114/23

Question Booklet Alpha Code

A

A

	Question Booklet Sl. No.

Total Number of Questions : 100 **Time : 90 Minutes**

Maximum Marks : 100

INSTRUCTIONS TO CANDIDATES

1. The Question Paper will be given in the form of a Question Booklet. There will be four versions of Question Booklets with Question Booklet Alpha Code viz. **A, B, C** & **D**.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the Question Booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a Question Booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same alpha code.
6. The Question Booklet will be sealed at the middle of the right margin. Candidate should not open the Question Booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him/her contains all the 100 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the Question Booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices **(A), (B), (C)** and **(D)** having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

A

1. In third angle projection the object is imagined to be placed
   A) Below HP and in front of VP
   B) Below HP and behind of VP
   C) Above HP and in front of VP
   D) Above HP and behind of VP

2. Which of the following statement is incorrect about ellipse ?
   A) The sum of the distances from two focuses and any point on the ellipse is constant.
   B) Eccentricity is less than 1.
   C) If a plane cuts the cone parallel to its axis, then the section obtained is an ellipse.
   D) Mathematical equation is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

3. The dimension of A3 size drawing sheet is
   A) 240 mm × 330 mm
   B) 297 mm × 420 mm
   C) 148 mm × 210 mm
   D) 330 mm × 450 mm

4. The projection lines in orthographic projection are
   A) Parallel to each other
   B) Perpendicular to each other
   C) Inclined at 45 degrees
   D) Inclined at 60 degrees

5. The development of a right cylinder of diameter 50 mm and height 60 mm gives a lateral surface of
   A) Rhombus of each side 60 mm
   B) Square of each side 60 mm
   C) Circle of diameter 40 mm
   D) Rectangle of length 157 mm and width 60 mm

6. In isometric projection, true length is converted into isometric length by multiplying it with
   A) 0.75 B) 0.92 C) 0.82 D) 0.78

7. The maximum frictional force developed in a body when it just starts to slide over another surface is
   A) Sliding friction
   B) Rolling friction
   C) Limiting friction
   D) Dynamic friction

8. "If a number of coplanar forces acting on a particle are in equilibrium, then the algebraic sum of their moments about any point is equal to the moment of their resultant force about the same point" is

   A) Lami's theorem
   B) Cauchy's theorem
   C) Euler's theorem
   D) Varignon's theorem

9. Resultant of two forces F and 2F which are at an angle of 60 degree apart is

   A) $\sqrt{7}P$ B) $\sqrt{5}P$ C) $\sqrt{3}P$ D) $\sqrt{2}P$

10. The moment (M) of the force (P) acting on the body at a distance R from the axis of rotation is represented by

    A) $M = PR\cos\theta$ B) $M = PR\sin\theta$ C) $M = P \times R\cos\theta$ D) $M = P \cdot R\sin\theta$

11. From what distance from the base, along the vertical axis, is the centre of gravity of a right circular solid cone ?

    A) h/2 B) h/4 C) h/6 D) h/8

12. If $m < 2j - 3$, where m is the number of members and j is the number of joints, the frame is a

    A) Redundant frame
    B) Prefect frame
    C) Deficient frame
    D) Rigid frame

13. The diameter of a circular plate is 20 cm. What will be its radius of gyration ?

    A) 5 cm B) 8 cm C) 10 cm D) 12.5 cm

14. The mass of a solid sphere is 2 kg and its radius is 10 cm. Its moment of inertia about its central axis is

    A) 0.005 kgm^2 B) 0.006 kgm^2 C) 0.008 kgm^2 D) 0.01 kgm^2

15. According to perpendicular axis theorem, the moment of inertia about an axis zz, which is perpendicular to xx and yy is

    A) $I_{zz} = I_{xx} + I_{yy}$ B) $I_{zz} = I_{xx} - I_{yy}$ C) $I_{zz} = I_{yy} - I_{xx}$ D) $I_{zz} = \frac{I_{xx}}{I_{yy}}$

16. Which of the following is not a surface force ?

    A) Frictional force
    B) Viscous force
    C) Traction
    D) Centrifugal force

17. Relation between Young's modulus and Shear modulus is

A) $G = \frac{2E}{(1+\upsilon)}$ B) $G = \frac{E}{2(1+\upsilon)}$ C) $G = \frac{E}{2(1+2\upsilon)}$ D) $G = \frac{E\upsilon}{2(1+\upsilon)}$

18. The stress developed in a brass rod of diameter 10 mm and length 1 m having a weight 5 kg is

A) 0.625 N/mm^2 B) 0.064 N/mm^2
C) 0.156 N/mm^2 D) 0.312 N/mm^2

19. Which of the following material does not undergo large deformation before fracture ?

A) Copper B) Aluminum C) Cast iron D) Steel

20. What is the maximum deflection developed in a simply supported beam of length L, which is subjected to a point load P at its centre ?

A) $\frac{PL^2}{16EI}$ B) $\frac{PL^3}{48EI}$ C) $\frac{PL^3}{6EI}$ D) $\frac{PL^4}{8EI}$

21. What is the angle of inclination of maximum shear stress planes and principal planes ?

A) 90° B) 60° C) 45° D) 30°

22. For a column, the ratio of least unsupported length and smallest radius of gyration of the cross-sectional area is

A) Euler ratio B) Poisson's ratio
C) Column ratio D) Slenderness ratio

23. At the point of contraflexure

A) Bending moment is maximum B) Bending moment changes sign
C) Shear force changes sign D) Shear force is maximum

24. The Young's modulus of Steel is around

A) 45 GPa B) 70 GPa C) 130 GPa D) 200 GPa

25. The shape of the shear force diagram of a cantilever beam subjected to uniformly distributed load is

A) Rectangle B) Triangle C) Parabola D) Circular arc

26. Units of kinematic viscosity of fluid is

A) m^2/s^2 B) m^2/s C) Ns/m^2 D) Nm/s

27. As the temperature of a gas increases, its viscosity
    A) Increases
    B) Decreases
    C) Remains constant
    D) None of the above

28. For Newtonian fluid like water, the velocity gradient and shear force applied are
    A) Non-linearly proportional
    B) Inversely proportional
    C) Linearly proportional
    D) Independent

29. With respect to pressure measurement, which is the correct correlation ?
    A) P(atm) = P(gauge) + P(abs)
    B) P(vacuum) = P(atm) + P(abs)
    C) P(abs) = P(atm) + P(gauge)
    D) P(gauge) = P(atm) + P(abs)

30. What is the relative density of a liquid, which weighs 9 N per liter, when acceleration due to gravity is 9.81 m/s^2 ?
    A) 0.917 B) 0.9 C) 9.17 D) 9

31. What is the location of center of pressure of a rectangular vertical plate with 4 m width and 6 m height measured from the free surface of water ?
    Note : the top edge of the plate is coinciding with the water surface.
    A) 1 m B) 2 m C) 3 m D) 4 m

32. The ratio of inertia force to surface tensional force is
    A) Reynolds number
    B) Euler number
    C) Mach number
    D) Weber number

33. For a fluid flow, the Bernoulli's equation is obtained from the conservation of
    A) Momentum B) Mass C) Energy D) Force

34. A Pitot tube is used for the measurement of
    A) Fluid velocity
    B) Atmospheric pressure
    C) Fluid static pressure
    D) Flow rate

35. Type of turbine through which the pressure of water is a constant
    A) Pelton turbine B) Francis turbine C) Kaplan turbine D) Gas turbine

36. A Kaplan turbine is
    A) Radial flow reaction turbine
    B) Axial flow reaction turbine
    C) Impulse turbine
    D) Cross flow turbine

37. In the following list of pumps, which is not a positive displacement pump ?
    A) Vane pump
    B) Gear pump
    C) Centrifugal pump
    D) Lobe pump

38. A jet of water with velocity 15 m/s hits a moving vertical plate with 5 m/s. What is the force exerted by the jet, if its cross sectional area is 1 cm^2 ?
    A) 1 N
    B) 10 N
    C) 10 kN
    D) 100 kN

39. Specific speed of a turbine is expressed as
    A) $N\sqrt{Q}/H^{3/4}$
    B) $N\sqrt{P}/H^{3/4}$
    C) $N\sqrt{P}/H^{5/4}$
    D) $N\sqrt{Q}/H^{5/4}$

40. Estimate the specific speed of a centrifugal pump running at 100 rpm working against a head of 1 m with a flow rate of 100 m^3/s.
    A) 1000 rpm
    B) 100 rpm
    C) 10 rpm
    D) 1 rpm

41. A draft tube is not essential for the working of a
    A) Propeller turbine
    B) Kaplan turbine
    C) Francis turbine
    D) Pelton turbine

42. What is the range of coefficient of discharge (C_d) for a venturimeter ?
    A) 0.5 – 0.6
    B) 0.6 – 0.7
    C) 0.7 – 0.8
    D) 0.9 – 1.0

43. For a cube completely immersed in water, which of the following statements is correct ?
    A) Centre of gravity and centre of buoyancy coincides
    B) Centre of gravity lies above centre of buoyancy
    C) Centre of gravity lies below centre of buoyancy
    D) Can not determine

44. Which of the following statements are true for an isolated system ?
    i. The total energy of the system always remains zero.
    ii. The total energy is constant.
    iii. The entropy of the system always remains constant.
    iv. The entropy of the systems will be greater than or equal to zero.
    A) i and iv
    B) ii and iv
    C) None of the above
    D) All the above

45. For a closed non-flow thermodynamic system, which of the following property relation is valid ?

A) $TdS = dH - Vdp$ B) $TdS = dH + Vdp$

C) $TdS = dQ + pdV$ D) $TdS = -dH - Vdp$

46. If a four stroke cycle diesel engine running at 1000 rpm has a displacement of 20 litres and brake mean effective pressure of 6 bar, what will be its brake power ?

A) 200 kW B) 100 kW

C) 1000 kW D) 2000 kW

47. In a SI engine, the detonation tendency increases with which of the following ?

i. Increase in compression ratio.

ii. Decrease in air inlet temperature.

iii. Increase in load on the engine.

iv. Increase in engine speed.

A) i, ii and iv B) ii, iii and iv

C) i, iii and iv D) i, ii and iii

48. An IC engine working between temperature limits of 477°C and 27°C consumes 1 kg of fuel per hour and produces an output power of 4.8 kW. If the heat value of the fuel is 43200 kJ/kg, what will be the actual efficiency and theoretical maximum efficiency of the engine ?

A) 40% and 94.34% B) 60% and 40%

C) 94.34% and 40% D) 40% and 60%

49. For ideal Otto cycle, which of the following statement is true ?

A) The heat addition takes place at constant pressure

B) The heat addition takes place at constant volume

C) The heat addition takes place at constant temperature

D) The heat addition takes place partially at constant pressure and partially at constant volume

50. If the solar irradiance is 1 sun, what will be the power output from a solar panel with 2 m^2 area and conversion efficiency of 20% ?

A) 400 W B) 400 kW

C) 2000 W D) 2000 kW

51. The error which occurs while conducting the survey from whole to part and part to whole is
    A) In whole to part error is localized and in part to whole it is accumulated
    B) Same
    C) In whole to part error is accumulated and in part to whole it is localized
    D) None of the above

52. Reciprocal levelling eliminates the effect of
    1. Error due to Earth's curvature
    2. Error due to atmospheric refraction
    3. Mistake in levelling staff reading
    4. Error due to line of collimation.

    A) 1, 2 and 4 B) 1, 3 and 4
    C) 2, 3 and 4 D) 1, 2 and 3

53. The type of surveying in which the curvature of the earth is taken into account is called
    A) Topographical surveying B) Contour surveying
    C) Plane surveying D) Geodetic surveying

54. Which GPS surveying method is used to establish control points ?
    A) Static method B) Control method
    C) Kinematic method D) Absolute method

55. The process of determining the elevations of stations from vertical angles and geodetic lengths at mean sea level is known as
    A) Hypsometry
    B) Trigonometric levelling
    C) Triangulation
    D) Levelling

56. Index frame of theodolite is _____ shaped.
    A) T B) A
    C) U D) V

57. The representation of general topography of a very steep terrain is possible only by
    A) Giving spot levels at large interval
    B) Drawing contours at large interval
    C) Drawing contours at small interval
    D) Giving spot levels to salient features at close interval

58. Grade of vertical curve can be expressed in terms of
    A) Percentage
    B) Ratio
    C) Both A) and B)
    D) None of the above

59. Which is not a type of building as per NBC ?
    A) Domestic
    B) Mercantile
    C) Industrial
    D) Storage

60. Height of habitable room measured from the surface of the floor to the lowest point of ceiling shall not be less than
    A) 2 m
    B) 2.5 m
    C) 2.75 m
    D) 3 m

61. The covered area of the usable rooms at any floor level (excluding the area of the wall) is
    A) Plinth area
    B) Covered area
    C) Carpet area
    D) Building area

62. Which among the following step is used for changing the direction of a stair ?
    A) Flight
    B) Nosing
    C) Landing
    D) Winder

63. Horizontal construction joints in concrete walls are generally provided at
    A) Floor level
    B) Soffit level
    C) Window sill level
    D) All the above

64. Rolled steel joist means
    A) Rolled steel I section
    B) Rolled steel angle section
    C) Rolled steel channel section
    D) Rolled steel T section

65. Why are bricks soaked in water before using in brick masonry ?
    A) For reducing efflorescence
    B) For preventing depletion of moisture from mortar
    C) For removing dust and dirt
    D) For reducing air voids

66. The main objective of compaction of concrete is
    A) To provide intimate contact between the concrete and embedded materials
    B) To remove the air voids
    C) To increase the density of concrete
    D) All the above

67. The diameter of longitudinal bars of a column should never be less than
    A) 16 mm
    B) 12 mm
    C) 10 mm
    D) 20 mm

68. In M20 concrete mix, numeric 20 represents the
    A) 7 days compressive strength
    B) 28 days compressive strength
    C) 14 days compressive strength
    D) 7 days tensile strength

69. Which Indian standard code is used for ductile detailing of reinforced concrete structures subjected to seismic forces ?
    A) IS 456
    B) IS 800
    C) IS 1893
    D) IS 13920

70. As per IS 399 (1963) : Classification of Commercial Timbers and their Zonal Distribution, X, Y and Z classification of timber is based on
    A) Availability
    B) Durability
    C) Treatability
    D) All the above

71. Which of the following is the example of shallow foundation ?
    A) Mat foundation
    B) Pile foundation
    C) Pier foundation
    D) All the above

72. Iron with least carbon content is
    A) Wrought iron
    B) Cast iron
    C) Mild steel
    D) Direct reduced iron

73. The preparation of surface of stone to obtain plain edges or to obtain stones of required size and shape is called
    A) Blasting of stones
    B) Seasoning of stones
    C) Dressing of stones
    D) Quarrying of stones

74. Which of this IS code provides specification for 53 grade OPC cement ?
    A) IS 8112 : 1989
    B) IS 8041 : 1990
    C) IS 12269 : 1987
    D) IS 1489

75. Which of the following statement is correct about Portland Pozolana Cement (PPC) ?
    A) The long term strength of PPC is less and it has reduced heat of hydration and permeability.
    B) The long term strength of PPC is more and it has enhanced heat of hydration and permeability.
    C) The long term strength of PPC is more and it has reduced heat of hydration and permeability.
    D) The long term strength of PPC is less and it has reduced heat of hydration and enhanced permeability.

76. The water quantity to be added for testing the compressive strength of cement is (where P = Percentage of water required for normal consistency paste, W1 = Weight of cement and W2 = Weight of sand.)
    A) $(P_3 + 4)$ % (W1 + W2)
    B) $(P_4 + 2)$ % (W1 + W2)
    C) $(P_4 + 3)$ % (W1 + W2)
    D) $(P_2 + 3)$ % (W1 + W2)

77. The shape of the aggregate that is having maximum void ratio
    A) Rounded B) Flaky C) Irregular D) Angular

78. As per IS 283 –1970 the aggregate impact value shall not exceed
    A) 45% by weight for aggregate used for concrete in wearing surface and 30% for concrete other than wearing surface.
    B) 35% by weight for aggregate used for concrete in wearing surface and 45% for concrete other than wearing surface.
    C) 30% by weight for aggregate used for concrete in wearing surface and 45% for concrete other than wearing surface.
    D) 30% by weight for aggregate used for concrete in wearing surface and 40% for concrete other than wearing surface.

79. The suggested range of slump value for pumpable concrete

A) 50 – 100 B) 75 – 100

C) 25 – 75 D) 100 – 150

80. A test is done to assess the quality of concrete by ultrasonic pulse velocity method as per IS : 13311 (Part 1) – 1992. The Pulse Velocity by Cross Probing obtained is 4 km/sec. Then in which concrete quality grading is it belongs to ?

A) Poor B) Doubtful

C) Excellent D) Good

81. Which of the following load combination is used for limit state design of reinforced concrete structures under ultimate limit state ?

A) 1 DL + 1 LL B) 1.5 DL + 1.5 LL

C) 1 DL + 1.5 LL D) 0.9 DL + 1 LL

82. The value for strain of tension steel (cu) for a steel rod with f_y = 500 MPa and $E_s = 2 \times 10^5$ MPa

A) 0.0031 B) 0.0052

C) 0.0042 D) 0.0033

83. What is the value for compressive force obtained from the stress block given in IS 456 – 2000 for an R. C. C. beam with f_{ck} (characteristic compressive strength) = 20 MPa, x_u = 200 mm and width of beam b = 300 mm ?

A) 432 KN B) 554 KN

C) 624 KN D) 724 KN

84. The limiting values of the depth of neutral axis, based on the assumptions given in IS 456 for a grade of steel of 500 is

A) 0.48 d B) 0.46 d

C) 0.53 d D) 0.34 d

85. As per IS 456 – 2000 the span to effective depth ratio of continuous slab of shorter spans (up to 3.5 m) with mild steel reinforcement and loading class up to 3 kN/mm^2 is

A) 35 B) 45 C) 50 D) 40

86. The live load for design of staircase for public building is to be taken as per IS 875
    A) 3 KN/mm^2
    B) 2 KN/mm^2
    C) 5 KN/mm^2
    D) 6 KN/mm^2

87. Unit of measurement of laying wearing course including consolidation in pavement construction
    A) cubic metre
    B) square metre
    C) cubic metre per metre depth
    D) metre

88. The estimate prepared for the valuation of a property is
    A) preliminary estimate
    B) detailed estimate
    C) approximate quantity method estimates
    D) cubic rate estimate

89. The property due to its size, shape, location fetches more value, it is known as
    A) book value
    B) potential value
    C) accommodation value
    D) monopoly value

90. Depreciation of a property is equal to annual sinking plus the interest on the fund for that year is applicable in
    A) Straight line method
    B) Sinking fund method
    C) Quantity survey method
    D) All the above

91. The present value of interest in a property having an annual income of Rs. 100 for a year calculated at 10% is
    A) 379.08
    B) 325.68
    C) 355.38
    D) 310.88

92. For concreting, no deductions shall be made for
    A) ends of beams, posts, girders, purlins upto 500 sq. m in cross section
    B) opening upto 0.1 sq. m
    C) volume occupied by reinforcement
    D) all the above

93. For obtaining environmental lead for sandy track, lead is multiplied by
A) 1.0 B) 1.1 C) 1.3 D) 1.4

94. In construction, contractor's profit is included in
A) Work charged establishments B) Specifications
C) Unit rate of items D) All the above

95. Interfering float is the difference between
A) Total float and free float
B) Total float and independent float
C) Free float and independent float
D) None of the above

96. Security deposit submitted for a work is
A) 2% of contract value B) 5% of contract value
C) 10% of contract value D) None of the above

97. In time cost trade off, the crashing of activities along the critical path using Critical Path Method of network analysis, is starting with the activity having
A) shortest duration B) least cost slope
C) longest duration D) highest cost slope

98. The expected time of an activity having optimistic, pessimistic and most likely time as 1, 3, 8 days is
A) 6 B) 3.5 C) 18 D) 10.5

99. The type of contract which is usually followed by railway department for construction is
A) lumpsum B) percentage rate
C) item rate D) piece work

100. The type of tender system preferred in the work of highly technical nature in which accuracy is more important than cost of the work is
A) open tender B) limited tender
C) negotiated tender D) single tender

Space for Rough Work