



**SUMMER– 18 EXAMINATION**

**Subject Name: BUILDING CONSTRUCTION**

**Model Answer**

Subject Code:

**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 judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q. N.	Answers	Marking Scheme														
Q.1	a) Ans	<b><i>Attempt any ten:</i></b> <b><i>State any two uses of lintel.</i></b> i) To support the loads of the portion of wall above the opening. ii) To transmit the load to the adjacent wall portions. iii) To support chajja or loaft.	<b>(20)</b>  Any two 01 M for each														
Q.1	b) Ans	<b><i>Distinguish between load bearing structures and framed structures on any two points.</i></b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Load bearing structure</th> <th style="width: 50%;">Framed Structure</th> </tr> </thead> <tbody> <tr> <td>1) Suitable for hard strata available at shallow depth.</td> <td>1) Suitable for any type of strata at any depth.</td> </tr> <tr> <td>2) Thick wall reduce the floor area.</td> <td>2) More floor area available due to thin walls.</td> </tr> <tr> <td>3) Allowed up to two storeys.</td> <td>3) Multi storied construction is possible.</td> </tr> <tr> <td>4) Constriction is slow and time consuming.</td> <td>4) Fast and speedy construction.</td> </tr> <tr> <td>5) Economical up to two storeys.</td> <td>5) Economical for multistoried building.</td> </tr> <tr> <td>6) Vibration due to machine and earth quake seriously affects foundation.</td> <td>6) Less effect of machine vibration and earth quake forces.</td> </tr> </tbody> </table>	Load bearing structure	Framed Structure	1) Suitable for hard strata available at shallow depth.	1) Suitable for any type of strata at any depth.	2) Thick wall reduce the floor area.	2) More floor area available due to thin walls.	3) Allowed up to two storeys.	3) Multi storied construction is possible.	4) Constriction is slow and time consuming.	4) Fast and speedy construction.	5) Economical up to two storeys.	5) Economical for multistoried building.	6) Vibration due to machine and earth quake seriously affects foundation.	6) Less effect of machine vibration and earth quake forces.	Any two 01 M for each
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Q.1	c) Ans	<b><i>Define "Foundation".</i></b> <b>Foundation:-</b> The lowest part of a structure below ground levels which provides the base for the superstructure and transmits the load of superstructure to subsoil properly is known as foundation.	02 M														
Q.1	d) Ans	<b><i>State any essential requirements of a good foundation.</i></b> <b>Essential requirements of good foundation:-</b> 1) 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.	Any two 01 M for														



		5) For good foundation, area below foundation should be drained properly. 6) A good foundation should be stable against environmental and other factors. ex. groundwater, frost action, soil erosion 7) A good foundation should be strong as well as economical.	each
Q.1	e) Ans	<b>State the necessity of scaffolding.</b> <b>Necessity of scaffolding:-</b> 1. To provide a working platform, so that the worker can stand on the platform to do the work easily & safely. 2. To provide platform for placing material & equipment needed by the workers to carry out their job 3. To reach the construction point, as it progresses.	Any two 01 M for each
Q.1	f) Ans	<b>State the importance of frog.</b> <b>Importance of frog:-</b> Frog provides a space for the mortar in top face of brick, on setting of mortar which forms a key with mortar joint, Frog is important to prevent displacement of the bricks above in lateral direction, to provide proper bonding between successive courses and to get safe construction of brick work, frog is important.	02 M
Q.1	g) Ans	<b>Define "Skirting".</b> The skirting is the full or half tiles laid vertically as finish to the wall, held in between bottom of the wall and floor.	02 M
Q.1	h) Ans	<b>Enlist two purposes of plastering.</b> <b>Purposes of plastering are:-</b> 1. To provide an even smooth, regular, clean and durable finished surface. 2. To conceal the defective workmanship 3. To preserve and protect the surface from atmospheric influences by acting as a protective coating 4. To fill the joints formed in masonry work 5. To cover inferior quality material. 6. To provide a satisfactory base for decorating the surface by applying white washing, color washing painting	Any two 01 M for each
Q.1	i) Ans	<b>State the necessity of pointing?</b> <b>Necessity of pointing: -</b> 1. 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. 2. Pointing is necessary for protecting the joint from the adverse effect of atmosphere. 3. To magnify the appearance of the surface by exhibiting the pattern of the joints, their thickness, colours and texture prominently.	Any two 01 M for each
Q.1	j) Ans	<b>State two purpose of termite proofing.</b> <b>Purpose of termite proofing:-</b> 1. To control or prevent the termite growth in the building. The termites enter into buildings through cracks, walls, pipes and floor joints etc. Once termites are developed in the building area, it is very difficult and costly to remove. 2. To prevent damage of materials of organic origin with a cellulosic base, household articles like furniture, furnishings, clothings, stationery, etc. 3. To prevent damage of Rubber, leather, plastics, neoprene as well as lead coating used for covering of underground cables. 4. To avoid widespread damage by termites in high construction cost buildings have	Any two 01 M for each



		necessitated evolving suitable measures for preventing access of termites to buildings.	
Q.1	k) Ans	<b>State two causes of settlement.</b> <b>The causes of settlement of foundation are:-</b> 1. Uneven bearing capacity of soil at foundation level 2. Different loads on different parts of foundation 3. Varying ground water table height 4. Compressible foundation soil 5. Pockets of different type of soil under the foundation level 6. Expansive soils such as black cotton soil 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.	Any two 01 M for each
Q.1	l) Ans	<b>State any two advantages of prefabrication.</b> <b>Advantages of Prefabrication:-</b> 1. Mass production of units. 2.Reduction of costs and construction time on site 3.Effective use of formwork 4. Improved quality of units. 5.Special shapes and surface finishes 6.Protection from hot or drying winds 7. Demountable structures.	Any two 01 M for each
Q.2	a) Ans	<b>Attempt any four:</b> <b>Explain in brief roller compacted concrete.</b> Recent and innovative development in the construction field is a 'Roller compacted concrete'. It is advanced type of concrete which is vitally used in dam construction. It is lean and almost dry concrete which is compacted with use of vibratory roller. Ingredients like coarse aggregates, cement and water taken in an appropriate proportion are thoroughly mixed together in a conventional batch mixer or in other suitable concrete mixers with or without a supplementary cementing material like fly ash. <b>Properties :</b> 1) It is harsh concrete. 2) Grade of concrete starts with M10. 3) It has low shrinkage. 4) It has less creep. 5) It has maximum dry density. <b>Uses :</b> 1) Dam construction. 2) Pavement construction.	<b>(16)</b>  02 M  Any two 01 M  01 M
Q.2	b) Ans	<b>Explain the procedure of Vacuum dewatering concreting for construction of floors.</b> Procedure of vacuum dewatering concreting for construction:- 1) It has stressed time that adoption of low water cement ratio will be given to improve the quality of concrete. 2) The use of super plasticizer in the vacuum dewatering of concrete. 3) It required formwork in the forms of channel internal vibrates, double beam screen vibrator, bull float filter pads vacuumed pump. Is floater power trowel. 4) First concert with higher water cement ratio and it is full compacted with needle vibrate then this concrete is further compacted by double beam screen vibrate it makes surface	



		<p>smooth.</p> <p>5) Filter mat is place and it is press within 30 min and the vacuum pump is started with sunks the unwanted water.</p> <p>6) It is rub about 20 to 30 min it is depending upon thickness of concrete floor.</p> <p>7) Then the concrete with skin floated further power trowel and finish.</p> <p>8) After vacuum dewatering it gives the ideal condition for application of surface hardener. In this way factory from may be constructed.</p>	04 M
Q.2	c) Ans	<p><b><i>Explain the importance and necessity of water proofing.</i></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>	Any four 01 M for each
Q.2	d) Ans	<p><b><i>Enlist any eight requirements of good form work.</i></b></p> <p><b>Good formwork or shuttering structures should satisfy the following requirements:-</b></p> <p>1. It should be strong enough to resist the pressure or the weight of the fresh concrete and the superimposed loads due to equipment, men etc., if any. This requires careful design of the formwork, because the consideration of overloads will affect the economy whereas of under loads may cause failure of the formwork.</p> <p>2. It should be rigid enough to retain the shape without undue deformation. Therefore, it should be so designed that deflection does not exceed 1/900th of span in normal cases.</p> <p>3. It must be made or constructed as tight so that it does not allow the cement paste to leak through the joints.</p> <p>4. The space enclosed by the form should be true to the size as designed. The form should, therefore, not warp, bend, bulge or sink to meet this requirement.</p> <p>5. The inside surface of formwork should be smooth so as to give good appearance to the resulting concrete surface. To achieve this, the inside surface of formwork is usually applied with crude oil or soft soap solution. This also facilitates the removal of formwork.</p> <p>6. The entire formwork should be so made that it can be removed easily without causing the least injury to the surface or edges of the concrete.</p> <p>7. As the formwork does not contribute anything to the stability of the finished structure, it should, therefore, be made economical by reducing the cost through proper design, construction and use of proper material.</p> <p>8. It should be as light as possible. So that it is easy to transfer.</p> <p>9. The material of the formwork should be cheap, easily available and should be suitable for reuse.</p> <p>10. Self-weight of the form work should be less.</p> <p>11. It should be easily possible to give the required geometrical shape to the form.</p>	Any eight 1/2 M for each
Q.2	e) Ans	<p><b><i>Explain in brief precautions to be taken while plastering.</i></b></p> <p><b>Some precautions for good Plastering are given below:-</b></p>	



		<ol style="list-style-type: none"> <li>1. Fix all the fittings of electric pipes, water supply pipes, and electric boxes etc. properly as per drawing /requirement before starting the plaster work.</li> <li>2. Fit all the pipes so deep into the walls that the pipes can get proper thickness of mortar on them to avoid cracks in plaster surface.</li> <li>3. Make proper bond between the background and the plaster coat. Make surface of the wall clean, free from all racked mortar and dust etc. with the help of iron brushes. Wash and water the surface for 24 hours before the plaster is applied. Fix the reference mark (BUNDAS) on the walls truly in lines and plumb before starting the plaster. Ensure that all the edges of openings are round. Check the plaster frequently with straight edges and plumb bob.</li> <li>4. Do proper curing for at least 15 days to harden the plaster sufficiently and avoid the damage when watered.</li> <li>5. Mark proper dates on the plastered surface for proper curing .</li> <li>6. Protect all the fittings on the wall.</li> <li>7. Clean any splash of mortar on a finished surface immediately on completion of the work.</li> <li>8. Carry 'Plastering' out with kiln mason.</li> <li>9. Remove the efflorescence of the brick by rubbing brushes on the surface and wash them with clean water.</li> <li>10. Make the water use for 'Plastering' free from salt.</li> <li>11. Plaster the surface with enough water so that it may not absorb water from the mortar.</li> <li>12. Avoid excessive troweling.</li> <li>13. Close pot holes with wet brick bats and mortar before starting the plaster.</li> <li>14. Make square or rectangular form of the patch if any patch is to be repaired.</li> <li>15. Make sure to fix any leakages or moisture before plastering.</li> <li>16. Ensure that the walls are completely dry at least 24 hours before plastering. Also keep the room at 55 to 70 degrees F temperature during plastering or till the plaster sets completely.</li> </ol>	<p>Any eight 1/2 M for each</p>
Q.2	f)  Ans	<p><b>Enumerate the defects found in plastering work and suggest the remedies to avoid such defects.</b></p> <p><b>Defects in plastering and the remedies to avoid such defects:-</b></p> <ol style="list-style-type: none"> <li><b>1. Blistering Of plastered Surface:</b> This is the formation of the plaster swelling out beyond the plastered surface due to late slaking of lime particles in the plaster. <b>Remedies:</b> The affected plasterwork should be stripped off. Re-plastering can take place once the background.</li> <li><b>2. Flaking:</b> It is the formation of very loose mass of plastered surface, due to poor bond between successive coats. <b>Remedies:</b> The affected plasterwork should be stripped off. Re-plastering can take place once the background.</li> <li><b>3. Peeling:</b> It is the complete dislocation of some portion of plastered surface resulting in the formation of a patch. <b>Remedies:</b> The affected plasterwork should be stripped off. Re-plastering can take place on the background.</li> <li><b>4. Cracking:</b> It consists of formation of cracks in the plaster work resulting from-Structural defect in building, Discontinuity of surface, background is not prepared up to mark, movement in back ground due to rapid or due to thermal expansion, due to excessive shrinkage, faulty workmanship. <b>Remedies:</b> Local cracks due to movement can be 'cut out' and filled once movement has ceased.</li> </ol>	<p>Any four 01 M for each</p>

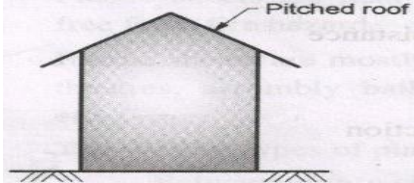
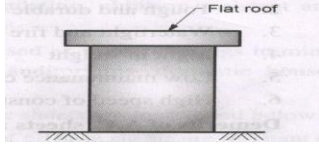


		<p><b>5. Efflorescence:</b> It is the whitish crystalline substance which appears on the surface. <b>Remedies:</b> It can be avoided by 1. Decline soluble salts 2.Design and construct masonry structure properly to prevent water penetration 3.Execute construction suitably to avoid paths through which moisture travels. Efflorescence is removed by rubbing brushes on the damaged surface. A solution of one part of hydrochloric acid or sulphuric acid and five parts of clean water is prepared and it is applied with the help of brushes on the affected area. The surface is then washed with clean water. It should, however be remembered that it is desirable to prevent efflorescence than to cure it. Building material should be selected of superior quality and suitable methods of construction should be employed.</p> <p><b>6. Popping:</b> It is the formation of conical hole in the plastered surface due to presence of some particles which expand on setting. <b>Remedies:</b> The cause of the pop out has been removed and the hole can be filled with proprietary filler and painted over.</p> <p><b>7. Uneven surface:</b> This is obtained purely due to poor workmanship. <b>Remedies:</b> Plastering work should be carried out by skilled masons in the best workmanship manner.</p> <p><b>8. Grinning:</b> is the term given to the appearance of a plastered wall when the positions of the mortar joints are clearly visible through the plaster. It is caused by the difference in suction between the masonry units and the mortar. Raking out mortar joints also causes grinning and the practice should thus be limited to soft clay brickwork. <b>Remedies:</b> While grinning may be unsightly, it is unlikely to lead to further cracking. The choice is to live with it, or to remove and replace the plaster.</p>	
Q.3	a)i) Ans	<p><b>Attempt any four:</b> <b>Enlist any four types of pointing.</b> <b>Types of pointing :-</b></p> <ol style="list-style-type: none"><li>1. Beaded pointing</li><li>2. Flush pointing</li><li>3. Recessed pointing</li><li>4. Rubbed or grooved pointing</li><li>5. Tuck pointing</li><li>6. Struck pointing</li></ol>	<p><b>(16)</b></p> <p>Any four 1/2 M for each.</p>
Q.3	a)ii) Ans	<p><b>State any two necessity of plinth protection:</b> <b>Necessity of plinth protection:-</b></p> <ol style="list-style-type: none"><li>i) Plinth protection is required to avoid/ reduce water seeping in the earth reaching the plinth wall and reaches the floor level by capillary action.</li><li>ii) Plinth protection reduces direct water entering into the soil close to the plinth wall.</li></ol>	<p>01 M each</p>
Q.3	b) Ans	<p><b>State any four advantages RMC.</b> <b>Advantages of ready-mix-concrete:-</b></p> <ol style="list-style-type: none"><li>1. Bulk amount of concrete can be produced at a time to avoid delay in construction.</li><li>2. Wastage of materials can be avoided due to mechanized operations at plants.</li><li>3. RMC gives higher quality mix than ordinary concrete due to computerized working of plant.</li><li>4. It can be easily transported longer distance without hardening, hence suitable even in congested urban area.</li><li>5. Easy to operate.</li><li>6. Economical in cost.</li><li>7. Less number of labours are required.</li></ol>	<p>Any four 1/2 M for each.</p>



Q.3	c) Ans	<b>State four uses of wire mesh and Geo-synthetics.</b> <b>i) Uses of wire mesh:-</b> <ol style="list-style-type: none"><li>1. It is used as drapery system to prevent rocks or debris from falling down onto roads and railways especially in hilly areas</li><li>2. It is used to stop land fall during heavy rainfall and cyclone or storm</li><li>3. It stops loose stone pieces from falling down over the road surfaces and prevents any severe accidents.</li></ol> <b>ii) Uses of geo-synthetics:-</b> <ol style="list-style-type: none"><li>1. Improvement in the mechanical properties of soils</li><li>2. Expensive structural designs are avoided</li><li>3. Undesirable mixing of soil and demands for earth moving are minimized</li><li>4. Construction time is shortened</li><li>5. Embankment safety and stability is increased</li><li>6. Natural appearance of landscape is maintained</li><li>7. Cost of construction is optimized</li></ol>	
Q.3	d) Ans	<b>Explain in brief precautions to be taken during pre-stressing of members.</b> <b>Precautions to be taken while pre-stressing the members</b> <ol style="list-style-type: none"><li>1) The beam mould on either side is properly fixed to steel beam section or steel joist which is used as abutments</li><li>2) To avoid stress loss during pre-stressing of members, the steel anchor plate and abutment with nut and washer should be properly fixed</li><li>3) The anchors should be secured before stressing commence</li><li>4) The joint in the ducting should be well tapped so as to prevent penetration of the grout during subsequent filling of voids</li><li>5) The pre-stressing force should be arrange properly to develop the uniformly distributed compressive stress across the face</li><li>6) The shear reinforcement in the forms of stirrups should be properly placed to avoid the lateral swelling.</li><li>7) The hydraulic jacks, anchors and end plates must be properly positioned before starting the tensioning of the members.</li><li>8) The jack should be removed properly after completion of the pre-stressing.</li><li>9) In case of pre-tensioning, the steel joints are rigidly and firmly fixed to the floor bed and the end of the wires are passed through the templates and grip fitting should be attached properly.</li></ol>	Any four 1/2 M for each.
Q.3	e) Ans	<b>State any four advantages of prefabrication.</b> <b>Advantages of Prefabrication.</b> <ol style="list-style-type: none"><li>1. Mass production of units.</li><li>2. Reduction of costs and construction time on site.</li><li>3. Effective use of formwork.</li><li>4. Improved quality of units.</li><li>5. Special shapes and surface finishes.</li><li>6. Protection from hot or drying winds.</li><li>7. Demountable structures</li></ol>	Any four 1/2 M for each.
Q.3	f)	<b>Distinguish between pitched roof and flat roof on any four points.</b>	

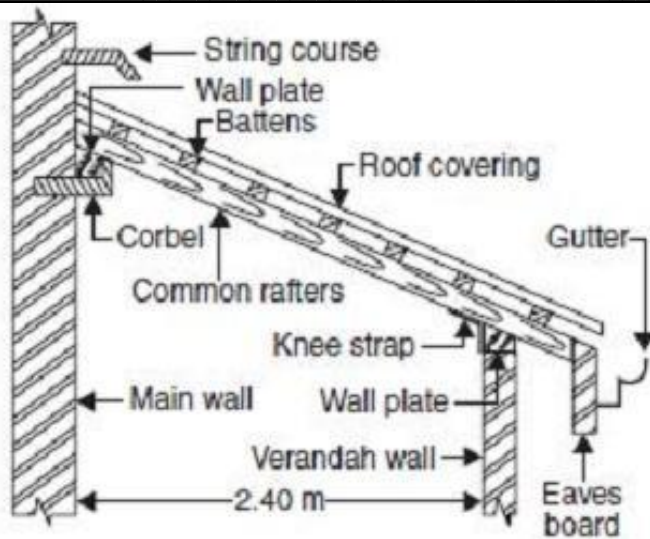


Ans	Sr. No	Pitched roof	Flat roof	
	1	Sloping roof is known as Pitched roof (slope $> 10^{\circ}$ )	A roof which is nearly flat is known as flat roof (slope $< 10^{\circ}$ )	
	2.	Types- 1. Single roofs 2. Double or purlins roofs 3. Trussed roof 4. Lean to roof	Types- 1. Madras terrace roofs 2. Bengal terrace roofs 3. R.C.C. slab	
	3.	It is suitable at the place where there is heavy rainfall	It is not suitable at the place where there is heavy rainfall	
	4.	Initial cost is less than flat roof	Initial cost is higher than pitched roof	
	5.	Progress of the work is fast as compared to flat roof	Progress of the work is slow as compared to pitched roof	
				

Any four points  
1/2 M for each.

Q.4	<b>Attempt any four:</b> <b>Explain with sketch lean-to-roof.</b>	(16)
a) Ans	<p>i) This is the simplest type of sloping roof, in which rafters slope to one side only .It is also known as pent roof or Aisle roof.</p> <p>ii) The wall to one side of room (or verandah) is taken higher than the wall or pillars to the other side.</p> <p>iii) A wooden wall plate is supported either on a steel corbel or a stone corbel, which are provided at 1 m Centre to Centre.</p> <p>iv) The wall plate is embedded on the other side, to the wall or pillars.</p> <p>v) The difference in elevation between the two wall plates is so kept that the desired slope is obtained. Usual slope is <math>30^{\circ}</math>.</p> <p>vi) The common rafters are nailed to wooden wall plate at their upper end, and notched and nailed to wooden post plate at their lower end.</p> <p>vii) Sometimes iron knee straps and bolt are used to connect the rafters to the post plate.</p> <p>viii) Eaves boards, battens and roof covering are provided as shown in fig.</p> <p>ix) This type of roof is suitable for maximum span of 2.5 m.</p> <p>x) These are provided for sheds, out-houses attached to main building, verandahs, etc.</p>	02 M
		02 M





(a) Lean to roof

Q.4 b) **Enlist types of floors and state their suitability.**

Ans

- i. Brick flooring
- ii. Mud flooring
- iii. Murum flooring
- iv. Cement concrete flooring
- v. Flag stone flooring
- vi. Terrazzo flooring
- vii. Mosaic flooring
- viii. Marble flooring and Granite flooring.
- ix. Timber flooring

**Suitability:**

- i. **Brick flooring** :- It is provided for warehouses, stores & godowns or places where heavy articles are stored.
- ii. **Mud flooring**: - These are constructed in villages. They are cheap, hard, fairly impervious, and easy in construction & maintenance. They remain warm in winter & cold in summer hence suitable under adverse conditions of climate
- iii. **Cement concrete flooring**: - This is commonly used for residential, commercial and in industrial building.
- iv. **Terrazzo flooring**:- Due to good wearing property ,such flooring extensively used in residential buildings ,offices, hospitals, schools, public buildings etc.
- v. **Mosaic flooring**: - Such type of flooring is commonly used in residential buildings as it is cheap in construction.
- vi. **Marble and granite flooring**:-This type of flooring is expensive and therefore used in monumental or ornamental work.
- vii. **Timber flooring**: - such type of flooring is not commonly used in residential buildings but can be used for carpentry halls, dancing halls, Drama Theater, health center. Timber flooring is quite costlier therefore used at a place where the timber is readily available.

Any four  
1/2 M for  
each type  
and  
1/2 M for  
each  
suitability

Q.4 c) **State any eight requirements of good stair case.**

Ans

**Following are the general requirements of a staircase –**

1. **Location**: - A stair should be located in buildings in a position where there is both light and ventilation.