1 Building Materials

1.1. CHARACTERISTICS OF GOOD BUILDING STONES

Good building stones must possess the following qualities:

1. Appearance. The stones should be of uniform colour and from the architectural point of view, these should match with the surroundings. Lighter colours are preferred to darker ones as the latter are less durable. The property of the appearance of stones is extremely important for the face work of buildings. The good stones should also be able to receive good polish.

2. Strength. The stones used in the construction of buildings are generally subjected to compressive stress. These should therefore, be able to withstand the compression without getting crushed due to the load of the structure. Though, all stones used for the construction of ordinary buildings, possess workable strength in compression but the strength of stones used for the construction of heavy structures should always be tested before use. Closed grained and uniform textured stones, are generally good in compressive strength.

3. Structure. A good stone when broken in a direction other than that of cleavage (if any) should not give a dull appearance. These should be either closed grained or crystalline and should show uniformity of texture. These should also be free from cavities and cracks. If the stones are obtained from sedimentary rocks, their stratification should not be visible to naked eye.

4. Hardness. A good stone when used in floors, pavements and aprons of bridges, should be able to resist the abrasive forces caused due to wear and friction. Hardness of stones can be tested by Mohr's scale of hardness in the laboratory whereas in field, it can be tested by knife scratching. Hard stones do not show any mark of scratching.

5. Toughness. Good stones should also be tough enough to withstand stresses developed due to vibrations of machineries and moving loads over them. Stones used in the construction of roads should be hard as well as tough.

6. Heaviness. The stones used for the construction of dams, weirs, barrages, docks and harbours, should be of heavier varieties. In case of dams and roof coverings, lighter varieties of stones are preferred to. The specific gravity of good building stones should lie between 2.4 to 2.8.

7. Durability. Good stones should resist the action of the atmosphere such as wind, rain and temperature. The effect of atmospheric conditions on stones is generally known as *weathering*. Durability of stones largely depends upon their chemical composition and physical structure. A durable stone should have a compact and crystalline structure, free from pores.

8. Porosity and Absorption. A good stone should not be porous. It should not absorb water when immersed. Porous stones are unsuitable for the construction work as rain water falling on their exposed surface get driven in the pores of stones by the prevailing winds. The rain water generally becomes acidic due to atmospheric acidic gases and this acidic water reacts with the constituents of stones causing them to crumble. In higher region water in the pores when freezes, disintegrates the stones because of increased volume after freezing. Porous stones should be used in the construction of structures with care and at places which are not exposed to frost, rain or moisture.

9. Resistance to Fire. Stones when exposed to fire should be able to resist higher temperature. To ensure this, stones should be free from minerals which are likely to decompose on heating such as calcium carbonate and iron oxide. Stones should not be composed of minerals, having different coefficients of thermal expansion. Quartz expands at low temperature and argillaceous variety of stones resist high temperature.

10. Dressing. The art of converting a natural stone into a definite shape, is known as *dressing*. Stones should therefore possess good dressing properties for carving and structural work in building constructions. Marble is a good example. It may be noted that a stone that possesses good dressing properties, is weak in strength and durability, and also its hardness is low.

11. Seasoning. A good stone should be free from quarry sap. To ensure this, the stones after quarrying and dressing should be left for a period of 6 to 12 months for proper seasoning, before using it in the construction work.

1.2. SUITABILITY OF STONES FOR VARIOUS TYPES OF CONSTRUCTION

The types of stones used for various types of construction are :

	Type of structure	Type of stone
1.	Piers, bridge abutments, light houses, and wires.	Good quality granite, good or stratified granite.
2.	Road pavements and railway ballast.	Inferior quality of granite and Gneiss.
3.	Road metalling, paving.	Basalt and trap.
4.	Cement concrete.	Basalt and trap.

5.	Ornamental work in building.	Red and yellow types of basalt and trap.
6.	Roof covering and flooring	Slate
7.	Damp proofing and sills of windows.	Slate
8.	Partitions in urinals and bath rooms.	Slate
9.	Ornamental buildings, monuments, statues and carved work.	Marble
10.	Building construction	Laterite
11.	Interior decoration in superior buildings.	Serpentine

1.3. OPERATIONS INVOLVED IN THE MANUFACTURE OF BRICKS

(*U.P.S.C. Engg. Services Exam. 1985*)

Brick making involves the following operations :

1. Preparation of clay. Good brick earth, a mixture of pure clay and sand along with a small quantity of finely divided lime is first dug out, broken up, watered and kneaded well under feet till it becomes a homogeneous mass. The tempered earth is then covered up with mat pieces and allowed to dry gradually till it is just soft-enough for moulding. For manufacturing superior bricks, the clay is generally prepared by pug mills.

2. Moulding. The well prepared clay is moulded in rectangular steel or wood moulds without top and bottom, their longer sides project a few centimetres to act as handles. Bricks are usually moulded on a block of wood having a projection 6 mm deep and same length and breadth as the inside dimensions of the mould. Moulding of bricks done on the stock board, is called *table moulding*.

3. Drying. The moulded bricks are then allowed to dry so that these are sufficiently hard to be handled. When the bricks become sufficiently hard, these are stacked. Eight or ten layers of bricks on edge with intervals of about one metre between them, are generally stacked.

4. Burning. Well dried bricks are burnt in clamps or kilns to attain desired crushing strength and also to impart red or yellowish colour.

1.4. CLASSIFICATION AND CHARACTERISTICS OF BRICKS AS PER INDIAN STANDARD INSTITUTION

According to IS : 1077-1971, the classification and characteristics of bricks, are as tabulated under.

Classification of Bricks

Sl. No.	*Type of bricks (classification)*	*Properties*	*Where used*
1.	First class bricks	These bricks are well burnt, having smooth and even surface, with perfect rectangular shape and uniform reddish colour. When struck with other brick,, these give a metallic ringing sound. These should not leave any mark when scratched by finger nail. These should not absorb water more than 20% of its weight when immersed in cold water for 24 hours. When broken into two pieces these should show a uniform compact structure. These show slight efflorescence.	These are used for good structures such as outer walls and facing work when no plastering is done. These are also used in floors and reinforced bricks slabs. Such bricks should be laid in rich mortar.
2.	Second class bricks	These are not perfectly rectangular in shape and are having rough surface,, but are hard,, slightly over-burnt and uniform in colour. These give ringing sound when struck with each other. Water absorption should not be more than 22% by weight,, when immersed in water for 24 hours. These show slight efflorescence.	These are used for internal walls,, not exposed to atmosphere, these are used in facing work, which should be plastered. These cannot be used for R.B. work. Such bricks may be laid in mud or lime mortar.

3.	Third class or pila bricks.	These bricks are not burnt properly in the kilns and may be slightly under/over-burnt, hence these are soft and can be easily broken. These are light red in colour, with yellowish tinge. On striking, these do not give a ringing sound. These should not absorb more than 25% of water by weight when placed in cold water for 24 hours. Efflorescence in these bricks is moderate.	These are used for inferior construction works, or at places where there is less rainfall or presence of dampness.
4.	Jhama or over-burnt bricks.	Due to excess fusion and temperature bricks get over-burnt, loose their shape and get twisted. These bricks yet dark bluish in colour.	These bricks are not used in building construction work. In the form of broken pieces,, these may be used as road metal,, also in foundations and floors as soling material.

1.5. TESTS FOR THE ACCEPTANCE OF BRICKS FOR BUILDING CONSTRUCTION

Before accepting the bricks for building construction, the following tests are generally performed.

1. Dimensions and tolerances test
2. Compressive strength test
3. Water absorption test
4. Efflorescence test.

1.5.1. Dimensions and Tolerances Test.

This test is performed to know the accuracy of the dimensions of the bricks.

Procedure. Proceed as under :

1. Take twenty bricks out of the given samples.
2. Remove loose particles of clay and small projections from the bricks.
3. Arrange them on a level surface in contact with each other and in a straight line.
4. Measure the overall length of the bricks having size 19 × 9 × 9 cm laid by means of a steel tape.
5. The dimensions of 20 bricks should be within the following limits :

Class	*Length*	*Width*	*Height*
Class A	368 to 392 cm	174 to 186 cm	174 to 186 cm
Class B	350 to 410 cm	165 to 195 cm	165 to 195 cm

1.5.2. Compressive Strength Test

This test is performed to determine the crushing strength of bricks.

Procedure. Proceed as under :

1. Take five bricks out of the sample at random.
2. Immerse the bricks in water at room temperature for 24 hours.
3. Take out the bricks from the water and wipe off surplus water from their surfaces.
4. Fill the frogs and all voids in the bed and face with cement mortar 1 : 1 (1 cement : 1 clean sand).
5. Store the bricks under damp gunny bags for 24 hours and there-after immerse them in water for 72 hours.
6. Take out the bricks from water, wipe off dry. Place the bricks with flat surfaces horizontal and mortar filled frog face upward between two or three thin ply sheets and centre them between the plates of a compression testing machine.
7. Apply the load at a uniform rate of 140 kg/cm^2 per minute till the brick fails.
8. Take the average value of the compressive strengths of the five bricks.
9. The compressive strength of a common brick should be 50 kg/cm^2.

1.5.3. Water absorption test

This test is performed to determine water absorption of the bricks. If the water absorption capacity of a brick is more, its strength will be comparatively low.

Procedure. Proceed as under :

1. Select five bricks at random out of the given sample.
2. Dry them in a ventilated oven at 105°C to 110°C till they attain practically constant weight.
3. Remove the bricks from the oven and cool them to room temperature.
4. Weigh the bricks in a balance. Let it be W_1 kg.
5. Immerse the five bricks in water completely at 27° ± 2C for 24 hours.
6. Remove one brick from water and wipe off its surfaces with a damp cloth.
7. Weigh the brick within three minutes after its removal from water. Let its weight be W_2 kg.
8. Water absorption capacity = $\frac{W_2 \times W_1}{W_1} \times 100$.
9. Take the average value of the water absorption capacities of the five bricks.
10. For Ist class bricks, the water absorption capacity should not be more than 20% by weight.

1.5.4. Efflorescence Test

This test is performed to know the presence of any alkaline matter in the bricks.

Procedure. Proceed as under :

1. Take five bricks at random from the given sample.

2. Place each brick on end in a dish containing distilled water ensuring depth immersion at least 2.5 cm.
3. Keep the dish in a ventilated room (Temp. 20°C to 30°C) till the whole of distilled water in the dish evaporates.
4. Again pour 2.5 cm depth of distilled water in the dish and keep it, till the whole of water gets evaporated.
5. Now, examine the bricks for efflorescence as detailed below :

Observation	*Result*
(*i*) No perceptible deposit	Nil-efflorescence
(*ii*) 10% area covered with thin deposit of salts	Slight-efflorescence
(*iii*) 50% area covered with deposit of salts without any powdering or flaking surface	Moderate-efflorescence
(*iv*) 50% area covered with deposit of salts accompanied by flaking of surface.	Heavy-efflorescence
(*v*) Heavy deposits of salts accompanied by flaking of the surface.	Serious-efflorescence

1.6 TERRA-COTTA

Terra-cotta which is a baked clay or baked earth is a superior variety of clay products and is usually moulded in the same manner as bricks. It is made from a mixture of fine clay (60%), crushed pottery (20%), white sand (14%) and powdered glass (6%), with a quantity of desired colouring substance.

For making a porous and sand proof terra-cotta, either sawdust or ground cork may be mixed with clay before moulding. Organic particles burn away during the burning of the moulded and dried terra-cotta and thus leaving behind small pores. Terra-cotta is used for architectural and ornamental parts of superior buildings as a substitute for stones. It is used as sound proof material and its hollow blocks prevent dampness in the structure.

1.7 GLAZING OF WHITE WARE PRODUCTS

Surfaces of white ware products are generally glazed to improve their appearance and also to protect them from the action of atmosphere, sewage and strong chemical agents.

For providing transparent glazing, self glazing is the most important method. In this method a solution of sodium chloride is thrown in the kiln when the product is well burnt at a temperature 1200°C to 1300°C. Due to high temperature, the sodium chloride evaporates and combines with silica of soil to make soda silicate. Soda silicate again combines with alumina, lime or iron of the clay to form a thin transparent layer. Vapours of volatilised salt get into every pore of the product and thus make it impermeable.

1.8 CHARACTERISTICS OF GOOD TIMBER

Good timber should possess the following qualities :

1. Hardness. It should be hard.

2. Strength. It should be able to resist heavy loads in structural members.

3. Toughness. It should be tough enough to resist shocks due to vibrations. It should not break in bending and should resist splitting. Timbers with narrow annual rings, are generally the strongest.

4. Elasticity. It should be elastic so as to regain its original shape after removal of loads. This property is very important for the timber used in sports goods.

5. Durability. It should be able to resist attacks of fungi and worms and also atmospheric effects for a longer duration.

6. Defects. It should be from the heart of a sound tree and be free from sap, dead knots, shakes and other similar defects.

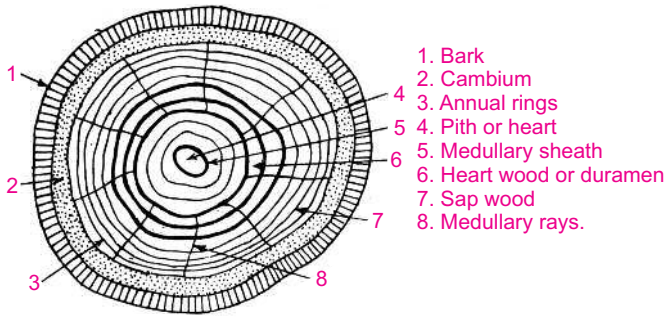
7. Fibres and structure. It should have straight and closed fibres and compact medullary rays. It should give a clear ringing sound when struck. Dull heavy sound is an indication of internal decay. Its annual rings should be uniform in shape and colour.

8. Appearance and colour. Freshly cut surface should give sweet smell and present shining surface. It should have preferably dark colour, as light coloured timbers are generally weak in strength.

9. Shape and weight. It should retain its shape during the process of seasoning. Heavy timbers are always stronger than light weight timbers.

10. Workability. It should be well seasoned and easily workable. Teeth of saw should not get clogged during the process of sawing. It should provide smoothened surface easily.

1.9 STRUCTURE OF A TIMBER (FIG. 1.1)



The cross-section of the trunk of a timber tree may be distinctly divided into four parts.

1. Pith, Heart or Medulla. Inner most part or core of the stem, which consists entirely of cellular tissues, is called *pith.*

2. Medullary Sheath. The portion consisting of vascular tissues and which encloses the pith, is called *medullary sheath.* Medullary rays are vertical layers of cellular tissues and spider-like radial lines originating from the pith to the bark. Medullary rays bind the annual rings to one another. Large and distinct radial lines are called *silver grains* or *flowers.*

3. Annual rings. These consist of cellular tissues and woody fibres arranged in distinct concentric circles round the pith. Annual rings are generally formed in every year, due to the deposition of sap below bark. Number of annual rings indicates the age of a tree in tropical climate. Sap wood consists of outer annual rings. Heart wood consists of inner annual rings round the pith.

4. Bark or Cortex. It consists of cells of wood fibre and is the outermost cover or skin of the stem.

1.10. CHARACTERISTIC DIFFERENCES OF SAP WOOD AND HEART WOOD

The main characteristic differences of sap wood and heart wood are as under :

1. Sap wood. (*i*) Sap wood is younger in age and lighter in colour

(*ii*) It is easily attacked by insects.

(*iii*) Its annual rings are far apart.

(*iv*) It possesses less strength.

2. Heart wood. (*i*) Heart wood is older in age and darker in colour.

(*ii*) It is hard core of the stem and is not attacked by insects.

(*iii*) Its annual rings are nearer to each other.

(*iv*) It possesses great strength.

1.11. CHARACTERISTIC DIFFERENCES OF HARD WOOD AND SOFT WOOD

The main characteristic differences of hard wood and soft wood, are as tabulated below :

Characteristic	*Soft wood*	*Hard wood*
1. Annual rings	Clearly visible and far apart	Less distinct and nearer to each other
2. Medullary rays	Indistinct	Distinct
3. Colour	Lighter	Darker
4. Heart wood and sap wood	Can not be distinguished	Can be distinguished
5. Fibres	Straight and possess high tensile strength	Strength of fibres is same in all directions.
6. Sawing	Easy	Difficult
7. Resinuneous material	Exists in pores	Does not exist
8. Examples	Chir, and other coniferous trees	Teak, mahagony, Sal, etc.

1.12 PRESERVATION OF TIMBER

A properly seasoned timber is most durable. If it is not seasoned properly, it is likely to be attacked by insects *i.e.,* white ants, dry and wet rots. Timber should be used either fully dried in well ventilated position or well immersed in water. In water the timber does not decay though it becomes soft and weak. In case timber is not seasoned before it is used, it should be preserved by the application of preservatives. In masonry construction, the timber should not be used in direct contact with lime mortar.

Preservation of timber may be done by one of the following methods :

1. Charring. Lower ends of the timber posts before embedding in ground are generally charred to a depth of 15 cm and quenched in water, to prevent attack from dry rots and worms.

2. Tarring. Embedded portion of timber fence posts, ends of door and window frames, battons and beams built in walls are usually tarred.

3. Painting. Painting the surface of timber members, protects it from moisture and thus prolongs its life. Paints possess excellent preservative properties and protect the timber against the attack of white ants. Paints are available in varieties of shade with different trade marks.

4. Creosoting. Creosote oil is a dark brown thick liquid. By applying creosotes to timber, chances of attacks of white ants and rots are reduced considerably. In this method well seasoned timber dried for 24 hours, is kept in air-tight chamber and air is exhausted. Creosote is then pumped in at a pressure of 9 kg/cm^2 at a temperature of 50°C till it is fully saturated with oil. Creosoting is done for railway sleepers, piles and transmission poles.

5. Wolmen salt. A timber treated with Wolmen salt which consists of creosote and sodium fluoride dissolved in water, is extremely fire resistant and free from fungi attacks. Zinc chloride, sodium fluoride, magnesium silco-fluoride and copper sulphate when applied to timber also help it from the attacks of fungi. On drying, such timbers are suitable for painting.

6. Ascu. A timber treated with Ascu powder developed by F.R.I. (Forest Research Institute), Dehra Dun is immune to the attacks of white ants and may be painted, varnished and polished.

7. Fire proofing of timber. A timber to some extent, may be made fire proof by soaking it in ammonium sulphate, ammonium chloride, ammonia phosphate, sodium arsenate or zinc chloride.

1.13 DEFECTS IN TIMBER

The following are the most common defects in timber.

1. Heart shakes. [Fig. 1.2 (*a*)]. These are splits occurring in the centre of the tree and running from the pith towards the sapwood in the direction of medullary rays. In some timbers, these splits are hardly visible and in some timbers these are quite prominent. Heart shakes are caused due to shrinkage of the interior parts due to age. However, a heart shake straight across the trunk, is not a serious defect.

2. Star shakes [Fig. 1.2. (*b*)]. These are splits which radiate either from the centre of timber or from the bark, running in the planes of medullary rays. Star shakes are mostly confined to sapwood and are caused due to severe frost and scorching heat of the sun.

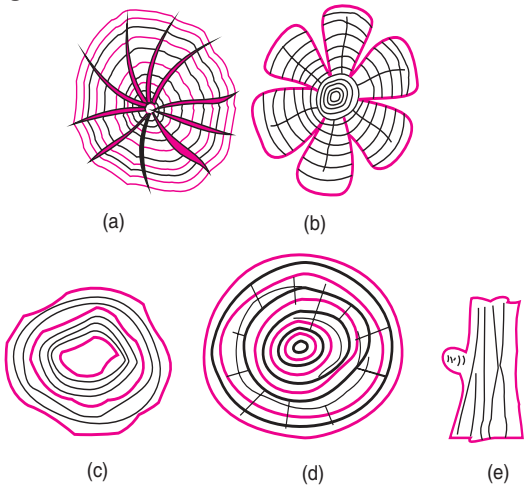


Fig. 1.2. Defect in timber.

3. Cup Shakes. [Fig. 1.2. (*c*)]. These are curved splits which separate the whole or part of one annual ring from another. These are caused due to unequal growth of timber.

4. Radial Shakes [Fig. 1.2 (*d*)]. These are similar to star shakes and occur in felled timbers when exposed to sun during seasoning. Radial shakes are generally irregular, fine and numerous. Many splits appear to start a few centimeters within the bark, run a short distance towards the centre, then following the course of an annual ring, approach the centre radially.

5. Rind-galls [Fig. 1.2. (*e*)]. These are typical enlarged swellings caused generally by the growth of layers over the wounds left after the branches have been cut off.

6. Rupture. These are caused due to fibres having been injured by crushing.

7. Twisted fibres. The twisting of fibres is caused due to the action of prevalent wind, twisting the young tree constantly in one direction.

8. Wind cracks. These are shakes or splits on the sides of a bark of timber due to the shrinkage of the exterior surface exposed to atmospheric influences.

9. Knots. These are the roots of small branches of the tree. knots break the continuity of fibres. These are not much harmful if small, hard and round. Timber with large dead (loose) knots of many smaller ones, should be rejected as these do not provide specified strength.

10. Dead wood. It is deficient in strength and weight and is the result of trees being felled after maturity.

1.14. SEASONING OF TIMBER AND ITS NECESSITY

Definition. The process of drying timber or removing moisture or sap from a freshly felled tree, is called *seasoning of timber*.

A well seasoned timber may contain about 10 to 12 per cent moisture which is necessary for proper retention of the shape and size of the articles manufactured from the timber. On the other hand, if a timber is not properly seasoned before use, it is liable to shrink, warp, crack, rot and decay. This is why properly seasoned timber need only be used for high class timber work.

Necessity of seasoning a timber. Seasoning of timber is done for the following purposes:

1. To reduce the weight of the timber for achieving economy in its transportation from the place of felling to the place of manufacturing the articles.
2. To minimise the tendency to shrink, split and warp in the manufactured wood work.
3. To increase the strength and durability of the timber and also to make the timber electrically resistant.
4. To improve the wood working qualities in timber for gluing, painting and polishing the surfaces of finished articles.
5. To enable to provide proper preservation treatment of the timber.
6. To make the timer free from the danger of being attacked by insects, fungus, etc.
7. To achieve good characteristics in timber.

1.15. METHODS OF SEASONING TIMBER

According to IS : 1141-1973, the following are the methods of seasoning the timber :

1. Natural or air seasoning;
2. Artificial or kiln seasoning.

1. Natural or air seasoning. A felled log if left on the ground for long is likely to be attacked by insects and fungi. It should therefore be converted by sawing into desired dimensions and stacked on well drained place in the shade. The main principle of seasoning is to remove the moisture from the timber. While stacking, it should be ensured that there is free circulation of fresh air around each piece. (Fig. 1.3).

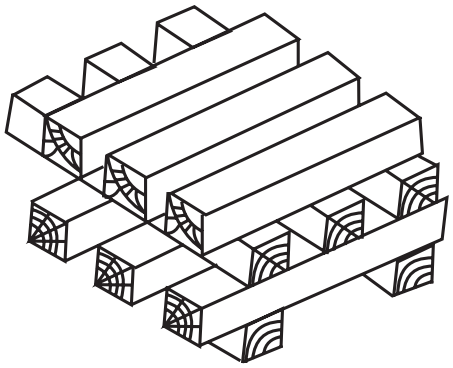


Fig. 1.3. Air seasoning

For natural air seasoning, a suitable concrete foundation, a few centimetres above the ground is provided to stack the logs under shade. Care should be taken not to expose the freshly converted timber stacked for seasoning to sun or to severe winds. To avoid the tendency of splitting of hard wood during seasoning, cleats are fixed and nailed to their ends.

This method of seasoning is the best as it gives very strong and durable timber but it takes longer time. It generally takes more than six months for timber to season to moderate climates. Timber seasoned by natural seasoning method, generally contains 18% of moisture.

2. Artificial or kiln seasoning. Seasoning of timber by this method is done in masonry chamber equipped with an arrangement for heating, controlling humidity and circulating the air in the kiln. Steam is generally used for heating and humidifying the air in the chamber. The timber in the chamber is stacked as for natural seasoning. In the beginning, the seasoning is started at a comparatively lower temperature and high humidity. Initially, moisture content in the timber is more and hence at higher temperature, the wood shrinks and cracks develop. As the moisture from the timber decreases, the temperature of the chamber is increased. At times, the sample pieces of wood are taken out of the seasoning chamber and their percentage of moisture content is checked. As the timber dries, at the end of seasoning, the temperature of the air inside the chamber is raised fairly high and humidity is reduced. The seasoned timber is allowed to cool in the chamber within 20°C of the outside temperature before removal. Seasoning by this method generally takes four to five days under normal conditions.

Kiln seasoning is a quick method of seasoning timber to the desired moisture contents.

Advantages and disadvantages of kiln seasoning are tabulated hereunder :

Advantages	*Disadvantages*
1. Perfect control of drying	1. It requires skilled supervision
2. Economy of time	2. Expensive in cost
3. Moisture content may be reduced to desired level	3. Due to carelessness, the wood develops surface cracks, warping and splitting
4. Unlikely to be attacked by fungi and insects.	—
5. Wood receives paints well.	—

1.16. CONSTITUENT PARTS OF PAINT AND THEIR FUNCTIONS

The constituent parts of paints are the following :

1. Base. It is very finely grounded metallic oxide. It acts as a body of paint. Because of film of base, the paint becomes hard and resistive to weathering friction. The most commonly used bases in paints are :

White lead, Lead sulphate, Sublimed lead, Red lead, Zinc oxide, and Titanium oxide.

2. Vehicle. The material used in paints to help it to spread the base over the surface is called *vehicle.* It acts as a binder between base and pigment and causes it to adhere to the surface to be painted. Vehicle is mixed with the bases to form a paste. Most commonly used vehicle, is Linseed Oil of the following four types *i.e.*,

(*i*) Row Linseed Oil. (*ii*) Refined Linseed Oil. (*iii*) Pale boiled Linseed Oil. (*iv*) Wouble boiled Linseed Oil.

3. Colouring Pigments. The materials added to the paints to obtain desired final colour, are called *colouring pigments.* These are used to obtain the final colour of the paint different from that of the base.

Depending upon the final colour of paints, the colouring pigments may be used. Such as lamp black, bone black, graphite, Indian red, chrome yellow, etc.

4. Thinner. The material used in paints to reduce its consistency, is called *thinner.* It enables the paint to be spread over the surface to be painted with the brush and to penetrate into the surface. Most commonly used thinner is turpentine oil which dries rapidly and helps to dry paint soon.

Naptha and spirit are also sometimes used as thinner.

5. Drier. The material used in paints, to accelerate the action of drying is called *drier.* Paints need be dried soon to avoid the risk to catch dust and dirt. Most commonly used drier is *Litharge* whose use in finishing coat should be avoided, otherwise colour of paint may change due to change in atmospheric conditions.

6. Adulterants. The material which is used to reduce the cost of paint and also to reduce the weight and to increase its durability, is called *Adulterant.* Barium sulphate is widely used as adulterant because of its cheapness and its property not to react with paint. Calcium Carbonate, Magnesium Silicate and Silica are also used as adulterants.

1.17 MANUFACTURE OF CEMENT BY WET PROCESS

For the manufacture of cement, following ingredients are required.

1. Lime stone 2. Clay
3. Coal 4. Gypsum.

Process. The cement is prepared by mixing 75% of limestone and 25% clay. Hard lime stone is powdered in a crusher. Clay is thoroughly mixed with water in a wash mill. Powdered lime stone and clay solution are then mixed and ground in a wet grinding mill to form a slurry having a moisture 32% to 40%. The slurry is stirred in a collecting basin, and is tested for its chemical composition as described below:

(*i*) Take the slurry in test tube and mix HCl to it.

(*ii*) The mixture is heated till precipitation occurs.

(*iii*) The mixture is cooled to obtain a jelly like material.

If the jelly so formed is hard, it indicates that the proportion of the mix is not correct. Either clay or limestone is then added as required in collecting basin itself. This test is very important and must be carried out by an expert, because if proportion is not correct, the properties of resulting cement will adversely change. From the collecting basin, slurry is dumped to a storage basin, where it is constantly stirred by mechanical process. From storage basin, the slurry is pumped to upper chamber of the rotary kiln, regularly.

Rotary kiln consists of an inclined cylinder supported on masonry chamber 15 metres apart. Its length varies from 90 to 120 metres and diameter varies from 3 to 3.5 metres. The diameter of the cylinder in burning zone, is comparatively larger than that of other zones.

Slurry is admitted from the upper chamber of the kiln, to the higher portion of the cylinder which makes one revolution per minute and pulverised coal is entered from other end. When the slurry reaches the burning zone (temp. 1500° to 1600°C), CO_2 gas is evolved after heating and the moisture evaporates. Hot chamber is then cooled by blowing in cool air in the outlet pipe. To delay the setting time of the resulting cement, gypsum (3 to 4%) is added at this stage.

Klinker is then ground in ball mill and tube mill in which balls grind the klinkers to a very fine powder, called *cement.*

OBJECTIVE TYPES QUESTIONS

1. Introductory Rocks and Minerals

1.1. Which one of the following construction material is not a constituent of cement concrete?
(*a*) lime (*b*) mortar
(*c*) cement (*d*) stone

1.2. Paints are used in construction as:
(*a*) cement materials (*b*) protective materials
(*c*) solid materials (*d*) liquid materials
(*e*) none of these are correct

1.3. Which one of the following is classified as a solid material
(*a*) stones (*b*) bricks
(*c*) iron (*d*) timber
(*e*) All of these are correct

1.4. To face shortage of conventional building materials, construction engineers are manufacturing building materials which are:
(*a*) cheap (*b*) environment friendly
(*c*) energy efficient (*d*) all of these are correct

1.5. Which one of the following definitions is correct?
(*a*) The molten or partly rock-materials inside the earth is called *magma*.
(*b*) The rocks which get formed by the cooling of magma are called *igneous rocks*.
(*c*) both (*a*) and (*b*)
(*d*) neither (*a*) nor (*b*)

1.6. Pick up the correct statement from the following.
(*a*) Granite rocks possess extremely grained crystalline structure.
(*b*) Dolerite rocks possess finely grained crystal line structure.
(*c*) Basalt rocks extremely fine-grained in structure may frequently contain non-crystalline glass.
(*d*) All of these are correct.

1.7. Pick up the correct statement from the following:
(*a*) Granite rocks are formed due to cooling of magma at a considerable depth from the earth's surface.
(*b*) Dolerite rocks are formed at a relatively shallow depth from the earth's surface due to quick cooling of magma.
(*c*) Basalt rocks are formed due to pouring of magma on earth's surface by very rapid cooling.
(*d*) All of these are correct.

1.8. Pick up the correct statement from the following.
(*a*) The portion of the weathered product that remains at the site of its origin, is known as residual deposit.
(*b*) The insoluble products of weathering carried away in suspension, when they get deposited, are called the sedimentary deposits.
(*c*) The soluble products of weathering carried away and get deposit by some physio-chemical processes such as evaporation precipitations etc are known as chemical deposit.
(*d*) The portion of the weathered product when they get deposited through the agency of organisms are called the organic deposits.
(*e*) All of these are correct.

1.9. Which one of the following rock is not sedimentary rock?
(*a*) Gravel (*b*) Sand stone
(*c*) Basalt (*d*) Gypsum

1.10. Pick up the correct statement from the following:
(*a*) The metamorphic rocks generally possess foliated structure.
(*b*) The sedimentary rocks are distinctly stratified.
(*c*) Both (*a*) and (*c*) are correct.
(*d*) Neither (*a*) nor (*b*) correct.

1.11. The argil or clay predominates in:
(*a*) Argillaceous rocks (*b*) Calcareous rocks
(*c*) Silicious rocks (*d*) None of these

1.12. Marble belongs to which of the following rocks?
(*a*) Calcareous rocks (*b*) Argillaceous rocks
(*c*) Silicious rocks (*d*) None of these

1.13. Quartz sand is:
(*a*) Monomineralic rock (*b*) Polymineralic rock
(*c*) Sedimentary rock (*d*) Calcareous rock

1.14. Augite (Pyroxene) is a mineral
(*a*) which contains octagonal crystals.
(*b*) which changes to chlorite by hydration.
(*c*) having density between 2.3 to 3.6 g/cm^3.
(*d*) whose hardness lies between 5 to 6
(*e*) All of these are correct.

1.15. Hornblende is :
(*a*) a heavy mineral. (*b*) a durable mineral.
(*c*) not a brittle mineral.
(*d*) a strong mineral.

1.16. Pick up the correct statement from the following:
(*a*) Mica is silicate of aluminium with potassium.
(*b*) Muscovite mica is popularly known as *white mica*.
(*c*) Biotite mica is popularly known as *black mica*.
(*d*) Mica commonly occurs in igneous rocks.
(*e*) All of these are correct.

1.17. Pick up the correct statement from the following:
(*a*) Quartz is the crystalline form of silica.
(*b*) Quartz is weather-proof and resists the acid attack with the exception of hydrochloric acid.
(*c*) Quartz's transparent crystal is known as *rock crystal*.
(*d*) Quartz is a compact translucent mass known as hornstone.
(*e*) All of these are correct.

1.18. Which one of the following acids does not react chemically?
(*a*) Sulphuric acid (*b*) Nitric acid
(*c*) Hydrochloric acid (*d*) Uric acid

1.19. The mineral calcite:
(*a*) is a chief constituent of many sedimentary rocks.
(*b*) is calcium carbonate ($CaCO_3$).
(*c*) when attacked by mineral acids produces carbon dioxide.
(*d*) deteriorates in water containing carbon dioxide and forms calcium bicarbonate Ca $(HCO_3)_2$.
(*e*) All of these are correct.

1.20. The Dolomite:
(*a*) consists of brittle crystals.
(*b*) is not soluble in ordinary water.
(*c*) is stronger and heavier than calcite.
(*d*) All of these are correct.

1.21. Dolomite, a mineral of sedimentary rocks, is:
(*a*) Bicarbonate of magnesium ($MgCO_3$).
(*b*) Bicarbonate of calcium ($CaCO_3$).
(*c*) Bicarbonates of magnesium and calcium.
(*d*) None of these are correct.

1.22. The percentage contents of magnesium carbonate and calcium carbonate in dolomite minerals are:
(*a*) $MgCO_3$ 46% and $CaCO_3$ 54%
(*b*) $MgCO_3$ 50% and $CaCO_3$ 50%
(*c*) $MgCO_3$ 54% and $CaCO_3$ 46%
(*d*) $MgCO_3$ 48% and $CaCO_3$ 52%

1.23. Gypsum:
(*a*) is the hydrated sulphate of calcium ($CaSO_4 . 2H_2O$).
(*b*) is white in colour in its pure state.
(*c*) has very poor solubility in water.
(*d*) All of these are correct.

1.24. The composite masonry includes:
(*a*) walls of bricks and facing in stones.
(*b*) walls of stones and facing in bricks.
(*c*) both (*a*) and (*b*)
(*d*) neither (*a*) nor (*b*)

2. STONES AS BUILDING MATERIAL

2.1. The popularity of stones as a building material is decreased due to RCC and steel structure, which have:
(*a*) good strength. (*b*) durability.
(*c*) suitability to multi-storeyed buildings.
(*d*) All of these are correct.

2.2. Pick up the correct statement from the following:
(*a*) The distinct plane of division in stones along which stone can be easily split, is known as *natural bed* of the stone.
(*b*) The natural bed of stone indicates the plane in which the sedimentary stone was initially deposited
(*c*) The natural bed of stone lies along the planes of stratification in sedimentary rocks.
(*d*) All of these are correct.

2.3. The maximum strength to stones is obtained by placing the applied load:
(*a*) Perpendicular to the direction of the natural bed of stone.
(*b*) Along the direction of the natural load of stone.
(*c*) Both (*a*) and (*b*) sometime,
(*d*) Neither (*a*) nor (*b*)

2.4. Pick up the correct statement from the following:
(*a*) In stone arches, the stones are placed with their natural beds radially.
(*b*) The stones are placed in cornices with the direction of natural bed vertical.
(*c*) The stones are placed in walls with the direction of their natural beds horizontal.
(*d*) All of these are correct.

2.5. Pick up the correct statement from the following:
(*a*) The acid test is done with a solution of hydrochloric acid (1% strength) on sand stones to detect the presence of calcium carbonate.
(*b*) Attrition test is carried out to find the rate of wear of stones to be used in road construction.
(*c*) Attrition test of stone is carried out in Deval's attrition machine which contains two cylinders of diameter 20 cm and length 34 cm.
(*d*) All of these are correct.

2.6. To test the compressive strength (crushing strength) of stone, which one of the following steps is/are involved?
(*a*) The sample of stone should be three cubes of side 40 mm,
(*b*) All the three cubes are placed in water for about 72 hours prior to test.
(*c*) The load bearing surface of the cube covered with plaster of Paris or 5 mm thick plywood is placed in a crushing test machine to receive the applied load finally.
(*d*) The rate of loading the crushing machine is kept140 kg/cm^2 per minute.
(*e*) All of these are correct.

2.7. Which one of the following is a correct statement? The compressive strength of stone is found out by the.
(*a*) Crushing test (*b*) Hardness test
(*c*) Impact test (*d*) Smith's test

2.8. The diameter and height of the test cylinder used for hardness test and impact test:
(*a*) 10 mm (*b*) 15 mm
(*c*) 20 mm (*d*) 25 mm

2.9. The smith's test of stones is performed to find out:
(*a*) The presence of soluble matter.
(*b*) The tensile strength.
(*c*) The presence of lime.
(*d*) None of these are correct.

2.10. It W_1 is the actual weight of the cube from the stone sample W_2 is the weight of the cube after immersing in distilled water, W_3 is the weight of the sample cube in water and W_4 to the weight of the sample stone, after keeping in boiling water for 5 hours, then which one of the following statement is correct?

(*a*) Percentage of absorption by weight after 24 hrs = $\frac{W_2 - W_1}{W_1} \times 100$

(*b*) Percentage absorption by volume after 24 hrs $\frac{W_2 - W_1}{W_2 - W_3} \times 100$

(*c*) Percentage porosity by volume $\frac{W_4 - W_1}{W_2 - W_3} \times$ kg/m^3

(*d*) Specific gravity = $\frac{W_1}{W_2 - W_3}$

(*e*) All of these are correct

2.11. Which one of the following qualities of a good building structural stone is correct?

(*a*) The crushing strength should be greater than1000 Kg/cm^2

(*b*) The stone should be durable.

(*c*) The stone should be easily carved, moulded and dressed.

(*d*) The coefficient of hardness of stones used in road work should be greater than17.

(*e*) All of these are correct.

2.12. Which one of the following minerals suddenly expands at a temperature lower than 600°C?

(*a*) Quartz (*b*) Calcite

(*c*) Dolomite (*d*) Gypsum

2.13. The fire resistivity of:

(*a*) the lime stone is good up to about 800°C

(*b*) the sand stone with silicates as binding material is better.

(*c*) the argillaceous stones is quite well but it is poor in strength.

(*d*) All of these are correct.

2.14. Pick up the correct statement from the following?

(*a*) The stones fresh from a quarry contain quarry sap.

(*b*) The lime stone splits in CaO and CO_2 at about 800°C

(*c*) The stones should be seasoned before using them as structural material for a period of 6 to12 months.

(*d*) The stones whose specific gravities are greater than 2.7 are classified as good stones.

(*e*) All of these are correct.

2.15. Lighter varities of stones are preferably used for

(*a*) Domes (*b*) Roof coverings

(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

2.16. Stones having toughness index:

(*a*) below13 are treated not tough stones.

(*b*) between13 and19 are treated moderately tough.

(*c*) more than19 are said to be of highly tough.

(*d*) All of these are true.

2.17. The percentage absorption of water of good stones by weight after 24 hours should not exceed:

(*a*) 0.5 (*b*) 0.6

(*c*) 0.7 (*d*) 0.4

2.18. In cold regions, porous stones are not to be used at places subjected to:

(*a*) Frost (*b*) Moisture

(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

2.19. Pick up the correct statement from the following:

(*a*) Soft stones are used for carving the structural portions.

(*b*) The light stones are suitably used in arches.

(*c*) The hard stones are required to with stand high pressure.

(*d*) All of these are correct.

2.20. The process of taking out stones under the ground at great depth is called:

(*a*) Quarrying (*b*) Mining

(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

2.21. In wedging process of quarrying stones, the steps taken are:

(*a*) A line of holes of diameter12 mm at10 to15 cm distance apart are drilled on the rock surface.

(*b*) The plug and feathers are placed in the holes at depth 20 to 25 cm.

(*c*) The plugs are conical steel wedges whereas feathers are flat steel wedges with upper end slightly curved.

(*d*) All of these are correct.

2.22. In the process of blasting rocks:

(*a*) Detonators are used

(*b*) Detonators are copper cylinders whose diameter is 6 mm and length 25 mm.

(*c*) Detonators are closed at one end and has a projecting fuse at the other end.

(*d*) Detonators are partly filled with 6 to 9 grains of fuminate of mercury.

(*e*) All of these are correct.

2.23. In the process of blasting rocks:

(*a*) A blasting powder and dynamite commonly known as *gun powder* is used.

(*b*) The gun powder is a mechanical mixture of charcoal, saltpetre (KNO_3) and sulphur.

(*c*) The proportion of charcoal, saltpetre and sulphur in gun powder are15, 75 and10 respectively.

(*d*) All of these are used

2.24. The quantity of gun powder required for a rock whose line of least resistance (LLR) is1 m, is about:

(*a*) 100 gm (*b*) 125 gm

(*c*) 150 gm (*d*) 175 gm

(*e*) 200 gm

2.25. The gun powder consists of:

(*a*) 75% of sandy earth, saturated with 25% of nitro-glycerine.

(*b*) 60% of sandy earth, saturated with 40% of nitro-glycerine.

(*c*) 50% of sandy earth, saturated with 50% of nitro-glycerine.

(*d*) 25% of sandy earth, saturated with 75% of nitro-glycerine.

2.26. The rate of burning of a good gun powder fuse is roughly.
(*a*) 1 cm per second (*b*) 2 cm per second
(*c*) 1 cm per minute (*d*) 2 cm per second

3. CLAY PRODUCTS

3.1. Pick up the correct statement from the following:
(*a*) Clay occurs plenty in nature.
(*b*) Clay is a distinct product of chemical weathering of igneous rocks.
(*c*) The orthoclase felsper is mainly responsible for the production of clays in nature.
(*d*) The clay is a stiff sticky earth used for making bricks
(*e*) All of these are correct

3.2. Pick up the correct statement from the following:
(*a*) Orthoclase felspar is the main source of clay in nature.
(*b*) Orthoclase felspar when decomposes produces kaolinite which is free from iron oxide and alkalis.
(*c*) Alumina and silica compounds in kaolin remain in colloidal state to form the basic compounds of all clays.
(*d*) The silicates of calcium and magnesium, ironoxide, free sand in small proportions occur in all clays.
(*e*) All of these are correct.

3.3. The wet clay with water possesses:
(*a*) a high degree of tenacity.
(*b*) a high degree of plasticity.
(*c*) Both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

3.4. Which one of the following steps is/are taken to prepare clay for making tiles?
(*a*) The selected clay is made free from impurities.
(*b*) The pure clay is pressed and converted into fine powder in pug mills.
(*c*) A large quantity of pure water is added to the powdered clay and mixed thoroughly in a tank.
(*d*) The solution is kept for settling heavy particles and the fine particles are drained into another tank where it is allowed to dry.
(*e*) The clay obtained in the second tank is used for manufacture of tiles.
(*f*) All of these are correct.

3.5. To make the tiles hard and impervious, which one of the following materials is added to the raw clay?
(*a*) Ground glass. (*b*) Pottery ware.
(*c*) Both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

3.6. The Allahabad tiles are:
(*a*) moulded under pressure in machines.
(*b*) burnt in such a way that attain more strength.
(*c*) provided projections for interlocking each other.
(*d*) extensively used in north-western India.
(*e*) All of these are correct.

3.7. Pick up the correct statement from the following:
(*a*) Sanitary pipes and chemical stone wares are salt-glazed.
(*b*) Terra-cotta fire- clay wares and earthen in wares are lead glazed.
(*c*) Sanitary articles are glazed by opaque glazing.
(*d*) All of these.

3.8. In present days, the brick is a leading material for construction due to :
(*a*) its durability. (*b*) its strength
(*c*) its reliability (*d*) its low cost
(*e*) All of these

3.9. Which one of the following statements is true for good brick earth?
(*a*) Alumina (20% to 30%) imparts plasticity to the earth to provide mouldability.
(*b*) Silica (50% to 60%) imparts uniform shape to the bricks.
(*c*) Lime (less than 5%) provides shrinkage of raw bricks.
(*d*) Oxide of iron (5% to 6%) imparts red colour to bricks.
(*e*) All of these are correct.

3.10. Pick up the correct statement from the following:
(*a*) An excess amount of alumina with inadequate quantity of sand causes the raw bricks to shrink and warp.
(*b*) The excess of silica destroys the cohesion between particles and makes the bricks brittle.
(*c*) The excess of lime causes the bricks to melt and thus disturbs their shape.
(*d*) The excess of oxide of iron makes the bricks dark blue or blackish whereas less amount of oxide makes the bricks yellowish.
(*e*) All of these.

3.11. A small quantity of magnesia in brick earth imparts:
(*a*) Red tint to bricks. (*b*) Yellow tint to bricks.
(*c*) Black tint to bricks (*d*) None of these.

3.12. The presence of alkalies in brick earth causes:
(*a*) the bricks to fuse, twist and warp.
(*b*) the bricks to melt and loose their shape.
(*c*) absorption of moisture from the atmosphere when bricks are used in masonry.
(*d*) All of these.

3.13. About 66% of silicon and 27% of alumina are contained in:
(*a*) Loamy clay. (*b*) Calcareous clay
(*c*) Pure clay. (*d*) None of these.

3.14. About 48% of lime and magnesia, and 35% silicon in brick earth is known as.
(*a*) Colcareous clay. (*b*) Sandy clay.
(*c*) Pure clay. (*d*) None of these.

3.15. 50% of silica and 34% of alumina is necessary in brick earth to obtain

(*a*) Sandy clay. (*b*) Pure clay.
(*c*) Calcareous clay. (*d*) None of these

3.16. Pick up the correct statement from the following:
(*a*) The addition of lime in loamy clay helps to fuse sand and to increase hardness of bricks.
(*b*) In calcareous clay the undesirable effects of lime is neutralized by adding sand
(*c*) The cracking, shrinking and warping of bricks during drying are avoided by addition of sand and ash in pure clay.
(*d*) All of these.

3.17. Pick up the correct statement from the following:
(*a*) If the dried balls of about 80 mm diameter of brick clay moulded with hands get deformed in shape and crumbles down easily the presence of exclusive sand content in the clay earth is indicated.
(*b*) If the dried threads in the sun for four days having diameter of 3 mm with plastic consistency develops cracks due to shrinkage, the clay earth is sand deficient.
(*c*) Both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

3.18. Which one of the following sequence of steps is correct for preparing the clay for making bricks?
(*a*) Weathering – Blending – Tempering
(*b*) Blending – Tempering – Weathering.
(*c*) Tempering – Weathering – Blending
(*d*) None of these is correct.

3.19. Pick up the correct statement from the following:
(*a*) The exposing of the clay to atmosphere for softening is called weathering the clay.
(*b*) The process of turning a small portion of clay up and down in vertical direction is called blending.
(*c*) The process of bringing the clay to a proper degree of hardness for moulding is called tempering.
(*d*) The process of grinding clay with water and manufacturing plastic is called pugging.
(*e*) All of these are correct.

3.20. Pick up the correct statement from the following:
(*a*) The thickness of steel mould for bricks is generally 6 mm.
(*b*) The bricks shrink during drying and burning.
(*c*) The brick moulds are made longer by about 8 to12 percent in all directions.
(*d*) All of these are correct.

3.21. Pick up the correct statement from the following:
(*a*) The bricks prepared by dipping mould in water every time are known as slop-moulded bricks.
(*b*) The bricks prepared by sprinkling fine sand or ash on the inside surface of mould are known as sand moulded bricks.
(*c*) Sand moulded bricks have sharp and straight edges.
(*d*) All of these are correct.

3.22. Pick up the correct statement from the following.
(*a*) The frog is a mark of depth10 mm to 20 mm placed on raw brick during moulding.
(*b*) The frog indicates the trade name of the manufacturer.
(*c*) The frog in the bricks affords a key formation between the next upper brick.
(*d*) All of these are correct.

3.23. The process of burning of earth bricks:
(*a*) is very important operation in brick manufacturing.
(*b*) imparts hardness and strength to the bricks.
(*c*) makes the bricks dense and durable.
(*d*) All of these.

3.24. Pick up the correct statement from the following:
(*a*) The earth bricks are normally burnt at about1100°C.
(*b*) At temperature of1100°C alumina and sand of the brick bind themselves together to provide strength and density to bricks.
(*c*) Bricks burnt beyond1100°C get fused to glassy mass which are called vitrified.
(*d*) All of these are correct.

3.25. Which one of the following kilns is not a continuous kiln?
(*a*) Bull's trench kiln. (*b*) Hoffman's kiln.
(*c*) Tunnel's kiln. (*d*) Intermittent kiln.

3.26. Pick up the correct statement form the following:
(*a*) The bricks should be uniform in shape and standard in size.
(*b*) The bricks should give a clear metallic ringing sound when struck with each other.
(*c*) The first class bricks should not absorb water more than 20% by weight.
(*d*) No brick should have crushing strength below 5.5 N/mm^2
(*e*) All of these are correct.

3.27. Bricks are laid not to be subjected to
(*a*) Tensile stresses. (*b*) Compressive stresses.
(*c*) Shear stresses. (*d*) All these stresses.

3.28. Pick up the correct statement from the following:
(*a*) An earth when immersed for a period of16 hours should not absorb water exceeding 20% of dry weight of brick.
(*b*) The minimum crushing strength of brick is 35 kg/cm^2 (3.5 N/mm^2) .
(*c*) The bricks having crushing strength over140 kg/cm^2 are graded as AA.
(*d*) All of these are correct.

3.29. A brick immersed in water for 24 hours after drying in shade:
(*a*) The absence of grey or white deposits on its surface indicates the absence of soluble salts.
(*b*) A10% coverage with white deposits, effloresence is said to be slight.
(*c*) A 50% coverage with white deposits, the effloresence is said to be moderate.

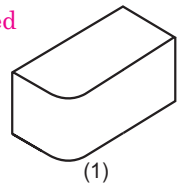
(*d*) More than 50% coverage of white deposits makes the brick seriously affected by effloresence.
(*e*) All of these are correct.

3.30. Which one of the following statement is correct?
(*a*) The nominal size of a modular brick is 20 cm × 10 cm ×10 cm.
(*b*) The weight of 1 m^3 of brick earth is about1800 kg.
(*c*) The average weight of a earth brick is 3 to 3.5 kg.
(*d*) All of these are correct statement.

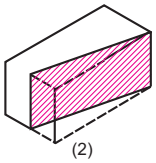
3.31. Construction bricks are classified into
(*a*) Four categories. (*b*) Five categories.
(*c*) Three categories. (*d*) Two categories.

3.32. Which one of the following statements is correct?
(*a*) Red colour of brick is due to iron excess in earth clay.
(*b*) White colour of brick is due to pure clay
(*c*) Yellow colour of brick is due to iron and magnese in clay
(*d*) Bright red colour of brick is due to large amount of iron oxide
(*e*) All of these are correct

3.33. The brick shown in the figure (1) is called
(*a*) saddle brick.
(*b*) half round brick.
(*c*) bull nose brick.
(*d*) chamferred brick.


(1)

3.34. The brick shown in the figure (2) is called.
(*a*) A chamferred brick
(*b*) A mitred closer
(*c*) A saddle leak brick
(*d*) A bull nose brick


(2)

3.35. Pick up the correct statement from the following
(*a*) The bricks produced in clamps are tough and strong
(*b*) In brick masonry bricks are laid with frog upper side
(*c*) Sand-lime bricks are totally free from effalerescence
(*d*) Sand-lime bricks cannot be used as paving material
(*e*) All of these are correct.

4. LIME

4.1. The property of lime by which it sets in damp places in the absence of free air, is called
(*a*) Calcination. (*b*) Hydraulicity
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

4.2. Lime is obtained by heating the lime stone
(*a*) due to removal of moisture.
(*b*) due to removal of carbon dioxide.
(*c*) both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

4.3. Pick up the correct statement from the following:
(*a*) The chemical composition of lime is oxide of calcium (CaO).
(*b*) The chemical reaction during calcination of lime stone takes place is $CaCO_3 \rightarrow CaO + CO_2$.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

4.4. Which one of the following statements is correct?
(*a*) The lime obtained by calcination of pure lime is known as quick lime (or caustic soda).
(*b*) The quick lime has great affirnity to moisture.
(*c*) The quick lime is amorphous.
(*d*) The quick lime has no affinity for carbon dioxide.
(*e*) All of these are correct.

4.5. Pick up the correct statement from the following:
1. By slaking quick lime, the hydrate of lime is obtained.
2. The theoretical amount of water required for lime slaking is about x% of the weight of a quick lime where x is
(*a*) 25 (*b*) 28
(*c*) 32 (*d*) 35

4.6. Pick up the correct statement from the following
(*a*) A thin pourable suspension of slaked lime in water is called *milk of lime*.
(*b*) The slaked lime has a tendency to absorb carbonic acid from the atmosphere in the presence of moisture.
(*c*) The chemical formula of carbonic acid is H_2CO_3.
(*d*) The slaked lime should be kept away from damp places.
(*e*) All of these are correct.

4.7. When sufficient quantity of water is added to quick lime.
(*a*) it cracks (*b*) it swells
(*c*) it becomes powder (*d*) All of these are correct.

4.8. Which one of the following is an air binding material?
(*a*) The gypsum. (*b*) Acid- resistant cement.
(*c*) Quick lime. (*d*) All of these are correct.

4.9. The clay is an important constituent of lime stone.
(*a*) To produce hydraulicity to lime.
(*b*) To provide in solubility in water.
(*c*) To retard slaking if it is in small quantity.
(*d*) Has a proportion of 8 to 30% in good lime.
(*e*) All of these are correct.

4.10. The hydraulicity of lime is due to the presence of
(*a*) Calcium silicate. (*b*) Magnesium silicate.
(*c*) Aluminium silicate. (*d*) All of these.

4.11. The silicate of calcium, magnesium and aluminium
(*a*) remain inactive at low temperature.
(*b*) becomes active to combine with lime at high temperature.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

4.12. Pick up the correct statement from the following:
(*a*) The presence of magnesium in lime stone allows lime to slake and set slowly.
(*b*) The magnesium carbonate imparts strength to lime.
(*c*) The hydraulicity to lime is rendered by 30% of carbonate of magnesium in the absence of clay in lime stone.
(*d*) All of these are correct.

4.13. Fat lime is also known as
(*a*) high calcium lime (*b*) pure lime.

(*c*) rich lime. (*d*) white lime.
(*e*) All of these.

4.14. Fat lime slakes vigorously and its volume increases about:
(*a*) 1½ times the volume of quick lime.
(*b*) 2 times the volume of quick lime.
(*c*) 3 times the volume of quick lime.
(*d*) None of these are correct.

4.15. Pick up the correct statement from the following:
(*a*) Fat lime is composed of roughly 95 percent of calcium oxide.
(*b*) Fat lime hardens very slowly.
(*c*) Fat-lime is perfectly white in colour.
(*d*) Fat lime slakes vigorously.
(*e*) All of these properties are correct.

4.16. Pick up the correct statement from the following:
(*a*) Hydraulic lime is popularly known as water lime.
(*b*) Hydraulic lime sets under water.
(*c*) Hydraulic lime contains clay and some amount of ferrous oxide.
(*d*) All of these are correct.

4.17. The hydraulic lime resembles the natural cement if clay content is:
(*a*) 15% (*b*) 20%
(*c*) 25% (*d*) 30%

4.18. Poor lime (impure lime)
(*a*) contains more than 30% of clay.
(*b*) slakes very slowly.
(*c*) hardens very slowly.
(*d*) is muddy white in colour.
(*e*) All of these are correct.

4.19. According to BIS: 712-1984, class A lime:
(*a*) is semi hydraulic lime which is used for mortar for masonry work.
(*b*) should have minimum compressive strength with lime sand mortar (1:3) by weight17.50 kg/cm^2 after in day.
(*c*) should have minimum compressive strength with lime sand mortar (1:3) by weight 28.00 kg/cm^2.
(*d*) all of these are correct.

4.20. The minimum compressive strength of class B lime with lime sand
(*a*) should be12.50 kg /cm^2 after14 days.
(*b*) should be17.50 kg/cm^2 after 28 days.
(*c*) both (*a*) and (*b*)
(*d*) neither (*a*) nor (*b*)

4.21. Class C lime:
(*a*) is the fat lime.
(*b*) is used in finishing coat in plastering.
(*c*) with surkhi produces artificial by hydraulic mortars
(*d*) All of these are correct.

4.22. The correct sequence of distinct operations in the manufacture of fat lime is:
(*a*) Collection of lime stones → calcination of lime stones → slaking of burnt lime.
(*b*) Collection of lime stones → slaking of burnt lime → calcination of lime stones.
(*c*) Slaking of burnt lime → collection of lime stone → calcination of lime stones,
(*d*) None of these correct.

4.23. Dimensions of a continuous lime kiln of 4 m^3 per day are:

	Top	*Middle*	*Bottom*
(*a*)	1.8	2.30 m	1.4 m
(*b*)	1.6 m	2.20 m	1.3 m
(*c*)	2.0 m	2.50 m	1.6 m

(*d*) None of these is correct.

4.24. During the process of burning of lime stones in continuous kiln:
(*a*) The bright red colour of stones indicates that the burning is complete.
(*b*) The burnt lime stones are withdrawn from the kiln soon after CO_2 is driven off.
(*c*) The dark red colour of stones indicate the presence of CO_2.
(*d*) All of these are correct.

4.25. Pick up the correct statement from the following:
(*a*) The sudden heating in the kiln blows of stones to pieces due to sudden release of moisture and carbon dioxide.
(*b*) The imperfectly calcined lime does not slake with water and is generally referred to as the dead burnt lime.
(*c*) 6 kg of fuel is sufficient for burning100 kg of $CaCO_3$.
(*d*) All of these are correct.

5. CEMENT

5.1. Natural cement is obtained by burning and crushing the stones which contain:
(*a*) Clay (*b*) Carbonate of lime.
(*c*) Some amount of carbonate of magnesia.
(*d*) All of these are correct.

5.2. Joseph Parker found that modules of argillaceous lime stone is made an excellent hydralic cement when burnt to powder in the year.
(*a*) 1756 (*b*) 1766
(*c*) 1786 (*d*) 1796

5.3. Which one of the following operations is not required for making cement?
(*a*) Burning a mixture of calcareous and argillaceous materials at a very high temperature.
(*b*) A correct proportion of calcareous and argillaceous materials is taken.
(*c*) A small quantity of gypsum is added to the calcinated product to get pulverized into fine powder.
(*d*) All of these operations are involved.

5.4. Pick up the correct property/ properties of cement from the following:

(*a*) Cement is an excellent binding material and provides strength to masonry.
(*b*) Cement provides good resistance to moisture.
(*c*) Cement possesses good plasticity and stiffens early.
(*d*) All of these.

5.5. Pick up the correct statement from the following:
(*a*) In argillaceous ingredient of ordinary cement, calcium carbonate predominates.
(*b*) In calcareous ingredient of ordinary cement, clay predominates.
(*c*) In ordinary cement, the argillaceous material, the clay predominates.
(*d*) In ordinary calcareous material, the calcium carbonate predominates.
(*e*) Both (*c*) and (*d*)

5.6. Pick up the correct chemical formula of the ingredients of ordinary cement from the following:
(*a*) Lime (CaO) (*b*) Silica (SiO_2)
(*c*) Alumina (Al_2O_3) (*d*) Calcium sulphate ($CaSO_4$)
(*e*) All of these are correct.

5.7. In a good quality cement, the percentage of:
(*a*) Lime is 62 (*b*) Silica is 62
(*c*) Alumina is 5 (*d*) Calcium sulphate is 4

5.8. State which one of the following statements is correct.
(*a*) The lime in excess makes the cement unsound.
(*b*) The deficiency of lime decreases the strength of cement and causes it set quickly.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

5.9. The silica (SiO_2), an important ingredient of cement.
(*a*) imparts strength to cement due to formation of di-calcium silicates ($2CaO . SiO_2$) and tricalcium silicates ($3CaO, SiO_2$).
(*b*) in excess increases the strength but prolongs the setting time.
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*)

5.10. The alumina (Al_2O_3), an ingredient of cement:
(*a*) imparts quick setting property to cement
(*b*) acts as a flux to lower the clinkering temperature.
(*c*) in excess reduces the strength of cement.
(*d*) All of these.

5.11. The calcium sulphate ($CaSO_4$):
(*a*) is not an ingredient of cement in the form of gypsum.
(*b*) increases the initial setting time of cement.
(*c*) decreases the initial setting time of cement.
(*d*) All of these.

5.12. Pick up the correct statement from the following:
(*a*) The function of calcium sulphate ($CaSO_4$) in cement is to increase its initial setting time.
(*b*) An excess of magnesia (MgO) in cement makes it unsound.
(*c*) Iron oxide (Fe_2O_3) imparts hardness and strength to cement.
(*d*) All of these are correct.

5.13. An ordinary Portland cement
(*a*) attains about 70% of its final strength in 28 days.
(*b*) attains about 90% of its final strength in one year.
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*)

5.14. Match list I with list II and choose the correct answer by using the codes given below the lists:

List – I (*Cement compound*)	*List – II* (*Chemical formula*)
A. C_3A	1. Dicalcium silicate
B. C_4AF	2. Tri calcium silicate
C. C_3S	3. Tetra calcium alumino-ferrite
D. C_2S	4. Teri calcium aluminate

Codes:

	A	B	C	D
(a)	4	3	2	1
(b)	1	2	3	4
(c)	3	1	2	4
(d)	2	4	1	3

5.15. When water is added to cement, the decreasing rate of reaction of the four minerals is as under:
(*a*) $C_3A \rightarrow C_4AF \rightarrow C_3S \rightarrow C_2S$
(*b*) $C_4AF \rightarrow C_3S \rightarrow C_2S \rightarrow C_3A$
(*c*) $C_3S \rightarrow C_2S \rightarrow C_3A \rightarrow C_4AF$
(*d*) $C_3A \rightarrow C_4AF \rightarrow C_2S \rightarrow C_3S$

5.16. The quickest ingredient to react when water is added to cement:
(*a*) Tri calcium aluminate ($3CaO . Al_2O_3$)
(*b*) Tetra-calcium – alumino – ferrite ($4CaO. Al_2O_3 Fe_2O_3$)
(*c*) Tri calcium –silicate ($3CaO. SiO_2$)
(*d*) Dicalciam – Silicate ($2CaO. SiO_2$)

5.17. Pick up the correct statement from the following:
(*a*) The hydration of tricalcium silicate ($3CaO . SiO_2$) practically ends after 28 days.
(*b*) The quickest compound in cement to react with water is tri-calcium aluminate ($3CaO . Al_2O_3$)
(*c*) For high – strength concrete at a later stage, a high content of C_2S ($2CaO. SiO_2$) is used.
(*d*) All of these are correct.

5.18. For manufacturing quick hardening Portland cement, which one of the following is used?
(*a*) C_3A (*b*) C_4AF
(*c*) C_3S (*d*) C_2S

5.19. The Portland cement which contains more than
(*a*) 50 to 60% of C_3S, is called Alit.
(*b*) 12% of C_3A, is called Aluminate
(*c*) 60% of C_3S, is called high Alit.
(*d*) 35% of C_2S, is called Belit.
(*e*) All of these are correct.

5.20. The steel rotary kiln used in the process of manufacturing normal setting ordinary Portland cement has:
(*a*) diameter 250 cm to 300 cm

(*b*) length 90 m to120 m
(*c*) gradient1 in 25 to1 in 30
(*d*) supports at intervals by masonry or concrete columns.
(*e*) All of these correct.

5.21. A 50 kg cement bag contains:
(*a*) 0.035 m^3 of cement. (*b*) 0.025 m^3 of cement.
(*c*) 0.033 m^3 of cement. (*d*) None of these.

5.22. The ratio of the percentages of alumina to that of iron oxide in cement should not be less than.
(*a*) 0.30 (*b*) 0.33
(*c*) 0.44 (*d*) 0.55
(*e*) 0.66

5.23. The total sulphur content in cement should not exceed:
(*a*) 1.50% (*b*) 1.75%
(*c*) 2.50% (*d*) 2.75%

5.24. Weight of magnesia in cement should not exceed:
(*a*) 2.5% (*b*) 3.5%
(*c*) 4.00% (*d*) 5.00%

5.25. An amount of cement weighing100 gm when passed continueusly only for15 minutes through IS sieve No 9 should not retain a residue:
(*a*) 5.0% of the original weight.
(*b*) 7.5% of the original weight
(*c*) 10.0% of the original weight
(*d*) 12.5% of the original weight.

5.26. The water cement ratio for the cement sand mortar (1:3) is kept.
(*a*) 0.25 (*b*) 0.30
(*c*) 0.35 (*d*) 0.40

5.27. The compressive strength of the Test Cube at the end of 3 days should not be.
(*a*) less than115 kg/cm^2 after 3 days and 175 kg/cm^2 after 7 days.
(*b*) less than 95 kg/cm^2 after 3 days and 160 kg/cm^2 after 7 days.
(*c*) less than 80 kg/cm^2 after 3 days and 210 kg/ cm^2 after 7 days.
(*d*) none of these.

5.28. The tensile stress of a Test Cube of cement sand ratio1:3.
(*a*) After 3 days should not be less than 20 kg/cm^2 and after 7 days.
(*b*) After 3 days not to less than 15 kg/cm^2 and after 7 days 20 kg/cm^2.
(*c*) After 3 days should not be less than 10 kg/ cm^2 and after 7 days 15 kg/cm^2.

5.29. The Vicat apparatus is used for testing:
(*a*) initial setting time of cement.
(*b*) final setting time of cement.
(*c*) soundness of cement.
(*d*) both (*a*) and (*b*) (*e*) both (*b*) and (*c*)

5.30. The interval of time between the moment of addition of water to cement and commencement of filling the Vicat apparatus mould is known as the time of gauging that should be.
(*a*) 2½ to 3½ minutes. (*b*) 3 to 4 minutes.
(*c*) 2¾ to 4¼ minutes. (*d*) None of these correct.

5.31. In Vicat apparatus.
(*a*) The square needle is used for testing initial setting time.
(*b*) The plunger is used for consistency test.
(*c*) The needle with annular collar is used for testing final setting time.
(*d*) All of these are correct.

5.32. The initial setting time of ordinary Portland cement should not be less than:
(*a*) 20 minutes (*b*) 25 minutes
(*c*) 30 minutes (*d*) 36 minutes

5.33. The final setting time of ordinary port land cement should not be more than.
(*a*) 8 hours (*b*) 9 hours
(*c*) 10 hours (*d*) 12 hours

5.34. The soundness test of cement:
(*a*) is performed with the help of Lechatlier apparatus.
(*b*) is carried out to detect the presence of un-combined lime in cement.
(*c*) the Lechattier apparatus has a brass mould of diameter 30 mm, height 30 mm and thickness 0.5 mm.
(*d*) All of these are correct.

5.35. The distance between the two readings of the Lechattier apparatus should not exceed:
(*a*) 4 mm (*b*) 5 mm
(*c*) 7.5 mm (*d*) 10 mm

5.36. For the storage of 20 bags (or1 tonne) of cement, minimum storage space is required:
(*a*) 1 m^3 (*b*) ½ m^3
(*c*) 1½ m^3 (*d*) None of these

5.37. An acid resistant cement contains:
(*a*) Aggregates of quartz and quartzites.
(*b*) Sodium fluosilicate (Na_2SiFe)
(*c*) Soluble glass. (*d*) All of these.

5.38. In additive sodium fluosilicate in acid resistant cement:
(*a*) accelerates the hardening process of soluble glass.
(*b*) Increases the resistance of cement to acidic water.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

5.39. Pick up the correct statement from the following:
(*a*) The binding material of acid-resistant cement is soluble glass (a water solution of sodium silicate or potassime silica).
(*b*) The ratio of the number of silica molecules to that of alkli oxide molecules is known as glass modulus
(*c*) The value of glass modulus varies from 2.50 to 3.50.
(*d*) By adding 0.5 percent linseed oil, the cement resistance to water increases.
(*e*) All of these.

5.40. The slag which is a waste product obtained in the manufacturing process of pig-iron, contains:
(*a*) Alumina (*b*) Lime

(*c*) Silica (*d*) All of these

5.41. The blast furnace cement
(*a*) gains less strength in early days.
(*b*) requires longer curring period.
(*c*) is durable.
(*d*) proves to be economical since it is made from a waste product.
(*e*) All of these.

5.42. Which one of the following statements is correct?
(*a*) The mixing of the chromium oxide to cement gives a green color.
(*b*) The mixing of cobalt to cement imparts blue colour
(*c*) The maganese dioxide when mixed in cement produces black or brown coloured cement.
(*d*) All of these are correct.

5.43. High alumina cement:
(*a*) contains bauxite not less than 32 percent.
(*b*) must contain alumina by weight to lime in the ratio between 0.85 to1.30.
(*c*) sets quickly and attains higher ultimate strength in a short period.
(*d*) attains strength in a day about 400 kg/cm^2 and after 3 days 500 kg/cm^2
(*e*) All of these.

5.44. Which one of the following is hydrophotric admixture hydrophotic cement?
(*a*) Alcohol (*b*) Napthene soap
(*c*) Oxidized petroline (*d*) All of these.

5.45. The low heat cement contains / is used for:
(*a*) Lower percentage of tricalcium aluminates (C_3A) roughly 5%.
(*b*) Higher percentage dicalcium silicate (C_2S) roughly 46%.
(*c*) Mass concrete work such as dams.
(*d*) All of these.

5.46. Pozzuolana cement:
(*a*) is a volcanic powder.
(*b*) resembles surkhi is prepared by burning bricks.
(*c*) contains10 to 30 percentage of pozzuolana materials.
(*d*) All of these.

5.47. Pick up the correct statement from the following regarding quick setting cement.
(*a*) It contains a small percentage of aluminium sulphate.
(*b*) It contains less percentage of gypsum or retarder.
(*c*) It starts setting within 5 minutes after addition of water and in less than 30 minutes it attains good strength.
(*d*) Fineness of the grinding is responsible for accelerating the setting action of cement.
(*e*) All of these.

5.48. Quick setting cement is usefully used to lay concrete under:
(*a*) static water (*b*) running water
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*)

5.49. The rapid hardening cement:
(*a*) has initial and final setting times as that of ordinary Portland cement.
(*b*) attains high strength in early days.
(*c*) contains high percentage of tricalcium silicate (C_3S) about 56%
(*d*) All of these.

5.50. Sulphate resisting cement is generally used in
(*a*) Canal linings (*b*) Culverts
(*c*) Systems (*d*) All of these.

5.51. White cement.
(*a*) is made by raw materials practically free from colouring oxides of iron, manganese, or chromium.
(*b*) is obtained by burning the clinkers by oil fuel.
(*c*) should not set earlier than 30 minutes.
(*d*) All of these.

6. MORTARS

6.1. Pick up the correct statement from the following:
(*a*) The required quantity of water and a mixture of binding material (cement or lime) and fine aggregates (sand) is called mortar.
(*b*) The binding material in mortars is known as matrix.
(*c*) The fine aggregate in mortars is called an adulterant.
(*d*) The matrix binds the particles of the adulterant to provide durability, quality and strength of the mortar.
(*e*) All of these.

6.2. Pick up the correct statement from the following:
(*a*) The strength of a mortar depends on the quantity and quality of matrix.
(*b*) The combined effect of matrix and adultrant of mortar is to bind the bricks or stones firmly.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

6.3. Pick up the correct statement from the following:
(*a*) The sand forms an important ingredient of mortar.
(*b*) The sand particles consist of small grains of silica (SiO_2)
(*c*) The sand is formed by the decomposition of stand stones due to weathering.
(*d*) All of these.

6.4. Pick up the correct statement from the following:
(*a*) The pit-sand consists of sharp angular grains.
(*b*) The pit-sand particles are free from salts.
(*c*) The pit-sand is an excellent material for mortar or concrete.
(*d*) When pit-sand particles are rubbed between fingers do not leave any stain on the fingers.
(*e*) All of these.

6.5. The river bed sand:
(*a*) is obtained from the beds of perennial rivers.
(*b*) contains fine – moulded grains due to mutual attrition under the action of water current.
(*c*) is almost white in colour.

(*d*) is widely used for building construction purposes.
(*e*) All of these.

6.6. The sea sand:
(*a*) is abundantly available along sea shore.
(*b*) contains particles of fine rounded shape.
(*c*) contain salts.
(*d*) is seldomly used for engineering purposes.
(*e*) All of these.

6.7. Pick up the correct statement from the following:
(*a*) The presence of moisture in sand increases the sand volume.
(*b*) The moisture in sand causes a film of water around sand particles which results in the increase of sand volume.
(*c*) The finer the sand particles the more will be the increase in sand volume of given moisture content.
(*d*) The phenomena of the increase of sand volume due to the presence of moisture in sand, is called bulking of sand.
(*e*) All of these.

6.8. Pick up the correct statement from the following:
(*a*) A dry sand and a completed flooded sand with water has practically the same volume.
(*b*) When proper allowance is not made for bulking of sand the cost of concrete and mortar increases.
(*c*) Ignoring the bulking effect of sand results in to under sanded mixes.
(*d*) The under-sanded mixes are harsh and difficult for working and placing.
(*e*) All of these.

6.9. Which one of the following statements is correct?
(*a*) Sand in mortar does not increase the strength of the mortar as it is used only to increase the bulk volume.
(*b*) Sand in mortar prevents excessive shrinkage while drying.
(*c*) Sand in variation of its proportion with cement increases the resistive force against crushing.
(*d*) Sand particles increase the surface area for spreading and adhering of the binding material.
(*e*) All of these.

6.10. Pick up the correct statement from the following:
(*a*) Presence of clay in sand is tested by keeping some quantity of sand in a glass of water containing water and vigorously shaken and allowed to settle. A distinct layer of clay gets formed on the top if there is clay in sand.
(*b*) The presence of salts in sand is detected by tasting.
(*c*) The size and sharpness of grains are examined by touching and observing with eye.
(*d*) All of these.

6.11. Which one of the following is a substitute of sand in mortars.
(*a*) Stone screening. (*b*) Surkhi
(*c*) Cinder (*d*) Ashes from coal.
(*e*) All of these.

6.12. In lime mortars:
(*a*) Lime is used as a binding material.
(*b*) The volume of lime is taken 2 to 3 times that of volume of sand.
(*c*) If hydraulic lime is used, the proportion of lime to sand is taken as 1:2.
(*d*) High plasticity is obtained.
(*e*) All of these.

6.13. In surkhi mortar:
(*a*) Surkhi is used instead of sand.
(*b*) Surkhi should confirm to B.I.S. No. 9 sieve.
(*c*) The residue of Surkhi on sieve no. 9 should not be more than 10% by weight.
(*d*) All of these.

6.14. In cement mortar:
(*a*) The proportion of cement to sand by volume varies 1:2 to 1:6 or even more as per the requirement of the strength.
(*b*) Sand can be used as adulterant.
(*c*) High strength and water-resisting properties prevail.
(*d*) All of these are correct.

6.15. Pick up the correct statement from the following:
(*a*) When cement is added to improve the quality of lime mortar, a gauged mortar is obtained.
(*b*) The gauged mortar proves to be economical strong and dense.
(*c*) The normal proportion of cement to lime by volume in the gauged mortar is about 1:6 to 1:8.
(*d*) All of these.

6.16. The gauged mortar is also known:
(*a*) a composite mortar. (*b*) a lime-cement mortar.
(*c*) a cement clay mortar.
(*d*) All of these.

6.17. The fire resistant mortar.
(*a*) is obtained by adding aluminous cement and finely crushed powder fine-bricks.
(*b*) contains a proportion of1 part of aluminous cement and 2 parts of powder of fine-bricks.
(*c*) is used with fine-bricks for lining furnaces, fire place etc.
(*d*) All of these are correct.

6.18. Light weight mortar obtained by adding sawdust, wood powder to lime mortar or cement mortar is used for.
(*a*) sound proof constructions.
(*b*) heat proof constructions.
(*c*) both (*a*) and (*b*)
(*d*) neither (*a*) nor (*b*)

6.19. The packing mortar which is generally used for packing oil wells possesses:
(*a*) High homogeneity.
(*b*) Water resistance.
(*c*) Predetermined setting time
(*d*) formation of solid water proof cracks.
(*e*) All of these.

6.20. Which one the following is a packing mortar?
(*a*) Cement–sand (*b*) Cement–loam
(*c*) Cement–loam sand (*d*) All of these are correct

6.21. The sound absorbing mortar used to reduce the noise level contains:
(*a*) Portland cement (*b*) Lime
(*c*) Gypsum.
(*d*) Slag and light weight porous materials.
(*e*) All of these.

6.22. Which one of the following terms is generally referred to in mortars
(*a*) Mobility (*b*) Placeability
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

6.23. Which one of the following statements is correct?
(*a*) The lime mortar should be consumed within 36 hours for its preparation.
(*b*) The cement mortar should be consumed within 30 minutes after adding water.
(*c*) The gauged mortar(composite mortar) should be consumed within 2 hours after adding water.
(*d*) All of these are correct.

6.24. Pick up the correct statement from the following:
(*a*) Sea water can be used with hydraulic lime or cement as it prevents too quick drying of mortar.
(*b*) Building units should be soaked in water before mortar is spread over them.
(*c*) The new construction work should be kept damp by sprinkling water to avoid rapid drying of mortar.
(*d*) All of these are correct.

6.25. Pick up the correct statement from the following:
(*a*) For damp proof courses and cement concrete roads, the cement mortar proportion is kept 1:2.
(*b*) For partition walls and parapet walls, cement mortar proportion is kept 1:3.
(*c*) For plaster work, cement proportion is kept1:3 to 1:4.
(*d*) For pointing work, cement proportion is kept 1:1 to 1:2.
(*e*) All of these.

7. TIMBER

7.1. A tree of not less them 60 cm in girth as a building material must possess:
(*a*) Low heat conductivity.
(*b*) Relatively high strength.
(*c*) Small bulk density.
(*d*) A menability to mechanical working.
(*e*) All of these.

7.2. Timber as a building material:
(*a*) is suspectable to decay and inflamation?
(*b*) fluctuates its properties due to change in moisture content.
(*c*) possesses different strength along length and across fiber.
(*d*) All of these.

7.3. The wood dust (saw dust and shavings) and admixture of organic are used to make:
(*a*) Fiber slabs. (*b*) Fiber boards.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

7.4. Exogenous trees:
(*a*) increase in bulk by growing out wards.
(*b*) have distinct consecutive rings formed horizontally.
(*c*) provide good timber for engineering purpose.
(*d*) All of these.

7.5. Pick up the correct statement from the following:
(*a*) The conifers (every green trees) are exogenous trees.
(*b*) The conifers bear cone-shaped fruits.
(*c*) The conifers yield soft woods light in colour and weight.
(*d*) The conifers show distinct annual rings.
(*e*) All of these.

7.6. Deciduous trees:
(*a*) are broad leaf trees.
(*b*) shed their leaves in autumn and new ones grow in spring.
(*c*) provide timber mostly for engineering purposes.
(*d*) All of these.

7.7. Deciduous trees yield hard woods usually.
(*a*) close grained and strong.
(*b*) heavy and dark coloured.
(*c*) durable and non-resinous.
(*d*) All of these.

7.8. Pick up the correct statement from the following:
(*a*) Conifers are the varieties of exogenous trees.
(*b*) Conifers show distinct annual rings.
(*c*) Deciduous trees yield hard woods with close grained fibres.
(*d*) Deciduous trees do not show distinct annual rings.
(*e*) All of these.

7.9. Which one of the following trees is not endogenous?
(*a*) Deodar (*b*) Bamboo
(*c*) Cane (*d*) Palm

7.10. With reference to macro-structure of the trunk of an exogenous tree which one of the following statement is correct?
(*a*) The inner most central portion (or core)of the tree is called *pith* or *medulle*.
(*b*) The inner annual rings surrounding the pith constitute the hard wood.
(*c*) Hard wood is usually dark in colour and constitutes the dead portion of the tree.
(*d*) The outer ring between hard wood and cambium layer of sap between sapwood and inner bark is known as *sapwood*.
(*e*) All of these are correct.

7.11. Sap wood of a tree trunk:
(*a*) represents the recent growth of the tree.
(*b*) mainly contains the sap.
(*c*) takes active part in the growth of tree through which

sap moves in upward direction.
(*d*) is generally called alburnum.
(*e*) All of these.

7.12. Cambium layer of tree trunk:
(*a*) is a thin layer of sap between sap wood and inner bark.
(*b*) contains pure sap.
(*c*) gets exposed by removing the tree bark.
(*d*) All of these.

7.13. Medullary rays in the tree trunk:
(*a*) are thin radial fibers extending form faith to cambium layer.
(*b*) hold together the annual rings of heart wood and sap wood.
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*)

7.14. Living cell of a tree consists of:
(*a*) a membrane (*b*) proto plasma.
(*c*) Sap (*d*) Core
(*e*) All of these

7.15. The protoplasm in a living cell is a granular, trans- parent, viscous vegetable protein composed of:
(*a*) Carbon (*b*) Hydrogen
(*c*) Oxygen (*d*) Nitrogen
(*e*) All of these

7.16. The core of a living cell of a tree contains:
(*a*) Phosphorus (*b*) Sulphur
(*c*) Magnessium (*d*) None of these

7.17. Which one of the following cells usually found in medullary ray:
(*a*) Conductive cells (*b*) Mechanical cells
(*c*) Storage cells (*d*) None of these

7.18. Pick up the correct statement from the following:
(*a*) The durability of timber obtained from immatured trees is less.
(*b*) The tree felled after attaining its maturity provides decayed timber.
(*c*) The age of good trees for felling is 50 to100 years.
(*d*) All of these.

7.19. Pick up the correct statement from the following:
(*a*) The equilibrium formula of applied mechanics is applied for felling a matured tree.
(*b*) The timber from a freshly felled tree should be sown after removing the bark.
(*c*) Proper wedges should be driven gradually into the felling tree to cause smooth felling of the tree.
(*d*) All of these.

7.20. Which one of the following statements is correct?
(*a*) The felling of trees in autumn and spring when sap remains in vigorous motion is not recommended.
(*b*) In hilly regions felling of trees should be resorted to the mid-summer.
(*c*) In plains, the mid-winter is suitable time for felling trees.
(*d*) All of these are correct.

7.21. The decay of wood due to fungi occurs:
(*a*) when the moisture content of timber is above 20 percent.
(*b*) when there is presence of air and warmth for tree growth of fungi.
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*)

7.22. Which one of the following defects is caused in timbers by the fungi?
(*a*) Wet rot (*b*) Dry rot
(*c*) Write rot (*d*) Heart rot
(*e*) All of these.

7.23. Pick up the correct statement from the following:
(*a*) Conversion of wood by the attack of fungi into clay-powder form is called *dry rot* defect.
(*b*) The dry rot occurs in improperly ventilated basements, damp places as kitchen and toilets.
(*c*) The dry rot attacks unseasoned soft woods and sap wood.
(*d*) The fungus grows rapidly in the absence of sunlight, dampness presence of sap, stagnant air coupled with warmth.
(*e*) All of these.

7.24. After removing the damaged portion of dry rot, the remaining unaffected portion should be painted with.
(*a*) a solution of copper sulphate.
(*b*) a solution of dilute hydrochloric acid.
(*c*) a solution of nitric acid
(*d*) None of these.

7.25. Pick up the correct statement from the following:
(*a*) Heart-rot is formed when it is exposed to the attack of atmosphere agents.
(*b*) The wet rot converts timber into greyish brown powder.
(*c*) For the prevention of wet rot, a well seasoned timber should be used for exterior work or for underground work the timber to be pointed for protection against moisture.
(*d*) All of these are correct.

7.26. Pick up the correct statement from the following:
(*a*) The timber decayed by beetles (small insects) get converted into flour-like powder
(*b*) To the timber attacked by beetles looks sound till it completely fails.
(*c*) The wood attacked by marine bores loses colour and strength.
(*d*) Termites eat away the wood from the core of the cross-section.
(*e*) All of these are correct.

7.27. Pick up the correct statement from the following:
(*a*) The portion of the tree trunk from which a branch is removed, continuous to be nourished from the stem from a pretty long time and ultimately results in the formation of knot.
(*b*) The pin-knot is formed if diameter is up to 6.50 mm
(*c*) The peculiar curved swettings found on the body of

a free are called *rind galls*.
(*d*) The rind galls get developed at points from where branches are improperly removed.
(*e*) All of these.

7.28. The curved cracks which separate partly one annual ring from the other are called:
(*a*) Cup shakes (*b*) Heart shakes
(*c*) Ring shakes (*d*) Radial shakes
(*e*) Star shakes

7.29. The cracks which extend from the pith to sapwood in the direction of medullary rays are called:
(*a*) Cup shakes (*b*) Heart shakes
(*c*) Ring shakes (*d*) Radial shakes
(*e*) Star shakes

7.30. The cracks in the form of cup shakes which cover the entire annual ring are called:
(*a*) Heart shakes (*b*) Ring shakes
(*c*) Radial shakes (*d*) Star shakes

7.31. The cracks in the cross-section of timber which extend from bark towards the sapwood are called:
(*a*) Ring shakes (*b*) Star shakes
(*c*) Heart shakes (*d*) Cup shakes

7.32. Radial shakes in the timber cross-section :
(*a*) are similar to starshakes
(*b*) radiate a short distance from the bark towards the centre
(*c*) follow the direction of annual ring and ultimately run towards the pith
(*d*) All of these are correct

7.33. The sound conductivity in timber:
(*a*) is faster along the fiber
(*b*) is lower in radial direction
(*c*) is slowest along the core of the cross-section.
(*d*) All of these.

7.34. A good preservate affectively penetrates at least for a depth of
(*a*) 6 mm to 8 mm (*b*) 8 mm to12 mm
(*c*) 6 mm to16 mm (*d*) 6 mm to 25 mm

7.35. ASCU preservative for timber contains by weight:
(*a*) 1 part of hydrated arsenicpentoxide ($AS_2O_5 . 2H_2O$)
(*b*) 3 parts of blue vitriol (copper sulphate) ($C_4SO_4 . 5H_2O$)
(*c*) 4 parts of potassium dichromate ($K_2Cr_2O_4$) or sodium dichromate ($Na_2Cr_2O_7 . 2H_2O$)
(*d*) All of these

7.36. ASCU preservative:
(*a*) is available in powder form
(*b*) 6 parts by weight of ASCU and two parts by weight of water are mixed to prepare the ASCU solution
(*c*) gives timber protection against the attack of white ants
(*d*) solution is odourless
(*e*) All of these are correct.

7.37. Which one of the following is water borne preservatives?
(*a*) Copper sulphate (*b*) Mercury chloride
(*c*) Sodium fluorides (*d*) Zinc chloride
(*e*) All of these

7.38. The coal tar:
(*a*) is applied on the timber surface with hot coal tar with the help of a brush
(*b*) has unpleasant smell and appearance
(*c*) makes timber unsuitable for painting but it is fire resistant
(*d*) is found to be most useful for timber embedded in ground
(*e*) All of these.

7.39. In the process of creosotting a timber
(*a*) the creosote oil is pumped in the chamber containing thoroughly seasoned and dried timber
(*b*) timber is taken out of the chamber when it absorbs creosote oil
(*c*) the creosote oil used, is one of the best antiseptic for the timber against wood attacking fungi.
(*d*) causes an unpleasant odour.
(*e*) All of these.

7.40. The oil paints:
(*a*) should be coated on well seasoned timber
(*b*) preserve timber from mixture
(*c*) make timber durable
(*d*) All of these.

7.41. To preserve timber from white ants, which one of the following is most suitable?
(*a*) Ascu treatment (*b*) Coal tar treatment
(*c*) Creosote oil (*d*) Solignum paints

7.42. Which one of the following is refractory timber?
(*a*) Sal (*b*) Teak
(*c*) Deodar (*d*) None of these

7.43. To make the timber fire resistant, anti-pyrites are used which contains:
(*a*) Salts of ammonium (*b*) Boric salts
(*c*) Phosphoric acids (*d*) All of these

7.44. Sir Abel's process for making timbers fire-resistant, the sequence of the application of the chemicals is:
(*a*) Dilute solution of sodium silicate → cream like paste of slaked fat lime → concentrated solution of silicate of soda
(*b*) Cream like paste of slaked fat lime → concentrated solution of silicate of soda → dilute solution of sodium silicate
(*c*) Concentrated solution of silicate of soda → dilute solution of sodium silicate → cream like paste of slaked fat lime.
(*d*) None of these

7.45. Pick up the correct statement from the following:
(*a*) The process of drying of timber is known as *seasoning* of timber.
(*b*) Irregular drying of timber during seasoning causes

shrinkage and sets up stresses between the fibers
(*c*) Timber warps and shakes get developed in timber.
(*d*) All of these

7.46. Pick up the correct statement from the following:
(*a*) The capacity of wood to absorb water vapours from air is called hygrocopicity of wood.
(*b*) The fluctuation in moisture contents from zero to the fibre saturation point cause cracking, warping swetting and shrinkage of wood.
(*c*) At the fiber saturation point the timber cell cavities contain no free water
(*d*) All of these are correct.

7.47. The time of seasoning a moderately refractory timber of 25 mm thickness
(*a*) 8 days (*b*) 10 days
(*c*) 12 days (*d*) 14 days

7.48. A timber piece having parallel sides thickness less than 50 mm and width exceeding 200 mm is called:
(*a*) A board (*b*) A batten
(*c*) Baulk (*d*) None of these

7.49. Pick up the correct definition from the following regarding timbers
(*a*) A timber piece whose breath and thickness do not exceed 50 mm is called a *batten*
(*b*) The trunk of tree obtained after removing its branches is called a *log*
(*c*) The timber pieces of parallel sides, having thickness less than 50 mm and width exceeding 50 mm is called a plank.
(*d*) A sound long log of wood having its diameter less than 200 mm is called a *pole*
(*e*) All of these are correct

7.50. The Indian timbers for obtaining veneers, the thin slides of wood of thickness varying from 0.4 mm to 6 mm is/are:
(*a*) Mahogany (*b*) Rosewood
(*c*) Sissoo (*d*) Teak
(*e*) All of these

7.51. The veneers are generally used for making
(*a*) Plywoods (*b*) Batten boards
(*c*) Laminated boards (*d*) All of these

7.52. Which one of the following statements regarding the plywoods is correct?
(*a*) Three or more veneers in odd number are glued together with the direction of grains of successive layers at right angles
(*b*) The placing of veneers normal to each other increases both longitudinal and transverses strength
(*c*) While glueing veneers together a pressure 7 to14 kg/ cm^2 is applied.
(*d*) All of these are correct.

7.53. Pick up the correct statement from the following:
(*a*) The batten boards are widely used for making partition walls shutters of doors and windows
(*b*) Total thickness of laminate board is about 50 mm
(*c*) The fly woods containing more than three plies are designated as multy-ply.
(*d*) All of these are correct

7.54. Pick up the correct statement from the following.
(*a*) The plywoods possess uniform tensile strength in all directions
(*b*) The plywoods are very easy to work and suitable to any design
(*c*) The plywoods are elastic and do not split or crack due to atmospheric changes.
(*d*) The commercial plywoods are available with width up to150 cm and lengths up to 300 cm
(*e*) All of these

7.55. Which one of the following is an impreg timber which is fully or partly covered with resin?
(*a*) Formica (*b*) Sunglass
(*c*) Sun mica (*d*) All of these

8. PAINTS

8.1. Pick up the correct statement from the following:
(*a*) Paints are coatings of fluid materials which are applied over surfaces of timber and metals.
(*b*) Varnishes are transparent or nearly transparent solutions of resinous materials which are applied over painted surfaces.
(*c*) Distempers are applied over the plastered surfaces.
(*d*) Protective power of paints, varnishes and distempers decreases with time.
(*e*) All of these.

8.2. The base of a paint:
(*a*) is a solid substance in a fine state of division.
(*b*) forms the bulk of paint.
(*c*) determines the character of the paint.
(*d*) imparts durability to the painted surface.
(*e*) All of these.

8.3. Which one of the following is an ingredient of oil borne paint?
(*a*) Base (*b*) Colouring pigment
(*c*) Vehicle (carrier) (*d*) Solvent
(*e*) Drier (*f*) All of these

8.4. White lead (carbonate of lead):
(*a*) forms the base of lead paints.
(*b*) is the most widely used base.
(*c*) is most suitable for wood surfaces.
(*d*) is dense, permanent and water proof.
(*e*) All of these are correct.

8.5. Red lead (oxide of lead):
(*a*) forms the base of lead paints.
(*b*) is used as a primary coat to wood surface.
(*c*) acts as a drier when mixed with linseed oil.
(*d*) All of these.

8.6. Oxide of zinc:
(*a*) is an oxide of zinc.
(*b*) forms the base of all zinc paints.
(*c*) is smooth, transparent, and non poisonous.
(*d*) All of these are correct.

8.7. Oxide of iron:
(*a*) forms the base of all iron paints.
(*b*) mixes easily with the vehicle.
(*c*) prevents rusting of iron surfaces.
(*d*) is generally used for primary coat of iron surfaces.
(*e*) All of these.

8.8. Aluminum powder:
(*a*) is used for a primary coat to new wood-work.
(*b*) forms the bulk of aluminum paints.
(*c*) prevents cracking and warping of wood.
(*d*) keeps the moisture content of wood surface practically the same.
(*e*) All of these.

8.9. Lithophone is a base:
(*a*) is a mixture of zinc sulphide and barytes.
(*b*) is cheap and is easily applied on the surface.
(*c*) change colour in day light.
(*d*) is used for interior work of interior nature.
(*e*) All of these.

8.10. The vehicle which is a liquid substance of paint:
(*a*) holds the ingredients of a paint in liquid suspension.
(*b*) spreads the paint evenly and uniformly on the surface in the form of a thin layer.
(*c*) provides a binder for the ingredients of a paint and sticks to the surface.
(*d*) All of these are correct.

8.11. The function of drier in paints:
(*a*) is to accelerate the process of drying
(*b*) is to observe the oxygen from the air and helps to harden the linseed oil.
(*c*) in the form of soluble driers get dissolved in linseed oil.
(*d*) All of these.

8.12. Which one of the following is the most commonly used drier in paints?
(*a*) the litharge (*b*) the red lead
(*c*) the sulphate of manganese
(*d*) None of these.

8.13. The solvent in paints:
(*a*) helps to thin the paint for easy application on the surface
(*b*) helps the paint in penetrating through the porous surface
(*c*) most commonly used is the spirit of turpentine
(*d*) All of these.

8.14. The spirit or turpentine.
(*a*) is inflammable and evaporates rapidly
(*b*) is a transparent volatile liquid
(*c*) has a pungent odour
(*d*) has its substitute benzine and paptha
(*e*) All of these are correct.

8.15. A pure turpentine.
(*a*) should not leave any residue on evaporation
(*b*) vigorously shaken, should not froth
(*c*) when warmed gently should not smell of resin or coal tar
(*d*) All of them.

8.16. Aluminium paints:
(*a*) contain very finely ground aluminium suspension in varnish
(*b*) form a metallic film of aluminium after evaporation of spirit or oil
(*c*) are visible in darkness
(*d*) All of these.

8.17. Which one of the following statements is correct regarding the aluminium paint?
(*a*) It provides better protection from corrosion
(*b*) A litre of aluminium paint covers about 200 m^2 area
(*c*) It is impervious to moisture and highly resistive to electricity
(*d*) It is mostly used for hot water pipes, marine piers and oil storage tanks
(*e*) All of these.

8.18. An anti-corrosive paint
(*a*) essentially consists of oil and strong drier
(*b*) contains a pigment chromium oxide mixed with very fine sand
(*c*) lasts for a long duration
(*d*) is black in appearance
(*e*) All of these are correct.

8.19. Bituminous paints
(*a*) are prepared by dissolving asphalt or any other suitable material in petroleum
(*b*) are available in many varities
(*c*) are black in colour
(*d*) are used for painting iron work under water
(*e*) All of these.

8.20. A cellulose paint
(*a*) is prepared from photographic films
(*b*) hardens by evaporation of the thinner in the paint
(*c*) can be washed and cleaned easily.
(*d*) is capable to withstand extreme degree of cold and heat
(*e*) All of these.

8.21. Cement paint:
(*a*) consists of white cement, pigment, accelator and additives
(*b*) is available in dry powder form
(*c*) is water proof and durable
(*d*) All of these.

8.22. Pick up the correct statement from the following:

(*a*) Cement paint is suitably applied on damp surface, and likely to become damp after painting.
(*b*) For painting surfaces like corrugated iron sheet, the cement paint is mixed with boiled linseed oil.
(*c*) It is essential to keep the surface wet after final coat for about 2 days by frequent splashing of water.
(*d*) All of these.

8.23. The emulsion paint
(*a*) contains polyvinyl acetate as a binding material
(*b*) possesses excellent alkali resistance
(*c*) odour less (*d*) All of these.

8.24. The enamel paint
(*a*) contains white lead or zinc white.
(*b*) dries slowly and forms a hard and durable surface.
(*c*) surfaces are not affected by acids, alkalies, fumes of gas and extreme hot and cold water.
(*d*) must be applied after a coat of titanium white inflame linseed oil.
(*e*) All of these

8.25. Graphite paint
(*a*) presents a black colour
(*b*) is applied on iron surfaces in contact with ammonia, chlorine and sulphur gases
(*c*) is used in mines and underground railways.
(*d*) All of these.

8.26. The inodorous paint:
(*a*) dose not use turpentine
(*b*) uses white lead or zinc white mixed with methylated spirit
(*c*) makes use of the shellac with linseed oil and castor oil dissolved in mythylated spirit.
(*d*) remains with a film of shellac on the surface.
(*e*) All of these.

8.27. The luminous paint:
(*a*) contains calcium sulphite with varnish
(*b*) surfaces shine like radium dials of watches in the absence of light.
(*c*) is applied on surface free from corrosion or any of the lead paint
(*d*) All of these.

8.28. The oil paints:
(*a*) are generally applied in three coats (primer, under-coat and final coat)
(*b*) possess good capacity and low glass
(*c*) should not be applied during humid and damp weather
(*d*) All of these.

8.29. The plastic paint
(*a*) contains the necessary variety of plastic
(*b*) may be applied by brush painting or spray painting
(*c*) is widely used for showrooms, auditoriums, etc.
(*d*) All of these.

8.30. The typical composition of1 litre of plastic emulsion paint contains:
(*a*) 0.20 kg binders (*b*) 0.5 kg pigments
(*c*) 0.10 kg other solids (*d*) 0.6 kg water
(*e*) All of these.

8.31.1 litre of plastic emulsion paint covers a wall surface area per coat
(*a*) 10 m^2 (*b*) 12 m^2
(*c*) 15 m^2 (*d*) 20 m^2

8.32. The silicate paint
(*a*) is prepared by mixing calcined and finely ground silica with resionous substances.
(*b*) can be directly applied on brick, plaster or concrete surfaces
(*c*) is directly applied without a prime coat.
(*d*) All of these.

8.33. Pick up the correct statement from the following:
(*a*) After painting process is over, the brushes should be cleaned at once with kerosene oil
(*b*) the paint obtained by opening the seal of the paint container, the vehicle and solvent get volatised due to exposure to the atmospheric oxygen.
(*c*) The solidification of the base and pigment of paint occurs if it remains exposed for a long time.
(*d*) All of these are correct.

8.34. Pick up the correct statement from the following:
(*a*) The process of covering or killing knots in wood work with a substance ensuring a complete stoppage of resin through them
(*b*) Applying the varnish prepared by dissolving shellac in methylated spirit in two coats, is known as *patent knotting*.
(*c*) Covering the knot by hot lime for 24 hours and scrapping off it before carrying out ordinary knotting, is termed as *lime knotting*.
(*d*) All of these are correct.

8.35. Pick up the correct statement from the following:
(*a*) The rubbing down of the surface after first coat of paint by pumic-stone or glass paper or both is technically termed as *stopping*.
(*b*) The filling of the holes, cracks, etc. by an admixture of one-third white lead and two-third ordinary putty, is known as *hard stopping*
(*c*) The hard stopping is adopted for superior work
(*d*) All of them

8.36. Pick up the correct statement from the following:
(*a*) The first coat of the paint is called the priming coat
(*b*) The second coat of the paint is called the under coat.
(*c*) The third coat of the paint is called the finishing coat.
(*d*) All of these are correct.

8.37. Pick up the correct statement from the following:
(*a*) The priming coat provides adhesion of the paint with surface and also to protect it from the weathering actions.
(*b*) The under-coat serves as the foundation or support to the finishing coat.

(*c*) The finishing coat is applied to get the required result.
(*d*) All of these are correct.

8.38. Pick up the correct statement from the following:
(*a*) Sufficiently seasoned surface of wood work not containing more than15 percent mixture at the time of painting is good.
(*b*) After thoroughly cleaning and painting of heads of nails to a depth of 3 mm, the wood work is knotted.
(*c*) After priming coat, the process of slotting is carried out.
(*d*) After undercoat, the finishing coats are applied till a smooth and even surface without any brush marks is obtained.
(*e*) All of these are correct.

8.39. Before painting new iron work and steel work:
(*a*) The surface should be free from rust.
(*b*) The grease should be removed by the water with caustic soda or lime.
(*c*) The cleaned surface is provided a film of phosphoric acid to protect the surface from rust
(*d*) All of these.

8.40. For painting a new galvanized iron work.
(*a*) a solution containing 40 g of copper acetate to a1 litre of water is applied to the surface
(*b*) a solution containing13 g of each muriatic acid, copper chloride, copper matorite and solammoniae to1 litre of soft water is applied to the surface
(*c*) both (*a*) and (*b*)
(*d*) neither (*a*) nor (*b*)

8.41. Pick up the correct statement from the following regarding painting the surface of a metal.
(*a*) Priming coat for aluminium surface should be of zinc chromate
(*b*) Primary coat for zinc surface should be of zinc oxide
(*c*) Both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

8.42. Pick up the correct statement from the following:
(*a*) coats of alkali resistant prime paints should be applied on plastered surface.
(*b*) spots of efflorescence appearing on the plastered surface should be brushed off repeatedly till these cease to appear
(*c*) discolourization of plastered surface, is due to the presence of algae, mould or lichen.
(*d*) The conditions favourable for easy and free growth of organisms responsible for discolouration are both dampness and high humidity.
(*e*) All of these.

8.43. Which one of the following paints you will re-commend for plastered surface.
(*a*) Cement paint (*b*) Emulsion paint
(*c*) Oil paint (*d*) Silicate paint
(*e*) All of these.

8.44. Pick up the correct statement from the following:
(*a*) Blistering is caused by the water vapours trapped behind the painted surface.
(*b*) Blooms are the formation of dull patches which occurs on the finished polished surface.
(*c*) Poor adhesion of paint may cause flaking
(*d*) The glossy patches are developed due to poor workmanship, cheap paints or weather actions.
(*e*) The formation of soap patches on the painted surface is termed as *saponification*
(*f*) All of these are correct.

9. VARNISHES AND DISTAMPERS

9.1. Varnish is a solution of resins or resinous substances dissolved in :
(*a*) alcohol (*b*) oil
(*c*) turpentine (*d*) either of these

9.2. Which one of the following is an ingredient of varnish?
(*a*) Resins or resinous substances
(*b*) Driers
(*c*) Solvent (*d*) All of these.

9.3. Which one of the following is used as resins in varnishes?
(*a*) The copal (*b*) lac (or shellica)
(*c*) resin (*d*) All of these

9.4. Pick up the correct statement from the following:
(*a*) The copal is a hard substance which is available at places where pine trees existed in the past.
(*b*) The lac (or shellic) is obtained by exudation of a special type of insects in India.
(*c*) The resin is obtained from pine trees.
(*d*) All of these.

9.5. The driers in varnish which are used to accelerate the process of drying is/are:
(*a*) Litharge (*b*) white copper
(*c*) Lead acetate (*d*) All of these.

9.6. The solvent for amber and copal resins is :
(*a*) Boiled linseed oil (*b*) Methylated spirit of wine
(*c*) Wood naptha (*d*) Turpentine

9.7. For resins (or shellic) which one of the following is recommended as solvent.
(*a*) Methylated spirit of wine
(*b*) Turpentine
(*c*) Boiled linseed oil (*d*) Wood neptha.

9.8. Turpentine dissolves the following easily:
(*a*) Mastie (*b*) Gumdammar
(*c*) Resin (*d*) All of these.

9.9. On the basis of solvent used in varnishes, they are classified as :
(*a*) Oil varnishes (*b*) spirit varnishes
(*c*) turpentine varnishes
(*d*) water varnishes (*e*) All of these.

9.10. Which one of the following varnishes is the hardest and most suitable?
(*a*) oil varnish (*b*) spirit varnish

(*c*) turpentine varnish (*d*) water varnish
(*e*) All of these.

9.11. Spirit varnishes
(*a*) use soft variety resins (lac or shellic)
(*b*) dry quickly
(*c*) are not durable
(*d*) are generally used for furniture
(*e*) All of these

9.12. The shellac dissolved in hot water with enough quantity of ammonia/borax/potash/soda is called *water varnish* which are used for
(*a*) varnishing maps (*b*) varnishing pictures
(*c*) delicate internal work
(*d*) All of these.

9.13. A distemper consists of the following:
(*a*) base (*b*) carrier
(*c*) colonising pigments (*d*) All of these

9.14. In the manufacture of distempers;
(*a*) whiting or chalk is used as base
(*b*) water is used as carrier
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

9.15. Pick up the correct statement from the following:
(*a*) The distempers are available in powder form or paste form
(*b*) The distempers are mixed with hot water before use
(*c*) The oil bound distempers are a variety of an oil paint in which drying oil is treated to mix water.
(*d*) The emulsifying agent used in distempers is glue
(*e*) All of these.

9.16. Which one of the following precautions is necessary for distempering?
(*a*) The new plastered surfaces should be kept exposed for a period of two months to dry.
(*b*) The surface to be applied a distemper should be free from efflaresence patches.
(*c*) The cracks, holes, etc. on the surface need be filled by lime putty or gypsum and is allowed to become hard.
(*d*) All of these.

9.17. Which one of the following precautions is taken for distempering?
(*a*) Distempering should be done in dry weather.
(*b*) A prime coat of pure milk is applied before distempering is taken up
(*c*) 1 litre of milk covers about10 m^2 of the surface
(*d*) All of these.

10. GLASS

10.1. Which one of the following is the natural glass?
(*a*) obsidian (*b*) rock crystals
(*c*) both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

10.2. The fibre glass is obtained by reinforcing with
(*a*) steel fibres (*b*) plastic fibres
(*c*) aluminium fibres (*d*) None of these

10.3. The glass
(*a*) is a mixture of a number of metallic silicates
(*b*) contains an alkalinic metal
(*c*) is available as transparent or translucent
(*d*) is a solidified super-cooled solution of metallic silicates with very high viscosity.
(*e*) All of these.

10.4. The glass is available as
(*a*) Soda-lime glass (*b*) Potash-lime glass
(*c*) Potash-lead glass (*d*) All of these.

10.5. Which one of the following groups of glass is correctly represented by the chemical formula?
(*a*) Na_2O . CaO . 6 SiO_2 ... Sodalime glass
(*b*) K_2O . CaO . 6 SiO_2 ... Potash lime glass
(*c*) K_2O . P_4O . 4 SiO_2 ... Potash-lead glass
(*d*) All of these are correct

10.6. Which of the following methods is used for cleaning glass pan
(*a*) By applying methylated spirit
(*b*) By painting the glass panes with lime wash and washing with clean water after leaving it to dry.
(*c*) By rubbing damp salt for cleaning paint spots
(*d*) By rubbing finely powdered chalk
(*e*) All of these

10.7. Soda-lime glass (or soft glass).
(*a*) is a mixture of sodium silicate and calcium silicate
(*b*) is easily fusible at a comparatively low temperature
(*c*) is used in manufacture of glass tubes, plate glass, window glass
(*d*) All of these.

10.8. Potash-lime glass (hard glass)
(*a*) is a mixture of potassium silicate and calcium silicate
(*b*) does not melt so easily
(*c*) is used in the manufacture of combustion tubes
(*d*) fuses at high temperature
(*e*) All of these.

10.9. Potash-lead glass (flint)
(*a*) is a mixture of potassium silicate and load silicate
(*b*) fuses very easily
(*c*) is easily attacked by aqueous solution
(*d*) has specific gravity 3 to 3.3
(*e*) All of these.

10.10. Common glass (bottle glass) used for medicine bottles is a mixture of
(*a*) sodium silicate (*b*) calcium silicate
(*c*) iron silicate (*d*) All of these.

10.11. Chalk, potassium carbonate (K_2CO_3) and clean sand are the raw materials required for the manufacture of
(*a*) soda lime glass (*b*) potash-lime glass
(*c*) potash-lead glass (*d*) common glass

10.12. For the manufacture of potash-lead glass which one of the following is required as a raw material?
(*a*) Litharge (lead monoxide)
(*b*) Lead sesquioxide
(*c*) potassium carbonte
(*d*) Pure sand
(*e*) All of these are required.

10.13. The cullet used as a raw material for glass manufacture
(*a*) is waste glass or pieces of broken glass.
(*b*) increases the fusibility of glass.
(*c*) prevents loss of alkali by volatisation
(*d*) reduces the cost
(*e*) All of these.

10.14. Pick up the correct statement from the following:
(*a*) The ferrous oxide as a trace in raw material imparts a green colour to glass.
(*b*) The ferric oxide imparts vary high yellow tint to glass
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*).

10.15. Which one of the following is permitted a decolouriser to be added in glass during manufacturing process?
(*a*) Antimony oxide (Sb_2O_3)
(*b*) Arsenic oxide (AS_2O_3)
(*c*) Cobalt oxide (CoO)
(*d*) Manganese dioxide (MnO_2)
(*e*) Nickel oxide (NiO)
(*f*) All of these.

10.16. Pick up the correct statement from the following:
(*a*) The glass may be cut into required sizes with the help of a diamond
(*b*) The glass is made opaque *i.e.,* impervious to light by grinding its surface with emery
(*c*) The process of silvering glass surface is done by applying a very thin coat of tin duly protected by suitable paint for the protection against atmospheric effects.
(*d*) All of these are correct.

10.17. Which one of the following statements is correct?
(*a*) Bullet proof glass consists of layers of plate glass and alternate layers of vinyl-resins plastic.
(*b*) Fibre glass is composed of minute glass rods which are soft to touch and flexible in nature
(*c*) Fibre glass does not absorb water and is resistive to fire, vermins and acids.
(*d*) All of these

10.18. Form glass:
(*a*) is prepared with finely ground glass and carbon thoroughly mixed and the mixture is melted in a furnace.
(*b*) becomes black foam during melting due to mixture expansion
(*c*) as a black foam contains more than 350 million inert air cells per m^3.
(*d*) is fire-proof, rigid and excellent heat insulator.
(*e*) All of these.

10.19. For preparing acid resistant cement which one of the following types of glass is used:
(*a*) Soluble glass (*b*) Heat-excluding glass
(*c*) Shielding glass (*d*) Structural glass

10.20. Glass bricks are widely used for
(*a*) Pavement lights (*b*) Partition walls
(*c*) Lantern lights (*d*) All of these.

11. STEEL

11.1. Which one of the following statement is correct?
(*a*) The cast iron contains carbon 2 to 4 percent.
(*b*) The wrought iron contains carbon up to 0.15 percent
(*c*) The steel contains carbon varying from 0.25 percent to1.5 percent.
(*d*) All of these are correct.

11.2. Pick up the correct statement from the following:
(*a*) In steel there is no free graphite in its composition.
(*b*) In cast iron, there is a presence of free graphite in its composition.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

11.3. The hardness and toughness of steel increases with an increase of carbon content up to a maximum level of
(*a*) 1.1 percent (*b*) 1.2 percent
(*c*) 1.3 percent (*d*) 1.5 percent

11.4. Which one of the following types of iron is equally strong in compression as well as in tension?
(*a*) The cast-iron (*b*) The wrought iron
(*c*) The steel (*d*) All of these.

11.5. A drop of nitric acid when placed on which of the following irons, produces a dark grey stain?
(*a*) Steel (*b*) Cast iron
(*c*) Wrought iron (*d*) None of these.

11.6. The mild steel and wrought iron can be easily distinguished by
(*a*) nitric acid test (*b*) hydrochloric acid test
(*c*) sulphuric acid test (*d*) none of these.

11.7. The Bessemer process of manufacturing steel:
(*a*) was invented by Sir Henry Bessemer of England
(*b*) uses the acidic lining material of converter when iron ores are free from or containing a small amount of sulphur and phosphorus.
(*c*) uses the basic lining materials for pig-iron containing impurities.
(*d*) All of these

11.8. The correct order of oxidation of pig iron impurities is:
(*a*) Silicon, carbon, maganese, sulphur, phosphorus
(*b*) Carbon, maganese, sulphur, phosphorus, silicon
(*c*) Maganese, sulphur, phosphorus, carbon, silicon
(*d*) Sulphur, phosphorus, silicon, carbon, maganese
(*e*) Phosphorus, silicon, carbon, maganese, sulphur

11.9. In the cementation process of manufacturing steel:
(*a*) Pig-iron is converted to almost pure wrought-iron
(*b*) Carbon content is adjusted to prepare steel
(*c*) A dome-shaped furnace is used which is known as cementation furnace

(*d*) The wrought-iron combines with carbon and steel of the desired composition.
(*e*) All of these.

11.10. The steel obtained by cementation process:
(*a*) is costly and not practically adopted now-a-days
(*b*) is covered with blisters and thin bubbles
(*c*) is not homogeneous and is full of cavities and fissures
(*d*) All of these.

11.11. The crucible steel process:
(*a*) is adopted to produce small quantity of high carbon steel
(*b*) uses the fragments of blister steel or short bars of wrought iron mixed with charcoal.
(*c*) uses the molten iron and pours in suitable moulds.
(*d*) produces a hard and uniform steel in quality
(*e*) All of these.

11.12. Duplex process of preparing steel:
(*a*) makes use of both the acid Bessemer process and basic open-hearth process.
(*b*) is an economical method
(*c*) saves considerable time
(*d*) All of these.

11.13. The open-hearth furnace is used in manufacturing process of steel due to:
(*a*) The content of phosphorus in its basic slag is used as good fertilizer.
(*b*) great economy achievable by providing regenerative chambers on its either side.
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

11.14. Based on the carbon content, steel is designated as
(*a*) Mild steel (*b*) Medium carbon steel
(*c*) High carbon steel (*d*) All of these.

11.15. Dead steel (or very low carbon steel) contains carbon less than
(*a*) 0.10 percent (*b*) 0.08 percent
(*c*) 0.15 percent (*d*) None of these.

11.16. The steel containing carbon between 0.25 to 0.60 percent is classified as
(*a*) Low carbon steel (*b*) Medium carbon steel
(*c*) High carbon steel (*d*) None of these

11.17. The high carbon steel
(*a*) is popularly known as *hard steel*
(*b*) contains carbon between 0.60 to1.10 percent
(*c*) both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

11.18. The carbon content in steel increases :
(*a*) the hardness of steel
(*b*) the strength of steel
(*c*) the ductility of steel
(*d*) all of these.

11.19. The mild steel is widely used, having carbon content:
(*a*) 0.10 to 0.20 percent (*b*) 0.10 to 0.25 percent
(*c*) 0.10 to 0.30 percent (*d*) 0.20 to 0.30 percent

11.20. The usual impurity of steel is
(*a*) Silicon (*b*) sulphur
(*c*) phosphorus (*d*) manganese
(*e*) All of these

11.21. Pick up the correct statement from the following:
(*a*) The silicon content between 0.30 to 0.40 percent in steel increases the elasticity and strength of steel without any reduction in its ductility.
(*b*) The sulphur content between 0.02 to 0.10 in steel does not affect the ductility or strength but it decreases both melleability and weldability of hot steel.
(*c*) The excess of sulphur decreases the strength and ductility of steel
(*d*) The phosphorus content exceeding 0.12 percent reduces shock resistance, ductility and strength of steel
(*e*) All of these.

11.22. The steel loses its structural value if the maganese content exceeds:
(*a*) 1.20 percent (*b*) 1.50 percent
(*c*) 1.75 percent (*d*) 2.00 percent.

12. THE CEMENT CONCRETE

12.1. Which one of the following is an ingredient of concrete:
(*a*) cement (*b*) water
(*c*) fine aggregate (sand)
(*d*) coarse aggregate (small crushed)
(*e*) All of these.

12.2. Which one of the following statements is correct?
(*a*) Concrete is a building material obtained by mixing together in definite proportions of cement, water, fine aggregate and coarse aggrey
(*b*) Fresh concrete mixture when placed informs and properly cured becomes hard like stone.
(*c*) Cement concrete becomes stronger with age.
(*d*) Concrete mixture, use aggregates as inert material
(*e*) All of these.

12.3. Pick up the correct statement from the following:
(*a*) Concrete has high compressive strength
(*b*) Concrete has very low tensile strength
(*c*) Concrete strengthened by steel is called reinforced cement concrete (RCC)
(*d*) Concrete without reinforcement is known as plain cement concrete
(*e*) All of these are correct

12.4. Which one of the following constitutes the concreting operation?
(*a*) storing of materials and batching of materials
(*b*) mixing of concrete and transporting of concrete
(*c*) placing of concrete and compaction of concrete
(*d*) finishing of concrete and curing of concrete
(*e*) All of these are concreting operations

12.5. Pick up the correct statement from the following:

(*a*) A freshly mixed ingredients of concrete is called plastic or fresh concrete.
(*b*) After setting, the fresh concrete takes the shape of the mould and becomes hard like stone
(*c*) The properties of concrete are affected by the quantity and quality of cement, water and aggregates when mixed together
(*d*) In plastic state the concrete should be workable and free from segregation and bleeding.
(*e*) All of these are correct.

12.6. Pick up the in-correct statement from the following:
(*a*) Separation of course aggregates particles in freshly mixed concrete is known as *segregation*
(*b*) Separation of water from a freshly mixed mass concrete is known as *bleeding*.
(*c*) Segregation and bleeding result in a strong quality concrete
(*d*) Hardened concrete should be strong, durable and impermeable.

12.7. Which one of the following statements is correct?
(*a*) The concrete possesses high compressive strength and is not subjected to corrosive and weathering effect.
(*b*) The concrete and steel forms a very good combination because their coefficients of expansion are nearly equal.
(*c*) Construction of all types of structures including earthquake resistant by reinforcing it with steel.
(*d*) Concrete gains strength with age and proves to be economical.
(*e*) All of these.

12.8. Pick up the correct statement from the following
(*a*) Concrete has low tensile strength and easily develops cracks.
(*b*) Concrete expands and contracts with a change in temperature
(*c*) Creep develops in concrete under sustained loads.
(*d*) All of these are correct.

13. CEMENT

13.1. Which one of the following raw materials is/are required for manufacturing of Portland cement?
(*a*) Calcarisus materials(lime, stone or chalk)
(*b*) Argillaceous materials(shale or clay)
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

13.2. Which one of the following steps required in the process of manufacture of cement.
(*a*) Grinding of the required raw materials
(*b*) Mixing of the ground raw materials in certain proportions
(*c*) Burning the mixture of the ground raw materials in a kiln at 1300°C to1500°C to obtain modular shaped clinkers.
(*d*) Cooling of the clinkers before grinding them to fine powder
(*e*) Adding about 2% to 3% of gypsum.
(*f*) All of these are correct.

13.3. In wet process of preparation of cement, which one of the following is important step?
(*a*) The lime stone brought from the quarries is crushed to smaller fragments
(*b*) The small fragments of lime is mixed with clay or shale in a tube mill and ground to fine consistency of slurry with addition of water.
(*c*) The liquid slurry of creamy consistency with water content of about 35 to 50%, crushed to the fineness of IS sieve no. 9.
(*d*) The slurry is pumped to slurry tanks where it is kept in agitated condition by a suitable arrangement
(*e*) All of these are correct.

13.4. Which one of the following statements is correct regarding the rotary kiln used in the preparation of cement?
(*a*) The rotary kiln is a thick steel cylinder of diameter between 3 to 8 m.
(*b*) The rotary kiln is lined with refractory materials and is mounted on roller bearings for rotating its own axis with specified speed.
(*c*) The rotary kiln may be 30 to 20 m in length
(*d*) The rotation of the rotary kiln causes the flakes formed in the upper end of kiln to move towards the lower end
(*e*) All of these.

13.5. The rotary kiln of cement preparation mill:
(*a*) is fired from the lower end
(*b*) uses either a powdered coal, oil or natural gas as fuel
(*c*) makes the dry material to a series of chemical reactions till it reaches the hottest part of the kiln at a temperature of 1500°C, where lime, silica and alumina recombine.
(*d*) produces clinkers of size 3 to 20 mm and thereafter they get collected into a rotary cooler for cooling
(*e*) All of these.

13.6. A ball mill :
(*a*) is used to grind the cooled clinkers with addition of 2 to 3 percent of Gypsum to help to prevent flash setting of the cement.
(*b*) consists of several compartments charged with smaller hardened steel bolts.
(*c*) supplies begged cement to be sent to project site.
(*d*) All of these.

13.7. Which one of the following raw materials is used for the manufacturing cement.
(*a*) lime (*b*) silica
(*c*) alumina (*d*) iron oxide
(*e*) All of these.

13.8. Which one of the following Bogue's compounds is regarded as the major compound?
(*a*) Tricalcium silicate ($3CaO \cdot SiO_2$).... C_3S
(*b*) Dicalcium silicate ($2CaO \cdot SiO_2$).... C_2S
(*c*) Tricalcium aluminate ($3CaO \cdot Al_2O_3$).... C_3A
(*d*) Tetracalcium aluminate ($4CaO.Al_2O_3.FeO_3$) ... C_4A
(*e*) All of these

13.9. Tricalcium Silicate and Dicalcium compounds provide:
(*a*) strength (*b*) early strength
(*c*) late strength (*d*) All of these.

13.10. Pick up the correct statement from the following
(*a*) An increase in lime content beyond a specified limit remains a free lime in clinkers and causes unsoundness in cement.
(*b*) An increase in silica content at the cost of alumina and fericoxide makes cement difficult to fuse and form clinkers.
(*c*) High content of alumina and high feric-oxide are favourable to the production of high early strengths in cement.
(*d*) The high alumina content and high feric-oxide content help to combine the entire quantity of lime present in tri-calcium silicate.
(*e*) All of these.

13.11. Match List I with List II and ascertain which one of the following is/are correct

List I (Torneb Ohm's mineral)	List II (Bouge's compound)
(*a*) Alite	1. C_3S
(*b*) Belite	2. C_2S
(*c*) Celite	3. C_3A
(*d*) Felite	4. C_4AF

(*e*) All of these are correct

13.12. Study the following statements carefully
1. The cement and water react exothermically
2. The cement and water reaction liberates huge quantity of heat
3. The heat produced by the reaction of cement and water is called heat of hydration.

Out of these statements, the following are correct
(*a*) 1 and 2 (*b*) 2 and 3
(*c*) 1 and 3 (*d*) 1, 2 and 3

13.13. Pick up the correct statement from the following
(*a*) During the hydration reaction of C_3S and C_2S with water the calcium silicate hydrates and calcium hydro-oxide get formed.
(*b*) In hydraulic structures the cement containing higher percent of C_2S is used to ensure the concrete free from pores
(*c*) Cement with more C_3S content is useful in cold weather concreting.
(*d*) C_2S is responsible for later strength of concrete.
(*e*) All of these.

13.14. Higher resistance to the attack of sulphates in the concrete is due to the presence of
(*a*) C_4AF (*b*) C_3A
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*).

13.15. Which one of the following statements is correct?
(*a*) C_3S requires 24% of water by weight of cement for hydration
(*b*) C_2S requires 21% of water by weight of cement for hydration
(*c*) Portland cement requires 23% of water for hydration
(*d*) All of these are correct.

13.16. A porous concrete mass is obtained if the water cement ratio in the mixture is
(*a*) less than 0.7 (*b*) equal to 0.7
(*c*) more than 0.7 (*d*) None of these.

13.17. Rapid hardening cement:
(*a*) is similar to the ordinary Portland cement
(*b*) develops higher rate of strength
(*c*) develops strength after 3 days as get developed by ordinary Portland cement after 7 days.
(*d*) attains rapid strength due to higher fineness of grinding and higher proportion of C_3S but lower C_2S content
(*e*) All of these.

13.18. Extra rapid hardening cement:
(*a*) is obtained by inter-grinding calcium chloride with rapid hardening Portland cement
(*b*) need not contain calcium chloride exceeding 2 percent by weight of rapid hardening cement.
(*c*) used in concrete be transported, placed, compacted and finished in less than 20 minutes.
(*d*) gets detereorated after a month
(*e*) All of these.

13.19. The strength of extra rapid hardening cement may be the same as that of the ordinary Portland cement after:
(*a*) 45 days (*b*) 60 days
(*c*) 90 days (*d*) 120 days

13.20. In which of the following, the use of extra rapid hardening cement is prohibited
(*a*) pre-stressed concrete construction
(*b*) reinforced concrete construction
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

13.21. The sulphate resisting cement contains:
(*a*) low C_3A content (*b*) low C_4AF
(*c*) high silicate content
(*d*) C_3A content upto 5 percent
(*e*) All of these.

13.22. Which one of the following cements is recommended for the construction of sewage treatment work?
(*a*) Extra rapid hardening cement
(*b*) Rapid hardening cement
(*c*) Ordinary Portland cement
(*d*) Sulphate resisting cement

13.23. Which one of the following properties of Portland blast furnace cement does not match with that of the ordinary Portland cements?
(*a*) Fineness (*b*) setting time
(*c*) soundness (*d*) strength
(*e*) rate of hardening

13.24. Quick setting cement

(*a*) is obtained by reducing the Gypsum content at the time of clinker grinding
(*b*) requires mixing, placing and compaction in less time
(*c*) is mostly used under water construction
(*d*) may be preferred for typical grouting operation
(*e*) All of these.

13.25. Super-sulphate cement
(*a*) is manufactured by grinding together 80 to 85 granulated slag,10 to15 percent hard burnt-gypsum and 5 percent Portland cement
(*b*) is specifically recommended for use in foundations.
(*c*) is used in the marine work
(*d*) requires the water cement ratio more than 0.5
(*e*) All of these.

13.26. Low heat cement
(*a*) is used for mass concrete construction such as dams.
(*b*) is obtained by reducing the contents of C_3S and C_3A responsible for evolving the maximum heat of hydration
(*c*) uses more C_2S content
(*d*) has a slow rate of gaining strength
(*e*) All of these.

13.27. Portland Pozzolan cement
(a) possesses compressive strength not less than 220 kg/cm^2 at 7 days
(*b*) possesses compressive strength not less than 310 kg/cm^2
(*c*) is useful in marine and hydraulic structures
(*d*) All of these.

13.28. Air-entraining cement:
(*a*) is made by mixing a small amount of an air entraining agent with ordinary cement clinker during grinding
(*b*) may contain Alkali salts of wood resins
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

13.29. High strength cement is specially required for the following job:
(*a*) Pre-stresses concrete (*b*) Pre cast concrete
(*c*) Air field runways (*d*) All of these.

13.30. Pick up the correct statement from the following:
(*a*) High Alumina cement possesses very high rate of strength development
(*b*) High Alumina cement concrete should not be made with water-cement ratio exceeding 0.5.
(*c*) High Alumina cement concrete with low water cement ratio resists the sulphate attack.
(*d*) All of these.

13.31. Fineness of cement affects:
(*a*) the rate of hydration
(*b*) the rate of gain of strength
(*c*) the rate of evolution of heat
(*d*) All of these

13.32. Pick up the correct statement from the following:
(*a*) Fine grinding of cement makes it susceptible to air-set and early deteoration.
(*b*) The average size of cement particles is taken about10 microns
(*c*) An increase in fineness of cement increases the drying shrinkage of concrete
(*d*) All of these.

13.33. After sieving the residue by weight on IS test sieve no. 9 not to exceed for:
(*a*) Ordinary Portland cement10 percent
(*b*) Rapid hardening cement 5 percent
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

13.34. The standard consistency test is not required to find:
(*a*) initial setting time (*b*) final setting time
(*c*) soundness of cement
(*d*) fineness of cement

13.35. The standard consistency of a cement paste is the consistency which will permit a Vicat Plunger (10 mm diameter, 500 mm length) to penetrate from the top of the mould to a depth of
(*a*) 20 to 25 mm (*b*) 25 to 30 mm
(*c*) 30 to 33 mm (*d*) 33 to 35 mm

13.36. The initial setting time for ordinary Portland cement should not be less than
(*a*) 20 minutes (*b*) 25 minutes
(*c*) 30 minutes (*d*) 35 minutes

13.37. The final setting time for ordinary Portland cement should be more than
(*a*) 600 minutes (*b*) 570 minutes
(*c*) 540 minutes (*d*) 500 minutes

13.38. For obtaining a cement paste of standard consistency the water quantity is required by weight
(*a*) 0.85 times of the sample
(*b*) 0.75 times of the sample
(*c*) 0.80 times of the sample
(*d*) 0.60 times of the sample.

13.39. The temperature of water and the test room at the time of gauging shall be within
(*a*) 20° $\pm$ 2C (*b*) 22° $\pm$ 2C
(*c*) 25° $\pm$ 2C (*d*) 27° $\pm$ 2C

13.40. The cement shall be considered as finally set when the centre needle of the circular attachment of the Vicat apparatus makes an empression whereas the circular cutting edge of the attachment fails to do so and the centre needle does not piece through the cement paste more than:
(*a*) 0.10 mm (*b*) 0.20 mm
(*c*) 0.25 mm (*d*) 0.5 mm

13.41. The strength of the test of cement:
(*a*) is ascertained on cement sand mortar
(*b*) is carried out with a cement to standard ratio1:3
(*c*) is formed with water of quantity P/4 + 3.5 per cent of combined weight of cement and sand.
(*d*) cubes of face area 50 cm^2
(*e*) All of these.

13.42. The compressive strength of Ordinary Portland cement after 3 days shall not be less than
(*a*) 160 kg/cm^2 (*b*) 225 kg/cm^2
(*c*) 100 kg/cm^2 (*d*) none of these.

13.43. The soundness of cement is due to:
(*a*) an excess of lime
(*b*) high proportion of magnisium
(*c*) high proportion of sulphate content
(*d*) All of these.

13.44. In a sound cement the magnese content in cement is limited to
(*a*) 3 percent (*b*) 4 percent
(*c*) 5 percent (*d*) 6 percent

13.45. The split cylinder of spring brass of the Le-Chetlier apparatus is:
(*a*) 30 mm in diameter and 30 mm high
(*b*) 35 mm in diameter and 30 mm high
(*c*) 25 mm in diameter and 25 mm high
(*d*) 30 mm in diameter and 25 mm high

13.46. On either side of the Le Chatlier apparatus split two indicators are attached with pointed ends, whose length is kept:
(*a*) 135 mm (*b*) 145 mm
(*c*) 155 mm (*d*) 165 mm

13.47. The quantity of water required for gauging cement for testing cement soundness is taken
(*a*) 0.55 P (*b*) 0.65 P
(*c*) 0.73 P (*d*) 0.78 P

13.48. For testing the soundness of cement the difference of two measurements of the apparatus indicators one before the test and the second after keeping to the mould filled with test sample for 24 hours at temperature 27 to 32°C not to exceed:
(*a*) 6 mm (*b*) 8 mm
(*c*) 12 mm (*d*) 10 mm

13.49. The Le-Chetlier test finds the defects of unsoundness of cement due to:
(*a*) Free lime (*b*) Free magnesium
(*c*) Free gypsum (*d*) None of these.

13.50. The expansion of the cement specimen 25 × 25 mm after placing in a standard auto clave not to exceed 0.5 percent in case of:
(*a*) Ordinary Portland cement
(*b*) Rapid hardening cement
(*c*) Low heat cement (*d*) All of these

13.51. Pick up the correct statement from the following:
(*a*) About120 calories of heat is generated in the hydration of 1 gm of cement.
(*b*) The expansion of the dam body is caused due to unduly high temperature developed in the interior.
(*c*) Due to cement hydration, a considerable quantity of heat is literated.
(*d*) All of these.

14. AGGREGATES IN CONCRETE

14.1. Aggregate are important constituents of concrete to provide :
(*a*) a solid body
(*b*) reduction in the shrinkage
(*c*) an economy in concrete formation
(*d*) All of these.

14.2. Concrete aggregates are classified as:
(*a*) Normal weight aggregates
(*b*) Light weight aggregates
(*c*) Heavy weight aggregates
(*d*) All of these.

14.3. Concrete aggregates are obtained from
(*a*) igneous rocks (*b*) sedimentary works
(*c*) metamorphic rocks (*d*) All of these.

14.4. Which one of the following qualities of igneous rocks makes highly satisfactory concrete aggregates?
(*a*) hardness (*b*) toughness
(*c*) density (*d*) All of these

14.5. The weathering agencies the sun, the rain and wind are responsible for which one of the following actions?
(*a*) decomposition of rocks
(*b*) fragmentation of rocks
(*c*) transportation of fragments
(*d*) to deposite the transportation materials
(*e*) All of these.

14.6. The cementing material in sedimentary rock is:
(*a*) Carbonaceous in nature
(*b*) Siliceous in nature
(*c*) Argillaceous in nature
(*d*) All of these.

14.7. Pick up the correct statement from the following:
(*a*) Some siliceous sand stones prove to be good aggregates
(*b*) Lime stones may yield good concrete aggregates
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

14.8. Which one of the following factors decides the suitability of sedimentary rock as concrete aggregates?
(*a*) The degree of consolidation
(*b*) The degree of cementation
(*c*) The thickness of layers
(*d*) The contamination (*e*) All of these.

14.9. Pick up the correct statement from the following
(*a*) Sedimentary rocks yield flaky aggregates
(*b*) Metamorphic rocks show foliated structure
(*c*) Both quartzite and gneiss belong to metamorphic rocks and prove to be good concrete aggregates.
(*d*) Good aggregates from good parent rocks make good concrete.
(*e*) All of these.

14.10. Using the largest possible maximum size of aggregates (80 mm) results :
(*a*) in reduction of cement content

(*b*) in reduction of water requirement
(*c*) in reduction of drying shrinkage
(*d*) All of these.

14.11. The maximum size of aggregates to be used is decided by which of the following conditions?
(*a*) thickness of the structural section
(*b*) spacing of the reinforcement
(*c*) clear cover of the section
(*d*) mixing, handling and placing techniques
(*e*) All of these are correct.

14.12. Pick up the correct statement from the following
(*a*) Rounded aggregates for a given water cement ratio provides economy
(*b*) Angular aggregates for a given water cement ratio requires additional cement but provides high strength, greater durability and higher bond characteristics
(*c*) Flat particles in concrete aggregates influence on the workability, cement requirement, strength and durability
(*d*) All of these.

14.13. Pick up the correct statement from the following:
(*a*) Angularity number based on the percentage voids in aggregates after compaction in a metal cylinder of 3 litre capacity.
(*b*) The angularity of aggregates having 33 percent void is considered zero.
(*c*) The angularity of aggregates having 44 percent void is considered11.
(*d*) All of these are correct.

14.14. If f_H is the angularity number of aggregate, then angularity index f_A is given by:
(*a*) $\frac{3f_H}{20}+1.0$ (*b*) $\frac{2f_H}{15}+1.0$
(*c*) $\frac{4f_H}{20}+1.0$ (*d*) $\frac{5f_H}{15}+1.0$

14.15. At which water cement ratio, the strength of concrete made with angular aggregates or rounded aggregates is same?
(*a*) 0.55 (*b*) 0.60
(*c*) 0.65 (*d*) 0.68

14.16. On which factor from the following, the surface texture of aggregate is decided?
(*a*) Hardness (*b*) Grain size
(*c*) Pore structures
(*d*) Structure of the basic rock
(*e*) All of these

14.17. A smooth surface of aggregates:
(*a*) decreases the contact area
(*b*) provides less bonding area
(*c*) requires a thinner layer of paste for lubrication for the movement with respect of other aggregate particles.
(*d*) All of these.

14.18. Pick up the correct statement from the following:
(*a*) The percentage of crushed material to finer than 2.36 in a cylindrical mould under 40 tonnes is called as aggregate crushing value.
(*b*) The crushing value of aggregate for concrete used for roads and pavements is restricted to 30 percentage.
(*c*) The crushing value of aggregate for civil structures other than road and pavement, is restricted to 45 percent.
(*d*) All of these.

14.19. The impact value of aggregate used for concrete not to exceed 30 percent in the following structures:
(*a*) Runways (*b*) Roads
(*c*) Pavements (*d*) All of these.

14.20. The modulus of elasticity of aggregates influences the concrete property
(*a*) Shrinkage (*b*) Elastic behaviour
(*c*) Creep (*d*) All of these.

14.21. The relation of the modulus of elasticity of aggregates to that of the resulting concrete is:
(*a*) linear (*b*) parabolic
(*c*) cubic parabolic (*d*) exponential

14.22. The higher the bulk density.
(*a*) lower the void content
(*b*) higher the void content
(*c*) both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*).

14.23. Bulking of fine sand:
(*a*) increases with the increase of moisture to a certain limit
(*b*) becomes zero at the saturated point of the fine sand
(*c*) decreases with the increase of moisture for a certain limit
(*d*) All of these are correct.

14.24. If the height of moist fine sand in a measuring cylinder is10.5 cm and the height reduces when it is completely inundated to 8.2 cm, the percentage of bulking is:
(*a*) 25% (*b*) 26%
(*c*) 27% (*d*) 28%

14.25. Pick up the correct statement from the following:
(*a*) Aggregate comprises about 85% of volume of mass concrete
(*b*) Aggregate comprises about 55 percent of the volume of motor
(*c*) Mortar contains aggregate of size 4.75 mm
(*d*) Concrete contains aggregate of size150 mm
(*e*) All of these are correct

14.26. A well-graded aggregate in concrete requires:
(*a*) less quantity of cement
(*b*) less quantity of water
(*c*) Both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

14.27. A well graded aggregate in concrete provides
(*a*) increased economy (*b*) higher strength
(*c*) lower shrinkage (*d*) greater durability
(*e*) All of these.

14.28. Pick up the correct statement from the following:
(*a*) Determination of particle size distribution in a sample of aggregate is known as *Sieve analysis*.
(*b*) The aggregate fraction from 80 mm to 4.75 mm are termed as *coarse aggregates*
(*c*) The aggregate fraction from 4.75 mm to150 microns are termed as *fine aggregates*.
(*d*) All of these are correct.

14.29. The sum of the cumulative percentage of aggregate retained in successive sieves from 80 mm to150 micron divided by100 is called
(*a*) fineness of aggregate
(*b*) fineness range of aggregate
(*c*) fineness modulus
(*d*) soundness of aggregate
(*e*) None of these.

14.30. Fineness modulus range of which one of the following sands is correct
(*a*) Fine sand 2.2 to 2.6
(*b*) Medium sand 2.6 to 2.9
(*c*) Coarse sand 2.9 to 3.2
(*d*) All of these are correct.

14.31. Fineness modulus of sand for satisfactory concrete shall not to exceed
(*a*) 3.2 (*b*) 3.4
(*c*) 3.6 (*d*) 3.8

14.32. In the sieve analysis of fine aggregates the cumulative percentage weight retain is 253, the fineness modulus of the aggregate is:
(*a*) 5.06 (*b*) 2.53
(*c*) 0.253 (*d*) None of these

14.33. The specific surface of aggregate:
(*a*) is the surface area per unit weight of the aggregate
(*b*) increases with the reduction in the size of aggregate
(*c*) influences the workability of concrete mix
(*d*) All of these

14.34. In a gap-graded concrete:
(*a*) sand required will be 26 percent compared to 40 percent in continuous grading
(*b*) the specific surface area will be low due to high percentage of coarse aggregate and low percentage of fine aggregate.
(*c*) less cement and lower water, cement ratio is required
(*d*) drying shrinkage is considerably reduced.
(*e*) All of these are correct.

14.35. The flakiness index of aggregate:
(*a*) is the percentage by weight of particles in it whose least dimension (thickness) is less than $3/5^{th}$ of their mean dimension.
(*b*) test is not applicable to sizes smaller than 6.3 mm.
(*c*) is conducted by using a metal thickness gauge
(*d*) All of these are correct.

14.36. The elongation index of an aggregate:
(*a*) is the percentage by weight of particles whose greatest dimension (length) is greater than1.8 times their mean dimension
(*b*) test is not applicable to sizes smaller than 6.3 mm
(*c*) test is conducted by using a metal gauge
(*d*) All of these

14.37. If Gs = specific gravity of aggregate and γ = bulk density in kg/litre, then
(*a*) Bulk density = $\dfrac{\text{Net weight of the aggregates in kg}}{\text{Capacity of the container in litre}}$
(*b*) percentage of voids = $\dfrac{Gs-\gamma}{Gs}\times 100$
(*c*) Both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

15. FRESH CONCRETE

15.1. A workable plastic concrete should be free from:
(*a*) segregation (*b*) bleeding
(*c*) voids after hardening
(*d*) All of these

15.2. Study the following statements regarding the workability of fresh concrete
1. The extra water added to lubricate the concrete mix is not utilised in hydration and leaves voids on evaporation.
2. The concrete not fully compacted contains numerous air bubbles which create voids and decrease the strength.
3. The concrete mix with minimum volume of water to total voids provides the densest and strongest concrete.

Out of the above, which statements are correct?
(*a*) 1, 2 (*b*) 2, 3
(*c*) 1, 3 (*d*) 1, 2, 3

15.3. The workability of concrete mix depends upon:
(*a*) proportion of concrete
(*b*) amount of reinforcement
(*c*) size and shape of the formwork
(*d*) method of compaction
(*e*) All of these

15.4. Pick up the correct statement from the following:
(*a*) A workable concrete gets compacted without much effort and remains free from segregation and bleeding.
(*b*) During the compaction of concrete, the individual particles of the mix get reoriented to occupy the minimum space.
(*c*) The workability of concrete is measured by its degree of fluidity
(*d*) All of these.

15.5. Pick up the correct statement from the following
(*a*) Workability of concrete is mainly affected by its consistency
(*b*) Workability is defined as the relative plasticity of freshly mixed concrete

(*c*) The concrete of fluid consistency spreads out rapidly and allows segregation.
(*d*) The workability of concrete is improved by the use of certain admixture
(*e*) All of these.

15.6. Pick up the correct statement from the following:
(*a*) Workability increases with an increase in water content
(*b*) in a freshly mixed concrete water cement ratio causes segregation and bleeding
(*c*) Workability is primarly affected by water content
(*d*) All of these.

15.7. The maximum size of aggregate percentage depends upon
(*a*) handling of concrete
(*b*) mixing and placing equipment
(*c*) thickness of the structural section
(*d*) gravity of reinforcement
(*e*) All of these.

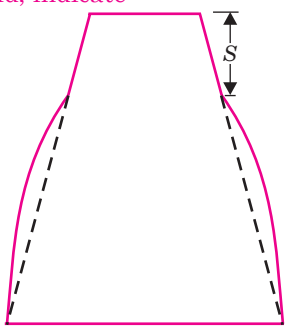
15.8. The presence of air bubbles in a freshly mix concrete.
(*a*) acts as rollers
(*b*) increases workability
(*c*) decreases bleeding and segregation
(*d*) increases the durability but decreases the strength
(*e*) All of these.

15.9. The slump test to check the consistency of a freshly mixed concrete is carried out by an apparatus in the form of a frustom of a cone, the bottom diameter is 20 cm and top diameter is10 cm and the height is:
(*a*) 15 cm (*b*) 20 cm
(*c*) 25 cm (*d*) 30 cm

15.10. The slump test of a freshly mixed concrete is recorded in terms of the specimen in:
(*a*) millimetres (*b*) centimetres
(*c*) decimetres (*d*) none of these

15.11. The shear slump of a freshly mixed concrete:
(*a*) is measured as the difference in height between the height slump mould and average value of the substance
(*b*) indicates the non-cohesiveness of the concrete
(*c*) shows the characteristics of segregation
(*d*) All of these.

15.12. The subsided concrete(s) shown in Figure after removal of the slump mould, indicate



(*a*) true slump (*b*) shear slump
(*c*) collapse slump (*d*) cohesive slump
(*e*) none of these.

15.13. Pick up the correct statement from the following
(*a*) A good concrete has all ingredients properly distributed in homogenous mixture
(*b*) The concrete having the tendency to segregate produces undesirable properties in the hardend concrete
(*c*) Concrete with higher compaction factor has low workability.
(*d*) All of these

15.14. The segregation in the concrete takes place in the following sequencial steps
(*a*) Separation of the coarse aggregate separation of matrix from the course aggregate water separation from the rest of the material.
(*b*) Water separation from the rest of material separation of matrix from the coarse aggregates separation of the coarse aggregate.
(*c*) Separation of the matrix from the coarse aggregates separation of coarse aggregates separation of water from the rest of the material.
(*d*) None of these.

15.15. To have a cohesive mix concrete which one of the following parameters is essential.
(*a*) Grading of aggregates
(*b*) Surface texture of the aggregates
(*c*) Size and shape of aggregates
(*d*) Optimum quantity of water
(*e*) All of these.

15.16. The cohesive and fatty matrix.
(*a*) do not allow the aggregates to fall apart
(*b*) remains sufficiently contained in aggregates
(*c*) do not allow water to escape easily through rest of the ingredient.
(*d*) All of these.

15.17. Which one of the following activities is responsible for segregation in concrete?
(*a*) Badly proportioned mix having insufficient matrix to bind the aggregates.
(*b*) Insufficiently mixed concrete with excess water contact
(*c*) Dropping of the concrete from height
(*d*) All of these.

15.18. Compaction of concrete by vibrators.
(*a*) is adopted for a comparatively hard mix.
(*b*) is continued for the required time for optimum results.
(*c*) results in segregation if it is resorted to in too wet mix
(*d*) All of these.

15.19. Pick up the correct statement from the following
(*a*) Separation of water from the concrete mix to the surface is called bleeding

(*b*) Bleeding generally takes place in a highly wet mix and badly proportioned.
(*c*) The formation of the cement paste at the surface is called laitance.
(*d*) The top surface of the roof slab or road slabs, devoid of aggregate matter develops high strindy cracks
(*e*) All of these.

15.20. Bleeding channels in concrete remain continuous if the water cement ratio used is:
(*a*) more than 0.7 (*b*) equal to 0.7
(*c*) less than 0.7 (*d*) None of these.

15.21. Bleeding rate:
(*a*) increases with time upto 60 minutes
(*b*) decreases after about one hour
(*c*) continuous till initial time of the cement
(*d*) continuous till final setting time of cement.
(*e*) All of these.

15.22. Pick up the correct statement from the following
(*a*) For quality control, the concrete ingredients must be measured by weight only
(*b*) Cement in concrete manufacturing process is always measured by weight.
(*c*) The volume of one bag cement is taken as 35 litres.
(*d*) The volume of the gauge box is kept equal to the volume of one bag of cement (35 litres)
(*e*) All of these.

15.23. A1:2:4 (M150) concrete mix contains:
(*a*) 50 kg of cement (*b*) 70 litres of sand
(*c*) 140 litres of coarse aggregate
(*d*) All of these.

15.24. For a1:3:6 (M100) concrete requires:
(*a*) 50 kg of cement (*b*) 105 litres of sand
(*c*) 210 litres of coarse aggregate
(*d*) All of these.

15.25. The quantity of water required in the concrete mix is a product of water-cement ratio and
(*a*) the weight of cement
(*b*) twice the weight of cement
(*c*) the weight of fine aggregate
(*d*) half of the weight of fine aggregate

15.26. Pick up the correct statement from the following:
(*a*) Hand mixing is done over an impervious concrete or brick floor
(*b*) a layer of course aggregate is first spread out on the floor followed by the layer of fine aggregates
(*c*) the cement is spread on the top of fine aggregate
(*d*) dry mixing is done by a shovel
(*e*) All of these are correct.

15.27. Which one of the following statements is correct?
(*a*) Continuous concrete mixers are used in large works
(*b*) Batch concrete mixers are used in normal concrete work
(*c*) Drum type mixers are available as tilting/non-tilting type
(*d*) All of these are correct.

15.28. Which one of the following statements is correct?
(*a*) For1:2:4 mix the ideal mixer is of 200 litre capacity
(*b*) For1:3:6 mix the ideal mixer is of 280 litre capacity
(*c*) Both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*)

15.29. Pick up the correct statement from the following
(*a*) Concrete gains its strength by the hydration of cement particles
(*b*) Immediately after adding water to cement hydration of cement starts and the process continues for a long time
(*c*) The rate of hydration of cement is fast to start with and continuous over a long time at a decreasing rate.
(*d*) For hydration of cement, a water-cement ratio of 0.23 is needed.
(*e*) All of these.

15.30. Curing the concrete:
(*a*) provides a favourable environment during early period for hydration.
(*b*) ensures a suitable temperature and ample moisture.
(*c*) has gained great importance due to the demand of high quality concrete in multi-storeyed buildings.
(*d*) All of these are correct.

15.31. Pick up the correct statement from the following:
(*a*) While hydrating the concrete a great heat of hydration is liberated.
(*b*) the heat of hydration gets removed by a thorough water curing
(*c*) Both (*a*) and (*b*)
(*d*) Neither (*a*) nor (*b*)

15.32. Water curing is the best method of curing as it satisfies
(*a*) promotion of hydration
(*b*) elemination of shrinkage
(*c*) absorption of heat of hydration
(*d*) All of these.

15.33. Which one the following methods of curing is correct?
(*a*) The precasting concrete items are normally immersed in curing tanks for a certain period.
(*b*) The roof slabs are covered under water by making small ponds
(*c*) The vertical retaining walls or concrete columns are covered by spraying water.
(*d*) The vertical surfaces are wrapped with wet gunny bags
(*e*) All of these are correct.

15.34. The most important and useful property of concrete from the following is:
(*a*) the compressive strength
(*b*) the tensile strength
(*c*) the shear strength (*d*) none of these

15.35. For a given cement and acceptable aggregates, the strength developed in the concrete is influenced by
(*a*) ratio of cement to mixing water
(*b*) ratio of cement to aggregates

(*c*) grading, surface texture, shape and strength of aggregates particles
(*d*) maximum size of aggregate
(*e*) All of these are correct.

15.36. Pick up the correct statement from the following:
(*a*) strength of concrete depends upon the strength of cement paste
(*b*) strength of cement paste increases with cement content
(*c*) strength of cement paste decreases with air and water content
(*d*) strength of workable concrete depends upon water cement ratio
(*e*) all of these.

15.37. The strength of concrete is assumed a full strength after
(*a*) 7 days (*b*) 14 days
(*c*) 21 days (*d*) 28 days

15.38. Pick up the correct statement from the following:
(*a*) The air entrained concrete is made by mixing a small quantity of air entraining agent.
(*b*) The quantity of air reaches its peak at fineness moduls (FM) of sand of 2.5
(*c*) The amount of air entrainment decreases as the temperature of concrete increases.
(*d*) All of these are correct.

15.39. Which one of the following materials reduces the amount of air entrains in concrete?
(*a*) the fly ash (*b*) Calcium chloride
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*)

15.40. Which one of the following statement is correct?
(*a*) Pozzolanic materials possess no cementitious value
(*b*) Pozzolanic materials in finely divided form and in the presence of moisture, chemically reacts with calcium hydroxide librated on hydration from compounds possessing cementitious properties.
(*c*) The calcium hydroxide produced on hydration of tricalcium silicate and dicalcium silicate has no cementitious value.
(*d*) Amorphous silicate reacts much more rapidly than its crystalline form
(*e*) All of these.

15.41. Which one of the following pozzolanic materials is not a natural pozzolana?
(*a*) Clay and shales (*b*) opaline shale
(*c*) fly ash (*d*) diatomaceous earth
(*e*) Volcanic tuffs and pumicites

15.42. The chemical composition of pozzolana contains
(*a*) Silica + Alumina + Iron oxide not less than 70%
(*b*) Silica not more than 40%
(*c*) Water soluble alkali not more than 0.1%
(*d*) Calcium oxide not more than10%
(*e*) All of these are correct.

15.43. Pick up the correct statement from the following:
(*a*) The replacement of ordinary cement by pozzolana, decreases the early strength of the concrete.
(*b*) The replacement of ordinary Portland cement by pozzolana reduces the permeability of concrete.
(*c*) At 28 days the fly ash cement concrete beams 3 times as permeable as ordinary Portland cement
(*d*) At 6 months, fly ash concrete is less than one – fourth as permeable.
(*e*) All of these are correct.

15.44. Pozzolanic admixtures:
(*a*) are used in mass concrete to achieve economy
(*b*) the heat generation and the resultant temperature rise in concrete made with pozzolanic-ordinary Portland cement is practically similar to the concrete made with low heat cement
(*c*) For the construction of multi-purpose dams, cement with pozzalanic materials is recommended.
(*d*) All of these.

15.45. Which one of the following statement is correct?
(*a*) Mortars with pozzolanic cement expand slightly more when it is continuously kept wet.
(*b*) Mortars with pozzolanic cement shrink more under continuously dry conditions.
(*c*) The high opaline pozzolana shows dry shrinkage 50 percent greater than that of pure Portland cement.
(*d*) All of these.

15.46. Pick up the correct statement from the following:
(*a*) Finely divided diatomite and other pozzolans high in opal prevents disintegration of concrete due to sulphide action
(*b*) The addition of pozzolanic material in cement converts calcium hydroxide formed during hydration into insoluble cementitious compounds.
(*c*) The improved permeability due to pozzolanic-cement improves the resistance to the sulphate attack.
(*d*) All of these.

15.47. Use of pozzolanic material in concrete.
(*a*) improves workability
(*b*) decreases both the bleeding and segregation
(*c*) reduces the cost substantially
(*d*) All of these.

15.48. Bleeding in concrete.
(*a*) makes it porous and inferior
(*b*) is more pronounced in lean mixes than in rich mix
(*c*) gets reduced considerably by using pozzolanic material
(*d*) All of these.

15.49. Which one of the following is the constituent of flyash?
(*a*) Silicon dioxide (*b*) Aluminium oxide
(*c*) Calcium oxide (*d*) Sulphur trioxide
(*e*) All of these.

15.50. Calcium chloride used as an accelator in concrete
(*a*) increases volume changes
(*b*) increase the alkaline aggregate reaction
(*c*) reduces the resistance of concrete
(*d*) All of these.

15.51. Which one of the following statements is correct?
(*a*) Additions of calcium chloride in concrete increases the durability at early age.
(*b*) Calcium chloride accelerates the time of cement setting.
(*c*) Calcium chloride does not allow corrosion of steel bars embeded in concrete if it is 0 to10 percent at the end of one year
(*d*) All of these.

15.52. The most commonly known retarder is:
(*a*) calcium sulphate (*b*) common sugar
(*c*) hydrooxylated carboxylic acids and their salts
(*d*) All of these.

15.53. Which one of the following statements is correct?
(*a*) The aluminium powder reacts with the hydroxide produced during hydration of cement to produce minute bubbles of hydrogen throughout the matrix
(*b*) Use of aluminium powder is very effective for growing under marine bases.
(*c*) At normal temperature the reaction of aluminium powder at the time of mixing may continue for1½ to 4 hours
(*d*) Aluminium powder is used as an admixture in the production of light weight concrete.
(*e*) All of these.

15.54. Which one of the following materials improves the workability of cncrete?
(*a*) Finely divided materials
(*b*) Water reducing agents
(*c*) Air-entraining agents
(*d*) All of these.

15.55. Which one of the statement is correct?
(*a*) Calcium chloride or triethamolamine, are used as accelaters to grout to hasten the set for quick plugging effect
(*b*) Gypsum is used as a retarder in grout to aid pumpability and to push grout in cracks.
(*c*) Aluminium powder is commonly used to form small bubbles of hydrogen to produce expansion of the grout.
(*d*) Flyash or bentomite clay is used to improve pumpability without increasing water.
(*e*) All of these.

16. BUILDING MATERIALS (ELEMENTARY)

16.1. The rocks formed from molten magma, are called
(*a*) sedimentary rocks (*b*) igneous rocks
(*c*) metamorphic rocks (*d*) none of these.

16.2. The rocks formed by gradual deposition, are called
(*a*) sedimentary rocks (*b*) igneous rocks
(*c*) metamorphic rocks (*d*) none of these.

16.3. Rocks formed due to alteration of original structure due to heat and excessive pressure, are called
(*a*) sedimentary rocks (*b*) igneous rocks
(*c*) metamorphic rocks (*d*) none of these.

16.4. Lime stones are generally known as
(*a*) aqueous rocks (*b*) sedimentary rocks
(*c*) stratified rocks (*d*) all the above.

16.5. Geologically, marble is known as
(*a*) sedimentary rock (*b*) igneous rock
(*c*) metamorphic rock (*d*) stratified rock.

16.6. Chemically, marble is known as
(*a*) metamorphic rock (*b*) argillaceous rock
(*c*) calcareous rock (*d*) silicious rock.

16.7. Kaolin is chemically classified as
(*a*) metamorphic rock (*b*) argillaceous rock
(*c*) calcareous rock (*d*) silicious rock.

16.8. Quartzite is a
(*a*) metamorphic rock (*b*) argillaceous rock
(*c*) calcareous rock (*d*) silicious rock.

16.9. Basalt is
(*a*) sedimentary rock (*b*) metamorphic rock
(*c*) extrusive igneous rock
(*d*) intrusive igneous rock.

16.10. Sand stone is
(*a*) sedimentary rock (*b*) metamorphic rock
(*c*) igneous rock (*d*) volcanic rock.

16.11. Lime stone is not a
(*a*) sedimentary rock (*b*) stratified rock
(*c*) aqueous rock (*d*) metamorphic rock.

16.12. Pegmatite is a/an
(*a*) intrusive igneous rock
(*b*) extrusive igneous rock
(*c*) sedimentary rock
(*d*) metamorphic rock.

16.13. Laterite is a/an
(*a*) volcanic rock (*b*) argillaceous rock
(*c*) calcareous rock (*d*) silicious rock.

16.14. Granite mainly composed of quartz and felsper particles, is obtained from
(*a*) sedimentary rocks (*b*) metamorphic rocks
(*c*) igneous rocks (*d*) all the above.

16.15. Gniess is obtained from
(*a*) igneous rocks (*b*) metamorphic rocks
(*c*) sedimentary rocks
(*d*) sedimentary-metamorphic rocks.

16.16. Dolomite is a lime stone which contains carbonate of magnesia upto
(*a*) 15% (*b*) 20%
(*c*) 25% (*d*) 35%
(*e*) 45%.

16.17. The colour of statuary marble used for sculptor's work, is
(*a*) red (*b*) blue
(*c*) white (*d*) green
(*e*) yellow.

16.18. Black marble is generally found in the district of
(*a*) Jodhpur (*b*) Jaipur
(*c*) Jabalpur (*d*) Jaisalmer
(*e*) Pune.

16.19. The rocks having alumina or clay as their major constituents, are known as
(*a*) siliceous rocks (*b*) argillaceous rocks
(*c*) calcareous rocks (*d*) sedimentary rocks
(*e*) igneous rocks.

16.20. The hardest rock is
(*a*) marble (*b*) diamond
(*c*) talc (*d*) quartz.

16.21. The softest rock is
(*a*) marble (*b*) diamond
(*c*) talc (*d*) quartz.

16.22. The specific gravity of marble, is
(*a*) 2.50 (*b*) 2.60
(*c*) 2.66 (*d*) 2.72
(*e*) 3.00.

16.23. Shingle is
(*a*) decomposed laterite
(*b*) crushed granite
(*c*) water bound pebbles
(*d*) air weathered rock.

16.24. The rock generally used for roofing, is
(*a*) granite (*b*) basalt
(*c*) slate (*d*) pumice.

16.25. Laterite is found in
(*a*) U.P. (*b*) Punjab
(*c*) West Bengal (*d*) Kerala.

16.26. Good quality stones must
(*a*) be durable (*b*) be free from clay
(*c*) resist action of acids (*d*) all the above.

16.27. A good quality stone absorbs water less than
(*a*) 5% (*b*) 10%
(*c*) 15% (*d*) 20%
(*e*) 25%.

16.28. A stone is rejected if it absorbs water more than
(*a*) 5% (*b*) 10%
(*c*) 15% (*d*) 20%
(*e*) 25%.

16.29. Stones used for ornamental work must be
(*a*) soft (*b*) hard
(*c*) light (*d*) heavy.

16.30. Stones used for rubble masonry must be
(*a*) soft (*b*) hard
(*c*) light (*d*) heavy.

16.31. Stones used for the construction of retaining walls must be
(*a*) soft (*b*) hard
(*c*) light (*d*) heavy.

16.32. In stone masonry, stones (stratified rocks) are so placed that the direction of pressure to the plane of bedding is
(*a*) right angles (*b*) 45°
(*c*) 60° (*d*) parallel
(*e*) None of these is correct

16.33. In stone masonry, if stones are so placed that their layers are parallel to the direction of load, they
(*a*) split easily (*b*) are affected by moisture
(*c*) both (*a*) and (*b*) (*d*) none of these.

16.34. In arches, stratified stones are placed so that their planes are
(*a*) parallel (*b*) perpendicular
(*c*) radial (*d*) none of these.

16.35. The tendency of a stone is, to split along :
(*a*) texture (*b*) fracture
(*c*) cleavage (*d*) structure
(*e*) all the above.

16.36. The standard size of masonry bricks, is
(*a*) 18 cm × 8 cm × 8 cm
(*b*) 19 cm × 9 cm × 9 cm
(*c*) 20 cm × 10 cm × 10 cm
(*d*) 21 cm × 11 cm × 11 cm
(*e*) none of these.

16.37. The size of modular bricks is
(*a*) 10 ×10 × 9 cm (*b*) 19 × 9 × 9 cm
(*c*) 22.5 ×10 × 8.5 cm (*d*) 22.5 × 8.0 × 9 cm.

16.38. The term frog means
(*a*) an apparatus to lift the stone
(*b*) a depression on a face of brick
(*c*) vertical joint in a brick work
(*d*) soaking brick in water.

16.39. The frog of a brick is normally made on its
(*a*) top face (*b*) bottom face
(*c*) longer face (*d*) shorter side.

16.40. The size of mould for bricks, is generally kept
(*a*) a little large to specified size
(*b*) a little small to specified size
(*c*) equal to specified size
(*d*) 10% larger than specified size
(*e*) 20% larger than specified size.

16.41. For one cubic metre of brick masonry, number of bricks required, is
(*a*) 400 (*b*) 425
(*c*) 450 (*d*) 500
(*e*) 550.

16.42. The minimum compressive strength of 1st class bricks should be
(*a*) 75 kg/cm^2 (*b*) 90 kg/cm^2
(*c*) 100 kg/cm^2 (*d*) 120 kg/cm^2
(*e*) 130 kg/cm^2 .

16.43. The minimum compressive strength of IInd class bricks should be
(*a*) 75 kg/cm^2 (*b*) 90 kg/cm^2
(*c*) 100 kg/cm^2 (*d*) 120 kg/cm^2
(*e*) 150 kg/cm^2.

16.44. A1st class brick immersed in water for 24 hours, should not absorb water (by weight) more than
(*a*) 10% (*b*) 15%
(*c*) 20% (*d*) 25%
(*e*) 5%.

16.45. The main ingredient of a good quality brick earth, is
(*a*) magnesia (*b*) lime
(*c*) silica (*d*) alumina.

16.46. Clay and silt content in a good brick earth must be at least
(*a*) 50% (*b*) 40%
(*c*) 30% (*d*) 25%
(*e*) 20%.

16.47. A bull nose brick is not used for
(*a*) rounding off sharp corners
(*b*) pillars
(*c*) decoration purpose (*d*) arches.

16.48. Second class bricks
(*a*) are of dark brown colour
(*b*) produce a metallic sound when struck
(*c*) are well burnt
(*d*) are under burnt.

16.49. Jhumb bricks are
(*a*) under burnt (*b*) over burnt
(*c*) kutcha (*d*) none of these.

16.50. The portion of the brick cut across its width and having its length equal to that of a full brick, is known as
(*a*) closer (*b*) queen closer
(*c*) king closer (*d*) prince closer
(*e*) none of these.

16.51. The portion of the brick without a triangular corner equal to half the width and half the length, is called
(*a*) closer (*b*) queen closer
(*c*) king closer (*d*) squint brick.

16.52. The portion of a brick cut to form angles other than right angles in plan, is known as
(*a*) queen closer (*b*) king closer
(*c*) closer (*d*) squint brick.

16.53. Refractory bricks resist
(*a*) high temperature (*b*) chemical action
(*c*) dampness (*d*) all the above.

16.54. Refractory bricks are used for
(*a*) retaining walls (*b*) columns
(*c*) piers (*d*) combustion chambers.

16.55. The fire clay contains pure
(*a*) lime (*b*) oxide of iron
(*c*) hydrated aluminium silicate
(*d*) magnesium.

16.56. Refractory bricks are
(*a*) neutral refractory bricks
(*b*) acid refractory bricks
(*c*) basic refractory bricks
(*d*) all the above.

16.57. Sewer pipes are made of
(*a*) earthen ware (*b*) stone ware
(*c*) refractory clay (*d*) terracota
(*e*) all the above.

16.58. Glazing of clay products, is done
(*a*) to improve their appearance
(*b*) to protect them from atmospheric effect
(*c*) to protect them from corrosive action
(*d*) all the above.

16.59. A pug mill is used for
(*a*) softening brick earth
(*b*) moulding brick earth
(*c*) tempering brick earth
(*d*) providing brick earth
(*e*) all the above.

16.60. Generally wooden moulds are made from
(*a*) ply wood (*b*) shisham wood
(*c*) deodar wood (*d*) teak wood
(*e*) hard wood.

16.61. The kiln which may work throughout the year, is
(*a*) Clamp (*b*) Bull's kiln
(*c*) Hoffman's kiln (*d*) none of these.

16.62. Pick up the correct statement from the following :
(*a*) Lime is available in free state
(*b*) Lime is available by dissolving calcium carbonate in water
(*c*) Lime is available by calcining calcium carbonate at 900°C
(*d*) Lime is nothing but calcium chloride
(*e*) None of these.

16.63. The lime which contains mainly calcium oxide and slacks with water, is
(*a*) fat lime (*b*) quick lime
(*c*) hydraulic lime (*d*) poor lime
(*e*) none of these.

16.64. The lime which contains high percentage of calcium oxide, is generally called
(*a*) fat lime (*b*) rich lime
(*c*) white lime (*d*) none of these.

16.65. The property by virtue of which lime sets under water, is known as
(*a*) slacking (*b*) setting
(*c*) hydraulicity (*d*) calcining.

16.66. For construction of structures under water, the type of lime used, is
(*a*) hydraulic lime (*b*) fat lime
(*c*) quick lime (*d*) pure lime
(*e*) none of these.

16.67. Pozzolana (or *surkhi*) is used in lime
(*a*) to impart hydraulicity
(*b*) to prevent shrinkage

(*c*) to decrease the cost of construction
(*d*) to decrease the setting time.

16.68. Pick up the correct statement from the following :
(*a*) Quick lime is obtained by burning pure lime stone:
(*b*) Hydraulic lime is obtained by burning lime stone containing clay 5% to 30%
(*c*) Poor lime is obtained by burning lime stone containing impurities more than 5%.
(*d*) All the above.

16.69. Slacking of lime is affected by
(*a*) keeping it exposed to air
(*b*) immersing the lime in water
(*c*) crushing the lime lumps
(*d*) none of these.

16.70. Lime mortar is generally made with
(*a*) quick lime (*b*) fat lime
(*c*) hydraulic lime (*d*) plain lime
(*e*) none of these.

16.71. The commonly used lime in white-washing, is
(*a*) white lime (*b*) fat lime
(*c*) hydraulic lime (*d*) lime
(*e*) quick lime.

16.72. Lime concrete is generally used for
(*a*) wall foundations (*b*) flooring at ground level
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*).

16.73. Lime putty
(*a*) is made from hydraulic lime
(*b*) is made by adding lime to water
(*c*) can be used only upto three days
(*d*) may be obtained from drying lime water mix passing through IS sieve No. 300
(*e*) all of above.

16.74. Pick up the correct statement from the following :
(*a*) Slaked lime contains calcium hydroxide
(*b*) Quick lime contains calcium oxide
(*c*) Slaked lime may be obtained from quick lime
(*d*) Slaked lime is obtained by adding water to quick lime
(*e*) All the above.

16.75. Quick lime
(*a*) generates heat when added to water
(*b*) reacts with carbon dioxide
(*c*) may be used for white-washing
(*d*) when mixed with water forms slaked lime
(*e*) all the above.

16.76. Pick up the incorrect statement from the following:
(*a*) Hydraulic lime is generally obtained by burning kankar
(*b*) Hydraulic lime sets slowly as compared to fat lime
(*c*) Hydraulic lime is generally used in lime mortar
(*d*) None of these.

16.77. The minimum percentage of silica, alumina and ferric oxide in lime for white washing, is
(*a*) 20 (*b*) 15
(*c*) 10 (*d*) 5
(*e*) 0.

16.78. The initial setting time of hydraulic lime, is
(*a*) 30 minutes (*b*) 60 minutes
(*c*) 90 minutes (*d*) 120 minutes
(*e*) 150 minutes.

16.79. The initial setting time of lime-pozzolona, is
(*a*) 30 minutes (*b*) 60 minutes
(*c*) 90 minutes (*d*) 120 minutes.

16.80. The normal curing period for lime mortar, is :
(*a*) one day (*b*) 3 days
(*c*) 7 days (*d*) 10 days
(*e*) 14 days.

16.81. For lime concrete,
(*a*) slump is 50 to 75 mm
(*b*) flexural strength at 90 days is 0.2 N/mm^2
(*c*) compressive strength at 90 days is1.5 N/mm^2
(*d*) compressive strength at 26 days is1.2 N/mm^2
(*e*) all the above.

16.82. Plaster of Paris is obtained by calcining
(*a*) bauxite (*b*) gypsum
(*c*) kankar (*d*) lime stone
(*e*) none of these.

16.83. For the manufacture of Portland cement, the proportions of raw materials used, are
(*a*) lime 63% ; silica 22% ; other ingredients15%
(*b*) silica 22% ; lime 63% ; other ingredients15%
(*c*) silica 40% ; lime 40% ; other ingredients 20%
(*d*) silica 70% ; lime 20% ; other ingredients10%.

16.84. Good quality cement contains higher percentage of
(*a*) Tricalcium silicate (*b*) Di-calcium silicate
(*c*) Tri-calcium aluminate
(*d*) Tetra calcium alumino ferrite
(*e*) all the above.

16.85. Initial setting of cement is caused due to
(*a*) Tri-calcium silicate (*b*) Di-calcium silicate
(*c*) Tri-calcium aluminate
(*d*) Tetra calcium alumino ferrite.

16.86. Ultimate strength to cement is provided by
(*a*) Tricalcium silicate (*b*) Di-calcium silicate
(*c*) Tri-calcium aluminate
(*d*) Tetra calcium alumino ferrite.

16.87. To retard the initial setting time of cement, the compound responsible, is
(*a*) Tricalcium silicate (*b*) Gypsum
(*c*) Di-calcium silicate (*d*) Tri calcium aluminate.

16.88. The compound of Portland cement which reacts immediately with water and also sets first is
(*a*) Tri-calcium silicate (*b*) Di-calcium silicate
(*c*) Tri-calcium aluminate
(*d*) Tetra calcium alumino ferrite.

16.89. The commonly used raw material in the manufacture of cement, is

(*a*) slate (*b*) sand stone
(*c*) lime stone (*d*) basalt.

16.90. The compound of Portland cement which contributes to the strength after two to three years is
(*a*) Tricalcium silicate (*b*) Di-calcium silicate
(*c*) Tricalcium aluminate
(*d*) Tetracalcium alumino ferrite.

16.91. Rapid hardening cement attains early strength due to
(*a*) larger proportion of lime grounded finer than normal cement
(*b*) lesser proportion of lime grounded coarser than normal cement
(*c*) lesser proportion of lime grounded finer than normal cement
(*d*) larger proportion of lime grounded coarser than normal cement
(*e*) excess percentage of gypsum.

16.92. Quick setting cement is produced by adding
(*a*) less amount of gypsum in very fine powdered form
(*b*) more amount of gypsum in very fine powdered form
(*c*) aluminium sulphate in very fine powdered form
(*d*) pozzolana in very fine powdered form
(*e*) none of these.

16.93. Portland cement manufactured from pure white chalk and clay but free from iron-oxide, is known as
(*a*) quick setting cement
(*b*) rapid hardening cement
(*c*) white cement
(*d*) low heat Portland cement.

16.94. Portland pozzolana cement possesses
(*a*) higher resistance to chemical attack
(*b*) lower heat of hydration
(*c*) lower shrinkage on drying
(*d*) water tightness
(*e*) all the above.

16.95. The percentage of water for normal consistency, is
(*a*) 5% to15% (*b*) 10% to 25%
(*c*) 15% to 25% (*d*) 20% to 30%
(*e*) 25% to 35%.

16.96. If P is the percentage of water required for normal consistency, water to be added for determination of initial setting time, is
(*a*) 0.70 P (*b*) 0.75 P
(*c*) 0.80 P (*d*) 0.85 P
(*e*) 0.90 P.

16.97. Soundness of cement is tested by
(*a*) Vicat's apparatus (*b*) Le-chatelier apparatus
(*c*) compressive strength testing apparatus
(*d*) none of the these.

16.98. Soundness test of cement determines
(*a*) quality of free lime (*b*) ultimate strength
(*c*) durability (*d*) initial setting
(*e*) all the above.

16.99. Cement is said to be of good quality if
(*a*) its colour is not greenish grey
(*b*) one feels cool by thrusting one's hand in the cement bag
(*c*) it is not smooth when rubbed in between fingers
(*d*) a handful of cement thrown into a bucket of water does not float
(*e*) none of these.

16.100. With storage, strength of cement
(*a*) increases (*b*) decreases
(*c*) remains the same (*d*) none to these.

16.101. In a mortar, the binding material is
(*a*) cement (*b*) sand
(*c*) surkhi (*d*) cinder.

16.102. Good quality sand is never obtained from
(*a*) river (*b*) nala
(*c*) sea (*d*) gravel powder.

16.103. Index number expressing the relative sizes of both coarse and fine aggregates, is called
(*a*) proportioning of aggregates
(*b*) fineness modulus
(*c*) grading of aggregates
(*d*) none of these.

16.104. Bulking of sand is caused due to
(*a*) surface moisture (*b*) air voids
(*c*) viscosity (*d*) clay contents
(*e*) all the above.

16.105. Pick up the correct statement from the following:
(*a*) Adding 5% to 6% of moisture content by weight, increases the volume of dry sand from18% to 38%
(*b*) The bulking of fine sand is more than that of coarse sand
(*c*) If the percentage content of moisture exceeds10%, increase in bulk of sand starts increasing
(*d*) The volume of fully saturated sand equals that of dry sand
(*e*) All the above.

16.106. Strength of cement concrete primarily depends upon
(*a*) quality of water (*b*) quantity of aggregate
(*c*) quantity of cement (*d*) water-cement ratio.

16.107. Slump test for concrete is carried out, to determine
(*a*) strength (*b*) durability
(*c*) workability (*d*) water content.

16.108. A badly mixed cement concrete results in
(*a*) segregation (*b*) bleeding
(*c*) honey combing (*d*) none to these.

16.109. For a 50 kg cement bag water required, is
(*a*) 2.5 litres (*b*) 18.5 litres
(*c*) 20.5 litres (*d*) 216.5 litres
(*e*) 25 litres.

16.110. Minimum required water cement ratio for a workable concrete, is

(*a*) 0.30 (*b*) 0.40
(*c*) 0.50 (*d*) 0.60
(*e*) 1.0.

16.111. Inner part of a timber log surrounding the pitch, is called
(*a*) sapwood (*b*) cambium layer
(*c*) heart wood (*d*) none to these.

16.112. Age of a tree may be ascertained by
(*a*) radius of its stem
(*b*) circumference of its stem
(*c*) number of branches
(*d*) number of annual rings.

16.113. Pick up the correct statement from the following: Method of sawing timber is
(*a*) tangentially to annual rings, is known as tangential method.
(*b*) in four quarters such that each board cuts annual rings at angles not less than 45°, is known as quarter sawing method.
(*c*) cut out of quarter logs, parallel to the medullary rays and perpendicular to annual rings, is known as radial sawing.
(*d*) all the above.

16.114. Seasoning of timber is essential to remove
(*a*) knots from timber
(*b*) sap from timber
(*c*) twisted fibre from timber
(*d*) roughness of timber.

16.115. A piece of sawn timber whose cross-sectional dimensions exceed 5 cm, in one direction and 20 cm in the other direction, is called a
(*a*) cant (*b*) deal
(*c*) baulk (*d*) strip.

16.116. A piece of timber whose thickness and width are respectively 5 cm and10 cm is called
(*a*) slate (*b*) plank
(*c*) board (*d*) strip.

16.117. Seasoning of timber is done
(*a*) to make it water proof
(*b*) to paint its surface
(*c*) to increase its temperature
(*d*) to remove water.

16.118. Based on its dry weight, a freshly felled tree may contain water
(*a*) 25% (*b*) 50%
(*c*) 75% (*d*) 100%.

16.119. A well seasoned timber may contain moisture up to
(*a*) 4 to 6% (*b*) 6 to 8%
(*c*) 8 to10% (*d*) 10 to12%.

16.120. The curved swellings from the growth of layers or wounds left after branches are cut off in an irregular manner, are known as
(*a*) knots (*b*) rindgalls
(*c*) burls (*d*) none of these.

16.121. For the manufacture of plywood, veneers are placed so that grains of adjacent veneers
(*a*) run at right angles (*b*) parallel
(*c*) inclined at 45° (*d*) inclined at 60°.

16.122. The most valuable timber may be obtained from
(*a*) chir (*b*) shisham
(*c*) sal (*d*) teak.

16.123. The timber having maximum resistance against white ants, is obtained from
(*a*) chir (*b*) shisham
(*c*) sal (*d*) teak.

16.124. Due to attack of dry rot, the timber
(*a*) cracks (*b*) shrinks
(*c*) reduces to powder (*d*) none of these.

16.125. Teak wood is suitable for
(*a*) sports articles (*b*) furnitures
(*c*) railway sleepers (*d*) all the above.

16.126. Seasoning of timber is done for
(*a*) increasing moisture content
(*b*) decreasing moisture content
(*c*) increasing strength of timber
(*d*) none to these.

16.127. Veneering means
(*a*) carving out designs on timber planks
(*b*) chemically treating timber planks
(*c*) thick layer of superior wood glued to inferior wood
(*d*) thin layer of superior wood glued to inferior wood.

16.128. According to IS: 399-1963, the weight of the timber is specified at
(*a*) 8% moisture content
(*b*) 10% moisture content
(*c*) 12% moisture content
(*d*) 14% moisture content.

16.129. Knots in timber are
(*a*) defects caused by crushing fibres
(*b*) splits radiating from the centre
(*c*) speckled strains
(*d*) signs of branches cut off.

16.130. Seasoning is
(*a*) a process of removing sap
(*b*) creosoting
(*c*) painting with sodium silicate
(*d*) coating with tar.

16.131. Plywood is obtained by gluing wooden sheets at a pressure of
(*a*) 100 to150 N/cm^2 (*b*) 100 to130°C
(*c*) both (*a*) and (*b*) (*d*) Neither (*a*) nor (*b*).

16.132. Plywood is normally available
(*a*) 1 mm thick (*b*) 2 mm thick
(*c*) 2 to 3 mm thick (*d*) 3 mm to 4 mm thick.

16.133. Plywood is made from

(*a*) common timber (*b*) bamboo fibre
(*c*) teak wood only (*d*) asbestos sheets.

16.134. Fibre boards can be :
(*a*) distempered (*b*) painted
(*c*) painted and distempered
(*d*) used for furniture.

16.135. Pick up correct statement from the following :
(*a*) Fibre boards are used for thermal and acoustic control
(*b*) Fibre boards are used for light weight standing members
(*c*) Fibre boards are obtained by impregnating a resin product on fibres
(*d*) all the above.

16.136. The most commonly used base for timber painting, is:
(*a*) red lead (*b*) zinc white
(*c*) white lead (*d*) titanium white.

16.137. The commonly used base for iron and steel work, is
(*a*) red lead (*b*) zinc white
(*c*) white lead (*d*) titanium white.

16.138. A volatile substance added to a paint to make its application easy and smooth, is known as:
(*a*) base (*b*) solvent
(*c*) vehicle (*d*) none to these.

16.139. Most commonly used solvent in oil paints, is
(*a*) petroleum (*b*) spirit
(*c*) coaltar (*d*) turpentine.

16.140. Turpentine oil is used in paints as
(*a*) thinner (*b*) vehicle
(*c*) base (*d*) drier.

16.141. Linseed oil is used in paints as
(*a*) thinner (*b*) vehicle
(*c*) base (*d*) drier.

16.142. Duco is one of the patent forms of
(*a*) emulsion paints (*b*) plastic paints
(*c*) bituminous paints (*d*) aluminium paints
(*e*) cellulose paints.

16.143. Varnish is a transparent or semi-transparent solution of resinuous substances in
(*a*) alcohol (*b*) linseed
(*c*) turpentine (*d*) all the above.

16.144. The most important constituent of an oil paint, is
(*a*) thinner (*b*) vehicle
(*c*) pigment (*d*) base
(*e*) all the above.

16.145. The most important constituent of varnish, is
(*a*) drier (*b*) solvent
(*c*) resin (*d*) all the above.

16.146. A prime coat is given to steel work with
(*a*) an oxide of iron paint
(*b*) a mixture of white lead and lead paint
(*c*) a special paint
(*d*) cement paint.

16.147. The base material for distemper, is
(*a*) chalk (*b*) lime
(*c*) lime putty (*d*) cement wash.

16.148. The commonly used drying oil for oil paints, is
(*a*) olive oil (*b*) linseed oil
(*c*) kerosine oil (*d*) accetate of lead.

16.149. Distemper is
(*a*) a paint consisting of powdered chalk, pigments, and water
(*b*) a water proofing agent
(*c*) a paint consisting of coloured cement and water
(*d*) a drying agent.

16.150. Plastic asphalt is
(*a*) used as a water proofing layer over roof
(*b*) a mixture of cement and asphalt
(*c*) a natural asphalt (*d*) a refinery product.

16.151. French polish is
(*a*) oil paint (*b*) distemper
(*c*) spirit varnish (*d*) none to these.

16.152. Duco paints are
(*a*) plastic paints (*b*) cellulose paints
(*c*) emulsion paints (*d*) bituminous paints
(*e*) oil paints.

16.153. Asbestos is
(*a*) corrugated sheet used for roofing
(*b*) an incombustible fire proof material
(*c*) an organic substance
(*d*) a bad insulator for sound and heat
(*e*) all the above.

16.154. Fibre glass
(*a*) retains heat-longer
(*b*) has a higher strength to weight ratio
(*c*) is shock proof and fire retardent
(*d*) does not decay
(*e*) all the above.

16.155. Bituminous fells are used for
(*a*) covering A.C. sheets (*b*) covering sloping roofs
(*c*) D.P.C. (*d*) none to these.

16.156. Formula for quick lime, is
(*a*) $CaCO_3$ (*b*) $Ca(OH)_2$
(*c*) CO_3 CO_2 (*d*) none to these.

16.157. Dry rot
(*a*) cracks the timber
(*b*) reduces the strength of timber
(*c*) reduces the timber to powder
(*d*) shrinks the timber
(*e*) spoils the appearance of timber.

16.158. In paints, the pigment is responsible for
(*a*) durability (*b*) colour
(*c*) smoothness (*d*) glassy face
(*e*) none of these.

16.159. The pigment used in paints for corrosive resistance, is
(*a*) white lead (*b*) ferrous oxide
(*c*) zinc white (*d*) red lead
(*e*) gypsum.

16.160. The material generally not used as extender in paints, is
(*a*) powdered silica (*b*) gypsum
(*c*) talc (*d*) zinc white.

16.161. The commonly used colour pigment in paints, is
(*a*) ambers (*b*) carbon black
(*c*) iron oxide (*d*) lamp black
(*e*) all the above.

16.162. The commonly used thinner in oil paints, is
(*a*) naptha (*b*) turpentine
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*)
(*e*) none the these.

16.163. Commonly used thinner in
(*a*) lacquer paints, is alcohol
(*b*) cellulose paints is ethyle acetate
(*c*) oil paints, is naptha
(*d*) distemper, is water
(*e*) all the above.

16.164. Lacquer paints
(*a*) are generally applied on structural steel
(*b*) are more durable as compared to enamel paints
(*c*) consist of resin and nitro-cellulose
(*d*) contain alcohol as thinner
(*e*) all the above.

16.165. Spirit varnish generally consists of
(*a*) oil, wax and resin
(*b*) alcohol, wax and turpentine
(*c*) pigment and synthetic resin
(*d*) spirit and shellac
(*e*) none of these.

16.166. Oil varnish generally consists of
(*a*) synthetic resin and spirit
(*b*) oil, wax and resin
(*c*) resin, oil and turpentine
(*d*) spirit, oil and wax.

16.167. Bitumen paints offer
(*a*) pleasing surface (*b*) hard surface
(*c*) smooth surface (*d*) protective surface
(*e*) rough surface.

16.168. Cement paints usually
(*a*) contain hydrated lime
(*b*) contain 5% to10% colour pigments
(*c*) are prepared with white cement
(*d*) contain 5% sodium chloride
(*e*) all the above.

16.169. Stuco paints are suitable for
(*a*) stone masonry (*b*) brick walls
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*).

16.170. Snowcrete is one of the patent forms of
(*a*) distempers
(*b*) water proof cement paints
(*c*) enamel paints
(*d*) cellulose paints.

16.171. The most fire resistant paints are :
(*a*) enamel paints (*b*) aluminium paints
(*c*) asbestos paints (*d*) cement paints.

16.172. Priming consists of
(*a*) one part of white lead, 8 parts of chalk and four parts of twice boiled linseed oil
(*b*) 8 parts of white lead, one part of chalk and four parts of twice boiled linseed oil
(*c*) one part of white lead, 8 parts of chalk and one part of linseed oil
(*d*) none to these.

16.173. Water paint is a
(*a*) white wash (*b*) colour wash
(*c*) whiting (*d*) distemper
(*e*) all the above.

16.174. Pick up the correct statement from the following :
(*a*) Blistering may be cured by applying water paint finished with oil paint dried with a little copal varnish
(*b*) Cracked paints may be cured by removing paint and giving a fresh coat of paint
(*c*) Crawling paints may be cured by sand preparing the surface and giving a fresh coat with plenty of turps
(*d*) All the above.

16.175. Resins are
(*a*) not soluble in water (*b*) soluble in spirit
(*c*) used in varnishes
(*d*) left behind on evaporation of oil
(*e*) all the above.

16.176. To give a brilliant finish, the type of varnish used, is
(*a*) water varnish (*b*) spirit varnish
(*c*) turpentine varnish (*d*) oil varnish
(*e*) none of these.

16.177. The most durable varnish is
(*a*) water varnish (*b*) spirit varnish
(*c*) turpentine varnish (*d*) oil varnish
(*e*) none of these.

16.178. Lacquer is
(*a*) oil paint (*b*) distemper
(*c*) spirit varnish (*d*) none to these.

16.179. Percentage content of silica in window glass, is
(*a*) 40 to 45 (*b*) 50 to 55
(*c*) 60 to 65 (*d*) 70 to 75.

16.180. Ground glass
(*a*) is made by grinding its one side
(*b*) is made by melting powdered glass paints surface
(*c*) is used for getting light without transparency
(*d*) all the above.

16.181. Bullet proof glass is made of thick glass sheet sandwiched by a layer of
(*a*) steel (*b*) stainless steel
(*c*) high test plastic (*d*) chromium plate.

16.182. Dextrine is
(*a*) animal glue (*b*) starch glue
(*c*) albumin glue (*d*) rubber based adhesive
(*e*) none to these.

16.183. Putty is
(*a*) made with finely powdered chalk and linseed oil
(*b*) used for fixing glass panes
(*c*) softened by a solution of pearl ash and quick-lime soaked in water
(*d*) all the above.

16.184. Bitumen
(*a*) in solid state, is called asphalt
(*b*) in semi fluid state, is called mineral tar
(*c*) in fluid state, is called petroleum
(*d*) all the above are correct.

16.185. Mastic asphalt is
(*a*) water proof (*b*) fire proof
(*c*) elastic (*d*) all the above.

16.186. Mastic asphalt is generally used for
(*a*) damp proof course (*b*) water proof layer
(*c*) partition walls (*d*) both (*a*) and (*b*).

16.187. According to ISI, bitumen is classified into
(*a*) 2 grades (*b*) 4 grades
(*c*) 6 grades (*d*) 8 grades.
(*e*) 10 grades.

16.188. Bitumen is generally obtained from
(*a*) organic material (*b*) synthetic material
(*c*) petroleum product (*d*) coal.

16.189. Bitumen may be dissolved in
(*a*) carbondioxide (*b*) water
(*c*) sodium chloride (*d*) carbon disulphide
(*e*) none of these.

16.190. Plastic bitumen is generally used for
(*a*) road pavements (*b*) expansion joints
(*c*) crack fillings (*d*) none to these.

16.191. Bitumen emulsion is
(*a*) a liquid containing bitumen in suspension
(*b*) a paint
(*c*) used as anti-corrosive paint
(*d*) all the above.

16.192. Bitumen felt
(*a*) is used as water proofing material
(*b*) is used as damp proofing material
(*c*) is made from bitumen and hessian fibres
(*d*) all the above.

16.193. Asphalt is obtained from
(*a*) petroleum distillation
(*b*) bitumen distillation
(*c*) plastic distillation (*d*) none of these.

16.194. Mastic asphalt is normally used for
(*a*) sound insulation (*b*) water proofing
(*c*) fire proofing (*d*) none to these.

16.195. Mastic asphalt is
(*a*) acid resisting material
(*b*) non-corrosive material
(*c*) corrosive material
(*d*) heating-resisting material.

16.196. The filler used in plastic bitumen, is
(*a*) shale powder (*b*) talc powder
(*c*) asbestos powder (*d*) plastic powder
(*e*) none of these.

16.197. Bitumen felt is used for
(*a*) water proofing (*b*) damp proofing
(*c*) both (*a*) and (*b*) (*d*) neither (*a*) nor (*b*).

16.198. A ferrous metal is
(*a*) cast iron (*b*) wrought iron
(*c*) steel (*d*) all the above.

16.199. Depending on the chemical composition and mechanical properties, iron may be classified as
(*a*) cast iron (*b*) wrought iron
(*c*) steel (*d*) all the above.

16.200. Iron ore may contain
(*a*) carbon (*b*) silicon
(*c*) sulphur (*d*) phosphorus & maganese
(*e*) all the above.

16.201. Pig iron is manufactured from the ores by
(*a*) dressing (*b*) calcination and roasting
(*c*) smelting (*d*) all the above.

16.202. The operation of removal of impurities or clay adhering to iron ores, is known as
(*a*) dressing (*b*) calcination
(*c*) roasting (*d*) smelting.

16.203. Calcination of iron ores is done
(*a*) to remove moisture (*b*) to remove carbonic acid
(*c*) by roasting in heaps (*d*) after dressing
(*e*) all the above.

16.204. The slag which floats on the surface of the molten iron generally contains
(*a*) Lime (CaO), 45%
(*b*) Silica (SiO_2), 35%
(*c*) Alumina (Al_2O_3), 12%
(*d*) MgO, $CaSO_4$, $KMnO_2$ and FeO 8%
(*e*) all the above.

16.205. Pick up the correct statement from the following:
(*a*) Roasting is not necessary if iron ore is an oxide
(*b*) Impurities float on the molten iron as slag
(*c*) The slag contains lime about 45%
(*d*) The molten iron is made to run, in a long channel

formed in sand called 'sow'
(*e*) All the above.

16.206. If the iron ore contains clay as an impurity, the flux added during calcination, is
(*a*) clay (*b*) lime stone
(*c*) argillaceous iron ore
(*d*) all the above.

16.207. If the ore impurities is
(*a*) clay, lime stone is used as flux
(*b*) lime stone, clay is used as flux
(*c*) quartz, lime stone and argallaceous iron ores are used as flux
(*d*) All the above.

16.208. During smelting process, the combination of fuel in the furnace
(*a*) forms carbon dioxide
(*b*) carbon dioxide with carbon forms carbon mono-oxide
(*c*) carbon mono-oxide reacts with Fe_2O_3 to form iron and liberates CO_2
(*d*) all the above.

16.209. Pig iron made from heamatite ores free from sulphur, phosphorus and copper, is known as
(*a*) Bessemer pig (*b*) Grey or foundry pig
(*c*) White or forge pig (*d*) Mottled pig
(*e*) All the above.

16.210. Pig iron obtained from the furnance which is properly provided with fuel at a very high temperature, is called
(*a*) Bessemer pig (*b*) Grey or foundry pig
(*c*) White or forge pig (*d*) Mottled pig
(*e*) None of the above.

16.211. If the furnace is provided with insufficient fuel at low temperatures, the type of pig iron produced, is called
(*a*) Bessemer pig (*b*) Grey or foundry pig
(*c*) White or forge pig (*d*) Mottled pig.

16.212. The variety of pig iron used for the manufacture of steel by Bessemer process, is
(*a*) Bessemer pig (*b*) Grey pig
(*c*) White forge pig (*d*) Mottled pig.

16.213. The variety of pig iron used for manufacture of wrought iron, is
(*a*) Bessemer pig (*b*) Grey or foundry pig
(*c*) White forge pig (*d*) Mottled pig.

16.214. For light and ornamental casting, the most unsuitable pig iron, is
(*a*) Bessemer pig (*b*) Grey or foundry pig
(*c*) White or forge pig (*d*) Mottled pig.

16.215. Upto a maximum of 72% of iron, is available in
(*a*) Magnetite (*b*) Red haemetite
(*c*) Limonite (*d*) Siderite
(*e*) Iron pyrites.

16.216. Minimum of 40% of iron, is available in
(*a*) Magnetite (*b*) Red haemetite
(*c*) Limonite (*d*) Siderite
(*e*) Black band.

16.217. Cast iron
(*a*) is obtained by purifying pig iron
(*b*) is manufactured in required shapes
(*c*) may contain 2 to 5 per cent of carbon with other impurities
(*d*) is remelted in a cupola furnace
(*e*) all the above.

16.218. For melting one tonne of cast iron
(*a*) 700 m^3 air is required
(*b*) 20 kg limestone is required
(*c*) one quintal coke is required
(*d*) all the above.

16.219. The cast iron when heated to red heat with powdered red haemetite in an oven for increasing its toughness, is converted to
(*a*) grey cast iron (*b*) white cast iron
(*c*) mottled cast iron (*d*) toughed cast iron.

16.220. Wrought iron contains carbon upto
(*a*) 0.15% (*b*) 1.0%
(*c*) 1.5% (*d*) 2%.

16.221. Wrought iron is manufactured from pig iron by
(*a*) refining (*b*) pudding
(*c*) shingling (*d*) rolling
(*e*) all the above.

16.222. Forge pig may be converted to wrought iron by
(*a*) rolling (*b*) pudding
(*c*) shingling (*d*) refining.

16.223. During pudding
(*a*) molten metal is kept clear of the fuel
(*b*) carbon is converted into carbonic acid gas
(*c*) silicon forms a slag
(*d*) metal is heated by the burning of gases
(*e*) all the above.

16.224. Brittleness of cold is due to an excess of
(*a*) sulphur (*b*) carbon
(*c*) phosphorus (*d*) silicon.

16.225. Red short iron cracks when bent due to the presence of
(*a*) sulphur (*b*) carbon
(*c*) phosphorus (*d*) silicon.

16.226. Pick up the correct statement from the following :
(*a*) Air bubbles in casting produce a dull sound by tapping their surfaces lightly with a hammer
(*b*) Cupola furnace is used for the manufacture of cast iron
(*c*) Red short iron is of no value for welding purpose
(*d*) All the above.

16.227. Pick up the correct statement from the following :
(*a*) Blisters in the finished wrought iron, are caused due to the reaction between oxide of iron and carbon
(*b*) The edges of a finished wrought iron, are rough due to red shortage

(*c*) Pig iron (charcoal) is manufactured from magnetite ore (Fe_3O_4)
(*d*) For the manufacture of wrought iron, non-sulphurous fuel is not necessary
(*e*) All the above.

16.228. The process of decarbonising the pig iron completely and then adding proper percentage of carbon for manufacturing steel, is called
(*a*) Cementation process
(*b*) Crucible process
(*c*) Bessemer process (*d*) Open hearth process.

16.229. The process of manufacturing steel by heating short lengths of wrought iron bars mixed with charcoal in fire clay crucibles and collecting the molten iron into moulds, is known as
(*a*) Cementation process
(*b*) Crucible process
(*c*) Bessemer process
(*d*) Open hearth process.

16.230. Bessemer process is used for the manufacture of
(*a*) Pig iron (*b*) Cast iron
(*c*) Wrought iron (*d*) Steel.

16.231. Softer variety of steel may be obtained by
(*a*) Cementation process (*b*) Crucible process
(*c*) Bessemer process (*d*) Open hearth process.

16.232. The steel which contains fissures and cavities, is manufactured by
(*a*) Cementation process (*b*) Crucible process
(*c*) Bessemer process (*d*) Open hearth process.

16.233. Cast steel is manufactured by
(*a*) Cementation process (*b*) Crucible process
(*c*) Bessemer process (*d*) Open hearth process.

16.234. Pick up the correct statement from the following :
(*a*) In basic Bessemer process, the steel heats the converter
(*b*) In open-hearth process, the furnace heats the steel
(*c*) In Siemens process, the impurities of pig iron are oxidised by the oxygen of the ore
(*d*) all the above.

16.235. Pick up the correct statement from the following :
(*a*) Steel produced by open hearth process is milder than that obtained by the bessemer process
(*b*) Engineers prefer open hearth steel for structural purpose as it is more homogenous
(*c*) Basic Bessemer process is suitable for converting poor ore containing a large proportion of sulphur and phosphorus into steel
(*d*) all the above.

16.236. Blister steel
(*a*) is obtained by cementation process
(*b*) is full of fissures and cavities
(*c*) can not be forged
(*d*) can be easily welded
(*e*) all the above.

16.237. For high grade instruments the steel preferred to, is
(*a*) cast steel (*b*) Bessemer steel
(*c*) mild steel
(*d*) Whitworth compressed steel.

16.238. The steel used in R.C.C. work is
(*a*) stainless steel (*b*) mild steel
(*c*) high carbon steel (*d*) wrought iron.

16.239. The steel used for the manufacture of rails, is
(*a*) Bessemer steel (*b*) mild steel
(*c*) cast steel (*d*) stainless steel.

16.240. Whitworth compressed steel is obtained when molten steel is subjected to a pressure of
(*a*) 5 kg/mm^2 (*b*) 9 kg/mm^2
(*c*) 13 kg/mm^2 (*d*) 15 kg/mm^2
(*e*) 10 kg/mm^2 .

16.241. The steel used for rails under heavy traffic and on sharp curves, is
(*a*) Nickel steel (*b*) Chrome steel
(*c*) Magnese steel (*d*) Vanadium steel.

16.242. Vanadium steel is generally used for
(*a*) railway switches and crossing
(*b*) bearing balls
(*c*) magnets
(*d*) axles and springs.

16.243. The type of steel used for precision levelling staff, is
(*a*) Titanium steel (*b*) Carbon steel
(*c*) Invar (*d*) Stainless steel.

16.244. Invar contains
(*a*) 12% of nickel (*b*) 24% of nickel
(*c*) 30% to nickel (*d*) 36% of nickel.

16.245. Stainless steel contains
(*a*) 18% of chromium and 8% nickel
(*b*) 8% of chromium and18% of nickel
(*c*) 12% of chromium and 36% of nickel
(*d*) 36% of chromium and12% of nickel.

16.246. Permanent magnets are made of high carbon steel and
(*a*) 15% of cobalt (*b*) 20% of cobalt
(*c*) 35% of cobalt (*d*) 45% of cobalt.

16.247. Cast iron contains carbon approximately
(*a*) 1.5% to 5.5% (*b*) 0.05% to1.75%
(*c*) 0.250% (*d*) none to these.

16.248. Steel contains carbon approximately
(*a*) 1.50% to 5.6% (*b*) 0.05% to1.75%
(*c*) 0.25% (*d*) none to these.

16.249. Wrought iron contains carbon about
(*a*) 1.5% to 5.5% (*b*) 0.5% to1.75%
(*c*) 0.25% (*d*) none to these.

16.250. Pick up the correct statement from the following:
(*a*) Solder material is an alloy which melts at a temperature above 400°C

(*b*) Brazing is done at temperature above 600°C to 1100°C
(*c*) Brazing joint is stronger than the solder joint
(*d*) all the above.

16.251. Pick up the correct statement from the following:
(*a*) Corrugated sheet iron is made by passing plain sheets between grooved rollers
(*b*) Strength and stiffness of corrugated sheets are considerably increased
(*c*) Corrugated sheets are generally galvenised to protect iron from corrosion by rust
(*d*) Corrugated sheets are generally used on slanting roofs
(*e*) all the above.

16.252. Expanded metal is
(*a*) manufactured from steel sheets
(*b*) used for reinforced concrete in road pavements
(*c*) measured in term of SWM (shortway mesh) and LWM (long way mesh)
(*d*) all the above.

16.253. Mild steel is used for
(*a*) structural works in beams, joints and girders
(*b*) small sized water pipes
(*c*) columns and struts
(*d*) none of these.

16.254. Wrought iron is used for
(*a*) structural works in beams
(*b*) small sized water pipes
(*c*) columns and struts
(*d*) none to these.

16.255. Cast iron is used for
(*a*) structural works in beams
(*b*) small sized water pipes
(*c*) columns and struts
(*d*) none to these.

16.256. Pick up the correct statement from the following :
(*a*) Rust is due to formation of oxides
(*b*) Cast iron oxidises less
(*c*) Steel oxidises most
(*d*) Wrought iron oxidises moderately
(*e*) All the above.

16.257. Galvanising means covering iron with a thin coat of
(*a*) tin (*b*) zinc
(*c*) glaze (*d*) coal tar.

16.258. Maganese steels
(*a*) are non-magnetic
(*b*) possess high electrical resistance
(*c*) possess low coefficient of expansion
(*d*) are used for the manufacture of rails
(*e*) all the above.

16.259. For the manufacture of stainless steel, steel is mixed with
(*a*) chromium (*b*) nickel
(*c*) tungsten (*d*) none of these.

16.260. The yield strength and tensile strength of low carbon steel may be improved by the addition of
(*a*) manganese (*b*) chromium
(*c*) nickel (*d*) venadium
(*e*) tungsten.

16.261. Pick up the correct statement from the following :
(*a*) Rusting is caused due to combined action of air, moisture and carbon dioxide
(*b*) During rusting, first ferrous bicarbonates are formed
(*c*) On further oxidation ferrous bicarbonates get converted to ferric bicarbonates
(*d*) Ultimately hydrated ferric oxide is formed during rusting and carbon dioxide gets liberated
(*e*) All the above.

16.262. German silver is an alloy of
(*a*) zinc, lead and nickel
(*b*) silver, gold and lead
(*c*) copper, nickel and zinc
(*d*) brass, silver and zinc.

16.263. PVC stands for
(*a*) plastic very compact (*b*) polythene vinyl chloride
(*c*) polythene vinyl carbon
(*d*) polythene vanadium carbide.

16.264. Stainless steel resists corrosion due to
(*a*) carbon (*b*) sulphur
(*c*) vanadium (*d*) chromium
(*e*) maganese.

16.265. Brass is an alloy of
(*a*) copper and zinc (*b*) zinc and lead
(*c*) tin and silver (*d*) zinc and nickel
(*e*) tin and lead.

16.266. The rocks which are formed due to cooling of magma at a considerable depth from earth's surface are called
(*a*) Plutonic rocks (*b*) Hypabyssal rocks
(*c*) Volcanic rocks (*d*) Igneous rocks.

16.267. The rocks which are formed due to cooling of magma at a relatively shallow depth from the earth's surface are called
(*a*) Plutonic rocks (*b*) Hypabyssal rocks
(*c*) Volcanic rocks (*d*) Igneous rocks.

16.268. The rocks which are formed due to pouring of magma at the earth's surface are called
(*a*) Plutonic rocks (*b*) Hypabyssal rocks
(*c*) Volcanic rocks (*d*) Igneous rocks

16.269. Pick up the plutonic rock from the following :
(*a*) Granite (*b*) Dolerite
(*c*) Basalt (*d*) All the above.

16.270. Pick up the hypabyssal rock from the following :
(*a*) Granite (*b*) Dolerite
(*c*) Basalt (*d*) All the above.

16.271. Pick up the volcanic rock from the following :
(*a*) Granite (*b*) Dolerite
(*c*) Basalt (*d*) All the above.

16.272. Match List I and List II and select the correct answer by using the codes given below the lists.

List I (Rock)	List II (Structure)
A., Plunotic	1. extremely fine grained
B. Hypabyssal	2. coarsely grained crystalline
C. Volcanic	3. finely grained crystalline.

Codes :

	A	B	C
(*a*)	1	2	3
(*b*)	2	3	1
(*c*)	3	1	2
(*d*)	2	1	3.

16.273. Pick up the rock which is not a sedimentary rock from the following :
(*a*) gravel (*b*) sand stone
(*c*) gypsum (*d*) dolerite
(*e*) lignite.

16.274. The foliated structure is very common in
(*a*) sedimentary rocks (*b*) igneous rocks
(*c*) metamorphic rocks (*d*) none of these.

16.275. The rocks in which argil (or clay) pre-dominates, are called
(*a*) sillicious rocks (*b*) argillaceous rocks
(*c*) calcareous rocks (*d*) igneous rocks.

16.276. In a rock calcium carbonate pre-dominates. State whether it is :
(*a*) Sillicious rock (*b*) Argillaceous rock
(*c*) Calcareous rock (*d*) None of these.

16.277. A rock contains only one mineral. It is called
(*a*) homogeneous (*b*) non-homogeneous
(*c*) monomineralic (*d*) polymineralic.

16.278. Pick up the monomineralic rock from the following :
(*a*) Quartz sand (*b*) Pure gypsum
(*c*) Magnesite (*d*) Granite
(*e*) None of these.

16.279. Pick up the correct characteristic of Pyroxene from the following :
(*a*) It forms octagonal crystals
(*b*) It converts to chlorine by hydration
(*c*) Its density is 2.3 to 3.6 g/cm^2
(*d*) Its hardness is 5 to 6
(*e*) All the above.

16.280. Chlorite, a green colour mineral is mainly derived from the decomposition of
(*a*) augite (*b*) biotite
(*c*) horn blende (*d*) All of these.

16.281. Pick up the correct statement from the following :
(*a*) Horn blende mineral is brittle
(*b*) Muscovite is also known as white mica and potash-mica
(*c*) Biotite is also known as blackmica
(*d*) All the above.

16.282. Match List I with List II and choose the correct answer by using the codes given below the lists :

List I (Mineral)	*List II (Chemical formula)*
A. Calcite	1. $MgCO_3$
B. Magnesite	2. $MgCO_3 . CaCO_3$
C. Dolomite	3. $CaSO_3 . 2H_2O$
D. Gypsum	4. $CaCO_3$

Codes :

	A	B	C	D
(*a*)	4	1	2	4
(*b*)	1	2	3	4
(*c*)	3	4	1	2
(*d*)	2	3	4	1.

16.283. Pick up the correct statement from the following:
(*a*) The distinct plane of division along which a stone can easily be split, is called natural bed of stone
(*b*) The natural bed of sedimentary rocks is along the planes of stratification
(*c*) The natural bed of igneous rocks is not defined
(*d*) All the above.

16.284. Pick up the correct statement from the following :
(*a*) In stone arches, the stones are placed with their natural beds radial
(*b*) In cornices, the stones are placed with their natural beds as vertical
(*c*) In stone walls, the stones are placed with their natural beds as horizontal
(*d*) All the above.

16.285. Pick up the correct statement from the following :
(*a*) Acid test is done to find out the weathering quality of stones
(*b*) Attrition test is done to find out the rate of wear of stones which are used in road construction
(*c*) Crushing test is done to find out the compressive strength of the stone
(*d*) Impact test is done to determine toughness of a stone
(*e*) All the above.

16.286. Match List I with List II and select a correct answer by using the codes given below the lists :

List I (Stone test)	*List II (Characteristics)*
A. Acid test	1. compressive strength
B. Attrition,	2. weathering quality
C. Crushing test,	3. toughness
D. Impact test	4. rate of wear

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	1	4	2
(*c*)	2	4	1	3
(*d*)	4	3	2	1

16.287. Smith's test of stones is performed to find out
(*a*) the presence of soluble matter of stone
(*b*) the compressive strength of the stone
(*c*) the hardness of the stone
(*d*) the toughness of the stone.

16.288. Match List I with List II and select a correct answer by using the codes given below the lists :

List I (Rock)	*List II (Crushing strength)*
A. Laterite	1. 5 kg/cm^2
B. Lime stone	2. 25 kg/^{2}
C. Sand stone	3. 650 kg/cm^2
D. Slate	4. 550 kg/cm^2

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	2	4	3	1
(*c*)	3	1	2	4
(*d*)	1	4	3	2

16.289. Durability of building stone is affected by its
(*a*) chemical composition
(*b*) texture
(*c*) resistance to atmosphere
(*d*) location in structure
(*e*) all the above.

16.290. Dorry's testing machine is used for
(*a*) crushing test of stone (*b*) hardness test of stone
(*c*) impact test of stone (*d*) water absorption test.

16.291. The coefficient of hardness of stones used in road work should be greater than
(*a*) 10 (*b*) 12
(*c*) 15 (*d*) 17.

16.292. Pick up the correct statement from the following :
(*a*) The free quartz suddenly expands at a temperature lower than 600°C
(*b*) The lime stone resists fire upto about 800°C and at higher temperature it splits into CaO and CO_2
(*c*) The sand stone with silicates resist a fire in a better way
(*d*) The argillaceous stone though poor in strength can resist fire quite weak
(*e*) All the above.

16.293. For a good building stone, its specific gravity should the greater than
(*a*) 1.5 (*b*) 1.7
(*c*) 2.2 (*d*) 2.7.

16.294. Pick up the correct statement from the following:
(*a*) soft stones are required for carving
(*b*) light stones are required for arches
(*c*) hard stones are required to stand high pressure
(*d*) All the above.

16.295. The wedging is adopted for quarrying costly stratified rock such as
(*a*) laterite (*b*) marble
(*c*) limestone (*d*) sandstone
(*e*) All the above.

16.296. The stones obtained by blasting are used as
(*a*) ballast in railways
(*b*) aggregates for concrete
(*c*) roadmetal
(*d*) All the above.

16.297. The proportions of charcoal, saltpetre and sulphur in gun powder by weight, are respectively :
(*a*) 15, 75,10 (*b*) 75,10,15
(*c*) 10,15, 75 (*d*) 10, 75,15.

16.298. Pick up the correct statement from the following :
(*a*) The baked earth is called terra-cotta
(*b*) The articles prepared from clay which is burnt at low temperature and cooled down slowly, are called earthen-ware
(*c*) The articles prepared from refractory clays which as mixed with stone and crushed pottery, are called stone ware
(*d*) The articles prepared from fine earthen ware which is white, thin and semi-transparent, are called pro-celain
(*e*) All the above.

16.299. For sanitary pipes and chemical stonewares,
(*a*) salt glazing is used (*b*) lead glazing is used
(*c*) opaque glazing is used (*d*) None of these.

16.300. Quartzite, a metamorphic stone is
(*a*) hard (*b*) brittle
(*c*) crystalline (*d*) compact
(*e*) All the above.

16.301. The melting point of silica is :
(*a*) 1570°C (*b*) 1630°C
(*c*) 1730°C (*d*) 1850°C.

16.302. The silica is used for preparing
(*a*) silica bricks (*b*) coke oven
(*c*) lining for glass furnaces
(*d*) all of these.

16.303. The sequence of refractory materials according to increasing melting points is :
(*a*) Dolomite, Magnesia, Bauxite, Chromite
(*b*) Bauxite, Chromite, Dolomite, Magnesia
(*c*) Magnesia, Bauxite, Dolomite, Chromite.

16.304. Match List I with List II and select a suitable answer by using the codes given below the lists :

List I (Neutral refractory materials)	*List II (Melting points)*
A. Bauxite	1. 1890°C
B. Carbon,	2. 2180°C
C. Forsterite,	3. 3500°C
D. Chromite	4. 1200°C

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	2	4	1	3
(*c*)	4	3	1	2
(*d*)	3	1	4	2.

16.305. The high quality refractory materials which contain pure clay are oxides of
(*a*) pure alumina oxide (*b*) pure magnesia oxide
(*c*) pure carbides (*d*) all of these.

16.306. Pick up the metal refractory from the following :
(*a*) Molyblendum (*b*) Tungsten
(*c*) Zicronium (*d*) All of these.

16.307. The usual percentages of clay and metal in cermet are:
(*a*) 50%, 50% (*b*) 60%, 40%
(*c*) 70%, 30% (*d*) 80%, 20%.

16.308. Pick up the constituent of good brick earth whose excess causes the raw bricks shrink and warp during drying and burning, from the following :
(*a*) Alumina (*b*) Lime
(*c*) Ironoxide (*d*) Magnesia.

16.309. A good brick earth should contain :
(*a*) about 20% to 30% of alumina
(*b*) about 50% to 60% of silica
(*c*) not more than 5% of lime
(*d*) about 5 to 6% of oxide of lime
(*e*) All the above.

16.310. Match List I with List II and select a correct answer by using the codes given below the lists :

List I (Porcelain)	*List II (Use)*
A. Carbon brick	1. Manufacture of spark plugs
B. Zircon porcelain	2. Lining of electric furnace
C. Carbon and graphite	3. Construction of atomic reactor rockets
D. Cordierite porcelain	4. In electric furnace

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	4	2	1
(*c*)	4	3	1	2
(*d*)	2	1	3	4

16.311. For preparing porcelains, the clay should be
(*a*) sufficiently pure (*b*) of high degree of tanacity
(*c*) of good plasticity (*d*) All the above.

16.312. Which one of the following is used for preparing porcelain
(*a*) clay (*b*) feldspar
(*c*) quartz (*d*) minerals
(*e*) All of these.

16.313. Porcelain is used as :
(*a*) sanitary wares (*b*) electric insulators
(*c*) storage vessels (*d*) reactor chambers
(*e*) All of the above.

16.314. Pick up the correct statement from the following :
(*a*) The low voltage porcelain is prepared by wet process
(*b*) The high voltage porcelain is prepared by dry process
(*c*) The low voltage porcelain is prepared by dry process
(*d*) None of the above.

16.315. The low voltage porcelain is mainly used for
(*a*) switch block (*b*) insulating tubes
(*c*) lamp sockets (*d*) All of these.

16.316. The presence of sand in brick earth prevents :
(*a*) cracking of bricks (*b*) shrinkage of bricks
(*c*) warping of bricks (*d*) none of these.

16.317. In order of increasing percentage of silica, the correct sequence is
(*a*) sandy clay, calcareous clay, pure clay
(*b*) calcareous clay, pure clay, sandy clay
(*c*) pure clay, sandy clay, calcareous clay
(*d*) None of these.

16.318. The clay to be used for manufacturing bricks for a large project, is dugout and allowed to weather throughout
(*a*) the monsoon (*b*) the winter
(*c*) the summer (*d*) none of these.

16.319. The harmonious mixing of the clay ingredients, is known as
(*a*) weathering (*b*) blending
(*c*) tempering (*d*) None of these.

16.320. Match List I with List II and select a correct answer by using the codes given below the lists :

List I (Operation)	*List II (Process)*
A. Weathering	1. To achieve proper degree of hardness
B. Pugging	2. Harmonious mixing of ingredients
C. Blending	3. Softening or mellowing
D. Tempering	4. Grinding clay with water to make plastic

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	4	2	1
(*c*)	4	2	3	1
(*d*)	1	3	2	4

16.321. Pick up the correct statement from the following :
(*a*) Bull's trench kiln a trench excavated in ground
(*b*) Hoffman's kiln is constructed overground
(*c*) Tunnel Kiln is constructed as a tunnel
(*d*) All the above.

16.322. Pick up the correct statement from the following :
(*a*) The average crushing strength of hand moulded bricks is 6000 t/m^2
(*b*) The average tensile strength of hand moulded brick is 200 t/m^2
(*c*) The average shearing strength of hand moulded brick is 600 t/m^2
(*d*) All the above.

16.323. The weight of a good quality brick when immersed in water for a period of16 hours should not exceed the weight of dry brick

(*a*) 20% (*b*) 15%
(*c*) 10% (*d*) None of these.

16.324. When a brick is immersed in water for 24 hours and then dried, if

(*a*) no grey or white deposits appear on the surface, the brick is free from soluble salts
(*b*) 10 per cent surface is covered with grey or white deposits, the brick has slight efflorescence
(*c*) 50 per cent surface is covered with grey or white deposits, the brick has serious efflorescence
(*d*) All the above.

16.325. Match List I with List II and select a correct answer by using the codes given below the lists :

List I (*Colour of brick*)	List II (*Constituent of clay*)
A. Black	1. Lime in excess
B. Bluish green	2. Iron in excess
C. Red	3. Alkalies burnt at high temperature
D. Brown	4. Manganese and iron

Codes :

	A	B	C	D
(*a*)	4	3	2	1
(*b*)	1	2	3	4
(*c*)	3	1	4	2
(*d*)	2	4	1	3.

16.326. The weight of 1 m^3 of brick earth, is about

(*a*) 1200 kg (*b*) 1500 kg
(*c*) 1800 kg (*d*) 2000 kg.

16.327. The percentage of alumina and silica in good fire clay vary respectively is

(*a*) 25 and 75 (*b*) 30 and 70
(*c*) 35 and 65 (*d*) All of these.

16.328. Pick up the correct statement from the following :

(*a*) The percentage of absorption for fire-bricks varies from 5 to10%
(*b*) The percentage of silica in silica bricks is to the extent of about 95 to 97%
(*c*) Roughly1 to 2% of lime in silica bricks is added to act as binding material
(*d*) The compressive strength of silica bricks is about 150 kg/cm^2
(*e*) All the above.

16.329. Match List I with List II and select a correct answer using the codes given below the lists :

List I (Colour of sand lime bricks)	*List II (Pigments)*
A. Green	1. Carbon black
B. Grey	2. Ochra
C. Red	3. Chromium oxide
D. Yellow	4. Iron oxide

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	1	4	2
(*c*)	2	3	1	3
(*d*)	4	3	2	1.

16.330. Pick up the correct statement from the following :

(*a*) The heating of a material to redness in contact with air, is known as calcination
(*b*) The property of lime by which it sets or hardens in damp places having no free circulation of air is called setting
(*c*) The product that remains after calcination of lime-stone, is called lime
(*d*) All the above.

16.331. Quick lime (or caustic lime)

(*a*) is obtained by the calcination of pure lime stone
(*b*) has great affinity to moisture
(*c*) is amorphous
(*d*) All the above.

16.332. For slaking of 10 kg of CaO, the theoretical amount of water is

(*a*) 2.2 kg (*b*) 1.5 kg
(*c*) 3.2 kg (*d*) None of these.

16.333. Which one of the following is an air binding material?

(*a*) Gypsum (*b*) Acid-resistant cement
(*c*) Quick lime (*d*) All of these.

16.334. Pick up the correct statement from the following :

(*a*) The lime in excess makes the cement unsound and causes the cement to expand and disintegrate
(*b*) The silica in excess makes the cement stronger but its setting time also increases
(*c*) The excess amount of alumina weakens the cement
(*d*) The addition of gypsum increases the initial setting time of cement
(*e*) All the above.

16.335. The cement becomes unsound by the presence of excess

(*a*) sulphur (*b*) magnesia
(*c*) lime (*d*) All of these.

16.336. Pick up the compound responsible for early strength of cement from the following :

(*a*) Tetra-calcium alumino-ferrite
(*b*) Tricalcium silicate
(*c*) Tricalcium aluminate
(*d*) Dicalcium silicate.

16.337. In the cement the compound quickest to react with water, is

(*a*) Tricalcium aluminate
(*b*) Tetra-calcium alumino-ferrite
(*c*) Tricalcium silicate
(*d*) Dicalcium silicate.

16.338. Pick up the correct statement regarding low heat cement from the following :

(*a*) It possesses less compressive strength
(*b*) Its initial setting time is about one hour
(*c*) Its final setting time is about10 hours
(*d*) Its mainly used for mass concrete work
(*e*) All the above.

16.339. Rapid hardening cement contains
(*a*) Tri-calcium silicate
(*b*) Tri-calcium aluminate
(*c*) Tetra-calcium alumino-ferrite
(*d*) Dicalcium silicate.

16.340. Name the type of cement from the following for canal linings :
(*a*) sulphate resisting cement
(*b*) rapid hardening cement
(*c*) quick setting cement
(*d*) pozzuolana cement.

16.341. Sea sand used in structures causes
(*a*) dampness (*b*) efflorescence
(*c*) disintegration (*d*) All of these.

16.342. If water required for1 bag of cement is 30 litres, the water cement ratio is :
(*a*) 0.40 (*b*) 0.50
(*c*) 0.60 (*d*) None of these.

16.343. Pick up the correct statement from the following :
(*a*) For thin structures subjected to wetting and drying, the water cement ratio should be 0.45
(*b*) For mass concrete structures subjected to wetting and drying, the water ratio should be 0.55
(*c*) For thin structures which remain continuously under water, the water-cement ratio by weight should be 0.55
(*d*) For massive concrete structures which remain continuously under water, the water cement ratio by weight should be 0.65
(*e*) All the above.

16.344. Pick up the correct statement from the following :
(*a*) The theory of formation of concrete is based on the phenomena of formation of voids
(*b*) The bulking of sand is taken into account while volumetric proportioning of the aggregates
(*c*) The dry sand and the sand completely flooded with water, have practically the same volume
(*d*) The expansion and contraction joints are provided if concrete structures exceed12 m in length
(*e*) All the above.

16.345. Match List I with List II and select a correct answer by using the codes given below the lists :

List I	*List II*
A. Pith	1. Inner annual rings surrounding the pith
B. Heart wood	2. The thin layer of sap between sap wood and inner back
C. Sap wood	3. Inner most control portion
D. Cambium	4. The outer annual rings between heart wood and cambium layer

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	1	2	4
(*c*)	2	3	1	3
(*d*)	4	3	2	1.

16.346. The presence of original rounded surface on the manufactured piece of timber, is called
(*a*) Wane (*b*) Torn grain
(*c*) Diagonal grain (*d*) Chipmark.

16.347. Pick up the most favourable condition for the rapid growth of fungus for dry rot from the following :
(*a*) absence of sun light (*b*) dampness
(*c*) presence of sap (*d*) stagnant air
(*e*) All the above.

16.348. The cracks which extend from bark towards the sap wood in the cross section of a tree, are called
(*a*) radial shakes (*b*) star shakes
(*c*) heart shakes (*d*) cup shakes.

16.349. The cracks caused by shrinkage of the exterior surface of the wood exposed to atmosphere, are called :
(*a*) radial shakes (*b*) heart shakes
(*c*) wind cracks (*d*) twisted fibres.

16.350. Pick up the correct statement from the following :
(*a*) The plywoods do not split or crack due to changes in atmosphere
(*b*) The commercial plywoods are available upto150 cm wide and upto 300 cm long
(*c*) The plywoods possess uniform tensile strength in all directions
(*d*) The plywoods are light in weight
(*e*) All the above.

16.351. Pick up the correct statement from the following :
(*a*) Alexander Parkes, a Scottish chemist prepared a hard material by mixing camphor and alcohol with nitro cellulose and called it, as *Parkesite*
(*b*) Dr. L. Bakeland, a Belgian scientist prepared a product known as *Bakelite*
(*c*) Pollark, an Austrian scientist prepared a substance from urea and formaldehyde and called it *Plastic*
(*d*) All the above.

16.352. Plastics are compounds of carbon with element
(*a*) hydrogen (*b*) nitrogen
(*c*) oxygen (*d*) All of these.

16.353. Plastic
(*a*) is an organic substance
(*b*) consists of natural or synthetic binders
(*c*) finished products are rigid and stable at normal temperature
(*d*) is capable of flow when necessary heat and pressure are applied
(*e*) All the above.

16.354. Pick up the correct statement from the following :
(*a*) The substance which consists of one primary chemical, is known as monomer
(*b*) The polymer consists of thousands of monomers joined together
(*c*) The polymer molecule is called macromolecule
(*d*) A polymetric material consists of a large number of long-chain molecules
(*e*) All the above.

16.355. Polymerization helps to improve the property of
(*a*) strength (*b*) rigidity
(*c*) elasticity (*d*) all of these.

16.356. The method of addition polymerization is used for obtaining :
(*a*) polythylene (*b*) polypropylene
(*c*) polyvinylchloride (*d*) polystyrene
(*e*) All of these.

16.357. In the method of condensation polymerization,
(*a*) low-molecular substances are removed from the high molecular substance
(*b*) the reaction proceeds with an evolution of ammonia
(*c*) the reaction proceeds with an evolution of hydrogen chloride
(*d*) all the above.

16.358. Which one of the following polymers is obtained from condensation polymerization ?
(*a*) phenol formaldehyde
(*b*) carbamide
(*c*) melamine-formaldehyde
(*d*) all of these.

16.359. For obtaining vinyl chloride acetate, the method used, is
(*a*) addition polymerization
(*b*) condensation polymerization
(*c*) co-polymerization
(*d*) none of these.

16.360. The thermosetting plastic
(*a*) becomes rigid when moulded at suitable pressure and temperature
(*b*) at127°C to177°C permanently set and further application of heat does not soften it
(*c*) charrs at 343°C
(*d*) All the above.

16.361. Elastomers can extend upto
(*a*) five times their original dimensions
(*b*) seven times their original dimensions
(*c*) ten times their original dimensions
(*d*) three times their original dimensions.

16.362. The plastics made from cellulose resin
(*a*) are as clear as glass
(*b*) are tough and strong
(*c*) possess excellent electrical properties
(*d*) All the above.

16.363. Acrylic is the name of
(*a*) cellulose resin (*b*) alkyl resin
(*c*) methyl metha crylate
(*d*) cumarone-indene.

16.364. Acrylic sheets
(*a*) possess10 to17 times greater breakage resistance than that of glass of equivalent thickness
(*b*) are generally unaffected by most house- hold detergents
(*c*) possess the light transmission rate of 93%
(*d*) are available in various shapes
(*e*) all the above.

16.365. Pick up the correct statement from the following :
(*a*) Styrene resin is produced from ethylene which is made from petroleum
(*b*) Styrene resin is light in weight
(*c*) Styrene resin transmits ultraviolet waves of light
(*d*) Styrene resin is used to manufacture utensils which are unaffected by chemicals
(*e*) All the above.

16.366. The plastics prepared from Vinyl resin are
(*a*) odourless (*b*) non-toxic
(*c*) transparent (*d*) colourless
(*e*) all of these.

16.367. Pick up the correct statement from the following :
(*a*) Melamine is obtained from calcium carbide
(*b*) Formaldehyde is prepared synthetically from methane
(*c*) The melamine when reacted with formaldehyde forms the melamine-formaldehyde resin
(*d*) The plastics made from melamine formaldehyde resin, are used for electrical insulators
(*e*) All the above.

16.368. Pick up the correct statement from the following :
(*a*) The phenol is carbolic acid
(*b*) The phenol is either extracted from coaltar or prepared from benzene
(*c*) Phenol reacts with formaldehyde, to form phenol formaldehyde resin
(*d*) The plastics prepared from phenol-formaldehyde are used for paints, varnishes, w.c. seats
(*e*) All the above.

16.369. Pick up the correct statement from the following :
(*a*) Catalysts are added to assist and accelerate the hardening of resin,
(*b*) The fillers are inert materials and they impart strength and hardness
(*c*) Fibrous fillers increase thermal resistance
(*d*) All the above.

16.370. Pick up the correct statement from the following :
(*a*) The plastic bottles are made by the process of blowing
(*b*) The plastic sheets are made by the calendering process in which the plastic material is allowed to pass between cylindrical rollers

(*c*) The application of thermo-setting resins on sheets of paper, is called laminating process

(*d*) The plastic articles made by placing raw material in the desired moulds, is known as moulding process

(*e*) All the above.

16.371. Pick up the incorrect statement from the following :

(*a*) Plastics are chemical resistant

(*b*) Plastics are durable

(*c*) Plastics are ductile

(*d*) Plastics are excellent electric insulators.

16.372. Pick up the non-inflammable plastic from the following:

(*a*) Cellulose acetate plastics

(*b*) Polyvinyl chloride plastics

(*c*) Phenol formaldehyde plastic

(*d*) Urea formaldehyde plastic.

16.373. Pick up the correct statement from the following :

(*a*) Plastics have generally low melting point

(*b*) The coefficient of thermal expansion of plastics is about three times than of steel

(*c*) The acoustical boards prepared by impregnating fibre-glass with phenolic resins has absorption coefficient of about 0.67

(*d*) All the above.

16.374. The PVC doors and windows are preferred as they are

(*a*) rust proof (*b*) rot proof

(*c*) termile proof (*d*) water proof

(*e*) all of these.

16.375. Based on flow quality, the sequence of pipes is

(*a*) A.C. pipes, G.I. pipes, C.I. pipes, PVC pipes

(*b*) C.I. pipes, G.I. pipes, A.C. pipes, PVC pipes

(*c*) C.I. pipes, G.I. pipes, PVC pipes, A.C. pipes

(*d*) None of these.

16.376. Match List I with List II and select a correct answer by using the codes given below the lists :

List I (Abrasive)	*List II (Use)*
A. Diamond	1. Polishing glass
B. Garnet	2. Polishing precious stone
C. Corundum	3. Rock drills
D. Emery	4. Grinding stone

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	2	1	3	4
(*c*)	4	3	1	2
(*d*)	1	4	2	3.

16.377. The most commonly used synthetic abrasive is

(*a*) aluminium carbide (*b*) boric acid

(*c*) silicon (*d*) All of these.

16.378. Pick up the synthetic resin from the following :

(*a*) Malamine resin (*b*) Phenolic resin

(*c*) Resorcinol resin (*d*) Urea resin

(*e*) All of these.

16.379. Asbestos

(*a*) is a natural fibrous mineral substance

(*b*) is composed of hydrous silicates of calcium and magnesium ($CaSiO_3$, $3MgSiO_3$)

(*c*) contains iron oxide and alumina

(*d*) all the above.

16.380. Which one of the following is acid resistant asbestos:

(*a*) actinolite asbestos (*b*) amosite asbestos

(*c*) anthophylite asbestos(*d*)crocidolite asbestos

(*e*) All the above.

16.381. Non acid-resistant asbestos is :

(*a*) tremolite asbestos (*b*) chrysolite abestos

(*c*) amosite absestos (*d*) none of these.

16.382. Asbestos

(*a*) is an excellant insulator for heat and electricity

(*b*) is fire-proof and acid proof

(*c*) has specific gravity equal to 3.10

(*d*) is smooth like glass and silk

(*e*) All the above.

16.383. Initial setting time of cement for asbestos cement products should be not less than

(*a*) 30 minutes (*b*) 50 minutes

(*c*) 75 minutes (*d*) 90 minutes.

16.384. Asbestos cement

(*a*) is brittle

(*b*) warps due to changes in humidity

(*c*) strength is lowered when saturated by water

(*d*) all the above.

16.385. Bitumen completely dissolves in

(*a*) carbon disulphide (*b*) chloroform

(*c*) benzol (*d*) coaltar

(*e*) All of these.

16.386. Pick up the correct composition of bitumen from the following :

	Carbon	*Hydrogen*	*Oxygen*
(*a*)	87%	11%	2%
(*b*)	80%	16%	4%
(*c*)	75%	20%	5%

(*d*) None of these.

16.387. For filling cracks in masonry structures, the type of bitumen used, is

(*a*) cut-back bitumen (*b*) bitumen-emulsion

(*c*) blown bitumen (*d*) plastic bitumen.

16.388. The main constituent of fly-ash, is

(*a*) aluminium oxide (*b*) silica

(*c*) ferrous oxide (*d*) All of these.

16.389. Inhaling of fly-ash over a long period causes

(*a*) silicosis (*b*) fibrosis of lungs

(*c*) bronchitis (*d*) pneumonitis

(*e*) All of these.

16.390. For making fly-ash building bricks, the following mix of fly-ash, sand and lime, is

(*a*) 80 :13 : 7 (*b*) 70 : 20 :10
(*c*) 60 : 35 : 5 (*d*) none of these.

The following17 items, consist of two statements one labelled the 'Assertion A' and other labelled the 'Reason R'. You are to examine these two statements and decide if the Assertion A and the Reason R are individually true and if so, whether the Reason is a correct explanation of the Assertion. Select your answers to these items using the codes given below and mark your answers sheet accordingly.

Codes :

(*a*) Both A and R are true and R is the correct explanation of A
(*b*) Both A and R are true but R is not a correct explanation of A
(*c*) A is true but R is false
(*d*) A is false but R is true.

16.391. Assertion : Porous stones should not be recommended for places subjected to frost, rain or moisture.

Reason : The rain water while falling through atmosphere absorbs some acidic gases. Such rain water if absorbed by porous stones causes the constituents of stones crumble.

16.392. Assertion : Lime should be present in good brick earth in a very finely powdered state.

Reason : Even small particles of the size of pin-head cause flaking of the bricks.

16.393. Assertion : Fourth class bricks are used for concrete in foundations.

Reason : The over burnt bricks have a compact structure and are stronger than even the first class bricks.

16.394. Assertion : The slaked lime should always be used as fresh as possible.

Reason : It has the tendency to absorb carbonic acid from the atmosphere in the presence of moisture.

16.395. Assertion : In initial stage, the gain in strength in hydrophobic cement is less.

Reason : The hydrophobic films on cement grains prevent the interaction with water.

16.396. Assertion : The presence of moisture in sand increases the volume of sand.

Reason : The moisture causes film of water around sand particles which increase.

16.397. Assertion : The mortar with surkhi should not be used for external plaster.

Reason : It disintegrates under the action of air and humidity.

16.398. Assertion : For strong and durable concrete, minimum quantity of water should be used to have reasonable degree of workability.

Reason : The excess water occupies space in concrete and on evaporation, the voids are created in concrete.

16.399. Assertion. The intermittant spraying of water on the dried surface of concrete has harmful effects as compared to the advantages of curing.

Reason : The green young concrete which is constantly subjected to multiple wetting and drying leads to early deterioration.

16.400. Assertion : Teak and sal resist the attack of white ants.

Reason : Such timbers contain certain chemicals in their composition. The smell of these chemicals, is not favourable for termites.

16.401. Assertion : If we remove the bark of a tree, it causes the death of tree.

Reason : The cambium layer gets exposed and the cells cease to be active.

16.402. Assertion : The fungi do not attack timber if the moisture content of timber is above 20 percent and there is presence of air and warmth.

Reason : The fungi grow if the moisture content of timber is above 20 per cent and there is presence of air and warmth.

16.403. Assertion : The plywoods do not split when nailed near edges.

Reason : They possess cross grained nature.

16.404. Assertion : The thermosetting plastics are used for making paints and varnishes.

Reason : The thermosetting plastics are soluble in alcohol and certain organic solvents.

16.405. Assertion : It is necessary to make adequate provisions for expansion and contraction of the acrylic sheets of large dimensions.

Reason : The coefficient of thermal expansion of acrylic sheets is too large.

16.406. Assertion : The lubricants are applied on the surface of the moulds.

Reason : The application of lubricants on the surface of moulds allows easy removal of finished plastic article from the moulds.

16.407. Assertion : A five minute inhalation of blue asbestos dust can produce cancer upto 20 years afterwards.

Reason : Asbestos fibres are capable of being separated to extreme fineness and into dust.

16.408. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Granite	1. Water worn pebble
B. Sand stone	2. Igneous rock
C. Gneiss	3. Sedimentary rock
D. Gravel	4. Metamorphic rock

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	2	3	4	1
(*c*)	3	4	1	2
(*d*)	4	3	2	1

16.409. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. serpentine	1. marine works
B. Quartzite	2. flooring
C. Slate	3. Indoor decoration
D. Granite	4. road metal

Codes :

	A	B	C	D
(*a*)	1	4	3	2
(*b*)	2	4	3	1
(*c*)	1	2	3	4
(*d*)	3	4	2	1

16.410. Match List I with List II and select the correct answer by using the codes given below the lists :

List I (Rock)	*List II (Weight)*
A. Sand stone	1. 8880 kg/m^3
B. Slate	2. 9300 kg/m^3
C. Marble	3. 7200 kg/m^3
D. Granite	4. 8725 kg/m^3

Codes :

	A	B	C	D
(*a*)	3	2	4	1
(*b*)	1	3	4	2
(*c*)	2	1	4	3
(*d*)	1	2	3	4

16.411. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Granites	1. Uttar Pradesh
B. Basalts	2. Gujarat
C. Slates	3. Deccan Traps
D. Sand stones	4. Rajasthan

Codes :

	A	B	C	D
(*a*)	1	3	2	4
(*b*)	2	3	4	1
(*c*)	2	3	1	4
(*d*)	4	3	1	2

16.412. Match List I with List II and select the correct answer using the codes given below the lists :

List I	List II
A. Blasting powder	1. 93% nitroglycerine and 7% gun cotton
B. Dynamite	2. 65% saltpetre, 20% sulphur and15% char-coal
C. Nitrocellulose	3. 75% nitro-glycerine and 25% sandy earth
D. Blasting gelatine	4. Saturated cotton with nitric acid

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	4	3	2	1
(*c*)	2	3	4	1
(*d*)	1	3	2	4

16.413. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Rubber masonry	1. hammer-dressed
B. Ashlar masonry	2. true faced
C. Freshly quarried blocks	3. rock faced
D. Fine ashlar	4. quarry sap

Codes :

	A	B	C	D
(*a*)	1	3	4	2
(*b*)	2	4	1	3
(*c*)	3	2	1	4
(*d*)	1	4	2	3

16.414. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Lime stones	1. Not affected
B. Porous & soft stones	2. Boring worms
C. Soft sand stones	3. Mechanical agents
D. Granite	4. Chemical agents

Codes :

	A	B	C	D
(*a*)	4	3	2	1
(*b*)	1	3	4	2
(*c*)	2	4	3	1
(*d*)	1	2	4	3

16.415. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Granite	1. Meghalaya
B. Rajmahal traps	2. West Bengal
C. Sandstone	3. Orissa
D. Limestone	4. Bihar

Codes:

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	4	3	2	1
(*c*)	3	4	2	1
(*d*)	1	3	4	2

16.416. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Granite	1. Haryana
B. Basalt	2. Himachal Pradesh
C. Slate	3. Punjab
D. Limestone	4. Uttar Pradesh

Codes :

	A	B	C	D
(*a*)	3	4	1	2
(*b*)	1	2	3	4
(*c*)	4	3	2	1
(*d*)	1	3	4	2

16.417. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Ancient Indian temples	1. White marble
B. Taj Mahal, Agra	2. Granite
C. Red Fort, Delhi,	3. Pink and stone
D. Rashtrapati Bhawan, Delhi,	4. Red and stone

Codes :

	A	B	C	D
(*a*)	2	1	4	3
(*b*)	1	2	3	4
(*c*)	2	3	1	4
(*d*)	1	2	4	3

16.418. Match List I with List II and select the correct answer in respect of brick earth by using the codes given below the lists:

List I	*List II*
A. Silica	1. provides red colour
B. Alumina	2. provides bondage to clay particles
C. Lime	3. provides hardness
D. Oxide of iron	4. prevents shrinkage

Codes :

	A	B	C	D
(*a*)	4	3	2	1
(*b*)	1	3	4	2
(*c*)	2	3	1	4
(*d*)	4	1	2	3

16.419. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Bull-nosed brick	1. for arches over doors and windows
B. Plinth bricks	2. on top of parapet wall
C. Coping bricks	3. for use in plinths
D. Voussoirs	4. for rounding off sharp corners

Codes:

	A	B	C	D
(*a*)	4	3	2	1
(*b*)	1	2	3	4
(*c*)	4	2	1	3
(*d*)	1	3	4	2

16.420. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Earthenware	1. burnt at high temperature
B. Stoneware	2. burnt at low temperature
C. Terracotta	3. means baked earth
D. Faience	4. means glazed terracotta

Codes :

	A	B	C	D
(*a*)	2	1	3	4
(*b*)	1	3	4	2
(*c*)	2	1	3	4
(*d*)	1	2	3	4

16.421. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Biscuiting of furnace	1. made with dry mixture and fireclay and crushed stone
B. Glazing of biscuited material	2. throwing salt during burning operation
C. Salt glazing	3. burnt at 12000°C
D. Sanitary tiles	4. burnt at 7000°C

Codes :

	A	B	C	D
(*a*)	4	3	2	1
(*b*)	1	2	3	4
(*c*)	1	3	4	2
(*d*)	4	2	3	1

16.422. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Granite	1. Quartzite
B. Sandstone	2. Slate
C. Lime stone	3. Marble
D. Shale	4. Gneiss

Codes:

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	4	3	2	1
(*c*)	4	1	3	2
(*d*)	3	2	1	4

16.423. Consider the following statements :

A. Granite, Basalt and trap are unstratified rocks

R. These rocks do not show any sign of stratification.

Of these statements:

(*a*) both A and R are true and R is the correct explanation of A.

(*b*) both A and R true, but R is not a correct explanation of A.

(*c*) A is true but R is false.

(*d*) A is false but R is true.

16.424. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Argillaceous	1. Sand (silica SiO_2)
B. Silicious	2. Lime (CaO)
C. Calcareous	3. Clay (alumina Al_2O_3)

Codes :

	A	B	C
(*a*)	1	2	3
(*b*)	3	2	1
(*c*)	2	1	3
(*d*)	3	1	2

16.425. Consider the following statements :

A. Stones disintegrate in cold region

R. Volume of water driven in the pores of stones increases on freezing. Of these statements :

(*a*) Both A and R are true.
(*b*) A is true but R is false,
(*c*) A is false but R is true
(*d*) both A and R are false.

16.426. Consider the following statements :
A. Porous stones are used at places where they are not to encounter moisture
R. Porous stones are generally strong.
Of these statements :
(*a*) Both A and R are true.
(*b*) Both A and R are false.
(*c*) A is true but R is false.
(*d*) A is false but R is true.

16.427. Match List I with List II and select the correct answer for quarrying stones by using the codes given below the lists:

List I	*List II*
A. Blasting method	1. Rocks bedded in horizontal layers
B. Heating method	2. Soft stratified rocks
C. Wedging method	3. Stones burried in earth
D. Excavating,	4. For tunneling

Codes:

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	4	1	2	3
(*c*)	1	3	4	2
(*d*)	1	3	2	4

16.428. Consider the following statements :
A. Stones should be placed in such a manner that its natural bed is at right angles to the expected pressure.
R. In doing so the stones offer maximum resistance to crushing and also maximum resistance to disintegration by rain water
Of these statements:
(*a*) Both A and R are true.
(*b*) A is true but R is false,
(*c*) A is false but R is true.
(*d*) Both A and R are false.

16.429. Match List I with List II and select the correct answer by using codes given below the lists :

List I	*List II*
A. For carved and ornamental work	1. Quartzite
B. For structures facing sea	2. Granite
C. For construction industrial towns	3. Marble
D. For railway ballast	4. Fine grained sand stone

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	4	2	1
(*c*)	4	2	3	1
(*d*)	1	3	4	2

16.430. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Hardest rock	1. Slate
B. Shingle	2. Marble
C. Ornamental work	3. Granite
D. Metamorphic rock	4. Water worn pebbles

Codes :

	A	B	C	D
(*a*)	1	3	2	4
(*b*)	4	2	3	1
(*c*)	3	4	2	1
(*d*)	1	4	2	3

16.431. Match List I with List II and select the correct functions of the ingredients of brick earth by using codes given below the lists :

List I	*List II*
A. Silica	1. In the presence of silica and alumina
B. Alumina	2. reduces shrinkage of bricks and acts as a flux.
C. Lime	3. a tenacious finely grained mineral compounds.
D. Magnesia	4. in the presence of iron,, it gives yellowish tint
E. Iron oxide	5. fuses in the presence of alumina at low temperature.

Codes :

	A	B	C	D	E
(*a*)	4	2	3	5	1
(*b*)	1	4	3	2	5
(*c*)	3	2	4	1	5
(*d*)	5	3	2	4	1
(*e*)	1	4	3	5	2

16.432. Match List I with List II regarding effects the codes given below the lists : of ingredients in earth and select the correct answer by using

List I	*List II*
A. Excess lime	1. causes deformation of bricks
B. Iron pyrites	2. weak and porous bricks are obtained
C. Pebbles of stones	3. causes efflorescene
D. Salt	4. crystalize and split the brick.

Codes :

	A	B	C	D
(*a*)	1	4	2	3
(*b*)	1	2	3	4
(*c*)	4	3	2	1
(*d*)	1	2	3	4

16.433. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Allahabad tiles	1. square, hexagonal or other geometrical pattern
B. Maggalore tiles	2. consist of two sets of tiles
C. Pot tiles	3. flat tiles with a suitable key projection
D. Flooring tiles	4. semi-circular in section and tapers along the length.

Codes :

	A	B	C	D
(*a*)	4	1	2	3
(*b*)	1	2	3	4
(*c*)	2	3	4	1
(*d*)	4	1	3	2

16.434. What is the correct sequence of operations involved in the manufacture of tiles ?

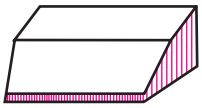
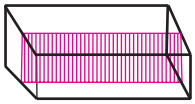
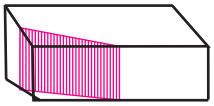
1. Moulding
2. Preparation of clay
3. Burning
4. Drying

Choose the answer from the codes given below:

Codes :

(*a*)	1	2	3	4
(*b*)	4	3	2	1
(*c*)	1	3	4	2
(*d*)	2	1	4	3

16.435. Match List I with List II and select the correct answer by using codes given below the lists :

List I		*List II*
A.		1. King closer
B.		2. Plinth brick
C.		3. Bullnosed brick
D.		4. Queen brick

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	4	3	2	1
(*c*)	1	3	4	2
(*d*)	2	1	4	3

16.436. Match List I with List II and select the correct answer by using the codes given under lists :

List I	*List II*
A. Stoneware	1. good in appearance
B. Porcelain	2. hygienic consumer goods
C. Glazed earthen ware	3. gets sanitary ware
D. Enamelled articles	4. attacked by hydrofluoric acid

Codes :

	A	B	C	D
(*a*)	4	3	2	1
(*b*)	1	2	3	4
(*c*)	2	1	4	3
(*d*)	3	2	1	4

16.437. Regarding the composition of raw material used for manufacturing ordinary Portland cement, match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Calcium oxide (CaO)	1. 2%
B. Silica (SiO_2)	2. 3%
C. Aluminium oxide (Al_2O_3)	3. 5%
D. Ferrous oxide, (Fe_2O_3)	4. 65%
E. Magnesium oxide (MgO)	5. 25%

Codes :

	A	B	C	D	E
(*a*)	4	5	3	2	1
(*b*)	1	2	3	4	5
(*c*)	3	4	5	1	2
(*d*)	2	1	3	5	4

16.438. Consider the following statements :

A. A cement having lesser aluminate shall have lesser initial strength

B. The aluminate is the first to set and harden.

Of these statements:

(*a*) Both A and R are false.
(*b*) Both A and R are true.
(*c*) A is true but R is false.
(*d*) A is false but R is true.

16.439. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	List II
A. Water and cement	1. fast in reaction
B. Tricalcium silicate	2. slow in reaction
C. Di-calcium silicate	3. slowest in reaction
D. Tri-calcium aluminate	4. hydrates.

Codes :

	A	B	C	D
(*a*)	4	2	3	1
(*b*)	1	3	2	4
(*c*)	4	1	2	3
(*d*)	3	2	1	4

16.440. Match List I with List II and select the correct answer by using the codes given below the lists :

List I	*List II*
A. Soundness of cement	1. Le Chatelier's apparatus
B. Initial setting time of	2. Vicat's apparatus cement
C. fineness of cement	3. Sieve analysis
D. consistency of cement	

Codes :

	A	B	C	D
(*a*)	1	2	3	2
(*b*)	2	1	3	3
(*c*)	1	3	3	2
(*d*)	3	1	2	2

16.441. Match List I with List II and select the correct answer by using codes given under lists :

List I	*List II*
A. P.V.C.N. 25 to 40	1. Paint for prime coat on wood

B. P.V.C.N. 28 to 40	2. Semi-gloss paint
C. P.V.C.N. 35 to 40	3. Paint for prime coat on metal
D. P.V.C.N. 35 to 45	4. Paint for exterior surface of house

Codes :

	A	B	C	D
(*a*)	3	4	1	2
(*b*)	1	2	3	4
(*c*)	2	3	4	1
(*d*)	1	2	4	3

16.442. Match List I with List II and select the correct answer by using codes given under lists :

List I	*List II*
A. White lead	1. Priming coat to iron surfaces
B. Red lead	2. Resists sulphur vapour
C. Zinc white	3. Priming coat to wood surfaces
D. Iron oxide	4. Does not resist sulphur vapours

Codes :

	A	B	C	D
(*a*)	1	3	2	4
(*b*)	4	3	2	1
(*c*)	3	4	1	2
(*d*)	2	1	3	4

16.443. Match List I with List II and select correct answer by using codes given below the lists :

List I	*List II*
A. Tung oil	1. odour less vehicle for paints
B. Nut oil	2. used for delicate colours
C. Linseed oil	3. cheap vehicle for paints
D. Poppy oil	4. used for superior paint

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	4	2	3	1
(*c*)	4	3	1	2
(*d*)	1	2	4	3

16.444. Match List I with List II and select correct answer by using the codes given below the lists :

List I (Tint)	*List II (Pigment of point)*
A. Green	1. Indigo
B. Black	2. Zinc chrome
C. Blue	3. Copper sulphate
D. Yellow	4. Graphite

Codes :

	A	B	C	D
(*a*)	3	4	1	2
(*b*)	1	2	3	4
(*c*)	3	2	1	4
(*d*)	4	3	2	1

16.445. Match List I with List II and select correct answer by using codes given below the lists :

List I (Paint)	*List II (Uses)*
A. Aluminium paint	1. for resisting corrossive reaction
B. Anti-corossive paint	2. for painting iron work under water
C. Bituminous paint	3. for painting surfaces exposed to high temperature
D. Cellulose paint	4. for painting oil storage tank

Codes:

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	2	4	1
(*c*)	4	1	2	3
(*d*)	1	3	2	4

16.446. Match List I with List II and select correct answer by using codes given below the lists :

List I (Defect)	*List II (Cause)*
A. Cracking of paint	1. Paint film becomes powdery
B. Efflorscene	2. Bleaching or fading of colours
C. Chalking of surfaces	3. Highly saline atmospheric conditions
D. Fleeting	4. Insufficient flexibility of the film of paint

Codes:

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	2	1	4
(*c*)	4	2	1	3
(*d*)	4	3	1	2

16.447. Match List I with List II and select correct answer by using codes given below the lists :

List I	*List II*
A. Enamel paint	1. excellent alkali resistant
B. Emulsion paint	2. requires a coat of titanium white in pale linseed oil
C. Graphite paint	3. mostly used in show rooms
D. Plastic paint	4. most suitable for underground railways

Codes:

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	2	1	4	3
(*c*)	2	1	3	4
(*d*)	4	3	2	1

16.448. Match List I with List II and select correct answer by using codes given below the lists :

List I (Defect in painting)	*List II (Causes)*
A. Blistering	1. due to bad ventilation
B. Bloom	2. due to poor adhesion of paint
C. Flaking	3. due to insufficient opacity
D. Grinning	4. due to entrapped water vapours in the painted surface

Codes :

	A	B	C	D
(*a*)	4	1	2	3
(*b*)	1	2	3	4
(*c*)	3	4	2	1
(*d*)	1	3	4	2

16.449. Match List I with List II and select correct answer by using codes given below the lists :

List I (*Defects in paint*)	*List II* (*Causes of defect*)
A. Running	1. due to thickly painted vertical surfaces
B. Saponification	2. due to chemical action of alkalies
C. Sagging	3. due to too smooth surface
D. Wrinkling	4. due to thickly painted horizontal surface

Codes :

	A	B	C	D
(*a*)	3	2	1	4
(*b*)	1	2	3	4
(*c*)	3	2	4	1
(*d*)	1	2	4	3

16.450. Plasticizers are added to cellulose paints to improve the film for :

(*a*) adhesion (*b*) flexibility
(*c*) toughness (*d*) smoothness
(*e*) All of these

16.451. Match List I with List II and select the correct answer by using codes given below the lists :

List I (Varnish)	*List II (Solvent)*
A. Oil varnish	1. Methylated spirit
B. Spirit varnish	2. hot water
C. Turpentine varnish	3. Linseed oil
D. Water varnish	4. Turpentine

Codes :

	A	B	C	D
(*a*)	3	1	4	2
(*b*)	1	4	3	2
(*c*)	2	3	4	1
(*d*)	1	2	3	4

16.452. What is the correct sequence of operations involved in the process of varnishing ?

Choose the correct answer from the codes given below :

Codes:
1. slopping
2. knotting
3. preparation of surface
4. application of varnish coats

(*a*)	1	2	3	4
(*b*)	2	4	3	1
(*c*)	3	2	1	4
(*d*)	4	3	2	1

16.453. Consider the following statements :
A. The whitewashing is extensively used for ceilings of houses
R. The lime kills the germs and reflects light and thus increases the brightness of the surface.
Of these statements:
(*a*) Both A and R are false.
(*b*) A is true but R is false.
(*c*) A is false but R is true.
(*d*) Both A and R are true.

16.454. Consider the following statements :
A. The oil painted walls receive the oil bound distemper.
B. If such surfaces are given a priming coat of kerosene.
Of these statements:
(*a*) Both A and B are true
(*b*) Both A and B are false
(*c*) A is true and B is false
(*d*) A is false and B is true

16.455. Consider the following statements :
A. The distempers are available both in powder and paste
B. The distempers are mixed with linseed oil before use.
Of these statements:
(*a*) Both A and B are true
(*b*) Both A and B are false.
(*c*) A is true and B is false
(*d*) A is false and B is true.

16.456 . Consider the following statements :
A. The painted surfaces develop efflorescence or crystalline deposits.
B. The defect is caused by highly saline atmosphere.
Of these statements:
(*a*) Both A and B are false
(*b*) Both A and B are true
(*c*) A is true and B is false
(*d*) A is false and B is true.

16.457. Consider the following statements :
A. The oil paint should be applied during humid and damp weather
B. The presence of dampness on wall surface considerably increases the life of oil paint coating
Of these statements :
(*a*) Both A and B are true
(*b*) A is true and B is false
(*c*) A is false and B is true
(*d*) Both A and B are false.

16.458. Consider the following statements :
A. The white lead is used for painting iron surface
B. It affords protection against rusting.
Of these statements:
(*a*) Both A and B are true
(*b*) Both A and B are false
(*c*) A is true and B is false
(*d*) A is false and B is true.

16.459. Match List I with List II and choose a correct answer by using the codes given below the lists:

	List I (Material)		*List II (Volume immediately after excavation*	*(Volume after compaction*
A.	Gavel	1.	0.95	0.89
B.	Clay	2.	1.2	0.90
C.	Chalk	3.	1.0	0.92
D.	Sandy soil	4.	1.8	1.4

Codes :

	A	B	C	D
(*a*)	1	4	3	2
(*b*)	3	2	4	1
(*c*)	4	3	2	1
(*d*)	2	1	3	4

16.460. Dolomite, a rock forming mineral

(*a*) contains brittle crystals

(*b*) is heavier than calcite

(*c*) is a chemical composition of bicarbonate of magnesium and calcium

(*d*) Possesses the ratio of magnesium bicarbonate and calcium bicarbonate as 46 : 54

(*e*) All the above.

16.461. Pick up the correct statement from the following:

(*a*) Calcite is a calcium carbonate ($CaCO_3$)

(*b*) Dolomite is chemical composition of magnesium bicarbonate and calcium bicarbonate

(*c*) Gypsum is the hydrated sulphate of calcium ($CaSO_4 . 2H_2O$)

(*d*) All the above.

16.462. The Smith's test of a stone sample is performed to determine :

(*a*) the presence of soluble matter

(*b*) the hardness of the stone

(*c*) the toughness of the stone

(*d*) the compressive strength of the stone.

16.463. Pick up the correct statement regarding Deval's attrition test machine from the following :

(*a*) The diameter and length of cylinder are respectively 20 cm and 34 cm

(*b*) The axes of cylinders make an angle of 30° with the horizontal

(*c*) The cylinders the rotated about horizontal axis for 5 hours at the rate of 30 r.p.m.

(*d*) The contents of the cylinders are passed through a sieve of 1.50 mm mesh.

(*e*) All the above.

16.464. Match the List I with List II and select a suitable answer by using the codes given below the lists :

	List I (Stone test)	*List II (Purpose)*
A.	Acid test	1. rate of wear
B.	Attrition test	2. hardness
C.	Hardness test	3. weathering quality
D.	Impact test	4. toughness.

Codes :

	A	B	C	D
(*a*)	1	4	3	2
(*b*)	3	1	2	4
(*c*)	4	3	1	2
(*d*)	2	3	4	1

16.465. Pick up the correct statement from the following :

(*a*) The coefficient of hardness of stone used in road work should be greater than17

(*b*) For a good building stone, percentage wear should be equal to or less than 3 percent

(*c*) The free quartz suddenly expands at a temperature lower than 600°C

(*d*) The argillaceous stones are poor in strength, but resist fire quite well

(*e*) All the above.

16.466. The stone whose margin of about 20 mm width is sunk on all the edges and whose central portion is made to project about 15 mm, is called

(*a*) reticulated finish (*b*) tooled finish

(*c*) furrowed finish (*d*) sunk finish

16.467. Which one of the following statements is incorrect ?

(*a*) The pre-cast concrete tiles with marble chips at top surface, are known as mosaic tiles

(*b*) A mixture of marble chips and cement is called Terrazo

(*c*) The calcium hydroxide [$Ca(OH)_2$] absorbs carbon dioxide from atmosphere and forms calcium carbonate ($CaCO_3$) which increases the strength of stone

(*d*) The tiles used for decorative purposes in floors, walls, ceiling and roofs are called encaustic tiles

(*e*) None of the above.

16.468. Match List I with List II and select a current answer by using the codes given below the lists :

	List I	*List II*
A.	Calcination	1. Lime obtained by calcination of pure lime
B.	Lime	2. Slaked quick lime
C.	Setting	3. Heating to redness in air
D.	Slaked lime	4. Hardening of lime.

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	1	4	2
(*c*)	3	1	4	2
(*d*)	4	2	3	1

16.469. Pick up the incorrect statement from the following :

(*a*) The slaked lime should be used as fresh as possible to avoid formation of carbonate of lime

(*b*) The slaked lime after conversion to carbonate of lime attains a good setting property

(*c*) By adding sufficient quantity of water to quick lime hydrated lime is obtained

(*d*) Cracking, swelling and becoming powder of quick lime due to mixing of sufficient quality of water, is the process of slaking
(*e*) All the above.

16.470. Pick up the correct statement from the following :
(*a*) Clay in lime stones provides hydraulicity in lime
(*b*) Clay in lime stone makes lime soluble in water
(*c*) Excess clay in lime stone retards slaking of lime
(*d*) Small quantity of clay in lime stone assests slaking
(*e*) None of the above.

16.471. Match List I with List II and select a correct answer by using the codes given below the lists :

List I	*List II*
A. Medullary rays	1. A thin layer of sap between sap wood and inner back
B. Cambium layer	2. Inner annual rings surroundings the path
C. Pith	3. Inner most central core of the tree
D. Heartwood	4. Thin radial fibres in the stem cross section

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	2	4	3	1
(*c*)	4	1	3	2
(*d*)	3	4	2	1

16.472. Match List I with List II and select a correct answer by using the codes gives below the lists :

List I (Defect)	*List II (Causes)*
A. Dry rot	1. Conversion of wood into dry powder form
B. Heart rot	2. Growth of a branch
C. Wet rot	3. Conversion of wood into greyish brown colour
D. Brown rot	4. Conversion of tree colour brown.

Codes :

	A	B	C	D
(*a*)	4	3	2	1
(*b*)	1	2	3	4
(*c*)	4	2	3	1
(*d*)	2	4	1	3

16.473. Match List I with List II and select a correct answer by using the codes given below the lists :

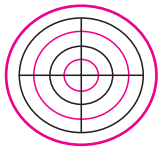
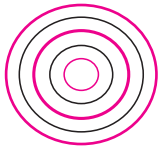
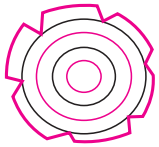
List I	*List II*
A. Coarse grain trees	1. Bases of cut off branches of
B. Dead wood	2. Tree grown
C. Foxiness colour	3. Light weight and reddish
D. Knots	4. Rapid growth of tree.

Codes :

	A	B	C	D
(*a*)	3	1	4	2
(*b*)	1	2	3	4
(*c*)	4	3	2	1
(*d*)	2	4	1	3

16.474. The peculiar curved swellings found on the body of a tree, are called
(*a*) knots (*b*) hearts rots
(*c*) rindgalls (*d*) None of these.

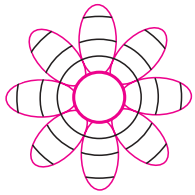
16.475. Match List I with List II and select a suitable answer by using the codes given below the lists :

List I	*List II*
A. 	1. Cup shakes
B. 	2. Heart shakes
C. 	3. Star shakes
D. 	4. Ring shakes

Codes :

	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	4	2	1
(*c*)	2	4	1	3
(*d*)	4	3	1	2

16.476. The adjoining figure indicates



(*a*) Star shakes (*b*) Wind cracks
(*c*) Heart shakes (*d*) None of these.

16.477. Match List I with List II and select a suitable answer by using the codes given below the lists :

List I
A. Bethel's method of preservation of timber
B. Sodinum paints
C. Sir Abel's process of timber preservation
D. Ascu solution

List II
1. Preservation of timber from white ants
2. Fire resistant
3. Odourless
4. Creosote oil

Codes :

	A	B	C	D
(*a*)	4	1	2	3
(*b*)	1	2	3	4
(*c*)	4	3	1	2
(*d*)	3	4	2	1

16.478. Pick up the most valuable timber from the following:

(*a*) Deodar (*b*) Mahagany
(*c*) Pine (*d*) Teak
(*e*) toon.

16.479. Arrange the following timbers in order of their decreasing weight at12 percent moisture :

1. Mahagany 2. Shisham
3. Teak 4. Toon

(*a*)	1	2	3	4
(*b*)	2	4	3	1
(*c*)	2	1	3	4
(*d*)	4	3	2	1

16.480. Toon is abundantly found in

(*a*) Madhya Pradesh (*b*) Andhra Pradesh
(*c*) Assam (*d*) Punjab.

16.481. Pick up the correct statement from the following :

(*a*) The planks obtained by tangetial sawing generally warp too much
(*b*) The solignum paints preserve timber from white ants
(*c*) The falling of trees in autumn and spring should be avoided
(*d*) The cost of radial sawing is always high
(*e*) All the above.

16.482. Pick up the timber from the followings which is used for railway sleepers :

(*a*) Sal (*b*) Mahagany
(*c*) Deodar (*d*) Teak.

16.483. Match List I with List II and select a correct answer by using the codes given below the lists

List I (Fuel)	*List II (Calorific value)*
A. Hydrogen	1. 2400 gm calories
B. Carbon monoxide	2. 34460 gm calories
C. Methane	3. 8080 gm calories
D. Carbon	4. 13060 gm calories

Codes :

	A	B	C	D
(*a*)	1	4	2	3
(*b*)	2	1	4	3
(*c*)	4	3	1	2
(*d*)	3	2	3	4

ANSWERS

1. Introduction Rocks and Minerals

1. (*d*) 2. (*b*) 3. (*e*) 4. (*d*) 5. (*c*) 6. (*d*) 7. (*d*) 8. (*e*)
9. (*e*) 10. (*c*) 11. (*a*) 12. (*a*) 13. (*a*) 14. (*e*) 15. (*c*) 16. (*e*)
17. (*e*) 18. (*c*) 19. (*e*) 20. (*d*) 21. (*c*) 22. (*a*) 23. (*d*) 24. (*a*)

2. Stones as Building Materials

1. (*d*) 2. (*d*) 3. (*a*) 4. (*d*) 5. (*d*) 6. (*e*) 7. (*a*) 8. (*d*)
9. (*a*) 10. (*e*) 11. (*e*) 12. (*a*) 13. (*d*) 14. (*e*) 15. (*c*) 16. (*d*)
17. (*b*) 18. (*c*) 19. (*d*) 20. (*c*) 21. (*d*) 22. (*e*) 23. (*d*) 24. (*c*)
25. (*d*) 26. (*a*)

3. Clay Products

1. (*e*) 2. (*e*) 3. (*c*) 4. (f) 5. (*c*) 6. (*e*) 7. (*d*) 8. (*e*)
9. (*e*) 10. (*e*) 11. (*c*) 12. (*d*) 13. (*a*) 14. (*a*) 15. (*b*) 16. (*d*)
17. (*c*) 18. (*a*) 19. (*e*) 20. (*d*) 21. (*d*) 22. (*d*) 23. (*d*) 24. (*d*)
25. (*d*) 26. (*e*) 27. (*a*) 28. (*d*) 29. (*e*) 30. (*d*) 31. (*a*) 32. (*e*)
33. (*c*) 34. (*b*) 35. (*e*)

4. Lime

1. (*c*) 2. (*c*) 3. (*c*) 4. (*e*) 5. (*c*) 6. (*e*) 7. (*d*) 8. (*d*)
9. (*e*) 10. (*d*) 11. (*e*) 12. (*d*) 13. (*e*) 14. (*b*) 15. (*e*) 16. (*d*)
17. (*d*) 18. (*e*) 19. (*d*) 20. (*c*) 21. (*d*) 22. (*a*) 23. (*a*) 24. (*d*)
25. (*d*)

5. Cement

1. (*d*) 2. (*d*) 3. (*d*) 4. (*d*) 5. (*e*) 6. (*e*) 7. (*d*) 8. (*d*)
9. (*c*) 10. (*d*) 11. (*b*) 12. (*d*) 13. (*c*) 14. (*a*) 15. (*a*) 16. (*a*)
17. (*d*) 18. (*a*) 19. (*e*) 20. (*e*) 21. (*a*) 22. (*e*) 23. (*d*) 24. (*d*)
25. (*c*) 26. (*d*) 27. (*a*) 28. (*a*) 29. (*d*) 30. (*c*) 31. (*d*) 32. (*c*)
33. (*c*) 34. (*d*) 35. (*b*) 36. (*a*) 37. (*d*) 38. (*c*) 39. (*e*) 40. (*e*)
41. (*e*) 42. (*d*) 43. (*e*) 44. (*d*) 45. (*d*) 46. (*d*) 47. (*e*) 48. (*d*)
49. (*d*) 50. (*d*) 51. (*d*)

6. Mortars

1. (*e*) 2. (*c*) 3. (*e*) 4. (*e*) 5. (*e*) 6. (*e*) 7. (*e*) 8. (*e*)
9. (*e*) 10. (*d*) 11. (*e*) 12. (*e*) 13. (*d*) 14. (*d*) 15. (*d*) 16. (*d*)
17. (*d*) 18. (*c*) 19. (*e*) 20. (*d*) 21. (*e*) 22. (*c*) 23. (*d*) 24. (*d*)
25. (*e*)

7. Timber

1. (*e*) 2. (*d*) 3. (*c*) 4. (*d*) 5. (*a*) 6. (*d*) 7. (*d*) 8. (*e*)
9. (*a*) 10. (*e*) 11. (*e*) 12. (*d*) 13. (*c*) 14. (*e*) 15. (*e*) 16. (*a*)
17. (*c*) 18. (*d*) 19. (*d*) 20. (*d*) 21. (*c*) 22. (*e*) 23. (*e*) 24. (*a*)
25. (*d*) 26. (*d*) 27. (*e*) 28. (*a*) 29. (*b*) 30. (*b*) 31. (*b*) 32. (*d*)
33. (*d*) 34. (*d*) 35. (*d*) 36. (*e*) 37. (*e*) 38. (*e*) 39. (*e*) 40. (*d*)
41. (*d*) 42. (*c*) 43. (*d*) 44. (*a*) 45. (*d*) 46. (*d*) 47. (*b*) 48. (*a*)
49. (*e*) 50. (*e*) 51. (*d*) 52. (*d*) 53. (*d*) 54. (*e*) 55. (*d*)

8. Paints

1. (*e*) 2. (*e*) 3. (f) 4. (*e*) 5. (*d*) 6. (*d*) 7. (*e*) 8. (*e*)
9. (*e*) 10. (*d*) 11. (*d*) 12. (*a*) 13. (*d*) 14. (*e*) 15. (*d*) 16. (*d*)
17. (*e*) 18. (*e*) 19. (*e*) 20. (*e*) 21. (*d*) 22. (*d*) 23. (*d*) 24. (*e*)
25. (*d*) 26. (*e*) 27. (*d*) 28. (*d*) 29. (*d*) 30. (*e*) 31. (*c*) 32. (*d*)
33. (*d*) 34. (*d*) 35. (*d*) 36. (*d*) 37. (*d*) 38. (*e*) 39. (*d*) 40. (*d*)
41. (*c*) 42. (*e*) 43. (*e*) 44. (f)

9. Varnishes and Distempers

1. (*d*) 2. (*d*) 3. (*d*) 4. (*d*) 5. (*d*) 6. (*a*) 7. (*a*) 8. (*d*)
9. (*e*) 10. (*a*) 11. (*e*) 12. (*d*) 13. (*d*) 14. (*c*) 15. (*e*) 16. (*d*)
17. (*d*)

10. Glass

1. (*a*) 2. (*b*) 3. (*e*) 4. (*d*) 5. (*d*) 6. (*e*) 7. (*d*) 8. (*e*)
9. (*e*) 10. (*d*) 11. (*b*) 12. (*e*) 13. (*e*) 14. (*c*) 15. (f) 16. (*d*)
17. (*d*) 18. (*e*) 19. (*a*) 20. (*d*)

11. Steel

1. (*d*) 2. (*c*) 3. (*c*) 4. (*c*) 5. (*a*) 6. (*a*) 7. (*d*) 8. (*a*)
9. (*e*) 10. (*d*) 11. (*e*) 12. (*d*) 13. (*c*) 14. (*d*) 15. (*a*) 16. (*b*)
17. (*c*) 18. (*c*) 19. (*b*) 20. (*e*) 21. (*e*) 22. (*b*)

12. Cement Concrete

1. (*e*) 2. (*e*) 3. (*e*) 4. (*e*) 5. (*e*) 6. (*c*) 7. (*e*) 8. (*d*)

13. Cement

1. (*c*) 2. (f) 3. (*e*) 4. (*e*) 5. (*e*) 6. (*d*) 7. (*e*) 8. (*e*)
9. (*b*) 10. (*e*) 11. (*e*) 12. (*d*) 13. (*e*) 14. (*a*) 15. (*d*) 16. (*c*)
17. (*e*) 18. (*e*) 19. (*c*) 20. (*c*) 21. (*e*) 22. (*d*) 23. (*e*) 24. (*e*)
25. (*e*) 26. (*e*) 27. (*d*) 28. (*c*) 29. (*d*) 30. (*d*) 31. (*d*) 32. (*d*)
33. (*c*) 34. (*d*) 35. (*d*) 36. (*c*) 37. (*a*) 38. (*a*) 39. (*d*) 40. (*d*)
41. (*e*) 42. (*a*) 43. (*d*) 44. (*d*) 45. (*a*) 46. (*d*) 47. (*d*) 48. (*d*)
49. (*a*) 50. (*d*) 51. (*d*)

14. Aggregates in Concrete

1. (*d*) 2. (*d*) 3. (*d*) 4. (*d*) 5. (*e*) 6. (*d*) 7. (*c*) 8. (*e*)
9. (*e*) 10. (*d*) 11. (*e*) 12. (*d*) 13. (*d*) 14. (*a*) 15. (*c*) 16. (*e*)
17. (*d*) 18. (*d*) 19. (*d*) 20. (*d*) 21. (*d*) 22. (*a*) 23. (*d*) 24. (*d*)
25. (*e*) 26. (*c*) 27. (*e*) 28. (*d*) 29. (*c*) 30. (*d*) 31. (*a*) 32. (*b*)
33. (*d*) 34. (*e*) 35. (*d*) 36. (*d*) 37. (*c*)

15. Fresh Concrete

1. (*d*) 2. (*d*) 3. (*e*) 4. (*d*) 5. (*e*) 6. (*d*) 7. (*e*) 8. (*e*)
9. (*d*) 10. (*a*) 11. (*d*) 12. (*e*) 13. (*d*) 14. (*a*) 15. (*e*) 16. (*d*)
17. (*d*) 18. (*d*) 19. (*e*) 20. (*a*) 21. (*e*) 22. (*e*) 23. (*d*) 24. (*d*)
25. (*a*) 26. (*e*) 27. (*d*) 28. (*e*) 29. (*e*) 30. (*d*) 31. (*c*) 32. (*d*)
33. (*e*) 34. (*a*) 35. (*e*) 36. (*e*) 37. (*d*) 38. (*d*) 39. (*c*) 40. (*e*)
41. (*c*) 42. (*e*) 43. (*e*) 44. (*d*) 45. (*d*) 46. (*d*) 47. (*d*) 48. (*d*)
49. (*e*) 50. (*d*) 51. (*d*) 52. (*d*) 53. (*e*) 54. (*d*) 55. (*e*)

16. Building Materials (Elementary)

1. (*b*) 2. (*a*) 3. (*c*) 4. (*d*) 5. (*c*) 6. (*c*) 7. (*b*) 8. (*d*)
9. (*c*) 10. (*a*) 11. (*d*) 12. (*a*) 13. (*b*) 14. (*c*) 15. (*d*) 16. (*e*)
17. (*c*) 18. (*b*) 19. (*b*) 20. (*b*) 21. (*c*) 22. (*d*) 23. (*a*) 24. (*a*)
25. (*a*) 26. (*d*) 27. (*a*) 28. (*b*) 29. (*a*) 30. (*b*) 31. (*d*) 32. (*a*)
33. (*c*) 34. (*c*) 35. (*c*) 36. (*b*) 37. (*a*) 38. (*b*) 39. (*a*) 40. (*a*)
41. (*d*) 42. (*c*) 43. (*a*) 44. (*c*) 45. (*d*) 46. (*a*) 47. (*d*) 48. (*b*)
49. (*b*) 50. (*b*) 51. (*c*) 52. (*d*) 53. (*a*) 54. (*d*) 55. (*c*) 56. (*d*)
57. (*b*) 58. (*d*) 59. (*c*) 60. (*b*) 61. (*c*) 62. (*c*) 63. (*b*) 64. (*d*)
65. (*c*) 66. (*a*) 67. (*a*) 68. (*d*) 69. (*b*) 70. (*c*) 71. (*b*) 72. (*b*)
73. (*e*) 74. (*e*) 75. (*e*) 76. (*d*) 77. (*e*) 78. (*d*) 79. (*d*) 80. (*c*)
81. (*e*) 82. (*b*) 83. (*a*) 84. (*a*) 85. (*c*) 86. (*b*) 87. (*b*) 88. (*c*)
89. (*c*) 90. (*b*) 91. (*a*) 92. (*a*) 93. (*c*) 94. (*e*) 95. (*c*) 96. (*d*)
97. (*b*) 98. (*a*) 99. (*e*) 100. (*b*) 101. (*a*) 102. (*c*) 103. (*b*) 104. (*a*)
105. (*e*) 106. (*d*) 107. (*c*) 108. (*c*) 109. (*d*) 110. (*b*) 111. (*c*) 112. (*d*)
113. (*d*) 114. (*b*) 115. (*c*) 116. (*d*) 117. (*d*) 118. (*d*) 119. (*d*) 120. (*b*)
121. (*a*) 122. (*d*) 123. (*b*) 124. (*c*) 125. (*b*) 126. (*b*) 127. (*c*) 128. (*c*)
129. (*d*) 130. (*a*) 131. (*c*) 132. (*d*) 133. (*c*) 134. (*d*) 135. (*d*) 136. (*c*)
137. (*a*) 138. (*b*) 139. (*a*) 140. (*d*) 141. (*d*) 142. (*e*) 143. (*d*) 144. (*e*)
145. (*d*) 146. (*b*) 147. (*a*) 148. (*d*) 149. (*a*) 150. (*b*) 151. (*c*) 152. (*e*)
153. (*e*) 154. (*e*) 155. (*a*) 156. (*a*) 157. (*c*) 158. (*b*) 159. (*d*) 160. (*d*)
161. (*e*) 162. (*c*) 163. (*e*) 164. (*e*) 165. (*d*) 166. (*c*) 167. (*d*) 168. (*e*)
169. (*c*) 170. (*b*) 171. (*c*) 172. (*a*) 173. (*e*) 174. (*d*) 175. (*c*) 176. (*b*)
177. (*d*) 178. (*c*) 179. (*d*) 180. (*d*) 181. (*c*) 182. (*d*) 183. (*d*) 184. (*d*)

185. (*d*) 186. (*d*) 187. (*e*) 188. (*c*) 189. (*d*) 190. (*c*) 191. (*d*) 192. (*d*)
193. (*a*) 194. (*b*) 195. (*b*) 196. (*c*) 197. (*c*) 198. (*d*) 199. (*b*) 200. (*e*)
201. (*d*) 202. (*a*) 203. (*e*) 204. (*e*) 205. (*e*) 206. (*b*) 207. (*d*) 208. (*d*)
209. (*a*) 210. (*b*) 211. (*c*) 212. (*a*) 213. (*c*) 214. (*d*) 215. (*a*) 216. (*e*)
217. (*e*) 218. (*d*) 219. (*c*) 220. (*a*) 221. (*e*) 222. (*b*) 223. (*e*) 224. (*c*)
225. (*a*) 226. (*d*) 227. (*e*) 228. (*a*) 229. (*b*) 230. (*d*) 231. (*c*) 232. (*a*)
233. (*b*) 234. (*d*) 235. (*d*) 236. (*e*) 237. (*a*) 238. (*b*) 239. (*a*) 240. (*b*)
241. (*c*) 242. (*d*) 243. (*c*) 244. (*d*) 245. (*a*) 246. (*d*) 247. (*a*) 248. (*b*)
249. (*c*) 250. (*d*) 251. (*e*) 252. (*d*) 253. (*a*) 254. (*b*) 255. (*c*) 256. (*e*)
257. (*b*) 258. (*e*) 259. (*a*) 260. (*d*) 261. (*e*) 262. (*c*) 263. (*b*) 264. (*d*)
265. (*a*) 266. (*a*) 267. (*b*) 268. (*c*) 269. (*a*) 270. (*b*) 271. (*c*) 272. (*b*)
273. (*d*) 274. (*c*) 275. (*b*) 276. (*c*) 277. (*c*) 278. (*d*) 279. (*e*) 280. (*a*)
281. (*d*) 282. (*a*) 283. (*d*) 284. (*d*) 285. (*e*) 286. (*c*) 287. (*a*) 288. (*b*)
289. (*e*) 290. (*b*) 291. (*d*) 292. (*e*) 293. (*d*) 294. (*d*) 295. (*e*) 296. (*d*)
297. (*a*) 298. (*e*) 299. (*a*) 300. (*e*) 301. (*c*) 302. (*d*) 303. (*b*) 304. (*c*)
305. (*e*) 306. (*d*) 307. (*d*) 308. (*a*) 309. (*e*) 310. (*d*) 311. (*d*) 312. (*e*)
313. (*d*) 314. (*c*) 315. (*d*) 316. (*c*) 317. (*b*) 318. (*a*) 319. (*b*) 320. (*b*)
321. (*d*) 322. (*d*) 323. (*a*) 324. (*d*) 325. (*a*) 326. (*c*) 327. (*a*) 328. (*e*)
329. (*b*) 330. (*d*) 331. (*d*) 332. (*c*) 333. (*d*) 334. (*e*) 335. (*d*) 336. (*b*)
337. (*a*) 338. (*e*) 339. (*a*) 340. (*a*) 341. (*d*) 342. (*c*) 343. (*e*) 344. (*e*)
345. (*b*) 346. (*a*) 347. (*e*) 348. (*b*) 349. (*c*) 350. (*e*) 351. (*d*) 352. (*d*)
353. (*e*) 354. (*e*) 355. (*d*) 356. (*e*) 357. (*d*) 358. (*d*) 359. (*c*) 360. (*d*)
361. (*c*) 362. (*d*) 363. (*c*) 364. (*e*) 365. (*e*) 366. (*e*) 367. (*e*) 368. (*e*)
369. (*d*) 370. (*e*) 371. (*c*) 372. (*b*) 373. (*d*) 374. (*e*) 375. (*b*) 376. (*b*)
377. (*d*) 378. (*e*) 379. (*d*) 380. (*e*) 381. (*b*) 382. (*e*) 383. (*d*) 384. (*d*)
385. (*e*) 386. (*a*) 387. (*d*) 388. (*d*) 389. (*e*) 390. (*a*) 391. (*a*) 392. (*a*)
393. (*a*) 394. (*a*) 395. (*a*) 396. (*a*) 397. (*a*) 398. (*a*) 399. (*a*) 400. (*a*)
401. (*a*) 402. (*d*) 403. (*a*) 404. (*a*) 405. (*a*) 406. (*a*) 407. (*a*) 408. (*a*)
409. (*d*) 410. (*a*) 411. (*b*) 412. (*c*) 413. (*a*) 414. (*a*) 415. (*c*) 416. (*a*)
417. (*a*) 418. (*a*) 419. (*a*) 420. (*a*) 421. (*a*) 422. (*c*) 423. (*a*) 424. (*d*)
425. (*a*) 426. (*c*) 427. (*b*) 428. (*a*) 429. (*b*) 430. (*c*) 431. (*d*) 432. (*a*)
433. (*c*) 434. (*d*) 435. (*a*) 436. (*d*) 437. (*a*) 438. (*b*) 439. (*a*) 440. (*a*)
441. (*a*) 442. (*b*) 443. (*c*) 444. (*a*) 445. (*c*) 446. (*d*) 447. (*b*) 448. (*a*)
449. (*a*) 450. (*e*) 451. (*a*) 452. (*c*) 453. (*d*) 454. (*c*) 455. (*c*) 456. (*b*)
457. (*d*) 458. (*b*) 459. (*b*) 460. (*e*) 461. (*c*) 462. (*a*) 463. (*e*) 464. (*b*)
465. (*e*) 466. (*c*) 467. (*e*) 468. (*c*) 469. (*b*) 470. (*a*) 471. (*c*) 472. (*b*)
473. (*c*) 474. (*c*) 475. (*c*) 476. (*b*) 477. (*a*) 478. (*d*) 479. (*c*) 480. (*c*)
481. (*e*) 482. (*a*) 483. (*b*)