – Various types of stone masonry are as follows: <b>1) <u>Rubble masonry</u></b> a) <u>Random rubble masonry</u> i) Coursed ii) Uncoursed  b) <u>Squared rubble masonry</u> i) Coursed ii) Uncoursed iii) Built to regular courses  c) <u>Miscellaneous</u> i) Polygonal ii) Flint  <b>2) <u>Ashlar masonry</u></b> a) Ashlar fine b) Ashlar chamfered c) Ashlar facing d) Ashlar rough tooled	<b>1M each any two</b>

e) Ashlar rock or quarry faced f) Ashlar block in course	
<b>f) State the purpose of providing cavity walls in building</b>	
Ans – The purpose of providing cavity walls in a building is to make the building heat , sound and damp proof.	<b>2M</b>
<b>g) Enlist four causes of cracks.</b>	
Ans – Causes of cracks 1) Due to moisture change. 2) Due to temperature variation 3) Due to vegetation. 4) Due to elastic deformation & creep. 5) Due to continuous vertical joints in masonry. 6) Due to faulty design. 7) Due to use of low quality materials. 8) Due to insufficient curing 9) Due to improper compaction of concrete. 10) Due to uneven settlement of the foundation.	<b>½ M each</b>
<b>h) State the uses of roller compacted concrete.</b>	
Ans – Uses of roller compacted concrete – 1) Roller compacted concrete is used in construction of dam. It can be used to overlay downstream slope of the existing embankment dam to protect the dam from exosion. 2) It is used in the construction of off highway pavements. 3) It is used in the construction of heavy duty parking & storage areas. 4) It is used as a base for conventional pavement. 5) It is used in ordinary roads, roads in factories, temporary roads for construction work. 6) It is used in service areas container yards, materials handling yards, apron & carriage way of airports etc.	<b>1M each any two</b>
<b>Q.1 B) Attempt any TWO of the following</b>	<b>8</b>
<b>a) State any four building components with their function of framed structure.</b>	
Ans – Following are the building components with their function. 1) <b>Foundation</b> – i) It transfer the load of building to the hard strata. ii) It spreads the load over a larger area. 2) <b>Plinth</b> – It raises the floor level above the surrounding soil to provide protection from rainwater, crawling animals & insects etc. 3) <b>Floor</b> – It provides smooth & plane surface 4) <b>Walls</b> - i) Separate the rooms from each other. ii) They act as partitions in framed structure.	<b>1M each</b>

<p>5) <b>Windows</b> – Provides air &amp; light inside the building.</p> <p>6) <b>Door</b> – Allow entrance in the building &amp; circulation through different rooms.</p> <p>7) <b>Roof / slab</b> - It protects the users from weathering elements like sun, rain, wind etc.</p> <p>8) <b>Beam</b> - Takes the load of slab &amp; transfer it to the column.</p> <p>9) <b>Column</b> – Takes the load of beam &amp; transfer it to the footing.</p> <p>10) <b>Lintel</b> - i) To support the loads of the portion of wall above the opening. ii) To transmit the load to the adjacent wall portions.</p> <p>11) <b>Staircase</b> – Provides access from one floor to other</p> <p>12) <b>Parapet</b> – Provides safety to the users of terrace.</p> <p>13) <b>Lifts</b> – In buildings having more than three floors, lift provides access from one floor to other.</p>	
<p><b>b) State the general principles to be observed during construction of good quality stone masonry.</b></p>	
<p>1) The stones selected for masonry work should be hard, tough &amp; durable.</p> <p>2) The stones in the masonry work must be well watered before use so that they do not absorb the moisture from the mortar.</p> <p>3) Care should be taken to secure good bond throughout the masonry. There should be no hollows left &amp; all the interstices should be well packed with mortar &amp; chips</p> <p>4) There should be thin &amp; uniform mortar joint .</p> <p>5) The faces of the wall should be constructed truly vertical &amp; their verticality should be tested by plumb bob.</p> <p>6) The entire masonry work should be kept wet until the mortar is set &amp; becomes hard.</p> <p>7) Load or weight should act axially &amp; centrally on masonry sections</p> <p>8) The exposed surface should be properly pointed with cement mortar or lime mortar</p> <p>9) Through stones must be introduced in each course at 1 to 1.5m apart, for the full thickness of the wall.</p> <p>10) The masonry in the entire length of the wall should be raised uniformly so that the pressure on the foundation under the entire length may be uniform.</p>	<p><b>1M each Any four</b></p>
<p><b>c) What do you mean by vacuum dewatering concreting? Where it is used?</b></p>	
<p>Ans – <b>Vacuum dewatering concreting</b> – It is the method of removal of surplus or extra water from the concrete to maintain optimum water / cement ratio by vacuum system to increase impact strength or toughness of wearing coarse of concrete.</p>	<p><b>2M</b></p>

<p><b>Uses</b></p> <ol style="list-style-type: none"> <li>I. Used in construction of bridges.</li> <li>II. In construction of parking decks.</li> <li>III. Industrial flooring</li> <li>IV. Construction of jetties</li> <li>V. Heavy duty highways</li> </ol>	<b>½ M each any four</b>
<p><b>Q. 2 Attempt ANY FOUR of the following</b></p>	<b>16</b>
<p><b>a) What are the remedial measures to overcome settlement?</b></p>	
<p>Ans – Following are the remedial measures to overcome settlement:</p> <ol style="list-style-type: none"> <li>1) Proper investigation of soil strata by trial pits &amp; borehole data.</li> <li>2) Special type of foundations for expansive soil such as black cotton soil.</li> <li>3) Compaction of the soil over the complete area at foundation level.</li> <li>4) Dewatering of foundations if ground water table interferes with foundation.</li> <li>5) Consideration of earthquake loads &amp; other earthquake resisting methods during design &amp; construction of building.</li> <li>6) If the site is near the river, the site should be selected above R.L. of maximum flood level.</li> <li>7) Proper design so that large load difference does not exist on different parts of foundation.</li> <li>8) Stabilisation of soil of foundation level if it is excessively compressible.</li> </ol>	<b>1 M each any four</b>
<p><b>b) Explain the strengthening of embankments by soil reinforcing techniques with neat sketch (Any One)</b></p>	
<p>Ans – Strengthening of embankments is done by soil reinforcing techniques. Soil reinforcing is done by geo-synthetic materials like geo – grids, geo-textiles or geo – composites, wire mesh rod of metals, wire grid, horizontal strip of metal etc.</p> <p><b><u>Geotextile as reinforcement for strengthening soil</u></b></p> <ol style="list-style-type: none"> <li>1) Geotextiles can be used to increase the load carrying capacity of soil</li> <li>2) Geotextiles are used as reinforcement in the soil. The action is somewhat similar to steel bars in reinforced concrete slab.</li> <li>3) Geotextiles are used in unpaved road construction over soft soil. These are laid over the soil &amp; the base course of the road is placed over it.</li> </ol>	<b>1M  2M</b>

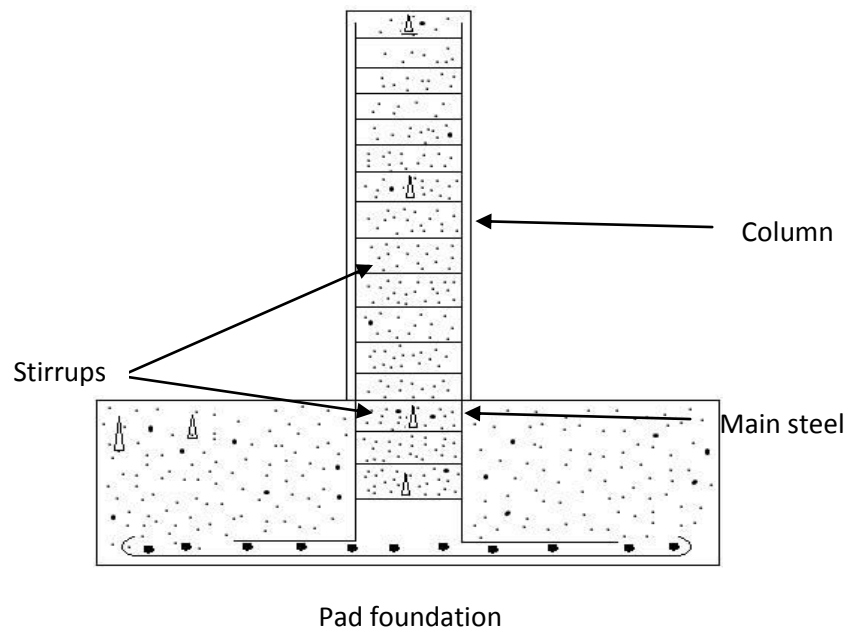


1M

c) Suggest the suitable and economic foundation in 2.5 m depth of black cotton soil for a building with neat sketch.

Ans – Here the depth of black cotton soil is more i.e. 2.5m. Hence following type of foundations may be provided

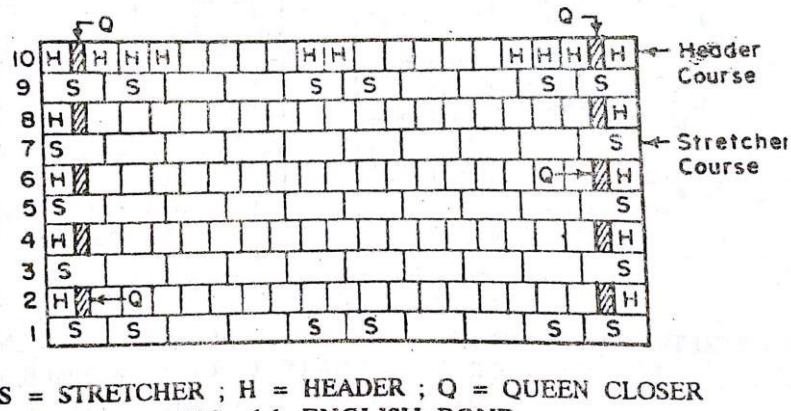
- 1) Strip or pad foundation.
- 2) Pier foundation with arches
- 3) Under reamed pile foundation.
- 4) Raft foundation



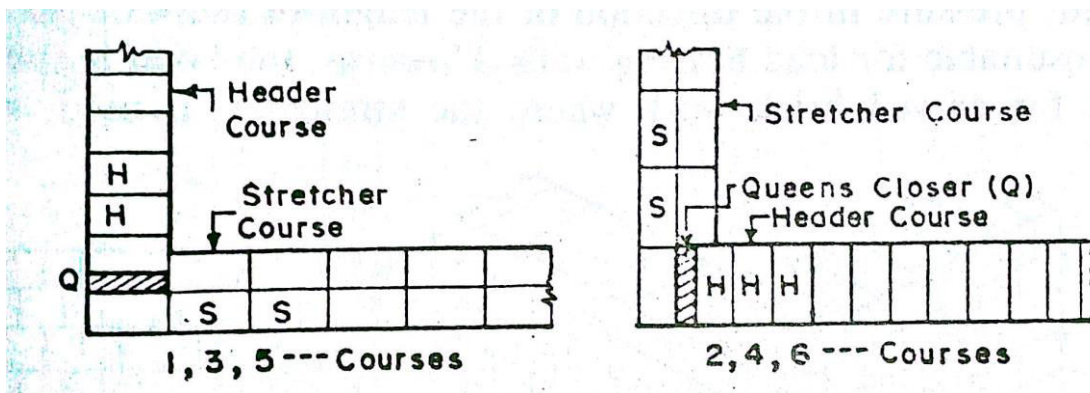
*(NOTE: Any one type of foundation may be suggested  
Suggested foundation 1 mark, sketch 2 marks, labelling 1 mark )*

d) Explain English bond with help o neat sketch

Ans –



Elevation



Plan of stretcher course

Fig – English Bond – One brick wall

This bond has alternate courses of headers & stretchers with a closer placed next to quoin header. Following points should be remembered

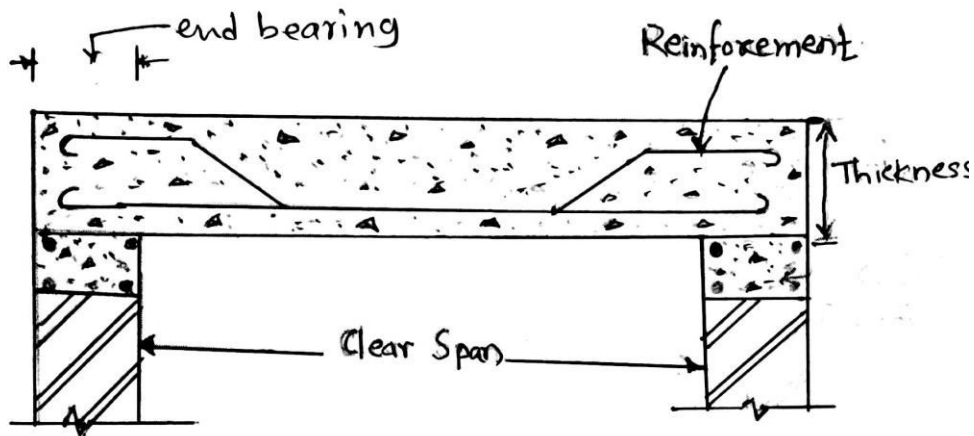
- 1) A heading course should never start with a queen closer.
- 2) Every alternate header comes centrally over the joint between two stretchers in course below giving a lap of 5 cm.
- 3) There is no continuous vertical joint.
- 4) Walls of an even number of half bricks in thickness, present the same appearance on both faces.
- 5) Walls of an odd numbers of half bricks in thickness will show each course comprising of headers on one face & stretchers on another face.
- 6) The middle portion of each of the thicker walls consists headers.
- 7) The number of vertical joints in the header course is twice the number of joints

<p>in the stretcher course.</p> <p>8) This bond is stronger and costlier than Flemish bond.  <i>(* 2 marks for figure , 1/2 marks each for any four points explanation )</i></p>																				
<p><b>e) Differentiate between plastering and pointing.</b></p>																				
<p>Ans –</p> <table border="1"> <thead> <tr> <th>Sr No.</th> <th>Plastering</th> <th>Pointing</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>It is the covering with material of various compositions applied to the wall.</td> <td>It is the art of finishing the mortar joints in the exposed masonry</td> </tr> <tr> <td>2.</td> <td>It is done on both external &amp; internal surface.</td> <td>Generally done in external surface.</td> </tr> <tr> <td>3.</td> <td>It is strong as compared to pointing</td> <td>Mortar joints are weak part of masonry.</td> </tr> <tr> <td>4.</td> <td>It is costly.</td> <td>It is cheaper.</td> </tr> <tr> <td>5.</td> <td>Types –            a) Single coat            b) Neeru finish            c) POP etc</td> <td>Type            a) Flush pointing            b) Recessed pointing            c) Beaded pointing            d) Tuck pointing etc</td> </tr> </tbody> </table>			Sr No.	Plastering	Pointing	1.	It is the covering with material of various compositions applied to the wall.	It is the art of finishing the mortar joints in the exposed masonry	2.	It is done on both external & internal surface.	Generally done in external surface.	3.	It is strong as compared to pointing	Mortar joints are weak part of masonry.	4.	It is costly.	It is cheaper.	5.	Types – a) Single coat b) Neeru finish c) POP etc	Type a) Flush pointing b) Recessed pointing c) Beaded pointing d) Tuck pointing etc
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<p><b>f) Explain king post truss &amp; queen post truss with it's suitability of each.</b></p>																				
<p>Ans – <b><u>King post truss</u></b></p> <p>1) In this type of truss, the central post is known as a king post. It supports tie beam.</p> <p>2) The inclined member is known as a strut. It's function is to prevent the principle rafter from bending in the middle.</p> <p><u>Suitability</u>          It is suitable for roofs having spans 5m to 8m</p> <p><b><u>Queen post truss</u></b></p> <p>1) In this, two vertical members are used so, it is called as Queen Post.</p> <p>2) The appear end of the queen post are kept in position by horizontal member. It is known as straining beam</p> <p><u>Suitability</u>          It is suitable for roofs having spans 9m to 14 m.</p> <p><i>(Note: Instead of description if sketches are drawn, marks may be given)</i></p>																				
		<p><b>1 M</b></p> <p><b>1M</b></p> <p><b>1 M</b></p> <p><b>1 M</b></p>																		



<b>Q.3 Attempt any FOUR of the following</b>	<b>16M</b>
a) <b>What is scaffoldings? State any two types of it with their function.</b>	
<p>Ans – <u>Scaffoldings</u> 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.</p> <p>Type of scaffolding :- (ANY TWO)</p> <p>i) Brick – Layers scaffolding or single scaffolding. Function :- It is used for brick laying</p> <p>ii) Masons scaffolding or double scaffolding Function :- It is used in case of stone masonry because it is very difficult to make holes into the wall.</p> <p>iii) Needle scaffolding or cantilever scaffolding Function :- 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).</p> <p>iv) Steel scaffolding Function :- Quick erection Usable for more height</p> <p>v) Trestle scaffolding Function – It is used for painting of repair works inside the room.</p> <p>vi) Suspended scaffolding :Where finishing work is on height.</p>	<p><b>2M</b></p> <p><b>1 M each Any two types with function</b></p>
b) <b>Define prefabricated structure. Enlist any four advantages and disadvantages</b>	
<p>Ans – Prefabricated structure</p> <p><b><u>Definition</u></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><u>Advantages</u></b></p> <ol style="list-style-type: none"> <li>1) Large production of units &amp; building components.</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>2 M</b></p> <p><b>1 M For any four</b></p>

<p><b><u>Disadvantages</u></b></p> <ol style="list-style-type: none"> <li>1) Design needs to be complete before casting commences.</li> <li>2) Last minute alterations to the structure are impossible.</li> <li>3) It is costlier than in – situ work; especially for small scale works.</li> <li>4) Unsuitable if structural alteration might be needed in the future.</li> <li>5) Units require care &amp; protection while in storage, during transport &amp; while handling on site.</li> <li>6) Prestressed floor panels or beams can create problems with uneven camber in different units.</li> <li>7) Unsuitable in case of structure which can not be satisfactorily broken into small components.</li> <li>8) Precast component may require excessively large site handling, hoisting equipments.</li> </ol>	<b>1 Mark for any four</b>
<p><b>c) Give any eight precautions you will take while setting out foundation for residential building.</b></p>	
<p>Ans – Precautions to betaken while setting out foundation for residential building:</p> <ol style="list-style-type: none"> <li>1) Correct measurement of distances, preferably by steel tape.</li> <li>2) Correct fixing of plot boundaries with help of location sketch.</li> <li>3) Use of level, either dumpy level or mason’s level or total station instrument.</li> <li>4) Correct making of face line or centre line.</li> <li>5) Checking of distances from atleast two independent measurements.</li> <li>6) Diagonal checks for individual room positions as well as for complete building.</li> <li>7) Use of correct plumb bob for transferring points on ground.</li> <li>8) Meticulous care in all types of measurements.</li> <li>9) Follow all necessary by - laws.</li> <li>10) Necessary site clearance should be done before starting work.</li> </ol>	<b>½ M each any eight</b>
<p><b>d) Draw section of a R.C.C slab roof showing thickness, end bearing, clear span and reinforcement.</b></p>	



(Neat sketch 2 marks, components 2 marks)

#### RCC Roof slab section

e) Suggest most suitable type of door for the following

- 1) Entrance of Bank - Collapsible door or rolling shutter.
- 2) Garage – Rolling shutter
- 3) Main door of residential building – Panelled door
- 4) Garden – Revolving Doors

1 M  
for  
each

f) Why metal windows are preferred to wooden windows?

Ans – Metal windows are preferred to wooden windows because :

- 1) Metal windows are termite proof.
- 2) It is highly fire resistant.
- 3) It is strong & more durable.
- 4) It is no contraction & expansion.
- 5) It manufactured with great precision.
- 6) It is easy to maintain.
- 7) Good in appearance
- 8) Better for safety purpose.
- 9) Fast erection is possible.

1 M  
each  
any  
four

#### Q.4 Attempt any FOUR of the following

16 M

a) Explain pre – tensioning and post – tensioning prestressed concrete.

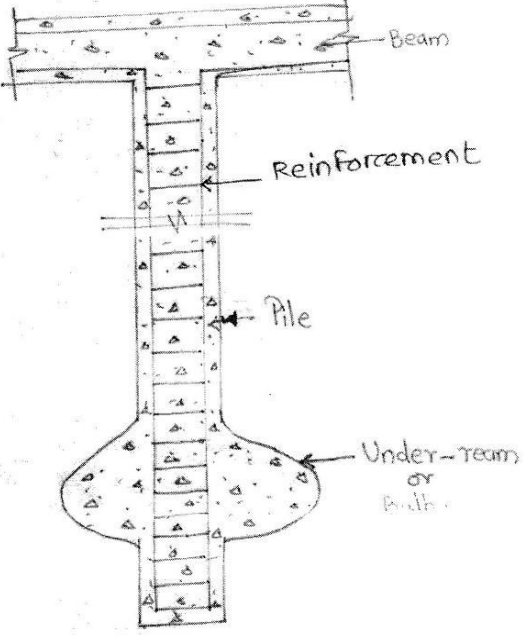
Ans - Pre – Tensioning

- i) A system of prestressing involves the process of tensioning the tendons and securing them firmly to the concrete.
- ii) The simplest method of making a pre – tensioned member is to pull the tendon between abutments which are anchored firmly against the ends of the stressing bed.
- iii) The tendons are cut off at each end after the concrete hardens. Now the prestress is transferred to the concrete.

Post – Tensioning

2 M

<p>i) The basic principle, in all post – tensioning system is to introduce prestresses in the concrete member cast previously by tightening the tendons accommodated in the ducts which are formed while casting the beam.</p> <p>ii) The tendons are pulled using a jack against the end of the concrete members; the desired prestressing force is obtained.</p> <p>iii) After the wires are pulled, they are anchored in their stretched position.</p>	<b>2 M</b>
<b>b) Explain the process of Guniting and Grouting, to repair concrete work.</b>	
<p>Ans – <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 concrete pump &amp; concrete 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 concrete sticks to the surface.</li> </ol>	<b>2 M</b>
<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 the cracks &amp; even deep in the branches &amp; sub – branches of cracks.</li> </ol>	<b>2M</b>

<p>c) What is under – reamed pile? Draw neat sketch showing the details of it.</p>	
<p>Ans – Under reamed pile – It is a bored cast in situ concrete pile having one or more bulbs at its lower end.</p>	<p>1 M</p>
<div style="text-align: center;">  </div>	<p>*</p>
<p>(Note – *- Neat sketch 2 Marks, components 1 Marks)</p>	
<p>d) Define the following</p>	
<p>i) <b>Facing</b> – The material used in the face of the wall is known as facing.  ii) <b>Backing</b> – The material used in the back of the wall is known as backing.  iii) <b>Hearting</b> – The portion of wall between facing of backing is known as hearting.  iv) <b>Through stone</b> - In stone work, some stones at regular intervals are placed right across the wall such stones are known as through stone.</p>	<p>1 M for each def.</p>
<p>( Note- Student may draw sketch, so give credit accordingly )</p>	
<p>e) Explain process of surface preparation and painting an old wooden surface</p>	
<p>Ans –</p> <ol style="list-style-type: none"> <li>1) The old painted surface must be thoroughly cleaned.</li> <li>2) If greasy ,washed with lime &amp; water, mobbed down with pumice and all the dents, holes are filled with putty.</li> <li>3) Old paint can also be removed by applying any one of the following there paint solvent. <ol style="list-style-type: none"> <li>a) A solution containing 200 gm of caustic soda to a litre of water is prepared and used to wash the surface.</li> <li>b) The mixture containing of one part of soft soap &amp; two parts of potash is prepared and one part of quick lime is added afterwards. This mixture is applied on the surface in a hot state , allowed to stay for about 24 hours. The surface is then washed with hot water</li> </ol> </li> <li>4) After removing old paint from the surface wood work is painted.</li> </ol>	<p>4M</p>

<p><b>f) What is DPC? State its necessity.</b></p>	
<p>Ans – DPC It is a water proof layer applied in between substructure and superstructure to prevent moisture (dampness) from passing into the interior part of building</p> <p><b>Necessity –</b></p> <ol style="list-style-type: none"> <li>1) To prevent seepage of moisture to superstructure.</li> <li>2) To keep building material / components dry.</li> <li>3) Increase life of painting work and enhance beauty of building.</li> <li>4) To minimize maintenance work of structure.</li> <li>5) Controls bacterial growth and improves hygienic conditions</li> </ol>	<p><b>2 M</b></p> <p><b>1 M each any two</b></p>
<p><b>Q.5 Attempt any FOUR of the following</b></p>	<p><b>16 M</b></p>
<p><b>a) State four uses of wire mesh and geosynthetics.</b></p>	
<p>Ans –</p> <ol style="list-style-type: none"> <li>1) Geotextile as separators between two layers of soils having a large difference in particle sizes to prevent migration of small sized particles into the voids of large size particles.</li> <li>2) Used as filters instead of conventional sand filters.</li> <li>3) Used as to drain water safely from one place to other to safeguard the embankment, retaining wall.</li> <li>4) Used as reinforcement for strengthening soil embankment, fills.</li> <li>5) Used as reinforcement in retaining wall.</li> <li>6) Used in reinforced earth, foundation .</li> </ol>	<p><b>1 M each any four</b></p>
<p><b>b) What is meant by composite masonry? State it's different types.</b></p>	
<p>Ans – <b><u>Composite masonry</u></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><u>Types of composite masonry</u></b></p> <ol style="list-style-type: none"> <li>1) Stone – composite masonry.</li> <li>2) Brick stone composite masonry.</li> <li>3) Cement concrete masonry.</li> <li>4) Hollow clay tile</li> <li>5) Reinforced brick</li> <li>6) Glass block</li> </ol>	<p><b>2M</b></p> <p><b>½ M each any four</b></p>
<p><b>c) State the different types of bonds used in brick masonry. Enlist the requirements of good bond.</b></p>	
<p>Ans – <b><u>Types of bonds used in B M</u></b></p> <ol style="list-style-type: none"> <li>1) Stretcher bond</li> <li>2) Header bond</li> <li>3) English bond</li> <li>4) Flemish bond</li> <li>5) Facing bond</li> <li>6) English cross bond</li> <li>7) Brick on edge bond</li> <li>8) Dutch bond</li> </ol>	<p><b>1/2 M each any four</b></p>

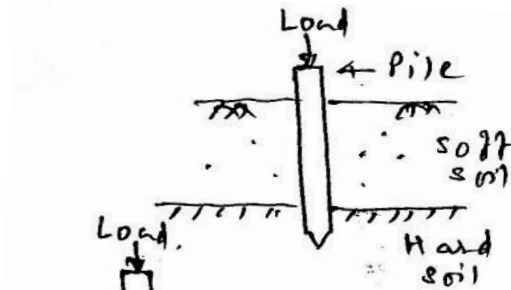
<p>9) Raking bond 10) Zigzag bond 11) Garden bond</p> <p><b><u>Requirements of good bond</u></b></p> <ol style="list-style-type: none"> <li>1) Bricks should be of uniform size. Length of the brick should be twice of its width plus one joint, so that uniform lap is obtained.</li> <li>2) The amount of lap should be min ¼ brick along length of the wall and ½ brick across the thickness of the wall.</li> <li>3) Use of brick bats should be used only at special locations.</li> <li>4) Vertical joints in the alternate courses should be along the same perpend.</li> <li>5) Stretchers should be used only in the facing, they should not be used in the hearting.</li> <li>6) Preferably provide every sixth course as a header course on both side of the wall.</li> <li>7) Bond should give pleasing appearance.</li> <li>8) Bond pattern selected should carry the loads and prevent any structural failure.</li> </ol>	<p><b>1 M each any two</b></p>																																							
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<p><b>e) What is Raft-foundation? State its suitability with different types.</b></p>																																								
<p>Ans – Raft foundation – A raft or mat is a combined footing that covers the entire area beneath a structure and supports all the walls and columns and transfers loads to sub soil when S.B.C is less.</p>	<p><b>1M</b></p>																																							

<p><b><u>Types of raft with their suitability</u></b></p> <ol style="list-style-type: none"> <li>1) <u>Flat plate raft foundation</u> Suitable when column spacing is small and column loads are relatively small.</li> <li>2) <u>Flat Plate thickened under column</u> Suitable when the column loads are heavy.</li> <li>3) <u>Flat plate with pedestals</u> Suitable when column loads are heavy.</li> <li>4) <u>Two way beam &amp; slab</u> Suitable when column spacing is large and or the column loads are heavy.</li> <li>5) <u>Cellular construction</u> Suitable when loads are extremely heavy, two way grid structure made of cellular construction may be used.</li> <li>6) <u>Basement walls as rigid frame</u> Suitable where basements are to be provided, the walls may be used as ribs or deep beams.</li> <li>7) <u>Piled raft</u> Suitable when bearing area of raft is less which can be strengthened by pile for heavy super structure loads.</li> </ol>	<p><b>1M each any three</b></p>
<p><b>f) Explain termite proofing with it's necessity and importance.</b></p>	
<p>Ans – 1) Termites also known as white ants causes considerable damages to wood work, furnishings etc. of buildings.</p> <ol style="list-style-type: none"> <li>2) Treatment given to building components to prevent or control the growth of termite is called termite proofing</li> <li>3) Termites are capable of survival under most adverse conditions &amp; environments and are very fast in eating wood &amp; other cellulose material such as wood.</li> <li>4) Termites hollows the timber thereby decreases strength &amp; stability of structure.</li> <li>5) Due to termite attack on building components the durability decreases.</li> <li>6) Termite proofing may be pre – construction &amp; post construction.</li> </ol>	<p><b>1 M each any four</b></p>
<p><b>Q.6 Attempt any TWO of the following</b></p>	
<p><b>a) Explain pile foundation and well foundation with neat sketches.</b></p>	
<p>Ans – <b><u>Pile foundation</u></b></p> <ul style="list-style-type: none"> <li>• Piles are used when load of the super structure is heavy and its distribution is uneven.</li> <li>• The top soil has poor bearing capacity.</li> <li>• Piles are used when the top soil is of expansive in nature.</li> <li>• Piles are used when open excavation is not feasible for shallow foundation construction.</li> <li>• Piles may be classified based on function and material, construction methods</li> </ul>	<p><b>½ M each any four points</b></p>

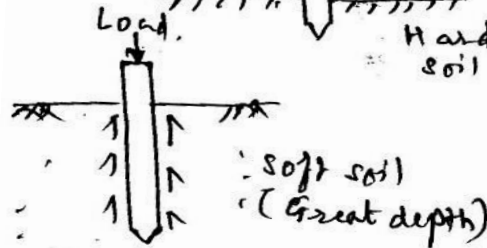


- Functional classification

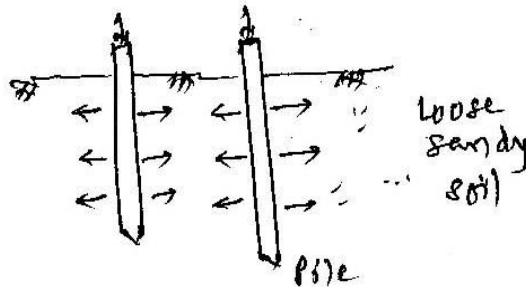
1) End bearing pile



2) Friction Pile



3) Compaction pile

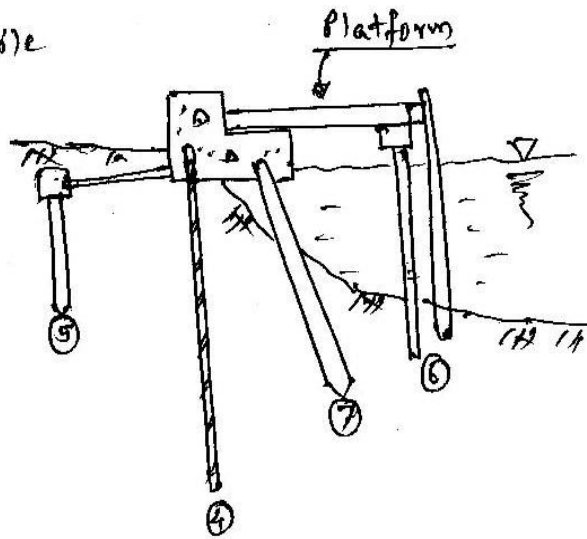


4) Sheet pile

5) Anchor pile

6) Fender pile

7) Batter pile



- Piles based on material

- i) Timber pile
- ii) Concrete pile
- iii) Steel pile
- iv) Composite pile

½ M  
each  
any  
four  
sketches  
of  
piles

- Piles based on method of construction
  - i. Precast pile
  - ii. Cast in situ pile
  - iii. Special type – Under reamed pile

*(Note: In case of pile foundation if sketches are drawn as per materials of pile, marks may be given.)*

**Well foundation**

**General-**

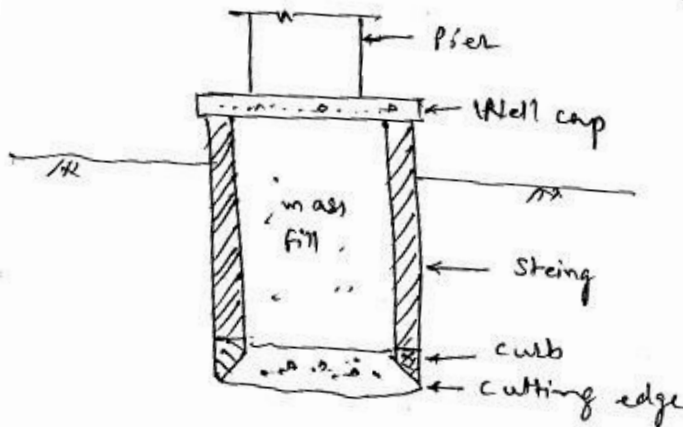
- Well or box like structure , round or rectangular which is sunk from the surface of either land or water to desired depth.
- It made up of wood, steel, reinforced concrete.
- It used for foundation of bridges, docks and harbours
- Well foundation remains in position and remains integral parts of permanent structure.

See footnote

**Types of well foundation**

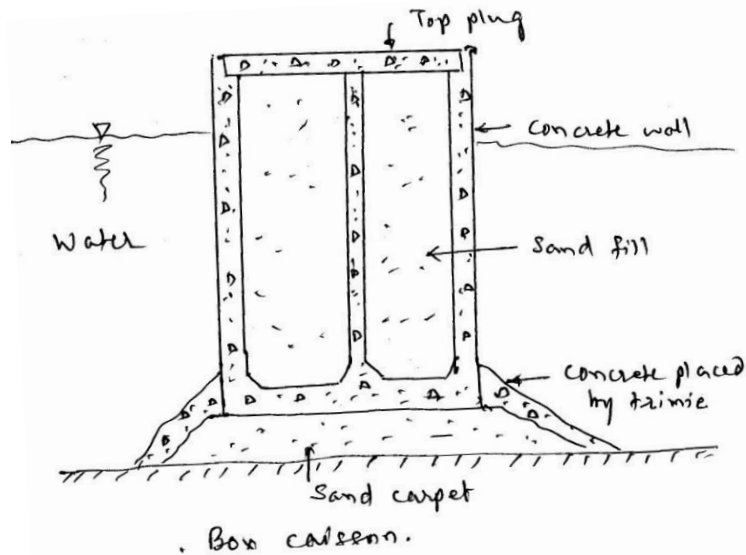
**i) Open well (caisson)**

- Open at top and bottom during sinking
- Bottom is closed when desired sinking is completed with concrete.
- Well is filled with mass such as sand, boulders etc.
- The top is plugged with concrete which supports pier



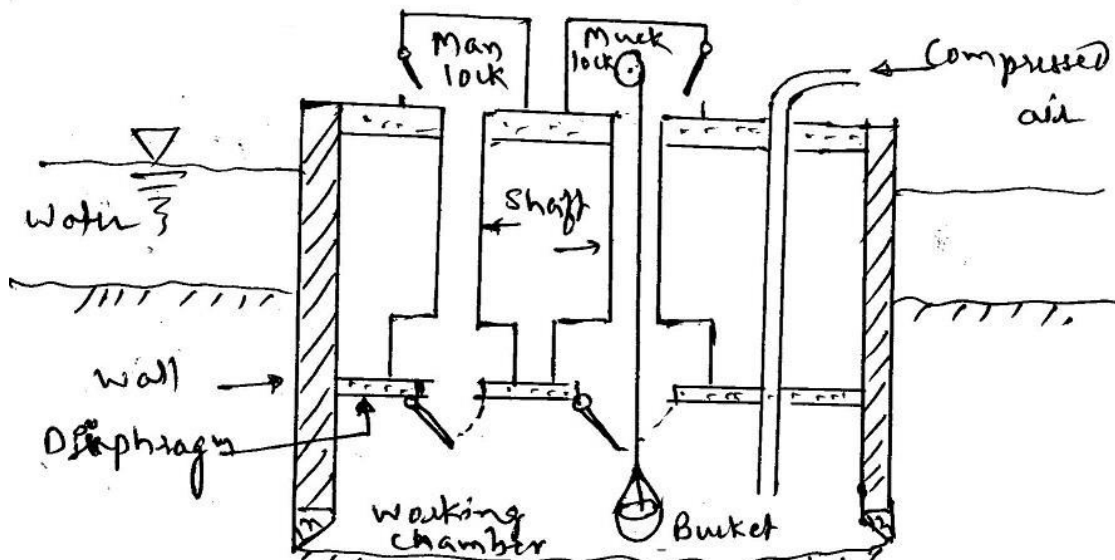
**ii) Box caisson**

- A box is open at top and closed at bottom during sinking.
- This is built on land then launched and floated to pier site where it is sunk in position.
- This is used when bearing stratum is available at shallow depth and where loads are not very heavy.
- Used for break waters and sea walls.



**iii) Pneumatic caisson**

- Pneumatic caissons are closed at top and open at bottom during construction.
- Compressed air used to exclude or remove water from the working chamber at the bottom and excavation is carried out in dry conditions.
- Sinking is carried out till it reaches the hard stratum.
- Bottom is closed when reached to desired depth as usually carried in open well.



( Note- Marks for well foundation: 1 mark for any two general points,  
 2 marks for any one Sketch,  
 1 mark for any two points of drawn sketch. )

**b) What is tremix floor? Write the procedure to construct tremix floor.**

Ans – Tremix floor

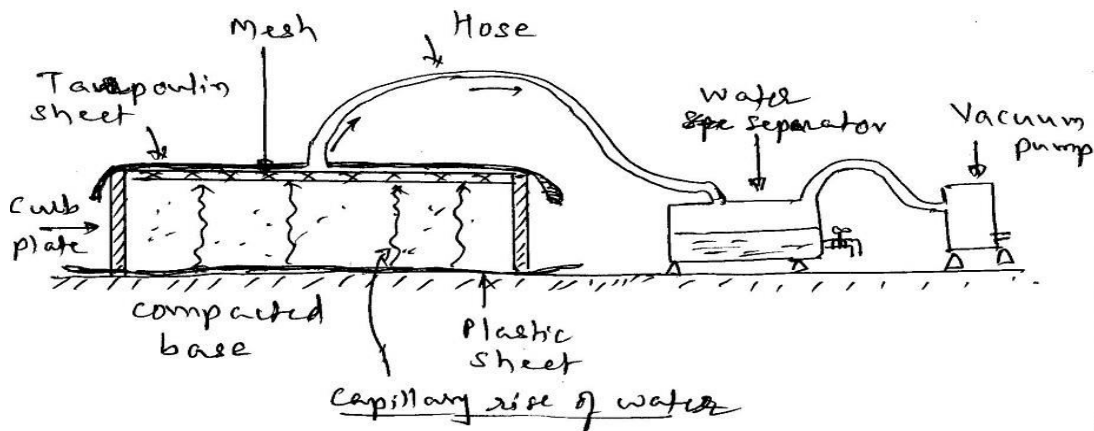
- It is flooring work is done by vacuum dewatering system from concrete when i is placed on site
- It is strong and durable concrete used for industrial floor, parking area, pavements.

2M

**Procedure of construction**

- 1) The compacted and levelled ground is covered with plastic sheet (Impermeable).
- 2) Concrete is placed on plastic sheet with high w/c ratio & workability.
- 3) Slab is curbed by steel plate at side wall.
- 4) Concrete is levelled to required thickness.
- 5) The levelled concrete surface is covered with mesh.
- 6) The whole mesh is covered with tarpoulin sheet and having central hose.
- 7) Through hose pipe air and water from concrete is sucked by application of vacuum by pump.
- 8) Due to atmospheric pressure concrete is consolidated and due to removal of entrapped air, excess water concrete become stronger.
- 9) When water suction stops, the application of vacuum is stopped. After sufficient hardening the surface, it is power trowelled.

4M  
for  
Proced  
ure



2M

\* Tremix floor construction \*

<p><b>c) Explain the Ready Mix Concrete w.r.t.</b></p>	
<p><b>a) R.M.C Definition -</b> The system of concrete manufacturing at one centralized location with uniform quality in controlled manner named as technology of ready mix concrete.</p> <p>The concrete is manufactured in bulk and controlled its quality at manufacturing point. The concrete is supplied to site through trucks, conveyors, pipes.</p> <p><b>b) Application</b></p> <ol style="list-style-type: none"> <li>1) When site manufacturing of concrete is not possible then RMC used.</li> <li>2) Site is so long, concreting at every point is not economical.</li> <li>3) RMC is used in congested area.</li> <li>4) When concerting is to be done in adverse climatic conditions.</li> <li>5)RMC can be used for building, road construction, dams, foundations.</li> </ol> <p><b>c) Workability</b></p> <ul style="list-style-type: none"> <li>• Workability of concrete in RMC is maintained by application of admixtures like additives, plasticizer retarding agents, air entertaining agents</li> <li>• Workability of concrete is also affected by proportions of ingredients.</li> <li>• Air entraining agents increasing cohesion &amp; reducing tendency of bleeding of concrete</li> <li>• Workability of concert is maintained also by agitation concrete during transportation</li> </ul> <p><b>d) Equipments used</b></p> <ol style="list-style-type: none"> <li>1) Storage silos for cement</li> <li>2) Storage of aggregates <ol style="list-style-type: none"> <li>i) In silos</li> <li>ii) Open storage (Partitioned stacks with a dragline / conveyor for feeding them to mixture)</li> </ol> </li> <li>3) Batching plant of required capacity (20 to 240 m<sup>3</sup> / hr)</li> <li>4) Testing laboratory</li> <li>5) Small workshop</li> <li>6) Vehicles to transport concrete to site</li> <li>7) Concrete pumps &amp; conveyors</li> </ol>	<p><b>2M</b></p> <p><b>½ M each for any four applications</b></p> <p><b>1 M each any two</b></p> <p><b>½ M each for any four</b></p>