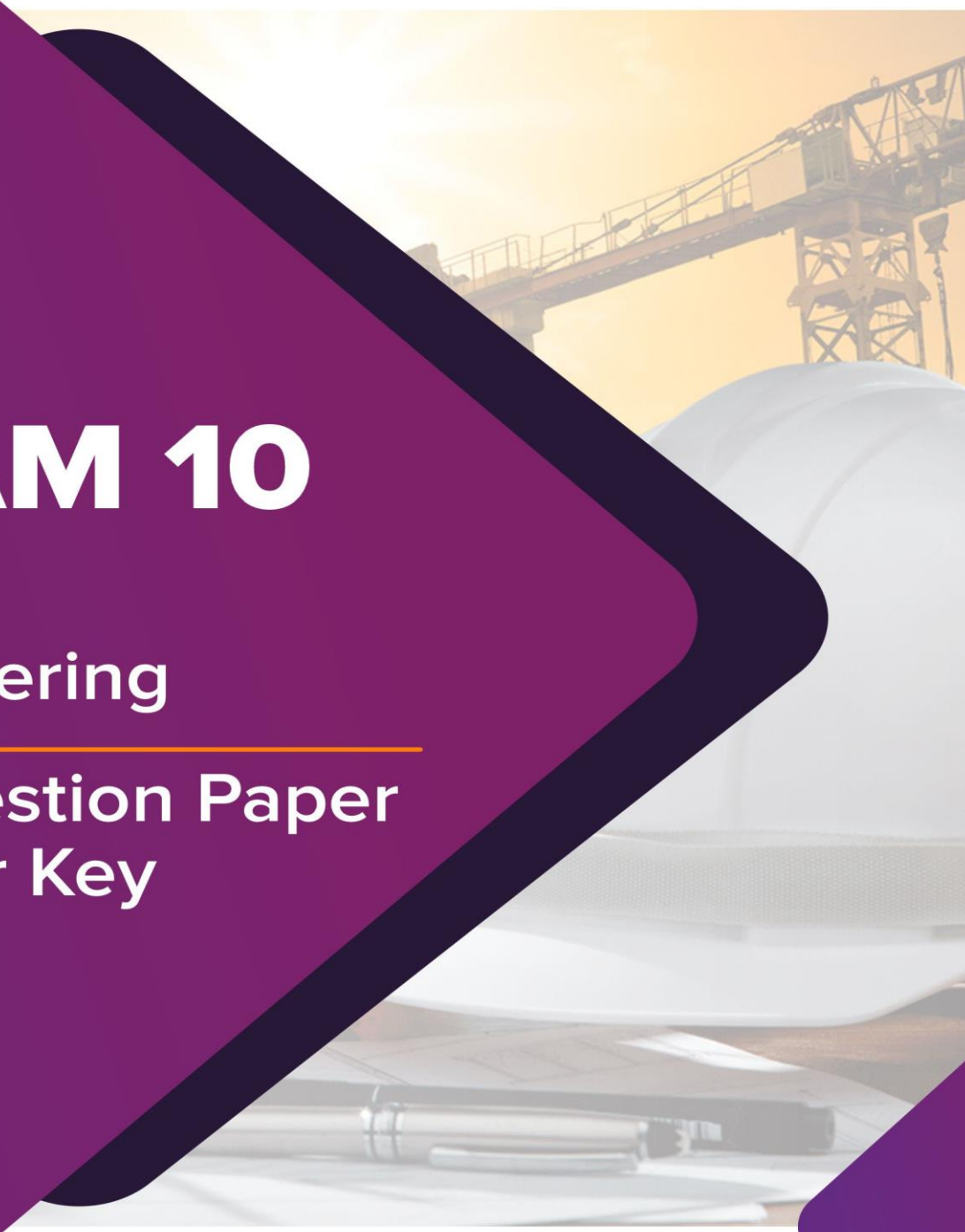
BYJU'S EXAM PREP

DRDO CEPTAM 10

Civil Engineering

Sample Question Paper with Answer Key



1. With the increase of time, the direct costs of the project

   A. increase
   B. decrees
   C. remain constant
   D. decrease and then increase

Ans. B

2. The maximum daily demand of a city is 12 x 10^5 and the rate of filtration is 50 per litre per hour per m^2. What is the area of the filter?

   A. 500
   B. 100
   C. 1000
   D. 1500

Ans. C

3. A turbine in which the total energy of water available is converted to kinetic energy is called

   A. Axial flow turbine
   B. Reaction turbine
   C. Impulse turbine
   D. Mixed flow turbine

Ans. C

4. The shear strength of plastic undrained clay depends upon

   A. Internal friction
   B. Cohesion
   C. Internal friction and cohesion
   D. Unit weight of clay

Ans. C

5. What are the units of measurement of distance according to Standards of Weights and Measures Act, 1956?

   A. Inches and feet
   B. Yards and feet
   C. Meter and centimetre
   D. Poles and chains

Ans. C

6. Which of the following statement is correct?

   A. Relative compaction and Relative density are same.
   B. Vibratory rollers are effective for cohesive soil.
   C. Zero air void and 100% saturation lines are same.
   D. For dense sand, maximum and minimum void ratios are identical.

Ans. C

7. A 1.4 m long laminated carriage leaves of 100 mm width and 10 mm thickness. The spring has to absorb 125 N-m thickness. When straightened, without energy bending stress of 160 MPa. What number of leaves required? (Take the elastic is the of material of spring as 200 GPa)

   A. 11
   B. 9
   C. 7
   D. 5

Ans. B

8. A wooden floor is required to carry a load of 12 kN/m^2 and is to be supported by wooden joists of 120mm × 250 mm in the section over a span of 4m. If the bending stress in these wooden joists is not to exceed 8 MPa, what is the spacing of the joists?

A. 356 mm
B. 318 mm
C. 432 mm
D. 417 mm

Ans. D

9. A 2m long alloy bar of 1500 mm^2 cross-sectional area hangs vertically and has a collar securely fixed at its lower end. What is the stress-induced bar when a weight of 2 kN falls from a height of 100 mm on the collar? (Take E = 120 GPa)

A. 126.5 MPa
B. 158.3 MPa
C. 161.2 MPa
D. 181.3 MPa

Ans. A

10. What is power in HP generated in Francis turbine. If net head is 5.15 meter and discharge of water is 57 m^3/sec.

A. 393 HP
B. 294690HP
C. 30040 HP
D. 3914 HP

Ans. D

11. Water is to be lifted by a net head of 240 m. Identical pumps each with specific speed of 30 and rotational speed of 1450 rpm with design discharge 0.2 m3/s are available. The number of pumps required will be

A. 2
B. 3
C. 4
D. 5

Ans. C

12. Which one of the method is NOT classified as force method?

A. The theorem of three moments
B. The moment distribution method
C. The method of consistent deformation
D. Castigliano's theorem

Ans. B

13. Which of the following processes is involved in filtration?

A. Sedimentation
B. Flocculation
C. Biological action
D. Straining

Ans. C

14. A motor driving a solid circular shaft transmits 30 kW at 500 r.p.m. What is the torque activity on the shaft if allowable shear stress is 42 MPa?

A. 427 Nm
B. 573 Nm
C. 180 Nm
D. 219 Nm

Ans. B

15. The real image of an object formed by the objective must lie _____.

A. in the plane of cross hairs
B. at the center of the telescope
C. at the optical center of the eye piece
D. anywhere inside the telescope

Ans. A

16. Which of the followings are correct for sensitivity of the bubble tube?

A. Sensitivity decreases with increase in internal radius of the tube
B. Sensitivity decreases with increase in diameter of the tube
C. Sensitivity increases with decrease in length of the tube.
D. Sensitivity increases with decrease in viscosity o f the liquid.

Ans. D

17. If for a soil void ratio e = 0.67 and water content w = 12% the find degree of saturation?

A. 47.46%
B. 49.00%
C. 36.46%
D. 38%

Ans. A

18. The expression for the total volume of earthwork for an embankment using Simpson's one third rule, if $A_1, A_2, A_3, A_4, ..., A_{n-1}$ and A_n are the areas at n sections at an interval of h is _____.

A. $\frac{h}{3}\times\left[(A_1+A_n)+4(A_2+A_4+...)+2(A_3+A_5+...)\right]$

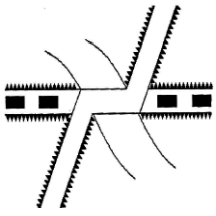
B. $\frac{h}{3}\times\left[(A_1+A_n)+2(A_2+A_4+...)+4(A_3+A_5+...)\right]$

C. $\frac{h}{3}\times\left[(A_1+A_n)+4(A_2+A_4+...)+(A_3+A_5+...)\right]$

D. $\frac{h}{3}\times\left[\frac{(A_1+A_n)}{4}+(A_2+A_4+...)+(A_3+A_5+...)\right]$

Ans. A

19. The conventional sign shown in the figure below represents a



A. Bridge carrying railway over the road.
B. Bridge carrying road over railway.
C. Bridge carrying road railway at the same level.
D. A level crossing.

Ans. B

20. Particles having size loss than 0.2μ can be analysed by:

A. Sieve analysis
B. Sedimentation analysis
C. Electron microscope
D. Can-not be analysed as size is to less.

Ans. C

21. Electrical conductivity (EC) of water and total dissolved solids (TDS) are interrelated. The value of EC will?

A. decrease with increase in TDS
B. increase with increase in TDS
C. decrease initially and then increase with increase in TDS
D. increase initially and then decrease with increase in TDS

Ans. B

22. The question consists of two statements; one labelled as 'Assertion (A)' and the other as 'Reason (R)':

Assertion (A): Tapered flocculation is more efficient when compared to the conventional process of flocculation.

Reason (R): In tapered flocculation, the velocity gradient at the inlet is less than that at the outlet of the flocculation unit.

Examine the above two statements carefully and select the correct answer from the option given below :

A. Both (A) and (R) are true and (R) is the correct explanation of (A)
B. Both (A) and (R) are true and (R) is not a correct explanation of (A)
C. (A) is true but (R) is false
D. (A) is false but (R) is true

Ans. C

23. Normal stresses of 126 MN/m^2 (Tensile) and 94 MN/m^2 (Compressive) are acting at a point in an elastic material at right angles to each other. If the maximum principal stress is limited to 146 MN/m^2, the shear stress that may be allowed at that point in the same plane is

A. 170 MN/m^2
B. 89 MN/m^2
C. 69 MN/m^2
D. 96 MN/m^2

Ans. C

24. Compute the maximum capillary tension for a tube of 0.12 mm in diameter at 4°C

A. 1.26 kN/m^2
B. 2.521 kN/m^2
C. 0.63 kN/m^2
D. 5.042 kN/m^2

Ans. B

25. The transition curve used in the horizontal alignment of highways as per IRC recommendation is

A. Cubic spiral
B. Lemniscate
C. Cubic Parabola
D. None of the above

Ans. A

26. Choice of gauge depends on

A. volume of traffic only

B. speed of train only

C. neither (volume of traffic) nor (speed of train)

D. both (volume of traffic) and (speed of train)

Ans. D

27. Determine the time factor if a soil sample undergoes a settlement of 3.89 cm. The final settlement of the soil sample is expected to be 8 .56 cm.

A. 0.186 B. 0.175

C. 0.162 D. 0.157

Ans. C

28. A compaction test was carried on the specimen having dia 100mm and height 200mm. The optimum water content and specific gravity of the sample was 14.65% and 2.65 . Assuming that the maximum possible dry density was achieved, the void ratio of the sample is

A. 0.34 B. 0.389

C. 0.398 D. 0.45

Ans. B

29. A central steel rod 18 mm diameter through a copper sleeve with 24 mm inside and 39 mm outside diameter. It is provided with nuts and washers at each end, and the nuts are tightened until the stress of 10 N/mm^2 is set up in the steel. Then, the stress developed in the copper tube is

A. 29.1 N/mm^2, Compressive B. 3.4 N/mm^2, Compressive

C. 3.4 N/mm^2, Tensile D. 29.1 N/mm^2, Tensile

Ans. B

30. Match List I (Process) with List II (Biological agent) and select the correct answer using the codes given below the lists :

List I	List II
(a) Oxidation ditch	(1) Facultative bacteria
(b) Rotating Biological Contractor (RBC)	(2) Anaerobic bacteria
(c) Waste stabilization pond	(3) Aerobic bacteria (suspended culture)
(d) Imhoff tank	(4) Aerobic bacteria (attached culture)

A. a-1 b-4 c-2 d-3 B. a-3 b-1 c-2 d-4

C. a-3 b-4 c-1 d-2 D. a-2 b-4 c-3 d-1

Ans. C

31. Calculate (to the nearest integer) the length of the curve of 15 chains radius with a deflection angle of 50° 30’, when the length of chain is 20m.

A. 300m B. 264m

C. 250 m D. 270 m

Ans. B

32. An element which is subjected to pure shear τ , find the volumetric strain?

A. $\frac{3\tau}{E}(1-2\mu)$ B. $\frac{\tau}{E}(1-2\mu)$

C. 0 D. $\frac{\tau}{G}(1-2\mu)$

Ans. C

33. Coning of wheels is provided

A. To check lateral movement of wheels B. To avoid damage to inner faces of rails

C. To avoid discomfort to passengers D. All of the above

Ans. D

34. Which one of the following is the most active clay material?

A. Na-illite B. Na- kaolinite

C. Na- montmorillonite D. Ca- montmorillonite

Ans. C

35. Consider the following parameters:

1. Fixed solids
2. Volatile solids
3. Chemical oxygen demand
4. Biochemical oxygen demand
5. Dissolved oxygen

Which of these parameters are taken into consideration for determining organic strength of a waste?

A. 1,2 and 3 B. 2, 3 and 4

C. 3, 4 and 5 D. 1, 4 and 5

Ans. B

36. The unit of angular displacement is:

A. Radian B. Radian per second

C. Radian per second per second D. None of these

Ans. A

37. If the sum of northings of a traverse exceeds the sum of southings by 1 m and sum of eastings exceeds the sum of westings by 1 m, the resultant closing error and its true bearing are respectively,

A. √2 m, N 45° E B. 1 m, N 45° E

C. 2 m, N 45° W D. 2 m, N 45° E

Ans. A

38. Effective length of a column effectively held in position and restrained in direction at one end, effectively held in position but not restrained in direction at the other end is?

A. L
B. 0.67L
C. 0.70L
D. 2L

Ans. C

39. A portion of an embankment having a uniform up-gradient 1 in 500 is circular with radius 1000 m of the centre line. It subtends 180° at the centre. If the height of the bank is 1 m at the lower end, and side slopes 2:1, the earth work involved is _____x1000 m^3.

A. 24.5
B. 25.5
C. 26.5
D. 27.5

Ans. D

40. The constant vertical distance between two adjacent contours is called _____.

A. horizontal interval
B. horizontal equivalent
C. vertical equivalent
D. contour interval

Ans. D

41. Which among the following is not on application of flow net: -

A. Determination of seepage
B. Determination of hydrostatic pressure
C. Determination of exit gradient
D. Determination of permeability.

Ans. D

42. A summit curve is formed at an intersection of 3° upgrade followed by a 5° downgrade. For a stopping sight distance of 128 m the length of summit curve would be

A. 271 m
B. 298 m
C. 322 m
D. 340 m

Ans. B

43. A nozzle placed at the end of a water pipe line discharges water at a

A. low pressure
B. High pressure
C. low velocity
D. high velocity

Ans. D

44. Which one of the following is not reduced by chlorination of water?

A. Ammonia content
B. Organic matter content
C. BOD
D. Dissolved oxygen content

Ans. D

45. Rate of loss of shear strength upon increasing water content is represented by :-

A. Flow index
B. Shrinkage index
C. Plasticity index
D. None

Ans. A

46. Permeability in cm/sec for silt is in the range of:-

A. < 1 cm/sec
B. $1 - 10^{-3}$ cm/sec
C. $10^{-3} - 10^{-7}$ cm/sec
D. < 10^{-7} cm/sec

Ans. C

47. A water supply scheme has to be designed for a city having a population of 100000, Estimate the maximum daily draft in million litres/day (MLD) for an average water consumption of 250 lpcd

A. 25 MLD
B. 50 MLD
C. 45 MLD
D. 90 MLD

Ans. C

48. A clay layer 6 m thick is lying on an impervious stratum and overlain by a sand layer 4 m thick. The properties of sand and clay layer are listed below:

For sand layer:

Dry unit weight = 14.65 kN/m^3

Saturated unit weight = 19.5 kN/m^3

For clay layer:

Saturated unit weight = 18.45 kN/m^3

Natural void ratio = 0.54

Compression index = 0.045

Coefficient of consolidation = 0.64 m^2/yr

The water table is 1m below the ground level and the soil above it is completely dry.

Determine the ultimate settlement of clay layer due to a surcharge of intensity 165 kN/m^2. Also, determine the time taken to reach 50% of ultimate settlement?

A. 9.25 cm, 8.50 years
B. 11.24 cm, 11.025 years
C. 9.25 cm, 11.025 years
D. 11.24 cm, 8.50 years

Ans. C

49. Stoke's low is Valid for the particles having size range between

A. 0.2 mm to 0.2μm
B. 0.002 mm to 0.002μm
C. < 0.2μm
D. greater than 0.2 mm

Ans. A

50. The width of carriageway for various classes of roads standardisedby the Indian Road Congress (IRC) for two lanes without raised kerbs is

A. 3.75 m
B. 7.00 m
C. 7.50 m
D. 5.50 m

Ans. B

51. Invar tapes are made of an alloy of _____.

A. Nickle and steel
B. Copper and steel
C. Tin and steel
D. Aluminium and steel

Ans. A

52. Consider the following statements for Euler's equation to find the critical load of a column:
1. Critical load of a column is proportional to the flexural rigidity.
2. Critical load of a column depends on yield stress.
3. Critical load of a column is inversely proportional to area.
4. Critical load of a column is inversely proportional to the square of the length of the column.
Which of the above statements are correct?
A. 1 and 2 only
B. 1 and 4 only
C. 2 and 3 only
D. 2 and 4 only

Ans. B

53. If modulus of elasticity of the subgrade is 25 MPa, then deflection at the surface of flexible pavement due to a wheel load of 40 kN and a tyre pressure of 0.6 MPa will be
A. 5.24 mm
B. 6.20 mm
C. 7.40 mm
D. 8.32 mm

Ans. A

54. The plasticity characteristics of clay are due to
A. Adsorbed water
B. Free water
C. Capillary water
D. None of the above

Ans. A

55. "Composite Sleeper Index" is employed to determine
A. Sleeper density requirement
B. Number of fixtures requirement for a particular type of sleeper
C. Durability of sleeper
D. Mechanical strength of wooden sleepers, and thereby, gives its suitability to be used as sleepers

Ans. D

56. Liquidated damage refers to
A. Damages of walls, plasters and paints due to gushing of liquid or rain
B. Penalty cost to rectify dampness in the buildings arising out of gushing of liquid or rain
C. Penalty cost to rectify sub-standard quality of work
D. Penalty for delaying the work beyond agreed date

Ans. D

57. The sag correction in surveys is always _____.
A. positive
B. negative
C. zero
D. None of these

Ans. B

58. The maximum number of vehicles beyond which the rotary may not function effectively is
A. 500 Vehicles per hour
B. 500 Vehicles per day
C. 5000 Vehicles per hour
D. 5000 Vehicles per day

Ans. C

59. The capillary rise in a soil having D_{10} = 0.07 mm is 49 cm. Estimate the capillary rise in another soil having its D_{10} to be 0.12 mm. Assume that the void ratio is same for both soils.

A. 28.58 cm
B. 14.29 cm
C. 57.16 cm
D. none of the above

Ans. A

60. An open-coiled helical spring of wire diameter 12 mm, mean coil radius 84 mm, helix angle 60° carries an axial load of 480 N. What is the twisting moment?

A. 10.22 Nm
B. 20.16 Nm
C. 14.24 Nm
D. 24.11 Nm

Ans. B

61. The number of sleepers used for rails varies from, Where 'n' length of rat in 'm'

A. (n+1) to (n-4)
B. (n+3) to (n+6)
C. (n+2) to (n+7)
D. (n+4) to (n+7)

Ans. D

62. Working out the exact quantities of various items of works is known as

A. estimating
B. mensuration
C. valuation
D. quantity surveying

Ans. D

63. The design period for branch mains and trunk sewer is

A. 5 – 10 years
B. 15 – 20 years
C. 40 – 50 years
D. 90 – 100 years

Ans. C

64. Consider the following statements :

Moment Area Method proves advantageous in analyzing

1. cantilever beams.
2. symmetrically loaded simply supported beams.
3. fixed beams.
4. continuous beams.

Which of the above statements are correct?

A. 1,2 and 4 only
B. 3 and 4 only
C. 1,2 and 3 only
D. 1 and 2 only

Ans. D

65. A contractor agreed to build 30 temporary sheds in 90 days at a price of Rs. 10000/unit. Twenty days later, the contractor has finished 8 sheds with an actual total cost of Rs. 85000. What is the status of the project?

A. The project is time and cost overrun

B. The project is time overrun and cost under run

C. The project is time under run and cost overrun

D. The project is time and cost under run

Ans. C

66. Pressure of 200 kPa is equivalent to the head of z metre of liquid having relative density 1.59. The value of z (m) is _____.

A. 11.6 B. 11.82

C. 12.82 D. 13.14

Ans. C

67. Force exerted by jet a stationary plate in vertical position in terms of area of jet 'a' and velocity of jet 'v'.

A. ρav^2 B. $\frac{1}{2}\rho av^2$

C. $\frac{1}{3}\rho av^2$ D. $\frac{2}{3}\rho av^2$

Ans. A

68. Best suitable foundation type for expansive soils (Ex. Block cotton soil) is?

A. Fender piles B. Batter piles

C. Friction piles D. Under reamed piles.

Ans. D

69. The system of organization introduced by F.W. Taylor is known as

A. Effective crganization B. Functional organization

C. Lien and staff organization D. Lien organization

Ans. B

70. A material which exhibits same elastic properties in a given direction at any point is

A. Homogenous B. Isotropic

C. Orthotropic D. Anisotropic

Ans. A

71. The dip of the compass needle _____.

A. is constant

B. varies from place to place and is zero at the equator and maximum at the poles

C. is zero at the equator and poles

D. None of these

Ans. B

72. _____ Standard provides tool for program to quantify, monitor and verify green house gas emission.

A. ISO 14024
B. ISO 14015
C. ISO 14064
D. ISO 14060

Ans. C

73. The height of any point with respect to mean sea level is called _____

A. Bench mark
B. Datum
C. Level surface
D. Reduced level

Ans. D

74. A normally consolidated clay layer settles 2 cm when the effective stress is increased from 80 to 160 kN/m^2. When the effective stress is further increased to 320 kN/m^2, the further settlement will be

A. 8 cm
B. 4 cm
C. 6 cm
D. 2 cm

Ans. D

75. A three hinged parabolic arch will have no bending moment if it is hinged at _____ in addition to those at the supports.

A. One quarter of span
B. The crown
C. Anywhere
D. None of these

Ans. D

76. One degree of curve is equivalent to

A. $\frac{1600}{R}$
B. $\frac{1700}{R}$
C. $\frac{1720}{R}$
D. $\frac{1820}{R}$

Ans. C

77. For high head and low discharge, which turbine preferred.

A. Kaplan turbine
B. Faris turbine
C. Pelton (Impulse) turbine
D. None of these

Ans. C

78. Sewage is flowing with a velocity of 0.90 m/sec. in a 300 mm diameter sewer. Find the hydraulic gradient. Assume Manning's rugosity coefficient "n" as 0.013.

A. 0.0043
B. 0.0053
C. 0.0063
D. 0.0073

Ans. A

79. Which one of the following pairs is not correctly matched?

A. Air valve: To release the accumulated air

B. Sluice valve: To control the flow of water through pipelines

C. Checked valve: To check water flow in all directions

D. Scour valve: The remove silt in a pipeline

Ans. C

80. For the High head loss characteristics, the type of valves seldom used in water distribution system is

A. Butterfly

B. Globe

C. Plug

D. Sluice

Ans. B

81. A hydraulic ram works on the

A. Principle of centrifugal action

B. Principle of water hammer

C. Principle of reciprocating action

D. None of the above

Ans. B

82. If a bar is cranked at both ends at an angle of 30°, then the extra length required when compared to a straight bar is (D = centre to centre distance between the top an bottom steel.)

A. 2x0.72 D

B. 2x0.27D

C. 2x0.42 D

D. 2x0.24 D

Ans. B

83. Honey-combed structure is found in

A. Gravels

B. Coarse sands

C. Fine sands and silts

D. Clay

Ans. C

84. The design speed of a traffic lane is 70 kmph. What is the theoretical capacity per hour taking the total reaction time to be 2 seconds and average length of vehicle as 8m?

A. 828

B. 728

C. 628

D. 528

Ans. B

85. Which of the following statement is false?

A. Space between the exterior walls of warehouse and bag piles should be 30 cm.

B. Cement bags should preferably be piled on wooden planks.

C. Cement bags should be placed such that bags of one layer should not touch the bags of another layer.

D. None of these

Ans. A

86. Among the clay minerals, the one having the maximum swelling tendency is

A. Kaolinite
B. Illite
C. Montmorillonite
D. Halloysite

Ans. C

87. The sieve analysis of the soil sample gives the following data:

Sieve Size	Percentage of soil retained
4.75 mm	32%
2 mm	8%
1 mm	10%
600µ	5%
300µ	15%
150µ	20%
75µ	7%
pan	3%

Classify the soil as per USC system.

A. SW
B. GW
C. SP
D. GP

Ans. C

88. Calculate the specific speed of turbine if number of revolutions per minute is 220. Pressure is 500 N/m^2 and head is 4.54 meter.

A. 500
B. 742
C. 983
D. 1070

Ans. B

89. What are wicket gate?

A. Gate value in a penstock
B. Guide vanes of reaction turbine
C. Rummer vanes of a reaction turbine
D. Sluice gates of the dam.

Ans. B

90. Which of following statement is correct for highly expansive soils?

A. It possess lower shrinkage limit
B. It possess high volume of liquid limit
C. Both A and B
D. None

Ans. C

91. What is the BOD_5 at 20^0C of a waste that yields an oxygen consumption of 2 mg/l from a 0.5% diluted sample?

A. 50 mg/l
B. 400 mg/l
C. 200 mg/l
D. 250 mg/l

Ans. B

92. Resource smoothing will be adopted when

A. resources are unlimited
B. resources are limited
C. resources are constant
D. in all the cases

Ans. A

93. Switch angle depends on

A. heel divergence only
B. length of tongue rail only
C. neither (heel divergence) nor (length of tongue rail)
D. both (heel divergence) nor (length of tongue rail)

Ans. D

94. Kaplan and propeller turbine has

A. High head and low discharge
B. Medium head and medium discharge
C. Low head and high discharge
D. None of these

Ans. C

95. What would be the diameter of a pelton wheel which is to be designed for a speed of 615 rpm and head 300 m. Take speed ratio = 0.42.

A. 0.84m
B. 0.92m
C. 1m
D. 1.24m

Ans. C

96. A wall surface of 200 mm thickness has an outside temperature of 50°C and inside temperature of 25°C with thermal conductivity of 0.51 W/m-K, the heat transfer through this wall will be

A. 63.75 W/m^2
B. 65.75 W/m^2
C. 64.75 W/m^2
D. 62.75 W/m^2

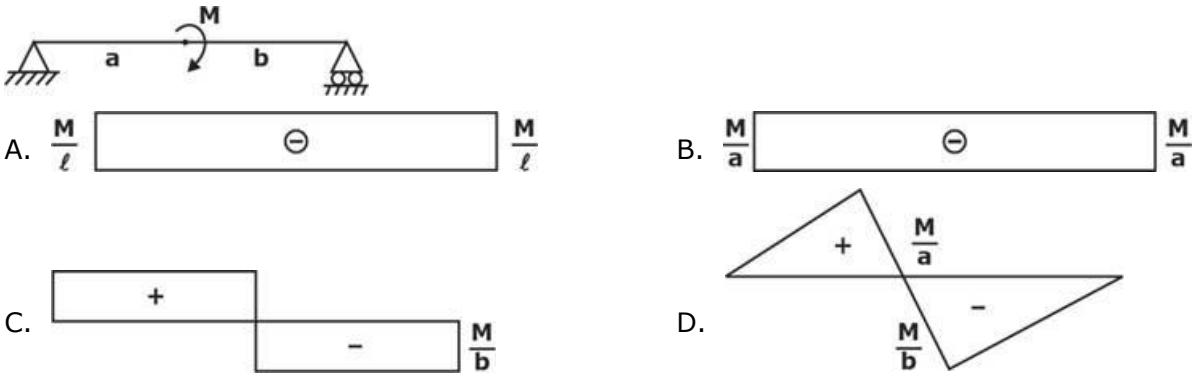
Ans. A

97. The rise and fall method of reduction of levels, provides a check on _____.

A. back sights
B. foresights
C. both back sights and foresights
D. None of these

Ans. C

98. The shear force diagram for the beam is



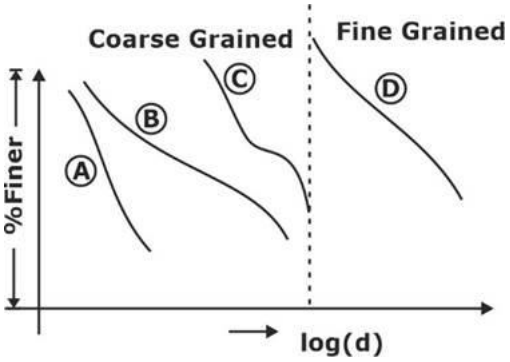
Ans. A

99. When a train passes on curves which have no super-elevation it will give thrust on

A. the inner rail
B. the outer rail
C. inner side of the inner rail
D. inner side of the outer rail

Ans. D

100. A particle size distribution curve s shown below. Which of the following curve correctly represents well graded coarsed grained soil.



A. A
B. B
C. C
D. D

Ans. B

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