BOOKLET NO. 004

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TBC : AKG-AP(C)-17

Time Allowed : 2 Hours] [Maximum Marks : 100

INSTRUCTIONS

1. **IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.**
2. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** write **anything** else on the Test Booklet.
3. This Test Booklet contains **100** items (questions). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
4. You have to mark all your responses ONLY on the separate Answer Sheet provided. No erasing/correction fluid is allowed.
5. All items carry equal marks.
6. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
7. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer Sheet***. You are permitted to take away with you the Test Booklet.
8. Sheets for rough work are appended in the Test Booklet at the end.
9. **Penalty for wrong answers :**
   THERE WILL BE PENALTY (NEGATIVE MARKING) FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.
   (*i*) There are four alternatives for the answers to every question. For each question for which a wrong answer has been given by the candidate, **one-fourth (0.25)** of the marks assigned to that question will be deducted as penalty.
   (*ii*) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answer happen to be correct and there will be same penalty as above for that question.
   (*iii*) If a question is left blank i.e. no answer is given by the candidate, there will be **no penalty** for that question.
10. Use and carrying of Mobile Phone and Electronic Gadget is prohibited in the Examination Hall.

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1. With reference to fire resistance of steel structures, the following relationship is *correct* :

(A) Period of Structural Adequacy ≥ Fire Resistance Level

(B) Period of Structural Adequacy < Fire Resistance Level

(C) Both of the above

(D) None of the above

2. In fatigue loading, the maximum stress range should not exceed ..... for normal stress. Where, f_y is the yield strength of the material.

(A) f_y

(B) 1.5 f_y

(C) $f_y / (3)^{0.5}$

(D) 1.5 $f_y / (3)^{0.5}$

3. Lug angles are used to ..... .

(A) transmit load on wider area

(B) reduce the length of the connection

(C) promote use of angles

(D) none of the above

4. Tension field method is used in ..... of a plate girder.

(A) unbuckled shear design

(B) buckled shear design

(C) unbuckled bending design

(D) buckled bending design

5. Battens should be designed to carry the bending moments and shear forces arising from transverse shear force equal to ..... of the total axial force on the whole compression member.

(A) 1.0%

(B) 1.5%

(C) 2.0%

(D) 2.5%

6. Slump of concrete to be used in in-situ piling should be ..... .

(A) 0 to 25 mm

(B) 25 to 50 mm

(C) 50 to 100 mm

(D) 100 to 150 mm

7. Minimum cement content in concrete including flyash and ground granulated blast furnace slag, to be used in reinforced concrete under mild exposure should not be less than ..... .

(A) 220 kg/m^3

(B) 240 kg/m^3

(C) 280 kg/m^3

(D) 300 kg/m^3

8. Under transient wind load, the lateral sway at the top of building should not exceed ....., where H is the total height of the building.

(A) H/500

(B) H/750

(C) H/1000

(D) H/1500

9. A simply supported beam should be so proportioned that the clear distance between lateral restraints does not exceed ..... .

(A) 60 b.

(B) 250 b^2/d.

(C) 60 b or 250 b^2/d whichever is less

(D) none of the above

10. For deformed bars conforming to IS : 1786, the values of bond strength should be increased by ..... .

(A) 15%

(B) 25%

(C) 45%

(D) 60%

11. The surface width of cracks should not exceed (in general) ..... in members where cracking is not harmful and does not have any serious adverse effects upon preservation of reinforcing steel nor upon durability of structures.

(A) 0.3 mm

(B) 0.2 mm

(C) 0.1 mm

(D) 0.05 mm

12. At the time of failure, the maximum strain in tension reinforcement at the failure section should not be less than ..... .

(A) $f_y/(1.15\ E_s)$

(B) $f_y/(1.15\ E_s) + 0.002$

(C) $f_u/(1.15\ E_s) + 0.002$

(D) $f_u/(1.15\ E_s) + 0.002$

13. The shear resistance of concrete without shear reinforcement in solid slabs is enhanced with reference to beam by a factor greater than unity when slab thickness is less than ..... .

(A) 150 mm

(B) 200 mm

(C) 250 mm

(D) 300 mm

14. In case of ideal fluid, shear stress is zero when fluid is ..... .

(A) at rest

(B) in motion

(C) at rest or in motion

(D) none of the above

15. Manometers are used to measure ..... .

(A) gauge pressures

(B) vacuum pressures

(C) pressure differences

(D) any of the above

16. When metacentre of a body is below its centre of gravity, the body will be in ..... .

(A) stable equilibrium

(B) unstable equilibrium

(C) neutral equilibrium

(D) any one of the above

17. If there is an error of 2% in water head measurement of a rectangular notch, the error in discharge will be of ..... .

(A) 1%

(B) 2%

(C) 3%

(D) 5%

18. When pressure force alone is predominant, a model may be taken to be dynamically similar to the prototype when the ratio of inertial force to pressure force is the same for model and prototype. Alternatively one can equate ..... of the model and prototype.

(A) Reynolds number

(B) Mach number

(C) Euler number

(D) Froude number

19. In a stream, generally mean velocity is at ..... .

(A) 0.2 of the depth

(B) 0.4 of the depth

(C) 0.6 of the depth

(D) 0.8 of the depth

20. When available water head is less than 15 m, suitable type of turbine is ..... .

(A) Pelton wheel

(B) Francis

(C) Kaplan

(D) Any of the above

21. A disturbed sample preserves ..... of the in-situ soil.

(A) moisture content

(B) soil structure

(C) particle size distribution

(D) all of the above

22. The downward drag, which tends to reduce the useable pile capacity is called ..... .

(A) skin problem

(B) positive skin friction

(C) negative skin friction

(D) none of the above

23. Minimum horizontal spacing between under-reamed piles under normal loading should be ..... .

(A) 1.0 times the bulb diameter

(B) 1.5 times the bulb diameter

(C) 2.0 times the bulb diameter

(D) None of the above

24. In Standard Penetration test, numbers of blow are recorded for ..... .

(A) 30 cm penetration

(B) 35 cm penetration

(C) 40 cm penetration

(D) 45 cm penetration

25. Bearing capacity :

$q_f = 1.2\ C_T\ N_C + {}_YD\ N_q + 0.3\ {}_YBN_y$

is applicable for ..... .

(A) square footing

(B) circular footing

(C) rectangular footing

(D) hexagonal footing

26. Critical hydraulic gradient, i_c is ..... .

(A) $(G - 1) / (1 - e)$

(B) $(G + 1) / (1 + e)$

(C) $(G - 1) / (1 + e)$

(D) $(G + 1) / (1 - e)$

27. A sand deposit is made up of three horizontal layers of equal thicknesses and permeability of k_1, k_2 and k_3. The resultant horizontal permeability will be ..... .

(A) $1/k = 1/k_1 + 1/k_2 + 1/k_3$

(B) $k = k_1 + k_2 + k_3$

(C) any one of the above

(D) none of the above

28. Lead and lift consists of ..... .

(A) 20 m and 1.0 m respectively

(B) 20 m and 1.5 m respectively

(C) 30 m and 1.0 m respectively

(D) 30 m and 1.5 m respectively

29. Transition curve is a ..... .

(A) vertical curve

(B) horizontal curve used in isolation

(C) vertical curve used in isolation

(D) horizontal curve used in between a tangent and a circular curve

30. Degree of a curve is the angle subtended at the centre of curve by ..... .

(A) the circular curve

(B) a chord of 20 m length

(C) a chord of 30 m length

(D) none of the above

31. In Theodolite Surveying, ... is the process of turning the telescope about its horizontal axis through 180° in the vertical plane thus bringing it upside down and making it to point exactly in the opposite direction.

(A) Transiting

(B) Centering

(C) Swinging of Telescope

(D) Changing face

32. When divisions of a vernier are increasing in the opposite direction of the main scale, such vernier is called a ..... .

(A) Simple vernier

(B) Direct vernier

(C) Retrograde vernier

(D) Double vernier

33. Distance between any two consecutive contours is called ..... .

(A) contour interval

(B) horizontal equivalent

(C) contour gap

(D) none of the above

34. An imaginary line joining centre of eye piece and optical centre of object glass is called ..... .

(A) Line of collimation

(B) Axis of bubble tube

(C) Axis of Telescope

(D) none of the above

35. If subsequent intermediate sight readings are increasing, it shows ..... .

(A) a plane land

(B) an upward slope

(C) a downward slope

(D) none of the above

36. What is the value of smallest reading that can be noted during process of leveling ?

(A) 5 mm

(B) 10 mm

(C) 15 mm

(D) 20 mm

37. In a uniform cross-section bar, elongation due to self weight is ..... .

(A) $\Delta = WL/(AE)$

(B) $\Delta = WL/(2AE)$

(C) $\Delta = WL/(3AE)$

(D) none of the above

38. Maximum shear stress induces on a ..... .

(A) major principal plane

(B) minor principal plane

(C) plane making 45° angle with major principal plane

(D) plane making 60° angle with major principal plane

39. A cantilever beam span 'I' is subjected to a couple 'M' at its free end, shear force in the beam is ..... .

(A) constant (i.e. M/I)

(B) linearly varying

(C) having parabolic variation

(D) zero everywhere

40. In a T-section, shear stress will be maximum at ..... .

(A) top face of the section

(B) bottom face of the section

(C) neutral axis of the section

(D) junction of web and flange of the section

41. To control deflection of a built up beam, which of the following option is preferable ?

(A) place the l-sections side bv side

(B) place the l-sections one above the other

(C) use cover plates along with option (A)

(D) any one of the above

42. In case of plane stress problem, normal strain in the direction perpendicular to the considered plane is ..... .

(A) zero

(B) non-zero but depend on normal stresses

(C) non-zero but depend on shearing stress

(D) none of the above

43. Mechanical advantage is ..... .

(A) ratio of load to effort

(B) ratio of distance moved by effort to distance moved by load

(C) ratio of efficiency to velocity ratio

(D) none of the above

44. Velocity ratio is the ..... .

(A) ratio of load to effort

(B) ratio of distance moved by effort to the distance moved by load

(C) ratio of efficiency to mechanical advantage

(D) none of the above

45. The geometrics of highway should be designed to provide ..... at reasonable cost.

(A) maximum safety

(B) maximum efficiency

(C) maximum efficiency and maximum safety

(D) optimal efficiency and maximum safety

46. Transverse friction in curve design of highways is considered as ..... .

(A) 0.15

(B) 0.20

(C) 0.30

(D) 0.35 to 0.40

47. In transition curves, the radius ..... as the length of the curve increases.

(A) increases

(B) decreases

(C) remains constant

(D) no set pattern

48. The ..... are in the shape of equilateral triangle with its apex pointing upwards.

(A) Regulatory signs

(B) Warning signs

(C) Informatory signs

(D) any of the above

49. Coning of wheels is there as the wheels are coned at a slope of ..... to prevent rubbing the inside face of the rail head and to prevent lateral movement of the axle with its wheels.

(A) 1 in 20

(B) 1 in 24

(C) 1 in 25

(D) 1 in 30

50. On curved tracks, minimum ballast cushion is maintained at ..... .

(A) inner rails

(B) outer rail

(C) centre line of track

(D) outer edge of sleeper

51. In railways, when gradient is steeper than ....., rack and pinion arrangement is adopted.

(A) 1 in 50

(B) 1 in 45

(C) 1 in 40

(D) 1 in 30

52. A Helper Gradient of ..... with additional one engine is generally used.

(A) 1 in 150 to l in 175

(B) 1 in 125 to 1 in 150

(C) 1 in 100 to 1 in 125

(D) 1 in 75 to 1 in 100

53. Average water consumption for flushing of latrines etc. ..... litres per day per person is considered.

(A) 15

(B) 20

(C) 25

(D) 30

54. Maximum hourly demand of water may be ..... times of average hourly consumption of the maximum daily demand.

(A) 1.5

(B) 1.4

(C) 1.3

(D) 1.2

55. Pipes of more than 30 cm diameter for water supply are designed for ..... years period.

(A) 5 – 10

(B) 10 – 15

(C) 15 – 20

(D) 20 – 25

56. ..... type rain gauge is most widely used in India at almost all its meteorological stations.

(A) Symon's

(B) Floating

(C) Tipping bucket

(D) any one of the above

57. In a cross drainage work, when canal is below the drain, such cross drainage work is called ..... .

(A) Aqueduct

(B) Level crossing

(C) Super passage

(D) Syphon Aqueduct

58. As per IS, Cast Iron (spun) pipes of class B are designed for working pressure of ..... .

(A) 12 kg/cm^2

(B) 15 kg/cm^2

(C) 18 kg/cm^2

(D) 20 kg/cm^2

59. The useful life of RCC pipes is considered as ..... .

(A) 15 years

(B) 25 years

(C) 40 years

(D) 75 years

60. Rotary pumps can be used for pressure upto ..... .

(A) 35 kg/cm^2

(B) 45 kg/cm^2

(C) 60 kg/cm^2

(D) 70 kg/cm^2

61. Generally ..... standby capacity against average demand is considered sufficient.

(A) 100%

(B) 80%

(C) 70%

(D) 60%

62. Jaundice is caused by ..... .

(A) bacterial infections

(B) viral infections

(C) protozoal infections

(D) any one of the above

63. Tentative cost of distribution system in water supply scheme ..... .

(A) 35%

(B) 40%

(C) 45%

(D) 50%

64. In combined system, during non-monsoon periods, about ..... of the designed discharge will be passing through sewers.

(A) 1/10

(B) 1/13

(C) 1/16

(D) 1/20

65. Mains and trunk sewers are designed for service life of ..... years.

(A) 10 – 20

(B) 20 – 30

(C) 30 – 40

(D) 40 – 50

66. Minimum self-cleaning velocity in the sewer should be developed at least once in ..... .

(A) a day

(B) 2 days

(C) 3 days

(D) 7 days

67. Non-scouring limiting velocity for earthen channels is ..... m/sec.

(A) 0.6 – 1.2

(B) 1.5 – 2.5

(C) 2.5 – 3.0

(D) 3.0 – 4.0

68. Sewers of 375 mm diameter are designed to run at ..... at ultimate peak designed flow.

(A) 1/2 depth

(B) 2/3 depth

(C) 3/4 depth

(D) 4/5 depth

69. Minimum diameter of siphon pipe in sewers should not be less than ..... .

(A) 10 cm

(B) 15 cm

(C) 25 cm

(D) 30 cm

70. In grit chambers, the velocity of flow reduces to ..... m/sec.

(A) 0.3

(B) 0.4

(C) 0.5

(D) 0.6

71. Municipal sewer is ..... water.

(A) 95%

(B) 96%

(C) 98%

(D) 99.9%

72. Blue baby disease is caused in children by the presence of excess ..... in water.

(A) nitrates

(B) sulphates

(C) phosphates

(D) chlorides

73. For the design of Septic Tanks, the rate of sludge accumulation has been recommended as ..... litres/person/year.

(A) 30

(B) 35

(C) 40

(D) 45

74. Gneiss is a type of ..... .

(A) Igneous rock

(B) Sedimentary rock

(C) Metamorphic rock

(D) None of the above

75. A good brick earth may contain Sand upto ..... .

(A) 50%

(B) 60%

(C) 65%

(D) 70%

76. ..... are made from refractory clay mixed with crushed pottery and stone.

(A) Porcelain

(B) Stoneware

(C) Terracota

(D) Earthenware

77. Kankar lime is used for ..... .

(A) structural purposes

(B) plastering

(C) white washing

(D) masonry mortars

78. Latest specifications of 53 grade cement may be referred from ..... .

(A) IS : 8112

(B) IS: 15269

(C) IS : 269

(D) IS : 1489

79. The duration of the project at which total cost of the project is minimum is called ..... .

(A) Minimum duration

(B) Most economic duration

(C) Most effective duration

(D) Optimum duration

80. When float of an activity is negative such activity is called ..... .

(A) Critical Activity

(B) Super Critical Activity

(C) Sub Critical Activity

(D) None of the above

81. By which treaty did the Sikhs cede to the British all their territories south of the Sutlej ?

(A) Treaty of Amritsar

(B) Treaty of Lahore

(C) Treaty of Aliwal

(D) Treaty of Sabraon

82. By which name is Kinnaur called in the Leh area of H.P. ?

(A) Maon

(B) Khunk

(C) Kurpa

(D) Khanu

83. Which of the following streams is a tributary of the Sutlej ?

(A) Jalal

(B) Andhra

(C) Baspa

(D) Asni

84. Which of the following folk dances is associated with the Sirmaur area of H.P. ?

(A) Burah

(B) Chohara

(C) Kayang

(D) Philli

85. Which building in Shimla town was the residence of A.O. Hume ?

(A) Kennedy House

(B) Red Roof

(C) Rothney Castle

(D) Gorton Castle

86. Which princely state set up a representative Government around 1947 with Bhagmal Santha as the Chief Minister ?

(A) Bushahr

(B) Jubbal

(C) Throach

(D) Keonthal

87. Girls of which age group are covered in H.P. under the Rajeev Gandhi Scheme of empowerment of adolescent girls (Sabla) ?

(A) 10 to 16 years

(B) 10 to 17 years

(C) 11 to 18 years

(D) 12 to 18 years

88. Which of the following is grown in H.P. during the Rabi Season ?

(A) Urd

(B) Moong

(C) Gram

(D) Bean

89. Among the following at which place is HPMC's packing house ?

(A) Jarol Tikker

(B) Nadaun

(C) Parwanoo

(D) Rohru

90. Students of which classes are being provided two sets of uniform per year in H.P. under Mahatma Gandhi Vardi Yojna ?

(A) Class I to V

(B) Class I to VIII

(C) Class I to X

(D) Class I to 10+2

91. Which one of the following Indian States does *not* have border with Bangladesh ?

(A) Manipur

(B) Tripura

(C) Mizoram

(D) Meghalaya

92. In which town of Bihar is Srijan Mahila Sahyog Samiti located ?

(A) Sitamarhi

(B) Purnia

(C) Bhagalpur

(D) Darbhanga

93. To which state/states of India does Article 35A of the Indian Constitution relate ?

(A) North-east States

(B) J and K

(C) Sikkim

(D) All of the above

94. In which city of India is Ramamani Iyengar Memorial Yoga Institute located ?

(A) Dehradun

(B) Kankhal

(C) Pune

(D) Bhopal

95. Who is the Chief Election Commissioner of India (Aug. 2017) ?

(A) Achal Kumar Joti

(B) Dina Nath Batra

(C) Om Prakash Rawat

(D) Nikhil Roy

96. Which ex-Prime Minister of Thailand is being tried for negligence ?

(A) Prayuth Chan-Ocha

(B) Yingluck Shinawatra

(C) Prawit Wongsuwan

(D) Cheep Chulamon

97. Which U.S. town witnessed white supremacist violence in August 2017 ?

(A) Carbondale

(B) Kansas

(C) Carmel

(D) Charlottesville

98. Which of the following is *not* a member of the forum for economic cooperation called G-20 ?

(A) South Korea

(B) Bangladesh

(C) Argentina

(D) Mexico

99. What name has been given to the massive super cluster of galaxies recently discovered by some Indian astronomers ?

(A) Urvashi

(B) Lakshmi

(C) Saraswati

(D) Rambha

100. In which city of Spain a driver ploughed his van into the crowd killing about 13 persons on August 17, 2017 ?

(A) Madrid

(B) Barcelona

(C) Seville

(D) Repoll