TED (15) – 3011

(REVISION — 2015)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

CONSTRUCTION MATERIALS AND ENGINEERING

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define bulking of sand.
2. List the functions of alumina and silica in brick earth.
3. Define fibre boards.
4. Define shoring.
5. Differentiate between a mullion and a transom. $(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Describe the characteristics of a good tile.
2. List the properties of asbestos.
3. Define cork. List its uses.
4. List the effects of dampness.
5. List the requirements of partition wall.
6. Enumerate the rules for locating doors and windows.
7. State the requirements of ceiling materials. $(5 \times 6 = 30)$

Marks

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

III (a) Draw a flow diagram showing dry process of manufacture of ordinary Portland cement. 8

(b) Discuss the geological classification of building stones. 7

OR

IV (a) Define seasoning of timber. List its requirements. 8

(b) Discuss the factors affecting workability of concrete. 7

UNIT — II

V (a) Enumerate the properties of rubber. 8

(b) State the limitations of plastics. 7

OR

VI (a) List the advantages of plywood. 8

(b) Discuss the functions of various constituents of an oil paint. 7

UNIT — III

VII (a) Define English bond and Flemish bond and bring out the differences between them. 8

(b) Discuss the various types of prestressing. 7

OR

VIII (a) Discuss the merits and demerits of steel formwork over timber form work. 8

(b) Explain the defects in plastering. 7

UNIT — IV

IX (a) Define : (i) Voussoirs (ii) Spandrill (iii) Springing point (iv) Striking point. 8

(b) List the objectives of foundation. 7

OR

X (a) Explain with neat sketches (i) Dog-legged stairs (ii) Quarter turn stairs. 8

(b) List the advantages of R.C.C. flat roof. 7

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SET-I VERSION - P

(15) 3011

THIRD SEMESTER DIPLOMA EXAMINATION IN ENGINEERING / TECHNOLOGY

CONSTRUCTION MATERIALS AND ENGINEERING

Time: 3Hours

(Maximum marks:100)

Marks

PART – A

(Maximum marks: 10)

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Define bulking of sand.

   The change (increase) in volume of sands on getting moist is termed as bulking of sands. (2marks)

2. What are the functions of alumina and silica in brick earth?

   Alumina – readily absorbs water and imparts plasticity to the clay so that it can be properly moulded (1mark)

   Silica – prevents the bricks from shrinkage, cracking, warping and undue hardness (1mark)

3. How fibre boards are made?

   - Are made by pressing together fibrous materials such as fibres of wood, cane and even vegetable matter (2marks)

4. What is shoring?

   - is the means of providing temporary support to unsafe structures, the stability of which has been endangered due to unequal settlement of the foundation or due to

removal of adjacent buildings, or due to the bad workmanship or due to any other reason (2marks)

5. What is the difference between a mullion and a transom?

Mullion – is a vertical member which is employed to sub-divide a window or a door and it runs through the shutter or opening vertically (1mark)

Transom – is a horizontal member which is employed to sub-divide a window or a door frame or an opening and it runs through the frame horizontally. (1mark)

PART- B

(Maximum Marks : 30)

II Answer *any five* of the following questions. Each question carries 6 marks

1. Describe the characteristics of a good tile.

Following are the characteristics of a good tile:

(i) It should be free from any cracks, flaws or bends.

(ii)It should be regular in shape and size.

(iii)It should be sound, hard and durable.

(iv)It should be well burnt.

(v)It should give a clear ringing sound when struck with hand or with one another or with light hammer.

(vi)It should fit in properly, when placed in position.

(vii)It should give an even and compact structure when seen on its broken surface.

(viii)It should possess uniform colour.

(any 6 points, 6X1=6marks)

2. List the properties of asbestos.

Following are the properties of asbestos:

(i) The holes can be drilled and screws can be fitted on its surface

(ii) It can be cut into pieces.

(iii) It is an excellent insulator for heat and electricity.

(iv) It is fire-proof and acid-proof.

(v) It is flexible, soft and non-porous.

(vi) It is smooth like glass and silk.

(vii) It possesses a good adsorption capacity. When it is mixed with cement and cured with water, it adsorbs i.e. retains firmly on its surface. Thus the asbestos cement items can be considered as reinforced cement stones with reinforcement in the form of asbestos fibres.

(viii) Its colour is brown, grey or white.

(ix) Its melting point is 1200°C to 1550'C.

(x) Its molecules are strongly bound together only in one direction and that is why it possesses very high tensile strength along the fibres.

(xi) Its quality is critically affected by the length of fibres and hence this characteristic of asbestos serves as a basis for classifying asbestos into different grades.

(xii) Its specific gravity is 3.10.

(any 6 points, 6X1=6marks)

3. What is cork? What are its uses?

The cork is obtained from the bark of cork oak trees. The bark is ground, cleaned and baked. During baking, the natural resin present in cork comes out and binds the material into a homogeneous mass.

(2marks)

Uses

(i) Widely used for preparing cork sheets and boards, bottle stoppers, packing gaskets, etc.

(2marks)

(ii) For making cork carpets which is suitable as a floor covering for places like churches, theatres, etc. where a noiseless covering is required. (1mark)

(iii) For making cork tiles which can be used as a covering for walls and floors (1mark)

4. What are the effects of dampness?

The various indirect defects, caused due to dampness in buildings, are mentioned below. All these effects mainly result in poor functional performance, ugly appearance and structural weaknesses of the buildings.

1. Dampness gives rise to breeding of mosquitoes and create unhealthy living conditions.
2. Presence of damp conditions creates efflorescence or building surfaces, which ultimately may result in the disintegration of bricks, stones, tiles etc. and hence in the reduction of strength.
3. Moisture travel may cause softening and crumbling of plaster, specially lime plaster.
4. The wall decoration is damaged, which is very difficult and costly to repair.
5. It may cause bleaching and flaking of the paint which results in the formation of coloured patches on the wall surfaces and ceilings.
6. It may result in rusting and corrosion of metals used in the construction of buildings.
7. The materials used as floor coverings, such as tiles, are damped because they lose adhesion with the floor bases.
8. Timber fittings such as doors, windows, almirahs, wardrobes etc., coming in contact with damp walls, damp floors etc., get deteriorated because of wraping, buckling, dry-rotting etc. of timber.
9. Electrical fittings get damaged and deteriorated, giving rise to leakage of electricity and consequent danger of short circuiting.
10. Dampness promotes the growth of the termites and hence creates unhygienic conditions in buildings.
11. Dampness, when accompanied by the warmth and darkness, breeds the germs of tuberculosis, neuralgia, acute and chronic rheumatism. etc., which sometimes, result in fatal diseases

(any 6 points, 6X1 =6marks)

5.What are the requirements of partition wall?

Following are the requirements of a reasonably good partition walls:

1. The partition wall should be strong enough to carry its own load or dead weight.

2. The partition wall will be strong enough to resist impact to which the occupation of the building is likely to subject them.

3. It should be thin in cross-section so that maximum floor area can be utilized.

4. It should provide adequate privacy in rooms in respect of sight and sound.

5. It should be constructed from light, sound, uniform, homogeneous durable and sound insulaw materials,

6. It should have the capacity to support suitable decorative surfaces.

7. It should be strong enough to support sanitary fittings and heavy fixtures.

8. It should be simple and economical in construction having proper coherence with the type of building structure.

9. It should be as thin and light as possible.

10. It should offer sufficient resistance against fire, heat, dampness, white ant or fungus etc.

11. It should be rigid enough to take the vibrations caused due to loads.

(Any 6 points, 6X1 = 6marks)

6. What are the rules for locating doors and windows?

The designer or planner should observe the following rules while deciding the location of doors and windows :

(i) The number of doors should be kept minimum for each room because the larger number causes obstruction and decreases utility of the accommodation. "The location and the size of the door should be based on its functional requirements.

(2) From viewpoint of utility of the accommodation and privacy of the occupants, doors should preferably be located near the corner of a room (nearly 20 cm from the corner).

(iii) From viewpoint of good ventilation and free air circulation inside the room, the doors should be located in opposite walls facing each other.

(iv) The location, number and size of the windows are decided considering various factors, *viz.*, desired daylight, desired vision of outside, privacy, natural ventilation, heat loss, etc,

(v)From viewpoint of ventilation, the windows should be located opposite lo each other wherever possible.

(vi) From viewpoint of maximum day-lighting, windows in a room should be located on the northern side.

(vii) Ordinarily speaking, the sill of a window should be-located at a height of 0 75 to 1 metre above the floor level. But, the windows when exposed to public places, *e.g* , shopping centre, cinema theatre, recreation place, etc., and windows of bath rooms, etc., are located at a higher level, say about 2 metres. This is essential for achieving privacy in buildings on ground floor.

(viii) In addition to above factors, doors as well us windows should be located by keeping in view the interior decoration of the room and views of the building owner.

(Any 6 points, 6X1= 6marks)

7. State the requirements of ceiling materials.

Ceiling material for whatever reason it has been specified should fulfil the following requirements.

(1) The ceiling material shall be homogeneous and stable in structure,

(2) The exposed surface shall have desired texture free from flaws.

(3) In case of boards (the edges shall be regular and smooth.

(4) The ceiling material shall have rigidity and structural strength and shall be resistant to rats, termites, white ants, fungus insects and weather action,

(5) When required they shall undergo necessary tests for thermal and acoustic, visulation properties and fire resistance.

(6) They shall be easy to construct, repair maintain and clean.

(7) They shall have to provide an adequate means of access for the maintenance of the suspension system and the maintenance of concealed service and light fittings.

(Any 6 points, 6X1 = 6marks)

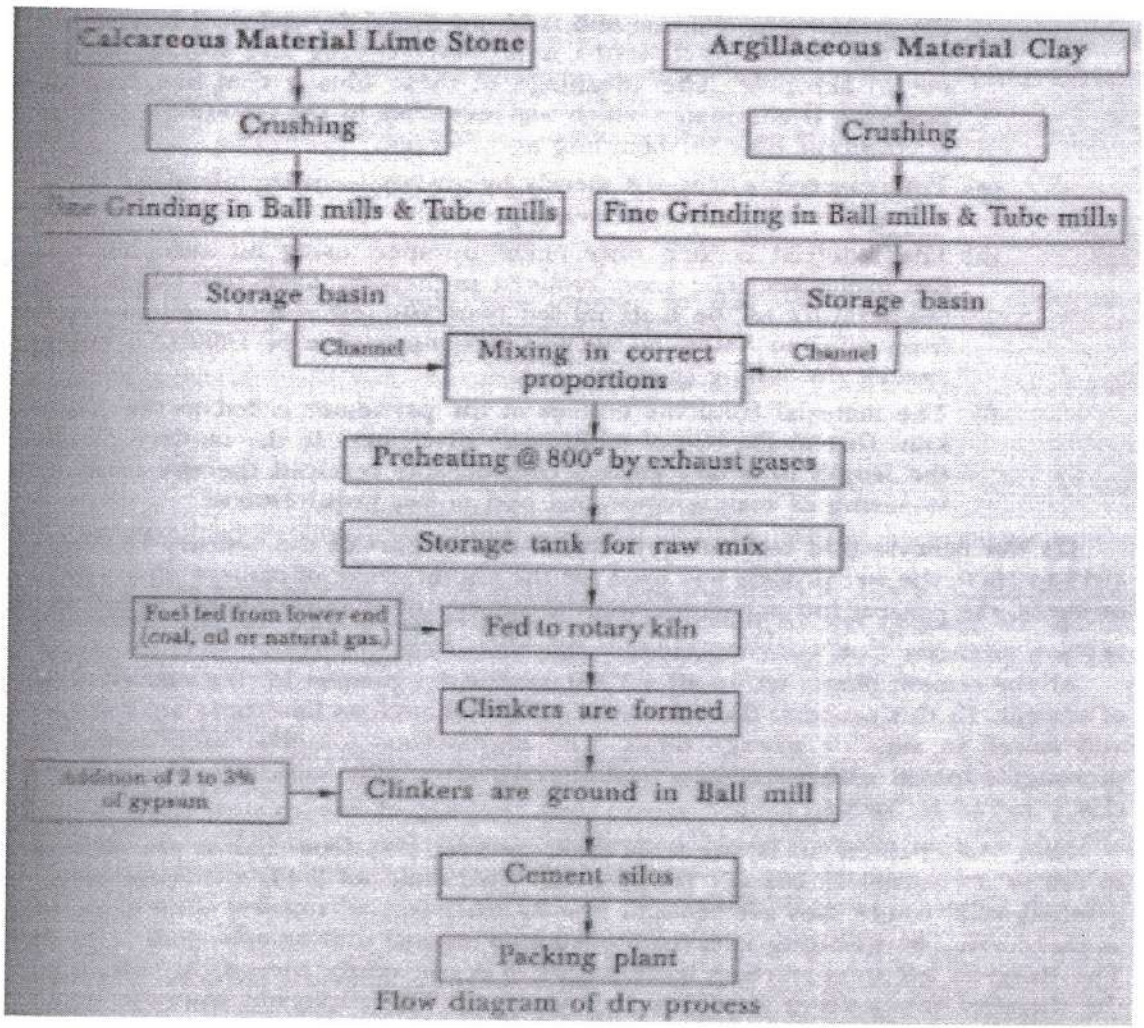
PART – C

(Maximum Marks: 60)

(Answer *one* full question from each unit. Each full question carries 15 marks)

MODULE – I

III (a) Draw a flow diagram showing dry process of manufacture of ordinary Portland cement.(8)



Flow diagram of dry process

(b) Discuss the geological classification of building stones. (7)

Geological classification: According to this classification, the rocks are of the following three types:

(i) Igneous rocks;

(ii) Sedimentary rocks; and

(iii) Metamorphic rocks.

(i) Igneous rocks: The inside portion of the earth's surface has high temperature so as to cause fusion by heat at even ordinary pressures. The molten or pasty rocky material is known as the magma and this magma occasionally tries to come out to the earth's surface through cracks or weak portions. The rocks which are formed by the cooling of magma are known as the igneous rocks. Eg. granite, dolerite, basalt

(2marks)

(ii) Sedimentary rocks: These rocks are formed by the deposition of products of weathering on the pre-existing rocks. All the products of weathering are ultimately carried away from their place of origin by the agents of transport. Such agents are frost, rain, wind, flowing water, etc. Eg. Gravel ,sandstone, lime stone, gypsum, lignite,etc.

(2marks)

(iii) Metamorphic rocks: These rocks are formed by the change in character of the pre-existing rocks (igneous or sedimentary rocks). The igneous as well as sedimentary rocks are changed in character when they are subject to great heat and pressure. The process of change is known as the metamorphism. In this process, the original constituent minerals which are unstable under the changed condition are converted into new ones which are more stable under the changed conditions. These minerals are arranged in a manner which is more suitable to the new environment. It should however be noted that changes produced by weathering and sedimentation are not included in the metamorphism. Eg. Marble, slate, gneiss, schist, etc.

(3marks)

OR

IV(a) What is seasoning of timber? Why is it required? (8)

Seasoning is the process of drying out the timber to a moisture content approximately equal to average humidity of situation where it is to be used. (1mark)

The seasoning of timber is carried out to achieve the following objects:

(i) To allow timber to burn readily, if used as fuel.

(ii) To decrease the weight of timber and thereby to lower the cost of transport and handling.

(iii) To impart hardness, stiffness, strength and better electrical resistance to timber

(iv) To increase the resisting power of timber, as most of the causes of decay of timber are more or less related to the moisture.

(v) To maintain the shape and size of the components of the timber articles which are expected to remain unchanged in form.

(vi) To make timber easily workable and to facilitate operations during conversion

(vii) To make timber fit for receiving treatment of paints, preservatives, varnishes, etc.

(viii) To make timber safe from the attack of fungi and insects.

(ix) To make timber suitable for gluing i.e. effectively joining two members of timber with the aid of glue,

(x) To reduce the tendency of timber to crack, shrink and warp.

(any 7points, 7X1= 7marks)

(b) Discuss the factors affecting workability of concrete. (7)

(i) Surface Texture: A rough surface aggregate will have more surface area then a smooth round textured aggregate.

(ii) Admixtures: Air entrained concrete is more workable. It is so because air forms bubbles, on which the aggregates slide past each other increasing the workability. Another factor is that air entraining agents are surface active and they reduce the internal friction between the aggregates.

(iii) Grading of Aggregates: Properly graded aggregates are more workable, It is so because such as mix will have least voids and thus excess cement paste will be available as lubricant. This also prevent segregation.

(iv) Water Content: The fluidity of concrete increases with water content. At site the normal practise is to increase the water content to make the concrete workable which lower strength. In controlled concrete this cannot be resorted and even in uncontrolled concrete this should be the last choice. However, in case, if more water is added due to any reason the cement content should be proportionately increased.

(v) Mix Proportions: Aggregate cement ratio influences the workability to a large extent. The higher the ratio leaner will be the concrete. In a lean concrete, paste available for lubrication of per unit surface area of aggregates will be less and hence the workability is reduced.

(vi) Aggregate size: For big size aggregate the total surface area to be wetted is less, also less paste is required for lubricating the surface to reduce internal friction. For a given water content big size aggregate give high workability.

(vii) Shape of Aggregates: For a given water content, round and cubical shape aggregates are more workable than rough, angular or flaky aggregates because the former type of aggregates requires less cement paste for lubrication as these have less surface area and lesser voids. In case of round aggregates frictional resistance is also small so less lubrication is required. For this reason river sand and gravel provide greater workability than crushed sand and aggregates.

(any 7 points, 7X1 = 7marks)

MODULE- II

V (a) Enumerate the properties of rubber. (8)

The important properties of rubber are as follows:

(i) It can absorb shocks due to impact.

(ii) It can contain liquids and gases.

(iii) It creeps or extends or undergoes slow deformation in length as a result of applied force or stress.

(iv) It is a bad conductor of heat.

(v) It is plastic in nature and hence it can be moulded to the desired shapes

(vi) It is possible to alter considerably its properties by the process of vulcanizing and compounding.

(vii) It possesses the quality of flexibility.

(viii) It resists abrasion in a better way.

(ix) The natural rubber should be protected from sunlight and should not be allowed to come in close contact with oils, organic liquids, etc

(x) The outstanding property of rubber is that it is capable to undergo deformation without being structurally damaged. It is thus reasonably elastic.

(xi) The synthetic rubber offers great resistance to acids, petroleum products, etc

(any 8 points, 8X1 = 8marks)

(b) Explain the limitations of plastics. (7)

(i) Plastic is a soft, non-renewable resources which cannot be used for some crucial applications.

(ii) The poisonous gaseous product produced by the decomposition plastic can causes CANCER

(iii) They are brittle at low temperature and deform at high pressure.

(iv) Plastic materials have low heat resistant and poor ductility. But they are combustible and release toxic fumes after burning.

(v) The recycling of plastic is not cost effective process and even more expensive compared to its manufacturing.

(vi) The raw material for manufacturing of plastic bags is petrochemicals which are non-renewable resource.

(vii) Plastic bags are flimsy and not durable like paper or cloth.

(viii) The improper disposal of plastic can cause hazard to wildlife as they are not readily biodegradable.

(ix) Plastic materials like plastic bags are mostly end up as harmful waste in landfill which may pollute the environment and threatening our health.

(x) The biodegradation of plastic takes 500 to 1,000 years but manufacturing takes only seconds.

(any 7 points, 7X1 = 7 marks)

VI (a) List the advantages of plywood. (8)

Following are the advantages of plywoods:

(i) As plies are placed at right angles to each other, the expansion and shrinkage are comparatively very low.

(ii) They are available in a variety of decorative appearance.

(iii) They are available in large sizes. The commercial sizes have widths upto1.50 m and lengths upto 3 m.

(iv) They are elastic and hence they are not liable to split or crack due to changes in atmosphere.

(v) They are light in weight,

(vi) They are not easily affected by moisture,

(vii) They are stronger than solid boards

(viii) They are very easy to work and they can be made to suit any design

(ix) They do not split in an axial direction.

(x) They do not split when nailed near edges because of their cross grained nature

(xi) They make use of rare and valuable timbers in a quite economical way.

(xii) They possess uniform tensile strength in all directions. (8X1 = 8marks)

(b) Discuss the functions of various constituents of an oil paint. (7)

(i) Bases – A base is a solid substance in a fine state of division and it forms the bulk of a paint. It determines the character of the paint and imparts durability to the surface which is painted. It reduces shrinkage cracks formed on drying and it also forms an opaque layer to obscure the surface of material to be painted. Eg. White lead, red lead, oxide of zinc or zinc white, oxide of iron, titanium white, antimony white, aluminium powder, lithophone. (1mark)

(ii) Vehicles or carriers – are the liquid substances which hold the ingredients of a paint in liquid suspension. They make it possible to spread the paint evenly and uniformly on the surface in the form of a thin layer. They also provide a binder for the ingredients of a paint so that they may stick or adhere to the surface.
Eg. Linseedoil, Tung oil, poppy oil, Nut oil (1mark)

(iii) Driers – These substances accelerate the process of drying. Eg. litharge, red lead, sulphate of manganese.
They are used for the following purposes
(a) to bring down the cost of paint;
(b) to improve the durability of paint;
(c) to modify the weight of paint; and
(d) to prevent shrinkage and cracking. (1½marks)

(iv) Colouring pigments – Colouring pigments are fine powders added to obtain paints of different colours. Eg. Graphite gives black colour, indigo – blue, burnt umber – brown, carmine – red (1mark)

(v) A Solvent or thinner – is a liquid which is mixed in a paint to make the paint thinner or of desired consistency so that it can be easily applied on the surface. It helps the paint in penetrating through the porous surfaces being thinner at the time of application. After applying the paint, the solvent evaporates and the resulting surface is more even and smooth. It facilitates brushing and improves spreading power of the paint. Eg. Turpentine, white spirit, naphtha, alcohol (1mark)

(vi) Inert filler or Extender or adulterant

These are the cheap inert materials or pigments, used as adulterants with the base, to extend help in the following functions.

-to reduce the cost of the base and hence of the paints as a whole

-to increase or decrease the weight of paint and hence to prevent too rapid setting of the ingredients

-to help to maintain the other pigments in suspension by modifying the weight

-to increase the durability of paint

-to improve the quality of brushing

-to prevent shrinkage and cracking of paint

Eg. Magnesium silicate, Talc, Barytes, Calcium carbonates, gypsum, ground silica. (1½marks)

MODULE – III

VII (a) Define English bond and Flemish bond and bring out the differences between them. (8)

English bond – alternate courses of headers and stretchers (2marks)

Flemish bond – alternate headers and stretchers in each course (2marks)

English Bond	**Flemish Bond**
More compact and stronger for walls having thickness more than1½bricks	Less compact and stronger
Not pleasing appearance of the facing	Better appearance in the facing
No strict supervision and skill required for its construction	Good workmanship and careful supervision is required
More in cost than double Flemish bond	Cheaper in cost because number of brick bats are used

(any 4 points, 4 X1 = 4marks)

(b) Define prestressed concrete. Discuss the various types of prestressing. (7)

Prestressed concrete: It is basically concrete in which internal stresses of a suitable magnitude and distribution are introduced so that the stresses resulting from external loads (or) counteracted to a desired degree. In reinforced concrete member the prestress is commonly introduced by tensioning the steel reinforcement. (1mark)

Types of Prestressing Prestressing of concrete can be classified in several ways.

(i) Source of prestressing force

This classification is based on the method by which the prestressing force is generated. There are four sources of prestressing force: Mechanical, hydraulic, electrical and chemical

(ii) External or internal prestressing

This classification is based on the location of the prestressing tendon with respect to the concrete section.

(iii) Pre-tensioning or post-tensioning

This is the most important classification and is based on the sequence of casting the concrete and applying tension to the tendons.

(iv) Linear or circular prestressing

This classification is based on the shape of the member prestressed.

(v) Full, limited or partial prestressing

Based on the amount of prestressing force, three types of prestressing are defined.

(vi) Uniaxial, biaxial or multi-axial prestressing

As the names suggest, the classification is based on the directions of prestressing a member

(any 6 types , 6X1 = 6 marks)

VIII(a) Discuss the merits and demerits of steel formwork over timber form work. (8)

Merits

1. Steel forms are more durable and have longer life as compared with timber forms.
2. The steel forms can be put to larger number of reuses. The number of reuses can be assumed to vary from 100 to 120.
3. Steel forms can be installed and dismantled with greater ease and speed.
4. The quality of exposed concrete surface obtained by steel forms is good and it needs no further treatment. On the other hand construction carried out by use of timber formwork in variably requires plastering to obtain the desired finish of the concrete surface.
5. In steel form work there is no danger of formwork absorbing water from concrete and hence the chances of honey combing are minimised.
6. Steel forms are not liable to shrink or distort and hence it is possible to achieve better workmanship and higher degree of accuracy by use of steel forms.

(any 4 points,4X1 = 4marks)

Demerits

1. The cost of steel forms is more and initial cost will be more than timber forms.
2. Steel forms are not economical if reuses are not there.
3. Steel forms are only economical in large construction projects or in situations where large number of reuses of the same shuttering is possible.
4. Skilled labour are required in making steel forms.

(any 4 points,4X1 = 4marks)

(b) What are the defects in plastering? (7)

1. Blowing or Blistering of Plaster

This consists in formation of small patches of plaster swelling out beyond the plastered surface and are chiefly due to improper slaking of lime particles in the plaster. After the application of plaster, the unslacked particles in the lime start slaking and thus the defect takes place. Properly slaked lime should therefore, be used to prevent blistering.

2. Cracks

These are formed on the plastered surface and may be hair cracks or cracks which may be easily seen. The development of fine hair cracks is known as crazing.

3. Falling Out of Plaster

Following are some of the reasons of this defect.

(i) The adhesion of the plaster to the back-ground may not be perfect.

(ii) The suction of the backing material may not be uniform.

(iii) Excessive thermal changes in plaster or backing,

4. Efflorescence

The soluble salt are present in plaster-making materials as well as building materials such as bricks, sand, cement, etc. Even water used in the construction work may contain soluble salts. When a newly constructed wall dries out, the soluble salts are brought to the surface and they appear in the form of a whitish crystalline substance. Such a growth is referred to as the efflorescence and it seriously affects the adhesion of paint with wall surface.

5. Flaking

The formation of a very small loose mass on the plastered surface is known as the flaking and it is mainly due to bond failure between successive coats of plaster.

6.Peeling

The plaster from some portion of the surface comes off and a patch is formed. Such formation is termed peeling and it is also mainly due to bond failure between successive coats of plaster.

7. Popping

Sometimes the plaster mix contains particles which expand on being set. A conical hole in plastered surface is formed in front of the panicle-. This conical hole is known us the blow or pop.

8. Rust Stains

Seen sometimes on plastered surface, especially when plaster is applied on metal lath.

9. Uneven Surface

This defect becomes prominent only due to poor workmanship of the work.

10. Softness

The excessive dampness at certain points on the plastered surface makes that portion soft. The chief reasons for such softness are undue thinness of the finishing coat, presence of deliquescent salts, excessive suction of the undercoat, etc.

(any 7 defects, 7X1 = 7 marks)

MODULE – IV

IX (a) Define : (i) Voussoirs (ii) Spandrill (iii) Springing point (iv) Striking point (8)

(i) Voussoirs – The wedge shaped bricks or blocks used for the construction of arches are called voussoirs (2marks)

(ii) Spandrill – This is the irregular triangular space formed between the extrados and the horizontal line drawn tangent to the crown (2marks)

(iii) Springing point – These are the points from where the curve of an arch starts. These are the points at which intrados and skewbacks intersects (2marks)

(iv) Striking point (or centre) – This is the geometrical centre point, from which the arch forming the extrados, arch rings and intrados are described or struck. (2marks)

(b) What are the objectives of foundation? (7)

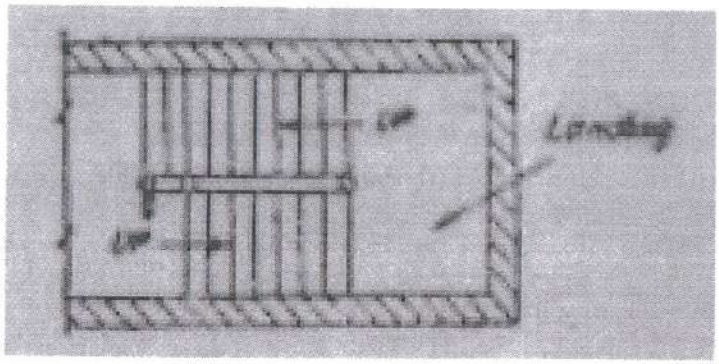
1. To prepare a level and hard surface for concreting and masonry work.
2. To support the structure.
3. To prevent or minimize cracks due to movement of moisture in case of weak or poor soils etc.
4. To distribute the total load coming on the structure on a larger area so as to bring down the intensity of load at its base below the safe bearing capacity of subsoil.
5. To give enough lateral stability to the structures against various distributing horizontal forces such as wind, rain, earthquake etc.
6. To provide the structural safety against undermining or scouring due to animals, flood water etc.
7. To transmit the super-imposed loads through side friction and end hearing in case of deep foundations. (any 7 points, 7X1 = 7marks)

OR

X (a) Explain with neat sketches: (i) Dog-legged stairs (ii) Quarter turn stairs (8marks)

(i) Dog-Legged Stairs (explanation – 2marks)

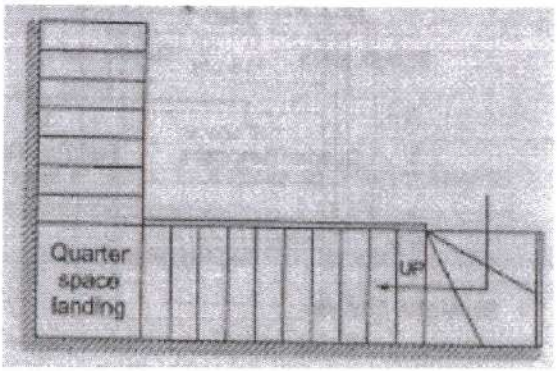
This is a very common and a popular type of stair, used in public and residential buildings alike. It has two flights running in opposite directions, separated by a half space landing. The stairs are very convenient and afford maximum safety. The staircase in which a dog-legged stair is to be provided, must have a width equal to twice the width of the stair. The stairs are generally made of R.B., RCC or timber.



(figure – 2marks)

(ii) Quarter turn stairs

A stair running through one right angle is known as quarter-turn stair. If a quarter turn stair is branched into two flights at a landing, it is known as bifurcated stairs. This type of stair is commonly used in the buildings near their entrance hall. The stair has wider flight at the bottom which bifurcates into two narrower flights at the landing-one turning to the left and the other to the right. (explanation – 2marks)



(figure – 2marks)

(b) What are the advantages of R.C.C. flat roof? (7)

(1) The roof can be conveniently used as terrace for playing and gardening.

(2) It is easy to render flat roof fire resistant.

(3) It has got good insulating properties,

(4) It avoids the need of a false ceiling.

(5) In this age of steel and reinforced concrete structures the construction of flat roof is considered more simpler and architecturally suitable.

(6) In a multistoreyed building flat roof is essential,

(7) Pitched roofs require greater area of roofing material than flat roofs.

(8) The construction and maintenance of the flat roof is simpler.

(any 7points, 7X1 = 7marks)