MCQ

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CIVIL ENGINEERING

Volume-I

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CONTENTS

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

UNIT-V

UNIT-VI

UNIT-VII

VOLUME-I

UNIT-I

BUILDING MATERIALS AND CONSTRUCTION

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NOTES

CHAPTER 1

BRICKS

OBJECTIVE QUESTIONS

1. The process of mixing sand with the powdered natural soil to improve the quality is known as
(a) Moulding (b) Tempering
(c) Drying (d) Blending

2. Lime is mixed with brick earth
(a) To impart plasticity
(b) To increase durability
(c) To prevent shrinkage
(d) To increase impermeability

3. Maximum percentage of water absorption of II-class bricks in 24 hours should be limited to
(a) 10% (b) 15%
(c) 20% (d) 22%

4. The over ground continuous kiln is
(a) Bull's trench kiln (b) Hoffman's kiln
(c) Tunnel kiln (d) All of these

5. Fire bricks should be laid in
(a) Lime mortar (b) Fire cement mortar
(c) Fire clay mortar (d) All of these

6. Bullnose bricks are not used in
(a) Walls
(b) Rounding off sharp corners
(c) Arches
(d) Pillars

7. Terracotta is used in buildings for
(a) Ornamental work (b) Insulation
(c) Storage (d) None of these

8. If rain water falls on hot bricks, then shape of the bricks gets deformed, the defect is known as
(a) Efflorescence (b) Bloating
(c) Chuffs (d) Nodules

9. The moulded bricks are dried before burning to an approximate moisture content of
(a) 3% (b) 6%
(c) 10% (d) 20%

10. Hollow brick is
(a) Sound proof
(b) Heat proof
(c) About 1/3 in weight of standard brick
(d) All of the above

11. The compressive strength of burnt clay bricks as per IS 1077-1992 is
(a) 105 kg/cm^2 (b) 150 kg/cm^2
(c) 105–150 kg/cm^2 (d) 35–350 kg/cm^2

12. Consider the following statements:
A good soil for making bricks should contain
1. About 30% alumina.
2. About 10% lime nodules.
3. A small quantity of iron oxides, 5 to 6%.
4. About 5% magnesia.

Of these statements
(a) 1 and 2 are correct
(b) 1 and 3 are correct
(c) 1, 3 and 4 are correct
(d) 1 and 4 are correct

13. Consider the following statements:

For the manufacture of good quality bricks it is essential to

1. Use a reverberatory kiln.
2. Blend the soil with clay or sand as deemed appropriate.
3. Kneading the soil in a ghani.
4. Temper the soil in a pug mill.

Of these correct statements are

(a) 1 and 3 (b) 2 and 4

(c) 1, 3 and 4 (d) 2, 3 and 4

14. The raw bricks shrink during drying and warp during burning because of

(a) Less lime in brick earth

(b) Less silica and excess magnesia in brick earth

(c) Excess of alumina

(d) Alkalies in bricks earth

15. In brick masonry the frog of the brick is generally kept on

(a) Top face

(b) Bottom face

(c) Exposed face

(d) Interior face

[Punjab JE - 2014, PHED-RAJ., Chandigarh JE - 2016]

16. The approximate weight of a brick should be

(a) 2.5 kg (b) 4.5 kg

(c) 5.1 kg (d) 3.2 kg

[Punjab JE - 2014, PEB.SUB ER. - 2017, DMRC - 2018]

17. Which one is the correct sequence of various operations of preparation of Brick-Earth. I. Blending II. Digging III. Weathering IV. Unsoiling V. Tempering

(a) IV, II, III, V, I (b) IV, II, III, I, V

(c) II, IV, V, III, I (d) II, III, IV, V, I

[RPSC]

18. What is the nominal size of standard modular brick-tile?

(a) 19 cm × 9 cm × 4 cm

(b) 19 cm × 9 cm × 9 cm

(c) 20 cm × 10 cm × 10 cm

(d) 20 cm × 10 cm × 5 cm

[PEB-SUB ER. - 2017]

19. What is the unit weight of broken bricks ?

(a) 1520 kg/m^3 (b) 1630 kg/m^3

(c) 1800 kg/m^3 (d) 1420 kg/m^3

[PEB-SUB ER. - 2017]

20. The compressive strength of first class bricks should not be less than

(a) 7 N/mm^2 (b) 10.5 N/mm^2

(c) 12 N/mm^2 (d) 15 N/mm^2

21. The term 'frog' means :

(a) An apparatus to lift the brick

(b) Soaking brick in water

(c) A depression on the face of the brick

(d) Vertical joint in a brick work

[PEB-SUB ER. - 2017, LMRC JE, AEC-2017]

22. How many bricks will be required for 1 cubic meter of brick masonry?

(a) 100 (b) 500

(c) 250 (d) 400

[PEB-SUB ER. - 2017, MPSC - 2012, ISRO - 2013]

23. Efflorescence is

(a) Formation of white patches on the surface of bricks due to the presence of insoluble salts in the clay used for making bricks

(b) Swelling of bricks due to the presence of carbonaceous matter and gas

(c) Deformation arising out of exposure to the weather

(d) Presence of impurities in the clay used for making bricks that show up after burning

[GESCOM-AE, PMB- JE - 2018]

24. Jhama bricks are

(a) Under burnt (b) Over burnt

(c) Not burnt (d) None of these

[KPSC-AE, KPSC-JE]

25. What is the content of clay and silt in good brick earth ?

(a) 20% (b) 30%

(c) 40% (d) 50%

[KPSC-AE]

26. The presence of excess alumina in the clay is reflected in the bricks as

(a) Makes the bricks brittle and weak

(b) Makes the bricks crack and warp on drying

(c) Changes the colour of the brick from red to yellow

(d) Improves impermeability and durability of the brick

[KPSC-JE]

27. Water absorption for Ist class bricks should not be more than _____ .

(a) 12% (b) 15%

(c) 20% (d) 25%

[KPSC-JE, ISRO - 2013]

28. Which of the following constituent in earth gives plasticity to mould bricks in suitable shape?

(a) Silica (b) Lime

(c) Alumina (d) Magnesia

[KPSC-JE]

29. Bricks are burnt at a temperature range of _____

(a) 500 – 700°C (b) 700 – 900°C

(c) 900 – 1200°C (d) 1200 – 1500°C

[KPSC-JE]

30. The usual name given to sculpture made by earthen ware using baked earth is

(a) Terracotta (b) Burnt sand

(c) Aggregate (d) Fossil

[KPSC-JE]

31. The standard size of modular brick including mortar thickness is

(a) 23 cm × 12 cm × 8 cm

(b) 19 cm × 20 cm × 19 cm

(c) 20 cm × 10 cm × 10 cm

(d) 18 cm × 9 cm × 9 cm

[KPSC-JE]

32. A good brick earth should, in general, contain

(a) About 20% to 30% of alumina

(b) About 50% to 60% of silica

(c) Not more than 5% of lime

(d) All of the above

[KPSC-JE]

33. In which of the following areas would refractory bricks be used?

(a) Retaining walls

(b) Columns

(c) Piers

(d) Combustion chambers

[KPSC-JE]

34. What is the standard size of masonry bricks ?

(a) 21 cm × 11 cm × 11 cm

(b) 20 cm × 10 cm × 10 cm

(c) 19 cm × 9 cm × 9 cm

(d) 18 cm × 8 cm × 8 cm

[KPSC-JE, MPSC - 2012, ISRO - 2013]

35. The main ingredient of a good quality brick earth is

(a) Magnesia (b) Lime

(c) Silica (d) Alumina

[KPSC-JE, RPSC]

36. Presence of which of the following is responsible for imparting yellow tint to bricks?

(a) Silica (b) Alumina

(c) Lime (d) Magnesia

[TSPSC-AE - 2015, DFCCIL - 2016]

37. The strength achieved by a brick depends on
(a) Composition of brick earth
(b) Nature of moulding adopted
(c) Burning and cooling process
(d) All of the above
[MPSC - 2012]

38. The red colour of bricks is due to :
(a) Iron oxide (b) Silica
(c) Magnesia (d) Alumina
[NBCC - 2017]

39. The recommended compression strength of A class Brick as per BIS is :
(a) 25 N/mm^2 (b) 20 N/mm^2
(c) 14 N/mm^2 (d) None of these
[NBCC - 2017]

40. Excess of silica in brick earth causes
(a) Loss of cohesion
(b) Impermeability
(c) Cracking and warping on drying
(d) None of the above
[Chandigarh JE - 2016]

41. A pug mill is used for
(a) Moulding of brick earth
(b) Baking of bricks
(c) Tempering of brick earth
(d) Testing of bricks
[ISRO - 2018]

42. Which tool is used for cutting bricks accurately?
(a) Bolster (b) Trowel
(c) Brick Hammer (d) Rammer
[Haryana JE - 2018]

43. Fire bricks are made from
(a) Fire clay (b) Quick lime
(c) Hydrate lime (d) Cement

44. Which one of following is not a defect in bricks?
(a) Wedge cut (b) Under burning
(c) Over burning (d) Black core
[DMRC - 2018]

45. To get uniform colour, Terracotta is burnt at a temperature that lies in the range of :
(a) 650 to 850°C (b) 900 to 1500°C
(c) 4500 to 4600°C (d) 1100 to 1200°C
[DMRC - 2018]

46. In the manufacturing process of bricks, which moulding is not practiced?
(a) Ground moulding
(b) Table moulding
(c) Automatic moulding
(d) Machine moulding
[DMRC - 2018]

47. A frog in a brick is provided to mainly serve which of the following purposes?
(a) Emboss builder's name
(b) Reduce the weight of brick
(c) Improve insulation by providing hollows
(d) Form keyed joint between brick and mortar
[AEC - 2017]

48. The average compressive strength of 2nd class bricks should not be less than
(a) 75 kg/cm^2 (b) 12 kg/cm^2
(c) 10 kg/cm^2 (d) 15 kg/cm^2
[AEC - 2017]

49. The following soil is good for making bricks
(a) Black cotton (b) Silty
(c) Alluvial (d) Sand and silt
[RPSC ACF - 2011]

50. The percentage of perforation in solid bricks is about
(a) 5 (b) 10
(c) 15 (d) 20
[RPSC ACF - 2011]

51. The tolerance in the width of the mould of a class I brick is about
(a) ± 3 mm (b) ± 6mm
(c) ± 10 mm (d) ± 12 mm
[RPSC ACF - 2011]

52. The percentage of alumina in a good brick clay should be lies between

(a) 20% – 30% (b) 30% – 40%

(c) 40% – 50% (d) 50% – 60%

[DSSSB JE - 2015, Bihar JE - 2016]

53. If L is the length and B the width of the brick and t the thickness of mortar, the relation between these is

(a) L = 2B (b) L = B + t

(c) L = B + 2t (d) L = 2B + t

54. Which of the following ingredients of the brick earth enables the brick to remain its shape?

(a) Alumina (b) Silica

(c) Iron (d) Magnesia

[RPSC ACF - 2011]

55. Glazing is used to make earthenware

(a) Hard (b) Soft

(c) Porous (d) Impervious

[RPSC ACF - 2011]

56. Bauxite bricks are

(a) Ordinary fire bricks

(b) Basic refractory bricks

(c) Acid refractory bricks

(d) Neutral refractory bricks

[Haryana SSC JE - 2015]

57. Refractory bricks resist

(a) High temperature

(b) Chemical action

(c) Dampness

(d) All of the above

[HPSC AE - 2010]

58. According to IS-1077, class-10 bricks are the bricks having_____.

(a) Thickness more than 10 cm

(b) Tensile strength not less than 10 N/cm^2

(c) Compressive strength not less than 10 N/mm^2

(d) Length more than 10 cm

[MP VYAPM - 2017]

59. Match the Grade of bricks with its compressive strength (According to IS : 1077 - 1992) and select the correct answer as per the codes given below.

	Compressive Strength	**Grade**
A.	Not less than 140 kg/cm^2	I. Grade A
B.	Not less than 105 kg/cm^2	II.Grade A-A
C.	Not less than 70 kg/cm^2	III.Grade B
D.	Not less than 35 kg/cm^2	IV.Grade C

(a) A-IV, B-II, C-III, D-I

(b) A-I, B-II, C-III, D-IV

(c) A-II, B-I, C-III, D-IV

(d) A-I, B-III, C-II, D-IV

[DFCCIL - 2016]

60. Which of the following is not mechanical property of bricks?

(a) Modulus of rupture (b) Texture

(c) Tensile Strength (d) Fire resistance

[RJC - 2016]

61. A good brick earth can be rolled without breaking in small thread of diameter:

(a) 1 mm (b) 3 mm

(c) 6 mm (d) 10 mm

[RJC - 2016]

62. For checking the length of bricks as per Indian standards how many bricks are to be taken:

(a) 10 (b) 15

(c) 20 (d) 25

[UP JAL NIGAM JE - 2013 , UP SSC JE - 2015]

63. Which of the following statement is INCORRECT with respect to first class bricks?

(a) No impression should be left on the brick when a scratch is made by a finger nail

(b) A metallic or ringing sound should come when two bricks are struck against each other

(c) Water absorption is about 25-30% of its dry weight is allowed

(d) These should be free from flaws, cracks and stones

[MP SUB ER. - 2017]

64. The function of iron oxide in brick is to _____.

(a) Impart uniform shape

(b) Prevent shrinkage of raw bricks

(c) Impart colour

(d) Impart plasticity to the brick

[Draughtsman-Bihar - 2016]

65. Percentage of silica in a good brick earth lies between

(a) 5 to 10% (b) 20 to 30%

(c) 50 to 60% (d) 70 to 80%

[UP JAL NIGAM JE - 2017, UPRVUNL JE - 2015]

66. The average crushing and tensile strength of hand moulded bricks in kN/m^2 is:

(a) 60000 and 2000 (b) 50000 and 1000

(c) 55000 and 1500 (d) 65000 and 2500

[UPRVUNL JE - 2016]

67. What happens of the constituents of brick, when a raw brick is heated in the temperature range of 700-1000 degree C?

(a) Physical changes (b) Chemical changes

(c) Dehydration (d) Colouring of brick

[CPEB - 2016]

68. The minimum compressive strength of a brick is:

(a) 3.5 MPa (b) 7.5 MPa

(c) 10.2 MPa (d) 5.5 MPa

[CPEB - 2016]

69. China clay is an example of .....

(a) Kaolinite (b) Illite

(c) Montmorillonite (d) None of these

[CPEB - 2016]

70. Stone chips or broken bricks are also known as

(a) Scrap (b) Waste

(c) Dust (d) Spall

[Haryana SSC JE - 2015]

71. Which of the following is an odd one as regards 'requirements of good bricks earth?'

(a) It must be free from lumps of lime

(b) It should not be mixed with salty water

(c) It must be non-homogeneous

(d) It should not contain vegetable and organic matter

[Haryana SSC JE - 2015]

72. Which class of bricks has the following quality?

1. Soft and have light color.
2. Crumble even on light crushing.

(a) Over burnt bricks

(b) Second class bricks

(c) Under burnt bricks

(d) First class bricks

[MP VYAPAM - 2016]

73. Frog is provided into the bricks to:

(i) Indicate the manufacture's name

(ii) Provide a key for mortar

Which among these is/are correct?

(a) Only (i) (b) Only (ii)

(c) Both (i) and (ii) (d) Neither (i) nor (ii)

[UPPCL JE - 2016, LMRC JE - 2015]

74. The articles prepared from refractory clays mixed with stone and crushed pottery are called

(a) Tiles (b) Terra cotta

(c) Porcelain (d) Stoneware

[UPPCL JE - 2016]

75. Excess of _____ is responsible for brick's decay.

(a) Magnesia (b) Alumina

(c) Lime (d) Silica

[UPPCL JE - 2016]

76. Strength based classification of bricks is made on the basis of

(a) IS : 3101 (b) IS : 3102

(c) IS : 3495 (d) IS : 3496

77. Which of the following constituent, present in excess quantity, changes the color of the brick from red to yellow?

(a) Alumina (b) Silica

(c) Lime stone (d) Iron Pyrite

[UPPSC-AE-2020]

❑❑❑

ANSWERS SHEET

1. ***Ans. (d)***

In the process of manufacturing bricks, the following four steps are involved:

1. Preparation of clay
2. Moulding
3. Drying
4. Burning

1. Preparation of clay :

(i) Unsoiling : In this process top layer of soil, about 200 mm in depth, is taken out and thrown away. The top soil is full of impurities and not use for purpose of preparing bricks.

(ii) Digging : The clay is then dug out from the ground. It is spread on the levelled ground.

(iii) Cleaning : The clay, as obtained in the process of digging, should be cleaned of stones, pebbles, vegetable matter, etc.

If these particles are in excess, the clay is to be washed and screened.

(iv) Weathering : The clay is then exposed to atmosphere for softening. The period of softening is from few week to few month.

(v) Blending : The required ingredient to be added to it and mixing the clay.

- Blending makes clay fit for next stage tempering.

(vi) Tempering : In the process of tempering, the clay is brought to a proper degree of hardness and it is made fit for the next operation of moulding.

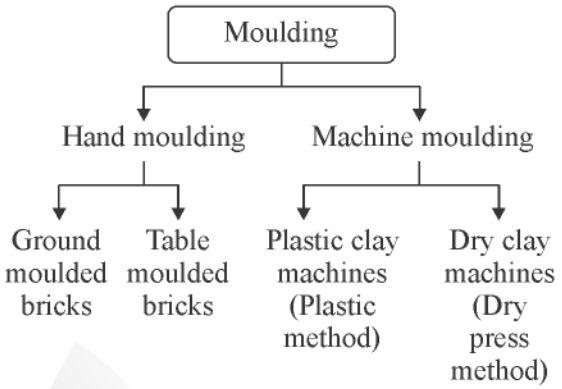
The water in required quantity is added to clay.

For manufacturing good bricks on a large scale, the tempering is usually done in pug mill. Which may be operated mechanically or with the help of animal.

2. Moulding :

The process of giving desire shape to the clay is term as moulding.

The moulding is done with the help of mould, which may be wood or steel.



3. Drying :

If bricks are directly burn without drying it lead to cracking and distortion.

4. Burning :

Burning imparts hardness and strength to the bricks and makes them dense and durable.

The bricks are burn at 1100°C temperature so that the ingredient of brick can fuse with each other and can provide desire strength and density to the bricks.

The burning of the bricks is done either in clamp and kiln.

The burning of clay may be divided into three main stages.

(i) Dehydration (400 – 650°C)

This is also known as water smoking stage.

(ii) Oxidation Period (650 – 900°C)

At this stage chemical changes occurs in the constituents of bricks.

(iii) Vitrification :

The temperature ranges 900 – 1100°C for low melting clay and 1000 – 1250°C for high melting clay.

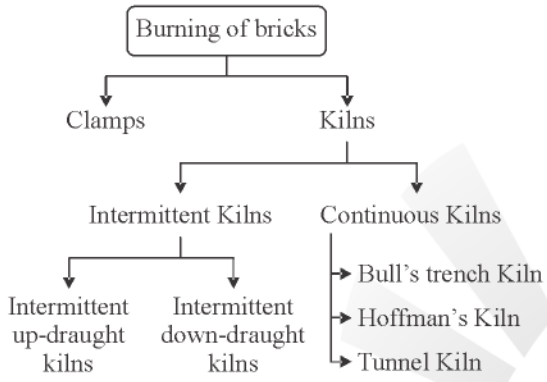
2. ***Ans. (c)***

3. ***Ans. (d)***

When bricks immerged in water for 24 hrs. it should not show absorption greater than 20% of its dry weight for first class brick and 22% for 2nd class bricks.

4. ***Ans. (b)***

The Hoffman's kiln is constructed overground and hence it is sometimes known as the flame kiln. Its shape is circular in plan and it is divided into a number of chambers.



5. ***Ans. (c)***

Fire clay bricks are made from fire clay and also known as refractory bricks.

These bricks are laid in fire clay mortar.

6. ***Ans. (d)***

Bullnose bricks : A brick moulded with a rounded angle is known as a bullnose. These types of bricks are used for rounded quoin (round corner). An external corner of a wall is known as quoin.

Bullnose bricks commonly used in the rounded edge for staircase steps, building corners, verandahs etc.

7. ***Ans. (a)***

Uses of Terracotta

- Ornamental works.
- Statuettes.
- Porous terracotta is used for sound insulation.
- Being fire proof, terracotta is most suitable as casing for steel columns and beams.
- It is used as a decorative material in place of stones for ornamental parts of buildings such as cornices, string courses, sills, copings, bases of pillars, fire places etc.

8. ***Ans. (c)***

Bloating : This defect observed as spongy swollen mass over the surface of burned bricks is caused due to the presence of excess carbonaceous matter and sulphur in brick clay.

Cracks : This defect may be because of lumps of lime or excess of water. When bricks come in contact with water, the absorbed water reacts with lime nodules causing expansion and a consequent disintegration of bricks.

Chuffs : The deformation of the shape of bricks caused by the rain water falling on hot bricks is known as chuffs.

Laminations : These are caused by the entrapped air in the voids of clay. Laminations produce thin lamina on the brick faces which weather out on exposure.

Black Core : When brick-clay contains bituminous matter or carbon and they are not completely removed by oxidation, the brick results in black core mainly because of improper burning.

Efflorescence : This defect is caused because of alkalis present in bricks. When bricks come in contact with moisture, water is absorbed by them.

This absorbed water dries out by evaporation from the exposed faces and the soluble salts it contains crystallize out on the surface.

On drying grey or white powder patches appear on the brick surface.

- Efflorescence can be minimized by selecting proper clay materials for brick manufacturing, preventing moisture to come in contact with the masonry. This can be achieved by providing waterproof coping and by using water repellent materials in mortars and by providing damp proof course.

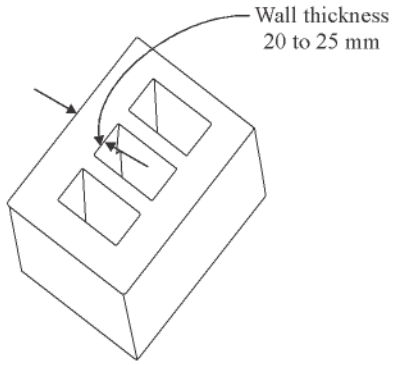
9. ***Ans. (a)***

10. ***Ans. (d)***

Hollow bricks are also known as the cellular or cavity bricks.

They are light in weight about one-third the weight of the ordinary brick of the same size.

Hollow bricks reduce the transmission of heat, sound and damp.



Hollow brick

11. ***Ans. (d)***

Class Designation	Average Compressive Strength not less than	
	N/mm^2	Kg/cm^2
35	35.0	350
30	30.0	300
25	25.0	250
20	20.0	200
17.5	17.5	175
15	15.0	150
12.5	12.5	125
10	10.0	100
7.5	7.5	75
5	5.0	50
3.5	3.5	35

12. ***Ans. (b)***

13. ***Ans. (b)***

14. ***Ans. (c)***

15. ***Ans. (a)***

The size of frog should be 10 cm × 4 cm × 1 cm.

The main purpose of providing frog is to form a key for holding the mortar and therefore, the bricks are laid with frogs on top.

It is also use to indicate the trade name of manufacturer's.

16. ***Ans. (d)***

17. ***Ans. (b)***

1. Unsoiling
2. Digging
3. Weathering
4. Blending
5. Tempering

18. ***Ans. (d)***

19. ***Ans. (d)***

20. ***Ans. (b)***

Type of bricks	**Compressive Strength (N/mm^2)**
First class bricks	- 10.5
Second class bricks	- 7.0
Common building bricks	- 3.5

21. ***Ans. (c)***

The depression provided in the face of a brick during its manufacturing is called frog in bricks.

22. ***Ans. (b)***

Size of standard brick should be 19 × 9 × 9 cm.

Size of standard brick with mortar 20 × 10 × 10 cm.

Volume of one brick $\Rightarrow 20 \times 10 \times 10 = 2000\ cm^3$

$= 2000 \times 10^{-6}\ m^3$

Number of bricks required in one cubic meter

$$\Rightarrow \frac{\text{Total Volume}}{\text{Volume of one brick}} = \frac{1}{2000 \times 10^{-6}}$$

$$\Rightarrow \frac{1000000}{2000} = 500 \text{ bricks}$$

$\Rightarrow$ Weight of 1 m^3 bricks approximately = 1800 kg.

23. ***Ans. (a)***

According to IS : 3495 – Part (3)

The liability to efflorescence shall be reported as nil, slight, moderate, heavy and serious.

- **Nil :** When the deposit of efflorescence is imperceptible.

- **Slight :** When not more than 10 percent of the exposed area of the brick is covered with a thin deposit of salts.
- **Moderate :** When the deposit of efflorescence is more than 10 percent but less than 50% of the exposed area of the brick but unaccompanied by powdering of flaking of the surface.
- **Heavy :** When the deposit of efflorescence is more than 50% but the deposits do not powder of flake away the brick surface.
- **Serious :** When there is a heavy deposit of salts accompained by powdering and/or flaking of the exposed surfaces.

24. *Ans. (b)*

Under burnt bricks : These are half burnt bricks. The color is yellow. The strength is low. Such bricks should not be exposed to rain water. These are used as soiling under RCC footing or basement. These are also used as surkhi in lime terracing.

Jhumb bricks : Jhumb bricks are mostly not used because these are over burnt bricks with irregular shape and size. Jhumb bricks twisted due to over burning.

Modular bricks : Modular bricks of standard size 190 mm × 90 mm × 90 mm are used for high class brick masonry.

25. *Ans. (d)*

A good brick earth should contain about 50% to 60% of silica. The excess of silica destroys the cohesion between particles and brick become brittle and weak.

26. *Ans. (b)*

If Alumina is present in excess, the raw bricks shrink and wrap during drying and burning and become too hard when burnt.

- The excess of silica destroys the cohesion between particles and bricks become brittle.
- The excess of lime causes the brick to melt and hence its shape is lost.
- The excess oxide of iron makes the bricks dark blue or blackish.
- Excess of magnesia leads to the decay of bricks.

27. *Ans. (c)*

For first class bricks :

- These should have uniform texture.
- No impression should be left on the brick when a scratch is made by a finger nail.
- These should be free from flaws, cracks and stones.
- A metallic or ringing sound should come when two bricks are struck against each other.
- The surface should be smooth and rectangular, with parallel, sharp and straight edges and square corners.
- The crushing strength of the brick should not be less than 10 N/mm^2.
- Water absorption should not be greater than 20% of its dry weight.

28. *Ans. (c)*

29. *Ans. (c)*

30. *Ans. (a)*

31. *Ans. (c)*

32. *Ans. (d)*

33. *Ans. (d)*

34. *Ans. (c)*

- Standard size of modular brick as per Indian standard is 19 × 9 × 9 cm or 190 mm × 90 mm × 90 mm.
- Nominal size of modular brick is 20 × 10 × 10 cm (size with mortar) or 200 mm × 100 mm × 100 mm.

35. *Ans. (c)*

Silica = 50 – 60%,

Lime = 4 – 5 %

Alumina = 20 – 30% ,

Iron oxide = 5 – 6%

Magnesia = 1%

36. *Ans. (d)*

37. *Ans. (d)*

38. *Ans. (a)*

39. ***Ans. (c)***

The bricks with crushing strength of 7 to 14 N/mm^2 are graded A and those having above 14 N/mm^2 are graded as AA.

40. ***Ans. (a)***

41. ***Ans. (c)***

42. ***Ans. (a)***

43. ***Ans. (a)***

44. ***Ans. (a)***

Underburning :

When bricks are not burnt to cause complete vitrification, the clay is not softened because of insufficient heat and the pores are not closed.

Consequently, bricks with low compressive strength and high-water absorption will be produced.

They produce adult sound when struk against each other.

Overburning :

When bricks over-burn, soft molten mass is produced and the brick will its shape along with other designated requirements.

45. ***Ans. (d)***

For manufacturing of terra-cotta following four steps are involved.

1. Preparation of clay
2. Moulding
3. Drying
4. Burning

Burning : Terracotta is burned with care to get uniform colour in muffle furnace between 1100 – 1200°C.

46. ***Ans. (c)***

47. ***Ans. (d)***

48. ***Ans. (a)***

49. ***Ans. (a)***

50. ***Ans. (d)***

51. ***Ans. (b)***

52. ***Ans. (a)***

The percentage of various ingredients for good quality brick earth are as follows:

Silica — 50 - 60%

Alumina — 20 - 30%

Lime — 5 - 10%

Oxide of iron — 5 - 6%

Magnesia — <1%

Carbon dioxide, Sulphur trioxide, Water } Very small percentage

53. ***Ans. (d)***

Length of brick = 2 × width of brick + thickness of mortar.

Height of brick = Width of brick

54. ***Ans. (b)***

55. ***Ans. (d)***

Bricks, tiles, earthenwares and stone wares are glazed by an impervious film to protect the surface from chemical attack and other weathering agencies.

A glaze is a glassy coat of thickness about 0.1 to 0.2 mm applied on the surface of an item and then fused into place by burning at high temperature.

Glazing make the articles durable and impervious.

Glazing provide smooth surface.

56. ***Ans. (b)***

Types of fire bricks

1. Acidic Refractories
   - (a) Ordinary fire bricks
   - (b) Silica bricks
   - (c) Ganister bricks
2. Basic Refractories
   - (a) Magnesite bricks
   - (b) Dolomite bricks
   - (c) Bauxite bricks

3. Neutral Refractories

   (a) Chromite bricks

   (b) Carborundum

   (c) Chrome Magnesite bricks

   (d) Spinal Bricks

   (e) Forsterite - Bricks

57. ***Ans. (a)***

Fire-clay bricks are made from fire-clay and are also known as refractory bricks.

The fire bricks can resist high-temperature without softening or melting. Hence, they are used for linings of interior surfaces of furnaces, chimneys, kilns, ovens, fire places etc.

- The colour of these bricks whitish yellow or light brown.
- The minimum average compressive strength of these bricks should be 3.5 N/mm^2.
- The water absorption of refractory bricks varies from 4 – 10%.

Following are the types of refractory bricks :

1. Acidic bricks
2. Basic bricks
3. Neutral bricks

58. ***Ans. (c)***

59. ***Ans. (c)***

60. ***Ans. (b)***

Physical properties of bricks

- Shape
- Size
- Color
- Texture

Mechanical properties of bricks

- Compressive strength
- Flexure strength
- Fire resistance
- Durability

61. ***Ans. (b)***

62. ***Ans. (c)***

63. ***Ans. (c)***

64. ***Ans. (c)***

Iron Oxide : Imparts red colour to the bricks.

Magnesia : A small quantity of magnesia in brick earth imparts yellow tint to the bricks and decreases shrinkage.

Silica : The presence of this constituent prevents, cracking, shrinkage and warping. The durability of bricks depends on the proper proportion of silica in earth brick.

Lime : Lime also prevent the shrinkage of raw bricks.

Alumina : Alumina imparts plasticity to the brick earth, so that it can be moulded easily.

65. ***Ans. (c)***

66. ***Ans. (a)***

67. ***Ans. (b)***

68. ***Ans. (a)***

69. ***Ans. (a)***

70. ***Ans. (d)***

71. ***Ans. (c)***

72. ***Ans. (c)***

73. ***Ans. (c)***

74. ***Ans. (d)***

75. ***Ans. (a)***

76. ***Ans. (b)***

IS : 3102 ⇒ Classification of burnt clay solid bricks.

IS : 3495 ⇒ Method for test for burnt clay building bricks.

IS : 3495 - Part-1

⇒ Determination of compressive strength.

IS : 3495 - Part-2

⇒ Determination of water absorption.

IS : 3495 - Part-3

⇒ Determination of efflorescence.

IS : 3495 - Part-4

⇒ Determination of warpage.

IS : 3496 ⇒ Methods of test for burnt, clay building tiles.

77. ***Ans. (b)***

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