

PUBLIC SERVICE COMMISSION SUB-ASST. ENGINEERS RECRUITMENT EXAMINATION CIVIL ENGINEERING-2005

PSC

When not stated otherwise, notations have their usual meaning.

1. To prevent the development of excessive compressive stresses in the concrete pavement as a result of expansion caused by increase in temperature, the type of transverse joint provided is
 - (a) Construction joint
 - (b) Expansion joint
 - (c) Contraction joint
 - (d) All of the above
2. The moment of inertia of an area is always least with respect to
 - (a) Horizontal axis
 - (b) Bottom most axis
 - (c) Vertical axis
 - (d) Neutral axis
3. Slump test for concrete is carried out to determine
 - (a) Durability
 - (b) Strength
 - (c) Workability
 - (d) Water content
4. Water cement ratio is usually expressed in
 - (a) Litres of water required per bag (approx. 50 kg) of cement
 - (b) Litres of water required per kg of cement
 - (c) Both (A) and (B) above
 - (d) None of (A) and (B) above
5. The relation between duty (D in hectare/Cumec) delta (in metres and base period (B in days) is

$$(a) \Delta = \frac{864B}{D}$$

$$(b) \Delta = \frac{864B}{D}$$

$$(c) \Delta = \frac{864B}{D}$$

$$(d) \Delta = \frac{8640B}{D}$$

6. The minimum pitch of rivets in a row is 14.
(a) 2.0 d (b) 2.5 d (c) 3.5 d (d) 3.5 d
7. A diversion work is weir/anicut functions as 15.
(a) To store water for irrigation.
(b) To raise the water level and divert the water into canals to feed the outlets.
(c) To control flood downstream
(d) To generate electricity
8. The value of dismantled materials of a property at the end of its utility period is 16.
(a) Scrap value (b) Book value
(c) Market value (d) Salvage value
9. The sewer, that transports the sewage to the point of treatment, is called
(a) House sewer (b) Lateral sewer
(c) Branch sewer (d) Main sewer
10. A canal constructed for the diversion of flood water of rivers to fields is 17.
(a) Inundation canal (b) Flood canal
(c) Perennial canal (d) Drain
11. In case of earth roads, the camber is usually 18
(a) 1 in 100 (b) 1 in 80
(c) 1 in 40 (d) 1 in 25
12. A separate system of disposal, as in use in the town of Bidhannagar, will be favourable when 19
(a) The topography is flat necessitating deep excavation for combined system
(b) The sewers are to be laid in sandy permeable soil
(c) The finance is no problem
(d) All of the above.
13. The maximum super-elevation of hill roads should not exceed 2
(a) 7% (b) 9% (c) 8% (d) 10%

14. Abrasion test is conducted to find
 - (a) Hardness of aggregate
 - (b) Toughness of aggregate
 - (c) Durability of aggregate
 - (d) Strength of aggregate
15. For the purpose of designing a well point system for lowering ground water table in a sandy silt deposit, the coefficient of permeability of the soil is to be determined, Which one of the following methods would be most suitable?
 - (a) Constant head permeameter test
 - (b) Variable head permeameter test
 - (c) Pumping in test in field
 - (d) Pumping out test in field
16. Tension does not develop in a gravity dam, if the resultant force lies within or
 - (a) Close to the corner of the base
 - (b) A few metre away from the vertical side of the dam.
 - (c) At the corner of the base of the dam
 - (d) Middle third of the base width of the dam.
17. The wood which has maximum resistance against white ants is
 - (a) Bamboo
 - (b) Sal
 - (c) Teak
 - (d) Shisham
18. Net irrigation requirement of a crop is equal to
 - (a) Consumptive use
 - (b) Consumptive use minus effective rainfall
 - (c) Consumptive use minus effective rainfall plus leaching and other requirements.
 - (d) Percolation loss plus effective rainfall.
19. Lining of a canal is necessary
 - (a) To minimise the seepage losses in canal
 - (b) To prevent erosion of bed and slopes due to high velocity
 - (c) To increase the discharge in canal section by increment of velocity.
 - (d) All of the above.
20. A work which carries one natural drain over the canal is called
 - (a) Aqueduct
 - (b) Hybrid channel
 - (c) Super passage
 - (d) Siphon

21. The water bearing strata is called 29.
(a) An aquifer (b) An aquiclude
(c) An aquifuge (d) Zone of saturation
22. Run off from precipitation is intended to be discharged into
sewers. Such water is usually termed as
(a) Storm water (b) Ground water
(c) Spent water (d) Sanitary water
23. The isometric projection of a sphere is 30.
(a) A sphere (b) A circle
(c) An ellipse (d) A sphere with reduced diameter.
24. The water absorption of the aggregates used for road making
should not exceed 31.
(a) 0.6% (b) 2.0%
(c) 1.0% (d) 0.3%
25. A vertical or sloping member along the edge of a pavement in
urban area is called 32
(a) Parapet wall (b) Projection wall
(c) Kerb (d) Wing wall
26. The top of the ground on which the foundation of a road rests
is called 33
(a) Sub-grade (b) Soling
(c) Base (d) Wearing layer
27. The factor of safety against overturning, for a gravity dam, is
defined as. 34
(a) Total water pressure/Dead load
(b) Resisting moments/Overturning moments
(c) Overturning moments/Resisting moments
(d) Total gravity loads/Total horizontal forces
28. In brick masonry, the frog of the brick is normally kept on the
(a) Bottom face (b) Top face
(c) Interior face (d) Anywhere

29. Euler's critical load for the column is

(a) $\frac{\pi^2 EI}{L^2}$ (c) $\frac{\pi^2 EI}{4L^2}$

(b) $\frac{2\pi^2 EI}{L^2}$ (d) $\frac{\pi^2 EI}{2L^2}$

30. The method of irrigation by which water is supplied in the form of spray through perforated pipes is called

- (a) Artificial irrigation (b) Lift irrigation
(c) Sprinkler irrigation (d) Spot irrigation

31. A hydraulic jump occurs when a channel has a break in grade from a

- (a) Steep slope to steeper slope (b) Steep slope to mild slope
(c) Mild slope to steep slope (d) Milder slope to mild slope

32. Bacteria that oxidise organic matter in the absence of dissolved oxygen are known as

- (a) Micro-bacteria (b) Aerobic
(c) Anaerobic (d) Fungi

33. In India, as per IS : 1172-1963, water consumption per capita per day for domestic purposes

- (a) 85 litres (b) 100 litres
(c) 115 litres (d) 135 litres

34. The total number of links in a 30m chain is

- (a) 200 (b) 150
(c) 100 (d) 50

35. The method of surveying in which field work and plotting work are done simultaneously is called

- (a) Compass surveying (b) Levelling
(c) Chain surveying (d) Plane tabling

36. The road connecting capital cities of States is called

- (a) Highway (b) Capital Highway
(c) State Highway (d) National Highway

37. The total horizontal pressure (p) per metre length of retaining wall at a dept (h) metre with weight of filling (w) in kg/m^3 and angle of repose of the soil (ϕ) is

$$(a) \quad wh = \frac{1 - \sin \phi}{1 + \sin \phi} \quad (b) \quad wh = \frac{1 + \sin \phi}{1 - \sin \phi}$$

$$(c) \quad \frac{wh}{2} = \frac{1 + \sin \phi}{1 - \sin \phi} \quad (d) \quad \frac{wh}{2} = \frac{1 - \sin \phi}{1 + \sin \phi}$$

38. The coefficient of active earth pressure is given by

$$(a) \quad K = \frac{1 - \sin \phi}{1 + \sin \phi} \quad (b) \quad K = \frac{1 + \sin \phi}{1 - \sin \phi}$$

$$(c) \quad K = \frac{1 - \tan \phi}{1 + \tan \phi} \quad (d) \quad K = \frac{1 + \tan \phi}{1 - \tan \phi}$$

39. A functional equation for specific gravity (G), water content (W), void ratio (e) and degree of saturation (Sr) is

$$(a) \quad W = \frac{Sr \cdot G}{e} \quad (b) \quad e = \frac{Sr \cdot W}{G}$$

$$(c) \quad Sr = \frac{WG}{e} \quad (d) \quad G = \frac{Sr \cdot W}{e}$$

40. A wall, constructed to retain the earth from slippage on the hill side of a roadway, is called

- (a) Breast wall (b) Retaining wall
(c) Parapet wall (d) Dwarf wall

41. The length of the road ahead of the vehicle which should be visible to the driver is called

- (a) Sight distance (b) Safe distance
(c) Braking distance (d) Clear distance

ining
and

42. In the roof trusses, the horizontal beams spanning between the two adjacent trusses are known as
 (a) Rafters (b) Purlins
 (c) Lintels (d) Connectors
43. AT-beam can be considered as a rectangular beam of width equal to its flange, provided the neutral axis lies
 (a) At the mid depth (b) Anywhere within the section
 (c) Below the slab (d) Within the flange area
44. A first class brick should have a minimum crushing strength of
 (a) 70 kg/cm² (c) 125 kg/cm²
 (b) 105 kg/cm² (d) 140 kg/cm²
45. A gravity dam is called
 (a) A low dam if the maximum allowable stress at the base controls the base width
 (b) A low dam if the base width is designed from the consideration of the resultant falling as close as possible to the extremities of the middle-third of the base
 (c) A high dam if the base width is designed from the consideration of no-tension anywhere in the dam
 (d) A high dam if its height is greater than 100 metres.
46. In a simply supported beam carrying a uniformly distributed load per unit length, the point of contraflexure.
 (a) Lies in the centre of the beam
 (b) Lies in the end of the beam
 (c) Depends upon the length of beam
 (d) Does not exist.
47. A facing of dry stone pitching or other material laid on a sloping face of earth to maintain the slope in position or to protect it from erosion, is called
 (a) Blanket (b) Pitching
 (c) Revetment (d) Rip rap

48. Conic sections are
 (a) 4 (b) 5 (c) 3 (d) None of the above 54.
49. Negative skin friction on a pile under vertical compressive load acts
 (a) Downwards and increases the load carrying capacity of the pile
 (b) Downwards and reduces the load carrying capacity of the pile
 (c) Upwards and increases the load carrying capacity of the pile
 (d) Downwards and maintains the same load carrying capacity of the pile (c) 55.
50. The maximum water content at which a reduction in water content will not cause a decrease in volume of a soil mass is known as
 (a) Plastic limit (b) Shrinkage limit
 (c) Liquid limit (d) Consistency limit 56.
51. For a beam of effective depth d , if the neutral axis factor is k and σ_{st}, σ_{cb} are the stresses in steel and concrete respectively, m being the modular ratio, then k is equal to
 (a) $\frac{\sigma_{cb}}{\sigma_{cb} + m\sigma_{st}}$ (b) $\frac{\sigma_{cb}}{m\sigma_{cb} + \sigma_{st}}$ 57.
 (c) $\frac{m\sigma_{cb}}{m\sigma_{cb} + \sigma_{st}}$ (d) $\frac{m\sigma_{st}\sigma_{cb}}{1 + m\sigma_{st}\sigma_{cb}}$ 58.
52. A short column $40 \times 40 \text{ cm}^2$ in cross-sectional area is reinforced with 4 bars of 4 cm^2 in cross-sectional area each. If the maximum allowable stresses in concrete and steel are 40 kg/cm^2 respectively, the safe axial load on the column would be
 (a) 56.78 tonnes (b) 75.68 tonnes 59.
 (c) 87.56 tonnes (d) 78.56 tonnes 60.
53. Gradients in hair-pin bends with inside curves of 10 to 15 m should never exceed
 (a) 1 in 40 (b) 1 in 20 (c) 1 in 60 (d) 1 in 80 61.

54. The useful part of liveable area of a building is known as
 (a) Carpet area (b) Circulation area
 (c) Plinth area (d) Horizontal circulation area

55. The number of rivets required in a joint is given by

(a) $\frac{\text{Force}}{\text{Rivet value}}$ (b) $\frac{\text{Force}}{\text{Tearing strength of rivet}}$

(c) $\frac{\text{Force}}{\text{Bearing strength of rivet}}$ (d) $\frac{\text{Force}}{\text{Shearing strength of rivet}}$

56. The property of a soil which is of great importance in finding settlement of structure is

- (a) Premeability (b) Consolidation
 (c) Compressibility (d) Both (B) and (C) above.

57. As per I.R.C specification, in the construction of premix carpet, the grade of bitumen to be used should be of penetration

- (a) 40/50 (b) 80/100
 (c) 180/200 (d) 10/120

58. The graphical representation of the amounts of cut and fill of earth is called

- (a) Soil profile map (b) Alignment of intersection
 (c) Carriage way (d) Mass diagram

59. If shear force is zero along a section, the bending moment at the section will be

- (a) Zero (b) Maximum
 (c) Minimum (d) Either Maximum or Minimum

60. A propped cantilever beam of length 'l' has a degree of redundancy

- (a) Zero (b) Two (c) One (d) Three

61. Turbidity may be removed by

- (a) Sedimentation (b) Filtration
 (c) Agitation (d) Aeration

62. From septic tank the effluents are discharged into.
(a) Drainage (b) Oxidation pool
(c) Soak pit (d) Sewer
63. The fineness modulus of an aggregate is roughly proportional to
(a) Shape of the aggregate (b) Specific gravity of the aggregate
(c) Average size of particles in the aggregate
(d) Grading of the aggregate
64. A hydrograph is a plot of
(a) Precipitation against time (b) Direct run off against time
(c) Stream flow against time (d) Surface run off against time
65. River training works, required for navigation, fall under the category of
(a) High water training (b) Low water training
(c) Mean water training (d) Navigation training
66. A silt regulator located at the head of a channel offtaking from a barrage is called
(a) Silt pump (b) Silt excluder
(c) Silt injector (d) Head extractor
67. The main object of sewage disposal is
(a) To dispose off properly human excreta to a safe place before it creates unhealthy conditions to the locality
(b) To dispose off waste water from an area so that it may not become breeding ground for mosquitoes
(c) To dispose off the sewage after giving it treatment so that the receiving land may not get polluted
(d) All of the above
68. A sluice valve, in a water distribution system is used to
(a) Protect the pipe against negative pressure
(b) Regulate the flow of water through the pipe
(c) Prevent water to flow back in the opposite direction
(d) All of the above.

69. The horizontal angle between the true meridian and the magnetic meridian is called
 (a) WCB (b) Dip (c) Declination (d) Azimuth
70. While doing analysis of rate, the number of modular bricks taken into account per cubic metre is
 (a) 500 (b) 100 (c) 50 (d) 2500
71. If the pH of raw water is 8.0, it indicates that the sample is
 (a) Acidic (b) Neutral
 (c) Alkaline (d) An industrial waste
72. The true length of an edge of a solid is L. In isometric projection this edge is drawn with a length of
 (a) 0.500L (b) 0.725 L
 (c) 0.816 L (d) 0.924 L
73. A bridge structure having a gross width of 6 m or less between the faces of the faces of the abutment or extreme ventage boundaries, is known as
 (a) Causeway (b) Culvert
 (c) Kerb (d) Minor bridge
74. The normal grades of concrete used generally in reinforced concrete building are
 (a) M-15, M-20, M-25 (b) M-10, M-15, M-20
 (c) M-20, M-25, M-30 (d) M-10, M-20, M-25
75. Plywood is specified by
 (a) Thickness (b) Volume
 (c) Weight (d) Both (B) and (C)
76. The ratio of total volume of water required to be delivered to a crop to the area on which it has been spread, is called
 (a) Critical depth (b) Duty depth
 (c) Delta (d) Crop-water depth
77. River training in the form of pitched islands are used in connection with
 (a) Diversion of water to the canals (b) Sedimentation control

- (c) Confining the river water during high flood
(d) Navigation
78. An obstruction, thrown in the bed a stream with a view to diverting water into offtaking channel, is called
- (a) Bifurcation channel (b) Diversion works
(c) Head work's (d) Distributory channels

86.

79. Sinking fund co-efficient is given by

(a) $\frac{i}{(1+i)^n - 1}$ (b) $\frac{(1+i)^n - 1}{i}$

(c) $\frac{1 + (1+i)^n}{i}$ (d) $\frac{i}{1 + (1+i)^n}$

87.

where i = rate of interest on sinking fund in decimal and n = number of years.

80. Major content of domestic water sludge is

- (a) Phosphorous (b) Organic matters
(c) Grease and fats (d) Nitrogen

81. The contract pressure of flexible footing on noncohesive soils

- (a) More in the centre than the edge
(b) Less in the centre than the edge
(c) Uniform throughout (d) None of the above

82. The main advantage of concrete pavements is that

- (a) It offers less resistance to traffic (b) It is not slippery when clean
(c) It has long life (d) It has low maintenance cost

83. In case of stairs, a series of steps without an intermediate platform is called

- (a) Ascend (b) Flight
(c) Rise (d) Landing

84. Hook's law holds good up to

- (a) Yield point (b) Plastic limit
(c) Elastic limit (d) Breaking point

85. A RCC column may be considered long for design purposes to give reduction in the load capacity, if the ratio of effective height to least lateral dimension is
- (a) More than 15 (b) More than 12
(c) Less than 12 (d) Less than 20
86. To find the difference of level between two points, the levelling instrument should be kept
- (a) At either of the two points
(b) At any point on the line joining the two points
(c) Exactly midway between the two points
(d) Any one of the above
87. A bench mark is
- (a) A point where the staff is held
(b) A point where the instrument is set up
(c) A fixed reference point of known elevation
(d) Any arbitrary assumed level surface
88. In a launching apron the required quantity of stone/boulder in final position is initially laid in a horizontal length of
- (a) 0.5 to 1.0 times the design depth of scour below the HFL
(b) 1.5 to 2.5 times the design depth of scour below the floor level
(c) 3.0 to 4.0 times the depth of downstream sheetpile
(d) 1.5 to 2.0 times the normal depth of scour as evaluated by Lacy's formula
89. If S is speed of vehicle and R is the radius of curves, the equilibrium super-elevation required to counteract centrifugal force is given by
- (a) $\frac{S^2}{81R}$ (c) $\frac{S^2}{gR}$ (b) $\frac{S^2}{2gR}$ (d) $\frac{S^2}{16gR}$
90. The densification of a soil by machines is called
- (a) Consolidation (b) Compression
(c) Soil stabilisation (d) Compaction

91. Young's modulus is defined as the ratio of
 (a) Shear stress to shear strain (b) Linear stress to linear strain
 (c) Linear stress to lateral strain (d) Lateral strain to linear strain
92. Garbage is a
 (a) Dry waste (b) Semi-liquid waste
 (c) Liquid waste (d) None of the above
93. There are two tests in connection with well
 (i) Recuperation test (ii) Pumping test
 (a) Both the tests are to determine the yield of well
 (b) Test (i) is for loss from well, test (ii) for yield of well
 (c) Test (i) is for yield of well, test (ii) for loss from well
 (d) Both the tests are for loss from well
94. The latitude of a line is obtained by multiplying its length by
 (a) $\tan \theta$ (b) $\cot \theta$
 (c) $\sin \theta$ (d) $\cos \theta$
 where θ is the reduced bearing.
95. The suitable gradient, within which the Engineer must endeavour to design the road, is called
 (a) Limiting gradient (b) Average gradient
 (c) Ruling gradient (d) Exceptional gradient
96. The walls constructed on banks of a river running parallel to the river, for protection of adjacent area from flood, are called
 (a) Levees (b) Spurs (c) Guide banks (d) Dykes
97. Isohytes are
 (a) Areas of equal precipitation
 (b) Lines of equal precipitation on maps
 (c) Lines of equal barometric pressure on maps
 (d) Lines of equal temperature on maps.
98. For a well conditioned triangle, no angle should be less than
 (a) 45° (c) 30°
99. ()
100. ()

(d) 15°

(b) 60°

strain
strain

99. B.O.D. stands for

(a) Bacteria of damage

(c) Best organised drainage

(b) Bill of demands

(d) Biochemical oxygen demand

100. Kennedy equation for the critical velocity (in MKS system) is

(a) $0.50 mD^{0.55}$

(b) $0.55 mD^{0.64}$

(c) $0.64 D^{0.55m}$

(d) $0.65 D^{0.54m}$

ANSWERS

gth by

1.(B)

2.(B)

3.(C)

4.(A)

5.(A)

6.(B)

7.(B)

8.(A)

9.(C)

10.(A)

11.(D)

12.(D)

13.(D)

14.(A)

15.(A)

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16.(D)

17.(D)

18.(B)

19.(D)

20.(C)

21.(A)

22.(B)

23.(C)

24.(C)

25.(C)

26.(A)

27.(B)

28.(B)

29.(A)

30.(C)

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31.(B)

32.(B)

33.(D)

34.(B)

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36.(C)

37.(D)

38.(B)

39.(C)

40.(A)

41.(D)

42.(D)

43.(A)

44.(D)

45.(C)

46.(D)

47.(A)

48.(C)

49.(B)

50.(B)

51.(C)

52.(B)

53.(A)

54.(A)

55.(C)

56.(D)

57.(B)

58.(D)

59.(B)

60.(A)

ian

61.(B)

62.(B)

63.(C)

64.(D)

65.(C)