16. While compacting the concrete by a mechanical vibrator, the slump should not exceed
(*a*) 2.5 cm (*b*) 5.0 cm
(*c*) 7.5 cm (*d*) 10 cm

17. Separation of coarse aggregates from mortar during transportation is known as
(*a*) Bleeding (*b*) Creeping
(*c*) Segregation (*d*) Shrinkage

18. Ordinary concrete is not used for concrete grades:
(*a*) M 100 (*b*) M 150
(*c*) M 250 (*d*) M 400

19. The compressive strength of ordinary Portland cement after 3 days should not be less than:
(*a*) 50 kg/cm^2 (*b*) 100 kg/cm^2
(*c*) 115 kg/cm^2 (*d*) 150 kg/cm^2

20. The constituent of cement which is responsible for initial setting time of cement is
(*a*) Dicalcium silicate
(*b*) Tricalcium silicate
(*c*) Tricalcium aluminate
(*d*) All the above

21. The partial safety factor for concrete is
(*a*) 1.15 (*b*) 1.5
(*c*) 1.95 (*d*) 2.0

22. Expansion joints are provided if the length of concrete structures exceeds
(*a*) 10 m (*b*) 15 m
(*c*) 35 m (*d*) 45 m

23. Grading of sand causes great variation in
(*a*) Workability of concrete
(*b*) Strength of concrete
(*c*) Durability of concrete
(*d*) All the above

24. Permissible compressive strength of M 200 concrete grade is
(*a*) 100 kg/cm^2
(*b*) 150 kg/cm^2
(*c*) 200 kg/cm^2
(*d*) 250 kg/cm^2

2010

25. A pre-cast pile generally used is
(*a*) circular
(*b*) square
(*c*) octagonal
(*d*) square with corners chantered

26. The value of ultimate creep coefficient for concrete
(*a*) Increases with age of loading
(*b*) Decreases with age of loading
(*c*) Remains constant
(*d*) Is taken as 0.0003

27. Shrinkage in concrete can be reduced by using
(*a*) Low water cement ratio
(*b*) Less cement in the concrete
(*c*) Proper concrete mix
(*d*) All the above

28. The operation of removing humps and hollows of uniform concrete surface is known as
(*a*) Floating (*b*) Screeding
(*c*) Trowelling (*d*) Finishing

2011

29. For one cubic metre of concrete (1 : 2 : 4), the number of cement bags required is
(*a*) 4.5 (*b*) 5.0
(*c*) 5.3 (*d*) 6.3

30. Le-Chatelier's method can be used to determine
(*a*) Fineness of cement
(*b*) Fineness of aggregate
(*c*) Soundness of cement
(*d*) Compressive strength of cement

31. Grading of aggregate in a concrete mix is necessary to achieve
(*a*) adequate workability
(*b*) higher density
(*c*) reduction of voids
(*d*) better durability

32. The purpose of concrete compaction is to
(*a*) increase the density
(*b*) increase the weight
(*c*) increase the voids
(*d*) decrease the setting time

33. The test strength of the sample is taken as the average of the strength of
(*a*) 2 specimens (*b*) 3 specimens
(*c*) 4 specimens (*d*) 5 specimens

34. An aggregate is said to be flaky if its least dimension is less than
(*a*) $\frac{2}{3}$ mean dimension (*b*) $\frac{3}{4}$ mean dimension
(*c*) $\frac{3}{5}$ mean dimension (*d*) $\frac{5}{8}$ mean dimension

2012

35. 28 day crushing strength of cement is tested on 70.7 mm size cubes of mortar having cement to sand proportion of mortar having cement to sand proportion of

(*a*) 1 : 5 (*b*) 1 : 6

(*c*) 1 : 3 (*d*) 1 : 4

36. For Portland cement of 43 grade, 28 day mean compressive strength should exceed

(*a*) 43 MPa (*b*) 43.5 MPa

(*c*) 33 MPa (*d*) 38.5 MPa

37. Minimum grade of concrete for moderate environmental exposure condition should be

(*a*) M25 (*b*) M30

(*c*) M15 (*d*) M20

38. The characteristic strength of concrete is defined as that compressive strength below which NOT more than

(*a*) 2% of results fall

(*b*) None of these

(*c*) 10% of results fall

(*d*) 5% of results fall

39. Workability of concrete is directly proportional to

(*a*) Grading of aggregate

(*b*) Water : Cement ratio

(*c*) Aggregate : Cement ratio

(*d*) Time of transit

40. The bottom diameter, top diameter and the height of the steel mould used for slump test are respectively

(*a*) 20 cm, 30 cm & 10 cm

(*b*) 10 cm, 30 cm & 20 cm

(*c*) 20 cm, 10 cm & 30 cm

(*d*) 10 cm, 20 cm & 30 cm

41. Los Angeles test for aggregates is made to determine the

(*a*) Abrasion resistance

(*b*) Water absorption

(*c*) Crushing strength

(*d*) Impact value

42. Out of the constituents of cement namely, tricalcium silicate (C_3S), dicalcium silicate (C_2S), tri calcium aluminate (C_3A) and tertracalcium alumino ferrite (C_4AF) the first to set and harden is

(*a*) C_3A (*b*) C_4AF

(*c*) C_3S (*d*) C_2S

43. The addition of $CaCl_2$ in concrete result in

A. increased shrinkage

B. decreased setting time

C. decreased shrinkage

D. increased setting time

(*a*) only A

(*b*) only A and B

(*c*) only A and D

(*d*) only D

44. The concrete mix design is conducted as per

(*a*) IS : 10262 (*b*) IS : 13920

(*c*) IS : 383 (*d*) IS : 456

45. The modulus of elasticity of concrete in N/mm^2 can be assumed as follows where F_{ck} is the characteristic cube compressive strength of concrete in N/mm^2

(*a*) $4000\sqrt{f_{ck}}$ (*b*) $5000\sqrt{f_{ck}}$

(*c*) $2000\sqrt{f_{ck}}$ (*d*) $3000\sqrt{f_{ck}}$

46. In limit state method of design, for HYSD bars the values of bond stress shall be

(*a*) Increased by 60% (*b*) Decreased by 60%

(*c*) Increased by 50% (*d*) Decreased by 50%

47. Critical section for calculating bending moment for a spread concrete footing of effective depth d is given by the plane at

(*a*) (d/2) from column face

(*b*) d from column face

(*c*) column face

(*d*) 75 mm from column face

2013

48. The amount of water used in performing setting time test of cement is (assuming p = standard consistency of cement)

(*a*) 0.60 p (*b*) 0.65 p

(*c*) 0.80 p (*d*) 0.85 p

49. For 15 mm thick cement plastering 1 : 6 on 100 sq.m. new brick work, the quantity of cement required is

(*a*) $0.200\ m^3$ (*b*) $0.247\ m^3$

(*c*) $0.274\ m^3$ (*d*) $0.343\ m^3$

50. Which of the following cements is suitable for use in urgent repairs of existing massive concrete structures such as large dams?

(*a*) Ordinary portland cement

(*b*) Low heat cement

(*c*) Rapid hardening cement

(*d*) Sulphate resisting cement

51. The grade of concrete M 20 means that characteristic compressive strength of 15 cm cubes after 28 days is given by

(*a*) 10 N/mm^2 (*b*) 15 N/mm^2

(*c*) 20 N/mm^2 (*d*) 25 N/mm^2

52. You are asked to construct a massive concrete dam. The type of cement you will use is

(*a*) Ordinary portland cement

(*b*) Rapid hardening portland cement

(*c*) Low heat cement

(*d*) Blast furnace slag cement

53. The initial setting time of Ordinary Portland Cement (OPC) is

(*a*) 10 min. (*b*) 30 min.

(*c*) 45 min. (*d*) 60 min.

54. A structure which offers negligible or zero resistance on bending at any point is known as

(*a*) Beam (*b*) Girder

(*c*) Lintel (*d*) Cable

55. During the manufacture of Portland cement, gypsum or Plaster of Paris is added to

(*a*) increase the strength of cement

(*b*) modify the colour of cement

(*c*) reduce heat of hydration of cement

(*d*) adjust setting time of cement

56. High percentage of C_3S and low percentage of C_2S in a cement will result in

(i) rapid hardening

(ii) high early strength with high heat generation

(iii)more resistance to chemical attack

The correct answer is

(*a*) Only (i) (*b*) Only (iii)

(*c*) Both (i) and (ii) (*d*) Both (i) and (iii)

57. Maximum admissible water-cement ratio for mild environmental exposure should be

(*a*) 0.55 (*b*) 0.50

(*c*) 0.45 (*d*) 0.40

58. Air entrainment in the concrete increases

(*a*) workability

(*b*) strength

(*c*) the effect of temperature variation

(*d*) the unit weight

59. Which of the following is added for quick setting of cement?

(*a*) Gypsum (*b*) Alum

(*c*) Zinc sulphate (*d*) aluminium sulphate

2014

60. To obtain very high strength concrete, it is necessary to use very fine grained

(*a*) Volcanic Scoria (*b*) Granite

(*c*) Magnetite (*d*) Barite

61. The concrete having a slump of 6.5 cm,is said to be:

(*a*) plastic (*b*) dry

(*c*) earthmoist (*d*) semi-plastic

62. As a cheap alternative, the fineness of cement is tested by using

(*a*) IS 100μ sieve where at least 90% (by weight) should be retained

(*b*) IS 90μ sieve where at least 90% (by weight) should pass

(*c*) IS 90 μ sieve where at least 95% (by weight) should pass

(*d*) IS 100 μ sieve where at least 90% (by weight) should pass

63. Calcium chloride added in concrete acts as:

(*a*) retarder

(*b*) accelerator

(*c*) air entraining agent

(*d*) plasticizer

64. To construct a massive dam the type of cement used is :

(*a*) blast furnace slag cement

(*b*) low heat cement

(*c*) rapid hardening cement

(*d*) ordinary Portland cement

65. The increase in the strength of concrete with time is :

(*a*) Linear (*b*) Non-linear

(*c*) Asymptotic (*d*) All of the above

66. Generally concrete cubes are tested measure concrete's

(*a*) Compressive strength

(*b*) Tensile strength

(*c*) Twisting strength

(*d*) None of the above

67. Workability of concrete is directly proportional to :

(*i*) time of transit

(*ii*) wate cement ratio

(*iii*)gradign of aggregate

(*iv*) strength of aggregate

(*v*) aggregate cement ratio

(*a*) (*iii*), (*iv*), (*v*) (*b*) (*i*), (*ii*), (*iv*)

(*c*) (*ii*), (*iii*), (*v*) (*d*) (*ii*), (*iii*)

68. The percentage of the fine aggregate of fineness modulus 2.6 to be combined with coarse aggregate of fineness modulus 6.8 of obtaining the aggregates of fineness modulus 5.4, is :

(*a*) 60% (*b*) 30%

(*c*) 40% (*d*) 50%

69. Generally the ratio of different ingredients (Cement Sand and aggregate) in concrete mix of grade M20

(*a*) 1 : 2 : 4 (*b*) 1 : 15 : 3

(*c*) 1 : 3 : 6 (*d*) 1 : 1 : 2

70. Fineness test of cement gives us an estimate of :

(*a*) workability of concrete

(*b*) heat of hydration

(*c*) rate of hydration

(*d*) durability of concrete

71. Admixture which cause early setting and hardening of concrete are called

(*a*) Air entrainign agents

(*b*) Workability admixture

(*c*) Accelerators

(*d*) Retarders

72. For a given aggregate ratio increasing the water cement ratio :

(*a*) increases the strength

(*b*) decreased shrinkage

(*c*) increases shrinkage

(*d*) does not cause any change in shrinkage

73. Separation of water or water sand cement from a freshly mixed concrete is known as :

(*a*) Segregation (*b*) Flooding

(*c*) Bleeding (*d*) Creeping

74. The permanent deformation of concrete with time under steady load is called

(*a*) visco -elasticity

(*b*) vicidity

(*c*) creep

(*d*) relaxation

75. An aggregate is known as cyclopean aggregate if its size is more than :

(*a*) 75 mm (*b*) 4.75 mm

(*c*) 30 mm (*d*) 60 mm

76. Which of the following acts as retarder for the concrete ?

(*a*) Calcium chloride

(*b*) Calcium lignosulphonate

(*c*) Calcium stearate

(*d*) Aluminium powder

77. Coarse sand has a fineness modulus in the range of

(*a*) 2.2 – 2.4 (*b*) 2.4 – 2.6

(*c*) 2.6 – 2.9 (*d*) 2.9 – 3.2

78. Separation of coarse aggregates from concrete during transportation, is known as

(*a*) bleeding (*b*) creeping

(*c*) segregation (*d*) evaporation

79. The resistance of an aggregate to wear is known as

(*a*) impact value (*b*) abrasion resistance

(*c*) shear resistance (*d*) crushing resistance

80. If fineness modulus of a sand is 2.5, it is graded as

(*a*) very fine sand (*b*) fine sand

(*c*) medium sand (*d*) coarse sand

81. Water-cement ratio is measured —— of water and cement used per cubic metre of concrete.

(*a*) volume by volume

(*b*) weight by weight

(*c*) weight by volume

(*d*) volume by weight

82. To prevent segregation, the maximum height for placing concrete,is

(*a*) 100 cm (*b*) 125 cm

(*c*) 150 cm (*d*) 200 cm

83. An aggregate is said to be flaky, if its least dimension is less than

(*a*) $\frac{2}{3}$ mean dimension

(*b*) $\frac{1}{2}$ mean dimension

(*c*) $\frac{3}{5}$ mean dimension

(*d*) $\frac{3}{4}$ mean diameter

84. The fineness of cement can be found out by sieve analysis using IS sieve number

(*a*) 20 (*b*) 10

(*c*) 9 (*d*) 6

85. For batching 1 : 2 : 4 concrete mix by volume the ingredients required per bag (50 kg) of cement are

(*a*) 100 litres of fine aggregate : 140 litres of coarse aggregate

(*b*) 100 kg of fine aggregate : 200 kg of coarse aggregate

(*c*) 70 kg of fine aggregate : 140 kg of coarse aggregate

(*d*) 70 litres of fine aggregate : 140 litres of coarse aggregate

86. Bulking is

(*a*) increase in volume of sand due to moisture which keeps sand particles apart

(*b*) increase in density of sand due to impurities like clay, organic matter

(*c*) ramming of sand so that it occupies minimum volume

(*d*) compacting of sand

87. The concrete cubes are prepared, cured and lested according to Indian Standards code number

(*a*) IS : 515 (*b*) IS : 516

(*c*) IS : 517 (*d*) IS : 518

88. Workability of concrete for a given water content is good if the aggregates are

(*a*) angular aggregates (*b*) flaky aggregates

(*c*) rounded aggregates (*d*) irregular aggregates

89. Generally, strength of concrete is considered negligible/very low in

(*a*) Compression (*b*) Tension

(*c*) Fatigue (*d*) None of the above

90. As the cement sets and hardens, it generates heat. This is called

(*a*) Heat of hydration (*b*) Latent heat

(*c*) Heat of vaporisation (*d*) Sensible heat

91. In concrete, while hand mixing is adopted, excess cement to be added is

(*a*) 4% (*b*) 10%

(*c*) 14% (*d*) 20%

92. If τ_v is the nominal shear stress, τ_c is design shear strength of concrete and $\tau_{c,max}$ is the maximum design shear strength of concrete which of the following statements is correct ?

(*a*) If $t_v > t_{c,max}$, section is to be designed for shear.

(*b*) If $t_v > t_{c,max}$, minimum shear reinforcement is to be provided.

(*c*) If $t_v < t_c$, minimum shear reinforcement is to be provided.

(*d*) If $t_v > t_c$, minimum shear reinforcement is to be provided.

2015

93. The construction joints in cement concrete

(*a*) should not be provided at the corners

(*b*) should be spaced at a distance of 3 m apart in case of huge structures

(*c*) should be located where shear force is large

(*d*) should be located where bending moment is large

94. The fineness modulus of an aggregate is roughly proportional to

(*a*) average size of particles in the aggregate

(*b*) grading of the aggregate

(*c*) specific gravity of the aggregate

(*d*) shape of the aggregate

95. The aggregate is said to be flaky when

(*a*) its length is equal to 1.8 times its mean dimension

(*b*) its length is equal to its mean dimension

(*c*) its least dimension is equal to its mean dimension

(*d*) its least dimension is three fifth of its mean dimension

96. The soundness of cement is tested by

(*a*) Vicat's apparatus

(*b*) Le Chatelier's apparatus

(*c*) Compression testing machine

(*d*) Standard briquette test

97. In lime concrete, lime is used as

(*a*) admixture

(*b*) binding aggregate

(*c*) fine aggregate

(*d*) coarse aggregate

98. The minimum quantity of cement content needed in one m^3 of a reinforced concrete which is exposed to sea weather conditions is (in kg)

(*a*) 350 (*b*) 200

(*c*) 250 (*d*) 300

99. Shrinkage in concrete increases its

(*a*) bond strength

(*b*) compressive strength

(*c*) flexural strength

(*d*) tensile

100. The strength of concrete mainly depends on

(*a*) quality of fine aggregates

(*b*) water cement ratio

(*c*) fineness of cement

(*d*) quality of course aggregates

101. Green concrete may be made by adding
(*a*) iron hydroxide
(*b*) barium manganate
(*c*) iron oxide
(*d*) chromium oxide

102. The Indian standard mix design for fly ash and cement concrete recommends water content
(*a*) to increase by 3% to 5%
(*b*) to reduce by 15%
(*c*) to increase by 15%
(*d*) to reduce by 3% to 5%

103. The resistance of an aggregate to the effect of hydration of cement and weather is called
(*a*) impact value
(*b*) soundness
(*c*) crushing strength
(*d*) abrasion resistance

104. Under which conditions highest water cement ratio is used?
(*a*) Heavy sections such as piers, foundations etc. exposed to alternate wetting and drying
(*b*) Heavy sections such as piers foundations etc. protected against rain and frost
(*c*) Hydraulic structure exposed to rain and snow
(*d*) Light structural members exposed to alternate wetting and drying

105. Slump test for concrete is carried out to determine
(*a*) Strength (*b*) Durability
(*c*) Workability (*d*) Water content

106. The leaching action in concrete is the example of
(*a*) decomposition (*b*) creeping
(*c*) crystallization (*d*) chemical reaction

107. Poission's ratio of cement concrete is about
(*a*) 0.28 (*b*) 0.50
(*c*) 0.40 (*d*) 0.15

108. The steel beam of light section placed in plain cement concrete are called
(*a*) filler joists
(*b*) concrete joists
(*c*) simple joists
(*d*) joists

109. Aggregate impact value indicates which of the following properties of aggregates?
(*a*) Durability (*b*) Toughness
(*c*) Hardness (*d*) Strength

110. Total depreciation during first five years of a cement concrete structure is
(*a*) zero per cent (*b*) 0.5 per cent
(*c*) 1 per cent (*d*) 2 per cent

ANSWERS

EXERCISE - I

1. (*d*)	**2.** (*d*)	**3.** (*a*)	**4.** (*b*)	**5.** (*a*)	**6.** (*a*)	**7.** (*b*)	**8.** (*c*)	**9.** (*b*)	**10.** (*a*)
11. (*b*)	**12.** (*a*)	**13.** (*c*)	**14.** (*c*)	**15.** (*d*)	**16.** (*a*)	**17.** (*a*)	**18.** (*b*)	**19.** (*a*)	**20.** (*c*)
21. (*a*)	**22.** (*b*)	**23.** (*c*)	**24.** (*c*)	**25.** (*d*)	**26.** (*c*)	**27.** (*d*)	**28.** (*d*)	**29.** (*b*)	**30.** (*c*)
31. (*d*)	**32.** (*a*)	**33.** (*a*)	**34.** (*a*)	**35.** (*b*)	**36.** (*a*)	**37.** (*a*)	**38.** (*c*)	**39.** (*a*)	**40.** (*c*)
41. (*d*)	**42.** (*b*)	**43.** (*a*)	**44.** (*c*)	**45.** (*c*)	**46.** (*b*)	**47.** (*c*)	**48.** (*a*)	**49.** (*d*)	**50.** (*a*)
51. (*b*)	**52.** (*d*)	**53.** (*d*)	**54.** (*d*)	**55.** (*a*)	**56.** (*c*)	**57.** (*b*)	**58.** (*d*)	**59.** (*b*)	**60.** (*c*)
61. (*a*)	**62.** (*b*)	**63.** (*a*)	**64.** (*a*)	**65.** (*d*)	**66.** (*b*)	**67.** (*a*)	**68.** (*c*)	**69.** (*c*)	**70.** (*b*)
71. (*a*)	**72.** (*d*)	**73.** (*c*)	**74.** (*a*)	**75.** (*d*)	**76.** (*a*)	**77.** (*a*)	**78.** (*c*)	**79.** (*c*)	**80.** (*c*)
81. (*b*)	**82.** (*a*)	**83.** (*a*)	**84.** (*d*)	**85.** (*b*)	**86.** (*a*)	**87.** (*b*)	**88.** (*a*)	**89.** (*a*)	**90.** (*d*)
91. (*b*)	**92.** (*a*)	**93.** (*a*)	**94.** (*b*)	**95.** (*d*)	**96.** (*b*)	**97.** (*c*)	**98.** (*b*)	**99.** (*d*)	**100.** (*d*)
101. (*c*)	**102.** (*a*)	**103.** (*a*)	**104.** (*a*)	**105.** (*d*)	**106.** (*a*)	**107.** (*b*)	**108.** (*d*)	**109.** (*b*)	**110.** (*c*)

111 (*a*)	**112.** (*b*)	**113.** (*c*)	**114.** (*c*)	**115.** (*d*)	**116.** (*c*)	**117.** (*d*)	**118.** (*d*)	**119.** (*d*)	**120.** (*d*)
121. (*b*)	**122.** (*d*)	**123.** (*c*)	**124.** (*d*)	**125.** (*c*)	**126.** (*c*)	**127.** (*a*)	**128.** (*d*)	**129.** (*c*)	**130.** (*d*)
131. (*c*)	**132.** (*b*)	**133.** (*a*)	**134.** (*a*)	**135.** (*a*)	**136.** (*a*)				

EXERCISE - II

1. (*c*)	**2.** (*d*)	**3.** (*c*)	**4.** (*d*)	**5.** (*c*)	**6.** (*b*)	**7.** (*d*)	**8.** (*d*)	**9.** (*a*)	**10.** (*c*)
11. (*c*)	**12.** (*a*)	**13.** (*d*)	**14.** (*c*)	**15.** (*a*)	**16.** (*b*)	**17.** (*c*)	**18.** (*d*)	**19.** (*d*)	**20.** (*c*)
21. (*b*)	**22.** (*d*)	**23.** (*d*)	**24.** (*c*)	**25.** (*b*)	**26.** (*c*)	**27.** (*d*)	**28.** (*b*)	**29.** (*d*)	**30.** (*c*)
31. (*b*)	**32.** (*b*)	**33.** (*b*)	**34.** (*c*)	**35.** (*c*)	**36.** (*a*)	**37.** (*a*)	**38.** (*d*)	**39.** (*a*)	**40.** (*c*)
41. (*a*)	**42.** (*a*)	**43.** (*b*)	**44.** (*a*)	**45.** (*b*)	**46.** (*a*)	**47.** (*c*)	**48.** (*d*)	**49.** (*d*)	**50.** (*b*)
51. (*c*)	**52.** (*d*)	**53.** (*b*)	**54.** (*d*)	**55.** (*d*)	**56.** (*c*)	**57.** (*c*)	**58.** (*a*)	**59.** (*a*)	**60.** (*b*)
61. (*a*)	**62.** (*b*)	**63.** (*b*)	**64.** (*b*)	**65.** (*b*)	**66.** (*c*)	**67.** (*d*)	**68.** (*d*)	**69.** (*b*)	**70.** (*c*)
71. (*c*)	**72.** (*c*)	**73.** (*c*)	**74.** (*c*)	**75.** (*a*)	**76.** (*b*)	**77.** (*d*)	**78.** (*c*)	**79.** (*b*)	**80.** (*b*)
81. (*b*)	**82.** (*a*)	**83.** (*c*)	**84.** (*c*)	**85.** (*b*)	**86.** (*a*)	**87.** (*b*)	**88.** (*c*)	**89.** (*c*)	**90.** (*a*)
91. (*b*)	**92.** (*c*)	**93.** (*a*)	**94.** (*a*)	**95.** (*d*)	**96.** (*b*)	**97.** (*b*)	**98.** (*a*)	**99.** (*c*)	**100.** (*b*)
101. (*c*)	**102.** (*d*)	**103.** (*b*)	**104.** (*b*)	**105.** (*c*)	**106.** (*d*)	**107.** (*a*)	**108.** (*b*)	**109.** (*b*)	**110.** (*)

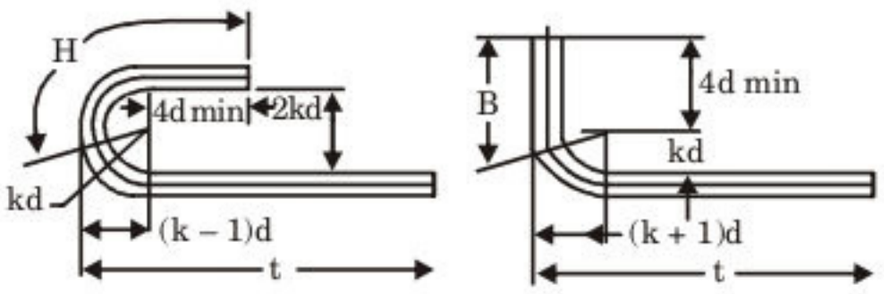
EXPLANATIONS

2008

1. Permissible compressive strength of M200 concrete grade is 200 kg/cm^2.

2. The shrinkage of concrete is proportional to water content in the mix. It is also proportional to cement concrete and increase with age of concrete.

4.



IA Hook IB Band

The length of the straight portion of a bar beyond the end of the hook curve should be at least four times the diameter.

6. I.S.I has specified the full stength.

It has a gain of strength beyond 28 days.

The quantum of increase depends upon the grade and type of cement, curing and environmental conditions, etc. The design should be based on 28 days characteristic strength of concrete unless there is a evidence to justify a higher strength for a particular structure due to age.

7. The concrete mix which causes difficulty is obtaining a smooth finish is known to possess hardness.

8. The flaky aggregate is said to be elongated if its length is Twice the mean size.

Flaky aggregate

The aggregate is said to be flaky when its least dimension is less than **3/5th** (or 60%) of its mean dimension.

Elongated aggregate

The aggregate is said to be elongated when its length is greater than 180% of its mean dimension.

22. Strength and the quality of concrete depend upon-

- Grading of the aggregate
- Shape of aggregates
- Surface area of the aggregate
- Surface texture of the aggregate etc.

23. The concrete having a slump of 6.5 cm, is said to be plastic.

24. Separation of water or water sand cement from a freshly mixed concrete is known as Bleeding.

25. Los angles machine is used to test the aggregate for abrasion resistance.

59. Column may be made of plain concrete if their unsupported length does not exceed their least lateral diameter by 4 times.

2009

22. • Walls, columns and vertical faces of all structural members : 24 to 48 hours
• Beam bottoms (props left under) : 7 days

23. The correct proportion of ingredients of concrete depends upon Bulking of sand, Water content, Absorption, Cement content, air, aggregates and pebbles etc.

24.

Grade of concrete	Mix proportion	Perspective characteristic strength (N/mm^2)
M10	1:3:6	10
M15	1:2:4	15
M20	1: 1.5 : 3	20
M25	1:1:2	25

25. To prevent segregation, the maximum height for placing concrete = 100 cm

26. While compacting the concrete by a mechanical vibrator, the slump should not exceed 5.0 cm.

29. Segregation

Segregation can be defined as the separation of the constituent materials of concrete or separation of coarse aggregates from mortar. A good concrete is one in which all the ingredients are properly distributed to make a homogeneous mixture.

Bleeding

Bleeding in concrete is sometimes referred as water gain. It is a particular form of segregation, in which some of the water from the concrete comes out to the surface of the concrete. It is being of the lowest specific gravity among all the ingredients of concrete.

Creep in concrete

Concrete creep is defined as: deformation of structure under sustained load. Basically, long term pressure or stress on concrete can make it change shape. This deformation usually occurs in the direction at which the force is being applied.

Shrinkage of concrete

Shrinkage of concrete is the time-dependent strain. It is measured in an unloaded and unrestrained specimen at constant temperature.

30.

Group	Grade Designation
Ordinary	M 10
Concrete	M 15
	M 20
Standard	M 25
Concrete	M 30
	M 35
	M 40
	M 45
	M 55
High	M 60
Strength	M 65
Concrete	M 70
	M 75
	M 80

52. The compressive strength of ordinary Portland cement after 3 days should not be less than 16.0 N/mm^2 or 150 kg/cm^2

Table: Minimum Specified Strength in N/mm^2

Type/Days	1 Day	3 Days	7 Days	28 Days
OPC	–	16.0	22.0	31.0
PPC	–	–	22.0	31.0
Low Heat Portland cement	16.0	27.5	–	–
Rapid hardening cement	–	–	22.0	31.0
High alumina cement	30.0	35.0	–	–

53. Tricalcium Aluminate (C_3A) : $3CaO.Al_2O_3$

It contains

- 5-11% of cement
- It **rapidly react with water**
- High heat of hydration
- Responsible for flash set

71. Partial safety factor for concrete = 1.5

72. Expansion joints have to be provided can be determined after taking into consideration various factors, such as temperature, exposure to weather, the time and season of the laying of the concrete, etc. Normally structures exceeding 45 m in length are designed with one or more expansion joints.

73. Grading of sand causes great variation in

- Workability of concrete
- Strength of concrete
- Durability of concrete
- Handing and placing of concrete

74. Permissible compressive strength of M 200 concrete grade is 200 kg/cm^2.

2010

55. Precast concrete piles are commonly manufactured in square and ranging from about 250. mm to about 450 mm.

56. The value of ultimate creep coefficient for concrete decreases with age of loading.

Age of loading	Creep coefficient
7 days	2.2
28 days	1.6
1 year	1.1

59. Shrinkage can be reduced by using the maximum practical amount of aggregate in the mixture. The lowest water-to-cement ratio is important to avoid this type of shrinkage.

67. The operation of removing humps and hollows of uniform concrete surface is known as Screeding.

2011

2012

2013

102. 0.85 p where (p-standard consistency of cement)

171. M20[20 stands for characteristics compressive strength]

M stands for mix.

172. Blast furnace slug cement used in concreting in dams, bridge abutmant and retaining wall.

174. 30 min [Initial setting time of ordinary portan cement]

10 hours or 600 min [Final setting time]

175. Cable [Cable Act as Arch] B.M at any section will be zero.

180. Adjust setting time of cement.

186. Both (*i*) and (*ii*)

C_3S reacts with water, producing more heat of hydration and responsible for early strength of concrete, C_2S are more resistance to sulphate affuese.

188. After reaching the w.c. = 0.45, the strength of concrete will decreases.

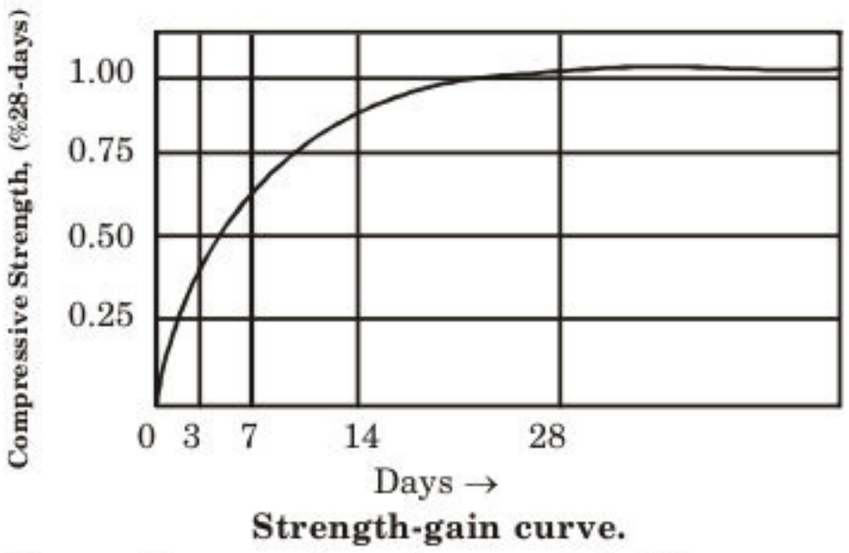
2014

102. As granite is strongest rock, we can use it for high strength concrete.

108. The concrete having a slump of 6.5 cm, is said to be plastic.

115. Calcium chloride ($CaCl_2$) added in concrete acts as Accelerator or it is a admixtures result in early setting and hardening or concrete and increased shrinkage.

130. As the graph of indicates that the increase in the strength of concrete with time is non-linear.



Strength-gain curve.

131. Generally concrete cubes are tested to measure concrete's characteristic compressive strength of 150 mm cube after 28 days.

140. The percentage of the fine aggregate-

$$R = \frac{FM_{coarse} - FM_{comp}}{FM_{comb} - FM_{fine}} \times 100$$

$$= \frac{6.8 - 5.4}{5.4 - 2.6} \times 100$$

$$= \left[\frac{1.4}{2.8} \times 100\right]\% = 50\%$$

145. The fineness of cement is responsible for the rate of hydration and hence the rate of gain of strength and also the rate of evolution of heat.

147. Admixtures which results in early setting and hardening of concrete are called accelerators.

182. For a given aggregate ratio increasing the water cement ratio increases shrinkage and decreases strength.

187. Separation of water or water sand cement from a freshly mixed concrete is known as bleeding.

192. The permanent deformation of concrete with time under steady load is called creep.

194. The size of aggregate is more than 75 mm then it is known as cyclopean aggregate.

168. Range is 2.2 to 2.6

171. Flaky, if least dimension is less than 3/5th of mean dimension.

2015

113. Constructor joint should be provided whenever the construction works stop temporarily. The joint could be either along transverse or longitudinal direction.

114. Fineness Modulus of an aggregate is an index number which is roughly proportional to average size of the particles in the aggregate. The coarser the aggregates the higher the fineness modules.

115. Flank index = 0.6 mean dimension.

116. Soundness of cement is tested by Le'chatelier apparatus. Soundness mean change of volume or expansion in volume.

117. When lime is mixed with water, lime slowly turns into the mineral portlandlite in reaction before portland cement lime is widely used.

118. Concrete in sea water as per IS : 456 along the sea cost be atleast M_{20} grade in plain concrete and M_{30} in case of reinforced concrete. For M_{30} grade minimum cement tightly 320 kg/m^3 is used.

119. Shrinkage concrete cause the concrete to grip reinforcing bars more. This increases friction between concrete and steel and so, improves bond strength, especially for plain bars.

120. Water cement ratio decreases with increase in strength.

121. For making green concrete with blast furnace slay with low heat. Green concrete made with $SiO_2 + Al_2O_3 + Fe_2O_3$ of flyash.

123. The flyash is replacement of cement with about 20-30% and also reduce the water demand of 10-15% with low heat of hydration.

132. Soundness of cement is determined either by 'Autoclave Test' soundness of aggregate loss in mass for C. Aggregate with mg. S increases as fraction size is reduced and extent of wearthering on aggregate.

133. Because of congested reinforcement is used in piers and high slum is required.

150. Slump test is used to find the fluidity of concrete.

151. Concrete degradation may have various causes by sea water effects, corossion, callicum leaching, it is a chemical $R \propto N$.

158. The joist to attached an outside wall. Then, span to an inside wall. The concrete and joist combined.

■■