A.C.F.&F.R.O.—2018

प्रश्न-पत्र पुस्तिका एवं उत्तर पत्रक के पेपर सील/पॉलिथीन बैग को खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि उसके प्रश्न-पत्र पुस्तिका पर वही प्रश्न-पत्र पुस्तिका संख्या अंकित है जो उत्तर पत्रक पर अंकित है । इसमें कोई भिन्नता हो तो परीक्षार्थी वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें । ऐसा सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी ।
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इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए ।
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18-□

1. The material having same elastic properties in all direction are called
   (1) Ideal materials
   (2) Isotropic materials
   (3) Elastic materials
   (4) Uniform materials

2. Determine the Poission ratio of a material for which Young's modulus is 1.2×10^5 N/mm^2 and modulus of rigidity is 4.8×10^4 N/mm^2
   (1) 0
   (2) 0.5
   (3) 1
   (4) 0.25

3. The curvature (R) of beam is equal to
   (1) $\dfrac{EI}{M}$
   (2) $\dfrac{M}{E}$
   (3) $\dfrac{M}{EI}$
   (4) $\dfrac{E}{MI}$

4. In cantilever beam there is tensile stress
   (1) Neutral axis
   (2) Below neutral axis
   (3) Above neutral axis
   (4) None of these

5. A bar of 30 mm diameter is subjected to a pull of 60 kN, the measured tension on gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Calculate Young's modulus
   (1) 1.432×10^5 N/mm^2
   (2) 1.697×10^5 N/mm^2
   (3) 1.0×10^5 N/mm^2
   (4) 2×10^5 N/mm^2

6. If the thickness is small in comparison with length and width, such structural members are called as
   (1) one dimensional
   (2) two dimensional
   (3) three dimensional
   (4) none of these

7. Points of contra-flexure are the points where
   (1) beam is supported
   (2) bending moment is not zero
   (3) shear force is zero
   (4) bending moment changes sign

8. The carryover factor in a prismatic member whose far end is hinged is
   (1) 0
   (2) 1/2
   (3) 3/4
   (4) 1

9. Plastic analysis of the structures is used in
   (1) Working stress design
   (2) Ultimate strength design
   (3) Limit state design
   (4) None of these

10. M_1 and M_2 are the members of two individual simple trusses of a compound truss. The compound truss will be rigid and determinate if
    (1) $M = M_1 + M_2$
    (2) $M = M_1 + M_2 + 1$
    (3) $M = M_1 + M_2 + 2$
    (4) $M = M_1 + M_2 + 3$

11. For a two-hinged arch, if one of the supports settles down vertically, then the horizontal trust is
    (1) increased
    (2) decreased
    (3) remain unchanged
    (4) zero

12. The load on a spring per unit deflection, is called
    (1) stiffness
    (2) proof resilience
    (3) proof stress
    (4) proof load

13. The maximum deflection due to a uniformly distributed load w/unit length over entire span of a cantilever of length l and of flexural rigidity EI is
    (1) $wl^3/3EI$
    (2) $wl^4/3EI$
    (3) $wl^4/8EI$
    (4) $wl^4/12EI$

14. While using the three moments equation, a fixed end of continuous beam is replaced by an additional span of
    (1) zero length
    (2) infinite length
    (3) zero moment of inertia
    (4) none of these

15. The degree of static indeterminacy up to which column analogy method can be used is
    (1) 2
    (2) 3
    (3) 4
    (4) unrestricted

16. In a prestressed member, it is advisable to use
    (1) low strength concrete only
    (2) high strength concrete only
    (3) low strength concrete but high tensile strength
    (4) high strength concrete and high tensile strength

17. Partial safety factors used for steel and concrete in limit state design are
    (1) 1.5 and 1.5
    (2) 1.0 and 1.5
    (3) 1.15 and 1.5
    (4) 1.0 and 1.0

18. For concreting of heavily reinforced sections, that too without vibration, the compaction factor for concrete should be
    (1) 0.75 – 0.80
    (2) 0.80 – 0.85
    (3) 0.85 – 0.92
    (4) above 0.92

19. The steel mould for slump test is in the form of a
    (1) cube
    (2) cylinder
    (3) frustum of a cone
    (4) none of these

20. Fully prestressed concrete beam means
    (1) no tension is permitted
    (2) no cracking is permitted
    (3) all working loads are resisted by prestressing force
    (4) none of these

21. Yield line theory results in
    (1) Elastic solution
    (2) Lower bound solution
    (3) Upper bound solution
    (4) Unique solution

22. The maximum permissible shear stress, $\tau_{c\ max}$ given in B1S : 456 – 1978 is based on
    (1) Diagonal tension failure
    (2) Diagonal compression failure
    (3) Flexural tension failure
    (4) Flexural compression failure

23. For a prestressed concrete bridge beam, a minimum clear spacing of cable or group of cables should be
    (1) 25 mm
    (2) 25 mm or 6 mm + largest size of aggregate
    (3) 40 mm
    (4) 50 mm

24. Drops are provided in flat slab to resist
    (1) Buckling moment
    (2) Thrust
    (3) Shear
    (4) Torsion

25. Side face reinforcement is provided in a beam when depth of web exceeds
    (1) 300 mm   (2) 500 mm
    (3) 450 mm   (4) 750 mm

26. Two steel parts at right angles are welded with fillet weld of 10 mm size. The throat thickness of the fillet weld should be
    (1) 7 mm   (2) 10 mm
    (3) 12 mm   (4) 5 mm

27. The minimum thickness of plates in a steel stack should be
    (1) 3 mm   (2) 5 mm
    (3) 6 mm   (4) 9 mm

28. As per BIS specifications, the maximum longitudinal pitch allowed in bolted joints of tension members is about
    (1) 12 times thickness of plate
    (2) 12 times diameter of the bolt
    (3) 16 times thickness of plate
    (4) 16 times diameter of the bolt

29. Minimum pitch value is equal to
    (1) 2.5 times the diameter of rivet hole
    (2) 3.0 times the diameter of rivet hole
    (3) 2.0 times the diameter of rivet hole
    (4) 3.5 times the diameter of rivet hole

30. According to IS 800, effective length of a compression members with both ends fixed is
    (1) 0.500 L   (2) 0.650 L
    (3) 0.707 L   (4) 0.800 L

31. Which of the following section will be preferred for a column ?
    (1) ISLB   (2) ISMB
    (3) ISWB   (4) ISHB

32. The optimum depth of plate girder is given by
    (1) $\left(\dfrac{Mk^2}{f_y} \right)^{0.33}$ (2) $C > d$
    (3) $\left(\dfrac{M}{f_y k^2} \right)^{0.33}$ (4) $1.21 \sqrt{\dfrac{MV_{m_1}}{f_y}}$

33. The slenderness ratio in a tension member as per IS code where reversal of stress is due to loads other than wind or seismic should not exceed
    (1) 350   (2) 180
    (3) 100   (4) 60

34. The unstiffened top edge of a gusset plate ($f_y = 250$ Mpa) should be limited to
    (1) 12 t   (2) 16 t
    (3) 20 t   (4) 42 t

35. For fillet welds subjected to normal (f_a) and shear (q) stresses, the equivalent stress is given by
    (1) $\sqrt{fa^2 + q^2}$ (2) $\sqrt{fa^2 + 3q^2}$
    (3) $\sqrt{3fa^2 + q^2}$ (4) $\sqrt{0.5fa^2 + 3q^2}$

36. Permeability of granular soil varies
    (1) inversely as grain size
    (2) as grain size
    (3) as square of grain size
    (4) inversely as square of grain size

37. Failure of the stability of slopes generally occurs along
    (1) a vertical surface
    (2) a horizontal surface
    (3) a curved surface
    (4) all the surfaces

38. Presence of organic matter in soil makes it
(1) swell at low moisture content
(2) spongy in nature
(3) shrink with increasing moisture content
(4) none of these

39. Sheet pile walls are used as
(1) uplift preventing devices
(2) retaining walls for water front construction
(3) load bearing foundations
(4) seepage preventing devices

40. A retaining wall retaining a surcharge, if overall height of the wall is H, then the width of the base slab would be
(1) 0.70 H   (2) 0.55 H
(3) 0.50 H   (4) 0.40 H

41. Skempton's pore pressure coefficient B for saturated soil is
(1) 1   (2) zero
(3) between 0 & 1   (4) greater than 1

42. In a plate load test, if the value of N lies between 15 to 30, no. of plates to be used are
(1) 2   (2) 4
(3) 3   (4) 5

43. Deformation in proving ring in direct shear indicates
(1) Vertical stress
(2) Shear force
(3) Axial force
(4) Resultant force

44. What percentage of the final load is the allowable load when there is net settlement of 6 mm in pile load test ?
(1) 50%   (2) 66.7%
(3) 33.3%   (4) 25%

45. Which type of bearing capacity failure is shown by a soil with low compressibility ?
(1) Punching shear failure
(2) General shear failure
(3) Local shear failure
(4) None of these

46. The gradient on which a motor vehicle moving with a constant speed continues to descend with the same speed without any application of power brakes is
(1) Ruling gradient
(2) Limiting gradient
(3) Exceptional gradient
(4) Floating gradient

47. If D is the degree of a curve, the percentage reduction of gradient, is
(1) 0.01 D   (2) 0.02 D
(3) 0.03 D   (4) 0.04 D

48. The maximum super elevation provided on a road curve is 1 in 15. If the rate of change of super elevation is 1 in 120 and road width is 10 m, the minimum length of transition curve on either end will be
(1) 30 m   (2) 80 m
(3) 125 m   (4) 180 m

49. Which one of the following statement gives intermediate sight distance as per IRC recommendations, (SSD : stopping sight distance, OSD : overtaking sight distance)
(1) 2 SSD
(2) (SSD + OSD)/2
(3) (OSD – SSD)/2
(4) 2 OSD

50. Newly constructed pavement with ordinary Portland cement attains its working strength after
    (1) 7 days   (2) 14 days
    (3) 21 days   (4) 28 days

51. The ductility test of bitumen is conducted at a temperature of :
    (1) 27 °C   (2) 25 °C
    (3) 22 °C   (4) 29 °C

52. Calculate the safe stopping sight distance for design speed of 50 kmph for a two-way traffic on a two lane road. Assume f = 0.37 and reaction time (t) = 2.5 sec
    (1) 61.4 m   (2) 65.2 m
    (3) 63.7 m   (4) 65.5 m

53. The range of camber provided in the area of heavy rainfall for water bound macadam (WBM) and gravel pavement is
    (1) 3%   (2) 4%
    (3) 5%   (4) 2.5%

54. The lateral coefficient of friction recommended by IRC in case of horizontal curve design is
    (1) 0.20   (2) 0.15
    (3) 0.40   (4) 0.30

55. According to IRC, the maximum volume of traffic that a rotary can efficiently handle is
    (1) 2500 vehicle/hr
    (2) 3000 vehicle/hr
    (3) 3500 vehicle/hr
    (4) 2000 vehicle/hr

56. To ensure better discharge capacity with minimum weir length, the weir is aligned with main river current at
    (1) 30° to river current
    (2) 45° to river current
    (3) 90° to river current
    (4) None of these

57. For a given discharge, the specific energy is a minimum
    (1) for the critical depth
    (2) for the normal depth
    (3) for the average depth
    (4) none of these

58. As per Indian Meteorological Department, the average annual rainfall over the whole of India is estimated as
    (1) 88 cm   (2) 119 cm
    (3) 217 cm   (4) 290 cm

59. The ratio of the quantity of water stored in the root zone of the crops to the quantity of water actually delivered in the field is known as
    (1) Water conveyance efficiency
    (2) Water application efficiency
    (3) Water used efficiency
    (4) None of these

60. A 6 hours storm had 4 cm of rainfall and resulting run-off was 2 cm. If ϕ index remains at the same value, the run-off due to 10 cm of rainfall in 12 hours in the catchment is
    (1) 4.5 cm   (2) 6.0 cm
    (3) 7.5 cm   (4) 9.0 cm

61. In syphon aqueduct the worst condition of uplift on the roof occurs when
    (1) canal and drainage running full
    (2) canal is running full and there is no drainage discharge
    (3) canal is empty and drainage is full
    (4) all of these

62. Base period of a particular crop is 120 days. If the duty is 1500 ha/cumec, the delta is
    (1) 69 cm   (2) 58 cm
    (3) 35 cm   (4) 54 cm

63. The design period for the design of a water supply project is generally taken as
    (1) less than 10 years
    (2) 20 – 30 years
    (3) 40 – 50 years
    (4) more than 50 years

64. What is field capacity ?
    (1) The total water content of the soil when all the pores of the soil are filled with water.
    (2) Water retained by an initially saturated soil against the force of gravity.
    (3) The soil water content at which the plants wilts.
    (4) None of these

65. Garret's diagram for designing canal is based on
    (1) Lacey's theory
    (2) Bligh's theory
    (3) Khosla's theory
    (4) Kennedy's theory

66. In a U-tube mercury manometer, one end is exposed to the atmosphere and the other end is connected to a pressurized gas. The gauge pressure of the gas is found to be 40 kPa. Now, we change the manometric fluid to water. The height difference changes by :
    (ρmercury = 13600 kg/m^3, ρwater = 1000 kg/m^3)
    (1) 13.6%
    (2) 92.6%
    (3) 12.60%
    (4) Remains unchanged

67. The most efficient channel section is
    (1) semi-circular
    (2) rectangular
    (3) triangular
    (4) half hexagon in the form of trapezoid

68. The best instrument for measuring the velocity of a stream flow is
    (1) pitot tube
    (2) price's current meter
    (3) surface float
    (4) subsurface float

69. The frictional resistance for fluids in motion is proportional to
    (1) the velocity in laminar flow and to the square of the velocity in turbulent flow.
    (2) the square of the velocity in laminar flow and to the velocity in turbulent flow.
    (3) the velocity in both laminar flow and turbulent flow.
    (4) the square of the velocity in both laminar flow and turbulent flow.

70. Centrifugal pumps transport fluids by converting
    (1) kinetic energy to hydrodynamic energy.
    (2) hydrodynamic energy to kinetic energy.
    (3) mechanical energy to kinetic energy.
    (4) mechanical energy to Hydrodynamic energy.

71. Froude number is ratio of inertia force to
    (1) Viscous force
    (2) Surface tension force
    (3) Gravity force
    (4) Compressive force

72. A triangular notch is a more accurate measuring device than rectangular notch
    (1) for low flow rates
    (2) for high flow rates
    (3) for medium flow rates
    (4) all types of flow rates

73. The ratio of average velocity to maximum velocity for steady laminar flow in circular pipes is

(1) 1/2   (2) 2/3

(3) 3/2   (4) > 2

74. For 25 m or less available head which turbine will be suitable

(1) Pelton wheel   (2) Francis

(3) Kaplan   (4) None

75. A free vortex

(1) has velocity increasing with radius

(2) has velocity decreasing with radius

(3) has constant velocity

(4) has velocity varying inversely with square of radius

76. The difference between magnetic north and geographic north is

(1) Dip   (2) Strike

(3) Declination   (4) Bearing

77. Which of the below is not a temporary adjustment of the prismatic compass ?

(1) Centring

(2) Levelling

(3) Focussing prism

(4) Adjusting sight vane

78. Pick up the item of work not included in the plinth area estimate

(1) Wall thickness

(2) Room area

(3) W.C. area

(4) Courtyard area

79. In long and short wall method of estimation, the length of long wall is the centre to centre distance between the walls and

(1) breadth of the wall.

(2) half breadth of wall on each side.

(3) one fourth breadth of wall on each side.

(4) none of these

80. Calculate the number of standard modular bricks required for flat brick soiling for one kilometre length of 4.00 m wide road

(1) 2.4 lakhs of bricks

(2) 2.2 lakhs of bricks

(3) 6.3 lakhs of bricks

(4) 7.7 lakhs of bricks

81. The order of booking dimensions is

(1) Length, breadth, height

(2) Breadth, length, height

(3) Height, breadth, length

(4) None of these

82. Pick up the correct statement :

(1) Sag correction may be positive as negative

(2) The limiting length of an offset is independent of the scale of plotting

(3) Error due to laying of the direction of offset is negligible

(4) The slope correction is always subtractive

83. Tilt of the staff is stadia tacheometry, increase the intercept, if it is

(1) away from telescope and pointing downhill.

(2) towards the telescope and pointing uphill.

(3) away from the telescope and pointing uphill.

(4) none of these

84. Indirect cost of project is
   (1) Project overheads + labour cost + equipment cost
   (2) Labour cost + subcontractors cost
   (3) Common workman cost + Contingency
   (4) Project overhead + common plant & equipment cost + common workmen cost

85. Forms in shuttering whose components can be reused several times are
   (1) Stripping
   (2) Newel forms
   (3) Panel forms
   (4) Casing

86. The size of the colloidal particles lies in between
   (1) 1 nm – 1 μm
   (2) 10 nm – 1 μm
   (3) 1 nm – 10 μm
   (4) 10 nm – 10 μm

87. Which type of filter is preferred in rural water supply schemes ?
   (1) Slow sand filter
   (2) Rapid sand filter
   (3) Dual media filter
   (4) Pressure filter

88. The detention period for plain sedimentation tank is usually
   (1) 4 to 8 hours
   (2) 8 to 12 hours
   (3) 16 to 24 hours
   (4) 24 to 36 hours

89. At what pH, the E-coli bacteria will not survive in the water ?
   (1) <6
   (2) 7
   (3) 9
   (4) >9.5

90. The first stage of natural process of sludge digestion is
   (1) acid fermentation
   (2) acid regression
   (3) alkaline fermentation
   (4) none of these

91. Mention typical values of acceptable sound level as per I.S. Code for urban residential area in day time. (6 am to 10 pm)
   (1) 75 db
   (2) 65 db
   (3) 55 db
   (4) 50 db

92. Ultimate BOD value of a waste
   (1) increase with temperature
   (2) decrease with temperature
   (3) remains the same at all temperatures
   (4) doubles with every 10 °C rise in temperature

93. Banglore method and Indore method of disposing solid wastes are
   (1) Identical
   (2) Different as Banglore method is anaerobic method
   (3) Different as Banglore method does not contain human excreta
   (4) Different as Indore method is an incineration method

94. Which of the following sewage treatment units has a parshall flumes ?
   (1) Trickling filter
   (2) Oxidation ditch
   (3) Grit Chamber
   (4) Aerated Lagoon

95. Manhole covers are made circular :
   (1) to strengthen the cover
   (2) to make the entry convenient
   (3) for architectural reasons
   (4) to prevent the falling of the cover into the manhole

96. Excess in lime causes the cement to
    (1) shrink and integrate
    (2) to shrink and disintegrate
    (3) expand and integrate
    (4) expand and disintegrate

97. The portion of bricks cut across the width in half is called :
    (1) Half split   (2) Half closer
    (3) Half bed   (4) Half bat

98. Efflorescence in cement is caused due to an excess of
    (1) alumina   (2) iron oxide
    (3) silica   (4) alkalies

99. Refractory bricks are specially manufactured to
    (1) withstand high temperature.
    (2) withstand high crushing pressure.
    (3) have high insulation against sound.
    (4) none of these

100. Distemper is used to coat
    (1) External concrete surfaces
    (2) Interior surfaces not exposed to weather
    (3) Wood work
    (4) Compound walls

101. Specific gravity for most of the building stones lies between
    (1) 1.5 to 2.0   (2) 2.0 to 2.5
    (3) 2.5 to 3.0   (4) 3.0 to 3.5

102. The diameter of plunger used in vicat apparatus is
    (1) 20 mm   (2) 10 mm
    (3) 5 mm   (4) 15 mm

103. The slump test apparatus is used for the
    (1) determination of fineness of cement
    (2) determination of plastic limit
    (3) determination of strength of aggregate
    (4) determination of the consistency of freshly mixed concrete

104. Fineness of cement is measured in the units of
    (1) volume/mass   (2) mass/volume
    (3) area/mass   (4) mass/area

105. The Charpy 'V' notch impact test is used to measure the toughness of the structural steels in tension members, the standard specimen size for test is
    (1) $55 \times 10 \times 10$ mm
    (2) $50 \times 10 \times 10$ mm
    (3) $40 \times 10 \times 10$ mm
    (4) $30 \times 10 \times 10$ mm

106. In ordinary residential and public buildings, the damp proofing course is generally provided at
    (1) Ground level   (2) Plinth level
    (3) Sill level   (4) Lintel level

107. If the center of the arch lies on the springing line, it is
    (1) segmental arch
    (2) semi-circular arch
    (3) Bull's eye arch
    (4) horse shoe arch

108. As per IS1905, the slenderness ratio of masonry walls, using Portland cement in mortar, is limited to
    (1) 20   (2) 27
    (3) 13   (4) 23

□

109. A minimum width of landing should be
    (1) Equal to width of stairs
    (2) Half the width of stairs
    (3) Twice the width of stairs
    (4) One fourth the width of stairs

110. The performance of a specific task in CPM is known as
    (1) Dummy
    (2) Event
    (3) Activity
    (4) Constant

111. Which type of foundation is used for the construction of hospital building on black cotton soil ?
    (1) Mat foundation
    (2) Grillage foundation
    (3) Steeped foundation
    (4) Cantilever foundation

112. A stair turning two right angles is a
    (1) Straight stair
    (2) Dog-legged stair
    (3) Spiral stair
    (4) Half turn stair

113. In PERT the optimistic time estimate is
    (1) time required to complete the activity if normal conditions prevail
    (2) maximum possible time that would be required to complete the activity
    (3) shortest possible time in which an activity can be completed
    (4) average possible time that would be required to complete the activity

114. Building orientation is the _____ of a building on a site.
    (1) design
    (2) heating
    (3) positioning
    (4) none of these

115. Which door is generally used in residential buildings ?
    (1) Flush door
    (2) Rotating door
    (3) Hinged door
    (4) Louvered door

116. If two forces each equal to T in magnitude act at right angles, their effect may be neutralized by a third force acting along their bisector in opposite direction whose magnitude will be
    (1) T
    (2) $(T)^{1/2}$
    (3) $(2)^{1/2}$ T
    (4) $(3)^{1/2}$ T/2

117. The units of flexural stiffness are
    (1) Radians per unit rotation
    (2) Moment per unit rotation
    (3) Force per unit deflection and rotation
    (4) Extension per unit force

118. Calculate the hoop stress at the bottom of penstock, if a steel penstock of 1 m and 10 mm thick is subjected to 100 m head of water. Take w = 9.81 kN/m^3.
    (1) 49 N/mm^2
    (2) 47 N/mm^2
    (3) 45 N/mm^2
    (4) 43 N/mm^2

119. Eccentrically loaded structures have to be designed for
    (1) Uniaxial force
    (2) Biaxial force
    (3) Combined axial force
    (4) Combined biaxial force

120. A beam of triangular cross section is placed with its based horizontal. The maximum shear stress intensity in the section will be
    (1) At the neutral axis
    (2) At the base
    (3) Above the neutral axis
    (4) Below the neutral axis

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