



MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION  
(Autonomous)

(ISO/IEC -270001 – 2005 certified)

Summer-2017 EXAMINATION

Subject code: 17308- BCO

Model Answer

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**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

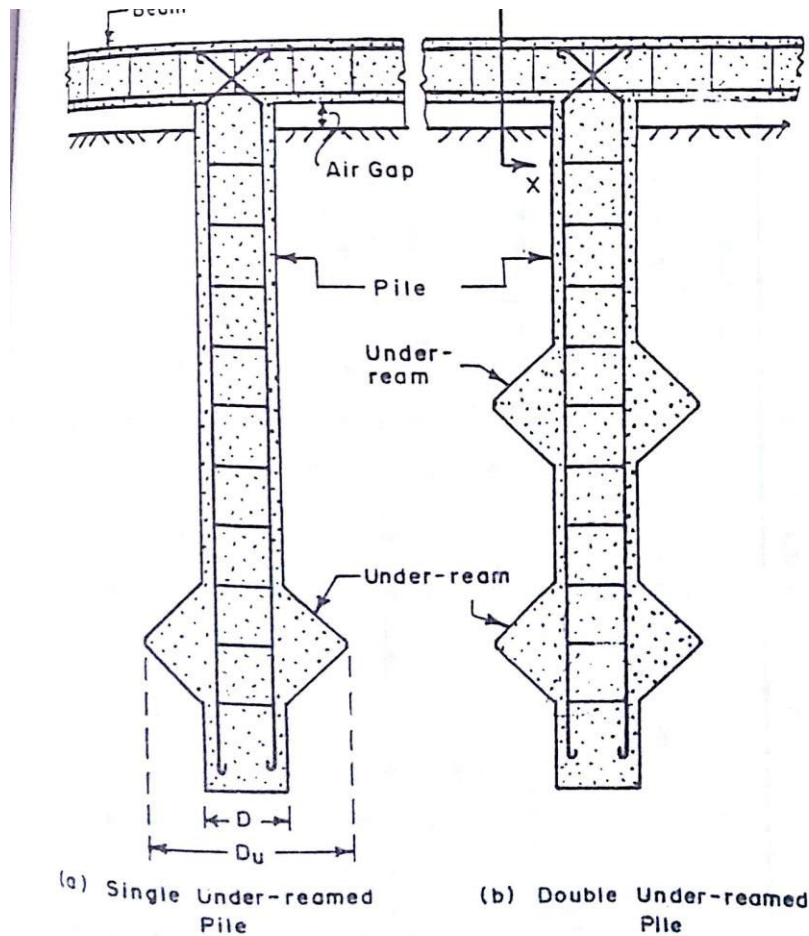
Question and Model Answers	Marks
<b>Q.1A) Attempt ANY six of the following</b>	<b>12</b>
<b>i) Define Neeru Finishing.</b>	
<b>Neeru Finish-</b> A coat which consist of cream of white or fat lime <b>OR</b> -This is a 3mm third coat applied after 5 days consisting cream of white or fat lime applied as a finishing or setting coat <b>OR</b> -It is final coat / third coat of lime plastering consisting lime and white sand in 1:2 proportion applied after 5days of second coat and finally finished with trowel or polished stone.	<b>2M</b>
<b>ii) Define i)Weathering, ii)Trough stone</b>	
<b>i)Weathering-</b> It is a term related with stone masonry in which upper surface of stone masonry is dressed in a sloping way so that the water may flow off easily. <b>ii)Through stone</b> – In stone work some stones at regular intervals are placed right across the wall. <b>OR</b> -A stone that is set with its longest dimension perpendicular to the face of the wall and - whose length is equal to the thickness of the wall.	<b>1M</b> <b>1M</b>
<b>iii) Give four components of Door Frame.</b>	
<b>i) Head, ii) Sill iii) Posts iv) Hold Fast v) Horn</b>	<b>½ M each</b>

<b>iv) What is Purpose of winder step?</b>	
1)Winders are used to change the direction of stairs without landings. 2)For spiral or circular stairway winders are provided.	<b>2M</b>
<b>v) List any four forms of stair.</b>	
1) Geometrical stair 2) Dog legged stair 3)Quarter turn stair 4) Half turn stair 5) Bifurcated stair 6) Open newel stair 7)Straight stair 8) Spiral stair 9) Circular stair	<b>½ M each</b>
<b>vi) State any four characteristics of good Paint.</b>	
1)The paint film should get dry rapidly. 2)It should provide workability. 3)It should provide resistance to failure by cracking and flaking. 4)The paint should be cheap in initial cost. 5)It should spread maximum surface area in minimum quantity without compromising quality. 6)Paint colour should not change due to weathering conditions. 7)The paint should forms hard and durable surface. 8)It should not affect health of workers during its application.	<b>½ M each</b>
<b>vii) Define the term i) Guniting ii) Grouting</b>	
<b>Guniting</b> -Process of applying cement and sand (1:3)mixture under pressure (20-30N/cm <sup>2</sup> ) on concrete surface in order to repair concrete work. <b>OR</b> It is a process of repairing concrete work or damaged surface using mortar under pressure. <b>OR</b> Guniting is a process of applying mortar pneumatically.	<b>1M</b>
<b>ii)Grouting</b> - Process of placing grout material(cement+sand+admixture if any) in existing cracks or cavities <b>OR</b> it is a thin mortar used to fill cracks and cavities in masonry. <b>OR</b> The process of placing a grout material into cavities of concrete or masonry is called grouting.	<b>1M</b>
<b>viii) Name any four accessories required for prestressing work.</b>	
1) Hydraulic jack 2)Anchorages for post tensioning 3)Temporary gripping devices 4)Releasing devices 5) Wedges 6) Bearing plates.	<b>½ M each</b>
<b>Q1B) Attempt Any Two of the following</b>	<b>8</b>
<b>i) State the suitability of Load Bearing and Framed structure.</b>	
<b>Load bearing Structure:</b> 1) For low cost housing. 2)Use of local materials can be unavoidable. 3)Suitable for non earthquake zone. 4)Suitable for low height structures. <b>Framed Structures:</b> 1)Multistoried Building construction. 2)suitable for Earthquake prone zone . 3)suitable for any type of foundation and strata. 4)suitable for where speed of work is essential.	<b>1M each any two</b>  <b>1 M each any two</b>

<b>ii) What is the necessity of dewatering of foundation trenches ?</b>	
<p>1) Water can enter into the excavated trench during excavation of foundation hence dewatering is necessary to remove excess water.</p> <p>2) Sliding of slopes can be possible if water is not removed properly.</p> <p>3) Accidents may be possible if water not removed immediately. This would be dangerous for labours and machineries.</p> <p>4) Piping problems are also source of danger on site.</p> <p>5) Dewatering is essential to excavate trench upto desired depth and dimensions.</p> <p>6) For construction of Headworks (ex. Jackwell, Intake well) it is necessary to work below water level hence dewater is prime necessary in such situations.</p> <p>7) Dewatering activity provides safe space for workers.</p>	<b>1 M each any four</b>
<b>III) Explain the timbering and strutting in excavation.</b>	
<p>Timbering and strutting is method of giving the temporary support to the sides of trench when the depth of trench is high.</p> <p><b>OR</b></p> <p>Timbering and strutting is a construction practice provided during excavation for foundation in order to avoid collapsing of sides of trench.</p> <p>This problem occurs during deep excavations.</p> <p>Following are the methods of timbering.</p> <p>1) Box sheeting, 2) Stay bracing 3) Vertical sheeting 4) Runners 5) Sheet piling.</p> <p>Timbering consist of Timber planks and strut to give temporary support to the sides of trench. It helps to reduce width of foundation. The purpose of timbering of foundation trenches is to uphold sides of excavation so as to avoid collapse of sides and to avoid wasteful labor cost of clearing falling earth from trench bottom.</p> <p><b>Note : If figure of any one type is drawn , marking scheme may be modified accordingly.</b></p>	<b>2M</b>
	<b>1M</b>
	<b>1M</b>
<b>Q. 2. Attempt Any four of the following</b>	<b>16</b>
<b>a) Discuss general rules of the earthquake resistance building.</b>	
<p>Following are the general rules of earthquake resistant structure:</p> <p>1) Before commencing design for building designer should know in which zone proposed building is located.</p> <p>2) Zone1, Zone2, Zone 3 and Zone4 intensity decreases in ascending order.</p> <p>3) Structures coming in Zone 4 needs only good workmanship.</p> <p>4) There should be continuity in construction of a structure, structure should act as a one unit.</p> <p>5) Sufficient space between adjacent structures: To avoid collision during an earthquake it is good practice to keep some space between the adjacent structure.</p> <p>6) Avoid Unnecessary projections :- Building should not have balconies, canopies etc.</p> <p>7) <u>Shape</u>:- Simple rectangular shape is preferable for building.</p> <p>8) <u>RCC Framed structures</u> :- Framed structures should be preferred than load bearing heavy structures.</p> <p>9) Avoid any addition or alteration in structures without proper technical guidance.</p> <p>10) Use high strength concrete for structural members.</p> <p>11) Increase sectional area near joints.</p> <p>12) Design light weight and well connected roof members</p> <p>13) Reinforcement should be provided at the corner and junctions of wall.</p>	<b>1M each any four</b>

<p><b>b) Explain the functions of following components of the structure.</b>  <b>i) Wall ii) Sill iii) Lintel iv) Parapet</b></p>	
<p>I) Wall- a) Separate the rooms from each other.  b) They act as partitions in framed structure.  c) Structural member in case of load bearing structure.  ii) Sill- a) To provide suitable finish to window opening.  b) It also provides support to vertical members of the opening.  c) It shades off the rain water from the face of wall immediately below the opening  iv) Lintel- a) To support the loads of portion of wall above opening.  b) To transmit the load to the adjacent wall portion.  v) Parapet- Provides safety to the users of terrace.</p>	<p><b>1M each for any one function</b></p>
<p><b>c) Explain timbering and strutting for foundation.</b></p>	
<p>Timbering and strutting is method of giving the temporary support to the sides of trench when the depth of trench is high.  <b>OR</b>  Timbering and strutting is a construction practice provided during excavation for foundation in order to avoid collapsing of sides of trench.  This problem occurs during deep excavations.  Following are the methods of timbering.  1) Box sheeting, 2) Stay bracing 3) Vertical sheeting 4) Runners 5) Sheet piling.</p> <p>Timbering consist of Timber planks and strut to give temporary support to the sides of trench. It helps to reduce width of foundation. The purpose of timbering of foundation trenches is to uphold sides of excavation so as to avoid collapse of sides and to avoid wasteful labor cost of clearing falling earth from trench bottom.</p> <p><b>Note : If figure of any one type is drawn , marking scheme may be modified accordingly.</b></p>	<p><b>2M</b></p> <p><b>1M</b></p> <p><b>1M</b></p>
<p><b>d) What are the requirement of good foundation?</b></p>	
<p>1) Location of foundation should be selected such that it can safely transfer load as per design with considering future expansion.  2) Good designed foundation should resist earthquake pressure, landslide pressure etc.  3) A good foundation should avoid unequal or differential settlement of the structure.  4) A good foundation should avoid overturning of building.  5) For good foundation area below foundation should be drained properly.  6) Faulty designed superstructure can not withstand by any foundation hence superstructure should be well planned and designed.  7) A good foundation should consider environmental and other factors. ex. groundwater, frost action, soil erosion  8) A good foundation should be strong as well as economical.</p>	<p><b>1M each any four</b></p>

e) Draw neat sketch of under reamed pile foundation and state situation under which situation it is adopted.



2M  
Any  
one  
sketch

- 1) It is preferred in black cotton soil.
- 2) These piles are best suited in soils where considerable ground movements occur due to seasonal variations.

2M

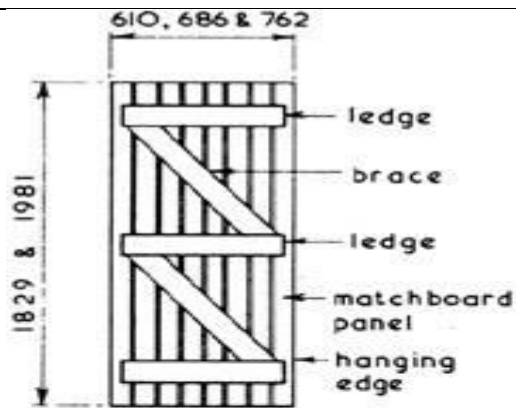
f) What are the requirements of good stone masonry?

- 1) Stone used should be hard, tough and durable.
- 2) For good stone masonry stones used should be perfectly dressed.
- 3) Pressure acting on stone should be normal to bedding plane.
- 4) For uniform distribution of load, under the ends of girders, roof trusses large flat stones should be used.
- 5) Mortar used should be good quality.
- 6) Plumb bob should be used to check true verticality.
- 7) It should be designed to take compressive loads not for tensile stresses.
- 8) Proper curing should be done after completion of work for minimum 14 days.
- 9) For good masonry broken stones should not be used.
- 10) Large bottom should be preferable for stone masonry, thickness reduces from bottom to top
- 11) Stones should be economical and easily available.
- 12) It should have low water absorption property.
- 13) For good stone masonry headers and bond stones should not be dumbbell shaped.
- 14) It should have adequate resistance to fire.
- 15) It should have resistance to weathering agencies.

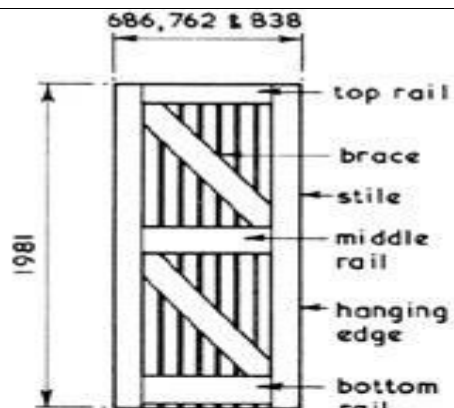
1/2 M  
each  
any  
eight

<b>Q.3 Attempt any Four of the following:</b>	<b>16</b>
<b>a) Explain English Bond and Flemish Bond in Brickwork with neat sketches</b>	
<p><b>Ans: English bond :</b>  The Bond with alternate courses of headers and stretchers with a closer-placed next to quoin header is called as the English Bond.</p> <p>Points Should be Remembered for English bond:</p> <ol style="list-style-type: none"> <li>1. A heading course should never start with a queen Closer.</li> <li>2. There is no continuous vertical joint.</li> <li>3. Walls of even number of half bricks in thickness present the same appearance on both faces.</li> <li>4. Walls of odd numbers of half bricks in thickness will show each course comprising of headers on one face and stretchers on another face.</li> </ol> <div data-bbox="268 651 1145 976" data-label="Image"> </div> <p style="text-align: center;"><b>Elevation of wall in English cross-bond.</b></p> <p><b>Flemish Bond:</b>  The Bond which consists of the alternate header and stretcher in the course is called as Flemish Bond.</p> <p>Points should be remembered for Flemish bond.</p> <ol style="list-style-type: none"> <li>1. It starts with a header at the corner.</li> <li>2. The vertical joint is staggered in each course.</li> <li>3. Flemish Bond appears more attractive and pleasing but it is less stronger and compact than English Bond.</li> <li>4. Flemish Bond is slightly economical as a number of brick bats can be used.</li> </ol>	<p style="text-align: center;"><b>01</b></p> <p style="text-align: center;"><b>01</b></p> <p style="text-align: center;"><b>1</b></p>

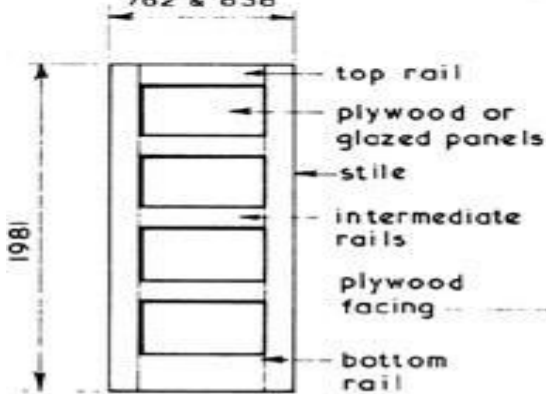




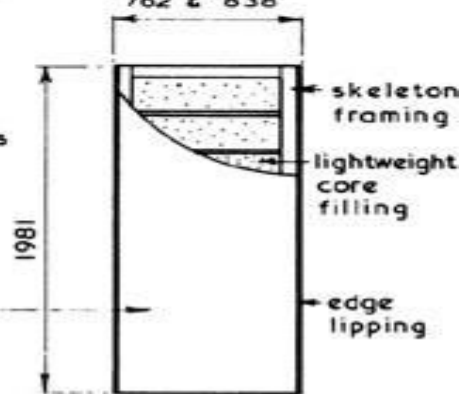
LEDGED AND BRACED DOOR  
762 & 838



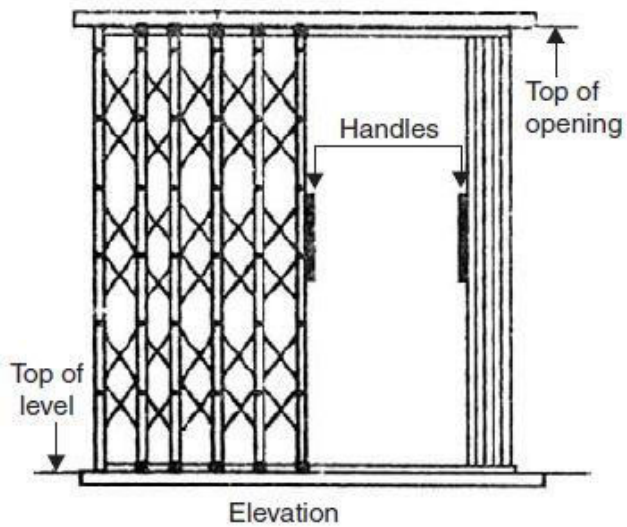
FRAMED LEDGED AND BRACED DOOR  
762 & 838



1, 2, 3 OR 4 PANELLED DOORS



FLUSH DOORS



Collapsible door.

1M  
each  
any  
two



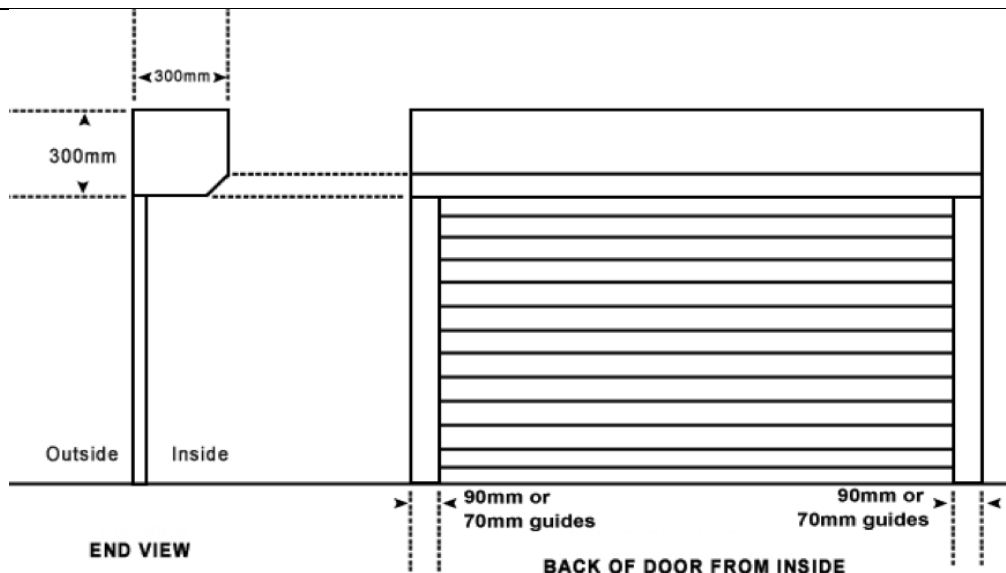


Diagram of rolling shutter

**c) Explain procedure of replacing glass of existing sliding window.**

Ans: Procedure for changing the glass of existing window.

1. The sliding window consist of the aluminum shutters which moves on the rollers bearing provided horizontally or vertically on the tracks .
2. This shutter is made of aluminum frame of sections like U,L etc.
3. The glass is fixed in this section by using the bidding strip or the rubber gasket or silicon.
4. Broken glass is removed by removing the shutter from frame and glass from the shutter by removing bidding or rubber gasket .
5. New glass is fixed in the shutter and replaced in position again.

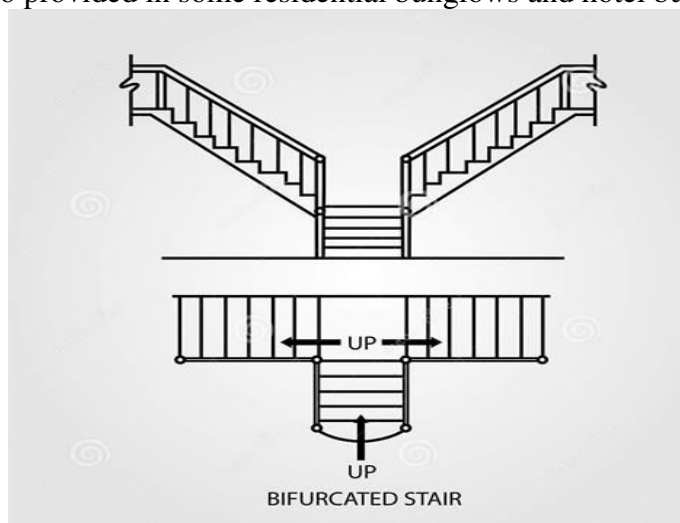
4 M

**d) Mention suitability and the neat labelled sketch of bifurcated staircase.**

Ans: Suitability of bifurcated staircase.

1. This type of stair is generally provided in the public buildings where the number of users is more like colleges, hospitals, government offices etc.
2. This is also provided in some residential bungalows and hotel buildings too.

02 for suitability



2M for any one diagram

<b>e) State any four advantages of steel roof trusses.</b>	
<p>Ans: Advantages of steel roof trusses are:</p> <ol style="list-style-type: none"> <li>1. Steel trusses are economical for large spans.</li> <li>2. Steel trusses are light in weight and can be fabricated in different shapes and sizes as per requirement.</li> <li>3. These trusses are fire proof.</li> <li>4. Free from the attack of white ants etc.</li> <li>5. Durability of steel trusses is more.</li> <li>6. Installation of the trusses is easy than the other or wooden trusses.</li> </ol>	<b>1M each any four</b>
<b>f) Explain king post truss and queen post truss with suitability of each.</b>	
<p><b>Ans: King Post Truss:</b></p> <ol style="list-style-type: none"> <li>1. When the central post known as a king forms a support for the tie beam it is known as king post truss.</li> <li>2. The inclined member is known as the struts which help to prevent the principal rafter from bending in the middle.</li> </ol> <p><b>Suitability:</b> A king post truss is suitable for roofs of span varying from 5 m to 8 m.</p> <p><b>Queen Post Truss:</b></p> <ol style="list-style-type: none"> <li>1. The truss which has two vertical members at central to support the principal rafter is known as queen post truss.</li> <li>2. The upper ends of the queen post are kept in position by means of a horizontal member known as a straining beam.</li> </ol> <p><b>Suitability:</b> A queen post is suitable for roofs of spans varying from 8 m to 12 m.</p> <p><b>Note: If sketches are drawn, marks may be given.</b></p>	<b>1M for exp. 1M for suitability</b>
<b>Q.4 Attempt any four of the following:</b>	<b>16</b>
<b>a) Describe the procedure of laying the Shahabad stone floor.</b>	
<p>Ans: The method of laying the Shahabad stone floor can be broadly divided in the following steps:</p> <ol style="list-style-type: none"> <li>1. Ground preparation</li> <li>2. Laying and construction of Shahabad floor</li> <li>3. Cleaning</li> <li>4. Curing. <ol style="list-style-type: none"> <li>1. Ground Preparation : The surface of the ground for receiving the floor is leveled, well watered and rammed before laying the Shahabad stone tile.</li> <li>2. Laying and construction of Shahabad floor: Upon the prepared surface of the ground, lean cement concrete ( 1:4:8) is laid in the necessary slope of 1 in 120 to 1 in 240. Then cement mortar bed (CM 1:8) is laid for thickness 35 to 50 mm. Then Shahabad tiles are laid side by side on mortar bed and joints are filled with mortar.</li> <li>3. Cleaning: As Shahabad stone can not get good polish, it is avoided; only cleaning of the paste is done in the joints.</li> <li>4. Curing: After flooring is completed, the whole surface is covered with wet bags or with 5 cm of wet sand and kept wet for at least 10 days by sprinkling water at suitable intervals.</li> </ol> </li> </ol>	<b>4M</b>
<b>b) Explain two defects in plastering with its neat sketch.</b>	
<p>Ans: Defects in plastering ;</p> <ol style="list-style-type: none"> <li>1. Blistering of plastered surface.</li> <li>2. Cracking</li> <li>3. Efflorescence</li> </ol>	



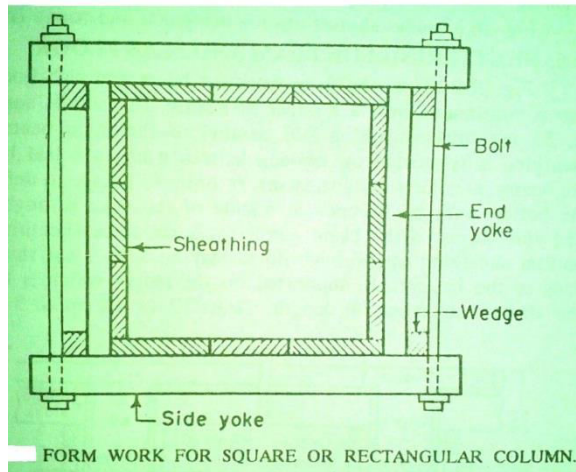
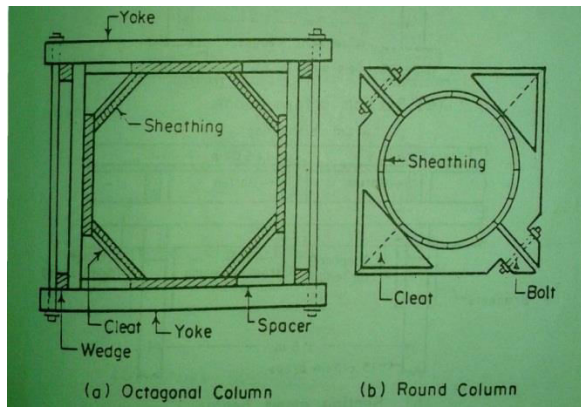
<b>d) Differentiate between white wash and distemper.</b>		
<b>White washing</b>	<b>Distemper</b>	<b>1M each any four</b>
<p>It is process of giving wash covering to the plastered or pointed surface with the slaked lime is called white washing.</p> <p>Material required are fat lime or unslaked lime mixed with water.</p> <p>The finished dry surface of white wash should be smooth and even and it should not come off readily on fingers when rubbed. They are not washable.</p> <p>White washing is economical.</p> <p>They do not provide pleasing appearance</p>	<p>It is process of applying dry distemper or oil bound distemper to the plastered surface.</p> <p>Distemper is composed of base, carrier, binder and colouring pigments.</p> <p>This gives smooth surface and cannot be removed with washing.</p> <p>Distemper is costly than white washing.</p> <p>They provide pleasing appearance.</p>	
<b>e) Describe any two causes of formation of cracks in walls and measures adopted to prevent them.</b>		
<p>Ans: The important causes responsible for cracks in building are :</p> <ol style="list-style-type: none"> <li>1. Due to movement of ground.</li> <li>2. Due to temperature variation.</li> <li>3. Due to moisture changes.</li> <li>4. Due to effect of chemical reaction.</li> <li>5. Due to creep and elastic deformation.</li> <li>6. Due to vegetation.</li> </ol> <ol style="list-style-type: none"> <li>1. Due to movement of ground: <ol style="list-style-type: none"> <li>a) If the building is erected on or near an area which is likely to be subjected to mining substance landslides, earthquake etc. the movement of ground due to this factors can cause cracks in building.</li> <li>b) Building constructed on shrinkable soils are liable to crack due to volumetric change in subsoil conditions due to change in moisture contend, unless specials measure are taken.</li> </ol> </li> <li>2. Due to temperature variation: <ol style="list-style-type: none"> <li>a) In some materials the changes in temperature can cause appreciable change in their size the extend of movement due to temperature variation in the building components depends upon number of factors such as dimension of materials, its coefficient of expansion.</li> <li>b) In case of roof slab supported on load bearing walls,cracks occur due to temperature variation. The roof slab being expose to the heat of sun, is subjected to alternate expansion and contraction. This movement of slab may result in pushing out top course of masonry and developing horizontal cracks in supporting walls.</li> </ol> </li> <li>3. Due to moisture change: <ol style="list-style-type: none"> <li>a) Most of the building materials like bricks, concrete, mortar, stones, timber etc. have pores hence these materials increases in size or expand on absorbing moisture and decrease in size or shrink on drying.</li> </ol> </li> </ol>		<b>1M for each cause any two</b>

<p>b) Shrinkage on account of drying out of moisture contents in building material is one of the main factor responsible for cracks in the building.</p> <p>4. Due to effect of chemical reaction:</p> <p>a) The carbon dioxide present in the air reacts chemically with cement based product. Resulting in increase in volume which ultimately leads to cracking.</p> <p>b) Soluble sulphates which may be present in the soil, ground water or clay bricks react chemically with Portland cement in presence of water and cause the concrete or mortar joined or brick itself to expand considerably leading to the formation of cracks.</p> <p>5. Due to creep and elastic deformation:</p> <p>a) The different components of building like wall, column, beam etc. undergo elastic deformation when loaded.</p> <p>b) The situation where cracking due to elastic deformation and creep arise are summarized as a cracks in masonry when a wall is unevenly loaded, cracks in masonry due to deflection of RCC beam or slab , cracks at a function of brick masonry with RCC column in load bearing walls.</p> <p>6. Due to vegetation :</p> <p>a) The effect of existence of vegetation near the building becomes more damaging when the soil at site is of shrinkable type.</p> <p>b) The roots of growing trees causes drying and shrinkage of the subsoil and this can result in unequal settlement of the foundation leading to cracks.</p> <p><b>Prevention:</b></p> <p>1) Continuous vertical joints in wall shall be avoided by proper bond.</p> <p>2) Weak lintels over the openings shall be avoided.</p> <p>3) Uneven settlements of foundation shall be avoided by resting foundation on hard strata.</p> <p>4) Building shall be well designed .</p> <p>5) Proper curing shall be done.</p> <p>6) Use of low quality materials shall be avoided.</p> <p>7) There shall be good workmanship.</p>	<p><b>1M each prv. Any two</b></p>
<p><b>f) Explain waterproofing with respect to necessity and importance.</b></p>	
<p><b>Necessity and Importance :</b></p> <p>i) One of the basic requirements in case of all the buildings is that the structure should remain dry as far as possible.</p> <p>ii) If this condition is not satisfied it is likely that the building may become inhabitable and unsafe from structural point of view.</p> <p>iii) This will improve the life of building and make the hygienic conditions in the building for the user.</p> <p>iv) Dampness in the building gives rise to breeding of mosquitoes.</p> <p>v) Dampness may cause unsightly patches.</p> <p>vi) Dampness may cause softening and crumbling of plaster.</p> <p>vii) Efflorescence may be caused due to dampness.</p> <p>viii) Timber and fittings are deteriorated due to dampness.</p> <p>iv) Electrical wiring and fittings may get damaged and may cause short circuiting.</p>	<p><b>1M each any four</b></p>

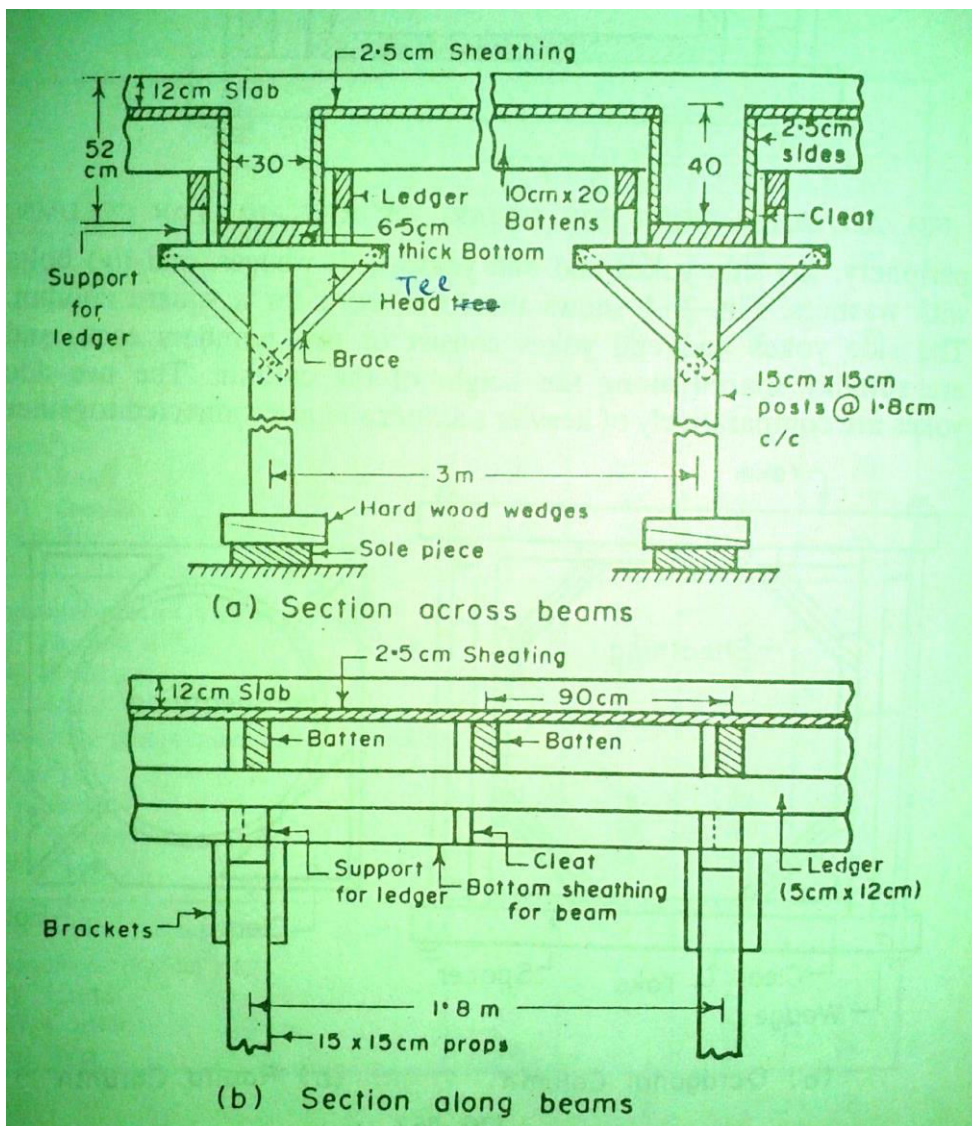
**Q.5 Attempt any four of the following**

**16**

**a) Draw the sketches of formwork for column and beam.**



**\*4**



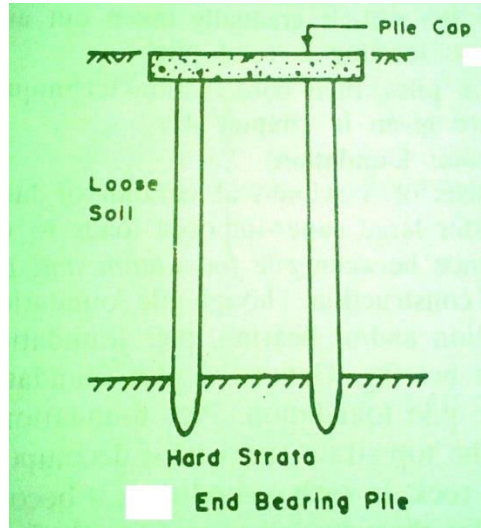
**Note: Any one sketch of column formwork 1M, Labelling 1M, Any one sketch of beam formwork 1M, Labelling 1M**

<b>b) Define pre-fabricated structure. Mention any four advantages and disadvantages of pre-fabrication.</b>	
<p><b>Pre-fabricated structure:</b> Pre-fabricated structure are cast in factory and delivered to work site without allowing additional handling and erected with joints involving use of minimum amount of material and manpower.</p> <p><b>Advantages :</b></p> <ol style="list-style-type: none"> <li>1) Complete manufacturing of units in factory with high quality control.</li> <li>2) Minimum erection time.</li> <li>3) Good finish and appearance.</li> <li>4) No form work is required at site.</li> <li>5) Less manpower required at site.</li> <li>6) Less scaffolding is required.</li> <li>7) No effect of adverse weather condition.</li> </ol> <p><b>Disadvantages :</b></p> <ol style="list-style-type: none"> <li>1) Design should be completed before casting.</li> <li>2) No alteration is possible after casting.</li> <li>3) For small work, it is costlier.</li> <li>4) Suitable to any specified structure.</li> <li>5) Special precaution is required for handling.</li> <li>6) Small damage in component may be unfit for construction.</li> <li>7) Large site clearance is required handling, hoisting equipment</li> </ol> <p align="center"><b>Note: Def 2M, Advantages any four 1M,Disadvantages any four 1M.</b></p>	<p><b>*4</b></p>
<b>c) State the precautions to be taken while constructing a foundation in B.C. soil.</b>	
<ol style="list-style-type: none"> <li>1) S.B.C. should be properly determined. In absence of test,it shall be limited between 5 – 10 t / sq. m.</li> <li>2) Foundation should be taken at least 50 cm lower than the depth of moisture movement.</li> <li>3) Depth should be much more than tension cracks.</li> <li>4) If soil is in the top layer and does not exceed 1.5 m then entire soil larger should be replaced with non expansive soil.</li> <li>5) When depth of clay layer is large,the contact of base should interposed with layer of stand / murum and around</li> <li>6) Capping beam of piles should kept about 15cm high above B.C. soil</li> <li>7) Foundation should be constructed in dry season.</li> <li>8) Provide plinth protection.</li> </ol>	<p><b>1M each any four</b></p>
<b>d) What is roller compacted concrete? State the properties and uses of roller compacted concrete.</b>	
<p><b>Roller compacted concrete:</b></p> <ol style="list-style-type: none"> <li>1) It is lean no slump concrete.</li> <li>2) It almost dry concrete with very small w/c ratio.</li> <li>3) It is compacted by vibratory roller.</li> </ol> <p><b>Properties :</b></p> <ol style="list-style-type: none"> <li>1) It is harsh concrete.</li> <li>2) Grade of concrete starts with M10.</li> <li>3) It has low shrinkage.</li> <li>4) It has less creep.</li> <li>5) It has maximum dry density .</li> </ol> <p><b>Uses :</b></p> <ol style="list-style-type: none"> <li>1) Dam construction.</li> <li>2) Pavement construction.</li> </ol>	<p><b>2M</b></p>  <p><b>1M any two</b></p>  <p><b>1M any two</b></p>

<p><b>e) Explain meaning and application of tremix concreting.</b></p>	
<p><b>Tremix concreting :</b> ( Vacuum dewatering concreting ) High w/c ratio, high slump workable concrete is filled in formwork and after finishing the top, the excess water is removed by vacuum dewatering technique which increases density and strength of concrete.</p> <p><b>Application :</b></p> <ol style="list-style-type: none"> <li>1) It is used for industrial floor</li> <li>2) It is used for concrete pavement</li> <li>3) It is used for runway construction</li> <li>4) For foot path</li> <li>5) For bridge floor</li> </ol>	<p><b>2M</b></p> <p><b>½ M each any four</b></p>
<p><b>f) Describe properties and uses of steel fibre reinforced concrete.</b></p>	
<p><b>Properties :</b></p> <ol style="list-style-type: none"> <li>1) It has high tensile and bending strength.</li> <li>2) It has high resistance to spalling.</li> <li>3) IT has high impact strength.</li> <li>4) It has resistance to cracking.</li> <li>5) It prevents rust stains.</li> <li>6) It is durable.</li> </ol> <p><b>Uses :</b></p> <ol style="list-style-type: none"> <li>1) It is used in making components of additional strength in flexure, impact and spalling</li> <li>2) It is used in pavement concrete</li> <li>3) It is used in ( airfield ) concrete runway.</li> <li>4) It is used in hydraulic structure.</li> <li>5) It is also used in tunnel lining.</li> <li>6) It is used in industrial floor.</li> <li>7) It is used in bridge construction.</li> <li>8) In repair work.</li> </ol>	<p><b>½ M each any four</b></p> <p><b>½ M each any four</b></p>
<p><b>Q.6 Attempt any two of the following.</b></p>	<p><b>16</b></p>
<p><b>a) Explain with sketch i) Friction piles ii) End bearing pile</b></p>	
<p><b>i) Friction piles :</b></p> <div data-bbox="555 1335 975 1765" data-label="Diagram"> </div> <p><b>Explanation :</b></p> <ol style="list-style-type: none"> <li>1) These used to transfer loads to a depth by means of skin friction along the length of the pile.</li> <li>2) Used in granular soil where the depth of hard strata is very great.</li> <li>3) Load carrying capacity depends on surface area and skin friction.</li> </ol>	<p><b>2M</b></p> <p><b>2M</b></p>



**ii) End bearing piles :**



2 M

**Explanation :**

- 1) Used to transfer load through water or soft soil to a suitable bearing stratum.
- 2) Used to carry heavy loads safely to hard strata.
- 3) Adopted when hard strata is available at few meter below the soft layer.
- 4) It settles less.

2M

**b) Make the comparison between brick masonry and stone masonry**

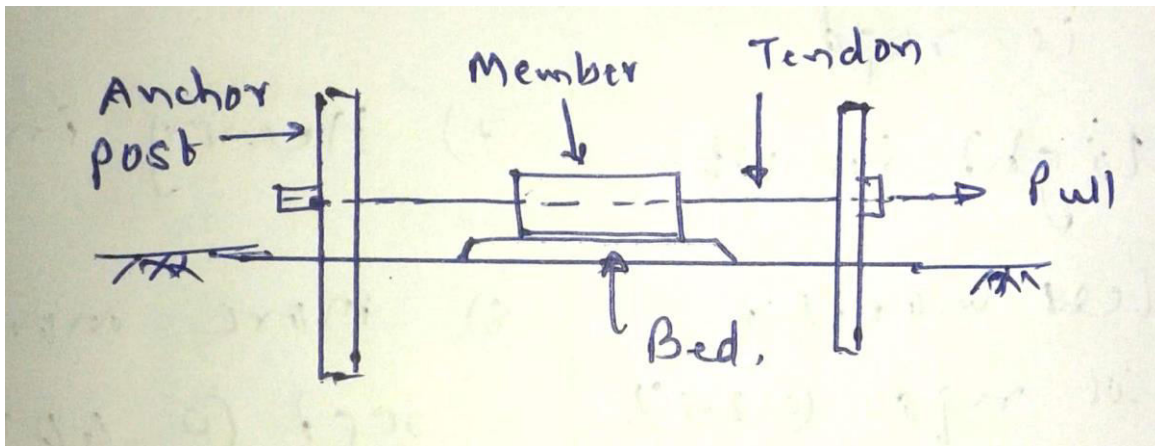
	Brick masonry	Stone masonry	
	<ol style="list-style-type: none"> <li>1) Used where stones are not easily available</li> <li>2) Thin wall (10cm)</li> <li>3) Less strength.</li> <li>4) Less durable</li> <li>5) Plastering required</li> <li>6) Single scaffolding is required.</li> <li>7) Light in weight.</li> <li>8) Less mortar is required @25 % of volume.</li> <li>9) No dressing is required.</li> <li>10) No heavy hoisting equipment is required.</li> <li>11) Less cost</li> <li>12) Less time</li> <li>13) Used in framed structure.</li> </ol>	<ol style="list-style-type: none"> <li>1) Used where stones are cheaply available</li> <li>2) Thick wall (45cm)</li> <li>3) High strength</li> <li>4) More durable</li> <li>5) No plastering required</li> <li>6) Double scaffolding is required.</li> <li>7) Heavy in weight.</li> <li>8) More mortar is required @40 % of volume.</li> <li>9) Dressing is required.</li> <li>10) Hoisting equipment is required.</li> <li>11) More cost</li> <li>12) More time</li> <li>13) Used in load bearing structure.</li> </ol>	<p><b>1M each any eight</b></p>

**c) Explain pre tensioning and post tensioning methods of prestressed concrete.**

**Pre tensioning :**

- 1) Tendons are tensioned even before casting the concrete and securing them firmly to the concrete.
- 2) Tendons are tensioned between abutments or bulkheads which are secured / anchored firmly against the ends of the stressing bed.
- 3) The tendons are cut off at each end after the concrete hardens.
- 4) Prestress in tendon is transferred to the concrete.

2M

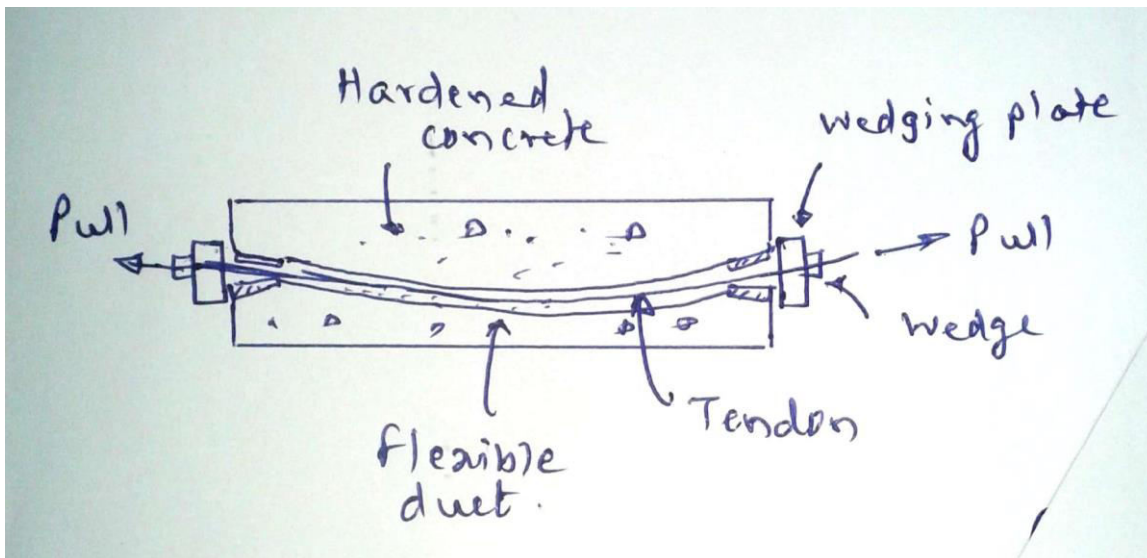


2M

**Post tensioning :**

- 1) 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.
- 2) Tendons are pulled by jack against ends of the concrete member.
- 3) Tensioned tendons are anchored at end with suitable wedging device.
- 4) The space between duct and tendon is filled with cement grout under pressure.
- 5) After setting and hardening of grout material, it develops bonding between tendons and concrete to develop grip.

2M



2M