

M.E. Civil Engg. (Construction Technology & Management)

1. The moment of inertia of a rectangular section 3 cm wide and 4 cm deep about xx axis is
A) 4 cm^4 B) 8 cm^4 C) 16 cm^4 D) 64 cm^4
2. Based on Euler's Column theory, the ratio of critical load on column for both the ends fixed to both ends hinged for same length, modulus of elasticity and moment of inertia is
A) 1 B) 2 C) 4 D) 8
3. If the dynamic viscosity of fluid is 0.5 poise and specific gravity is 0.5, then kinematic viscosity in stokes is
A) 0.5 B) 1.0 C) 1.5 D) 2.0
4. A rectangular block 4 m long , 1 m wide and 1 m deep floats in water with depth of immersion as 0.5 m . If water weighs 10 kN/m^3 , then weight of block is
A) 5 kN B) 10 kN C) 20 kN D) 40 kN
5. Which of the following velocity potential satisfy continuity equation ?
A) $x^2 - y^2$ B) $x^2 + y^2$ C) $x^3 + y^3$ D) $x^2 y$
6. For a sphere of radius 15 cm moving with uniform velocity of 4 m/s through a liquid of specific gravity 0.9 and dynamic viscosity 0.8 poise. The Reynold number is
A) 1050 B) 1150 C) 1250 D) 1350
7. Which of the following Froude number indicate weak jump
A) 1 to 1.7 B) 1.7 to 2.5 C) 2.5 to 4.5 D) 4.5 to 9.0
8. If the conjugate depth before and after the jump are 0.5 m and 2.5 m respectively. Then the loss of energy in the hydraulic jump will be
A) 0.8 m B) 1.2 m C) 1.6 m D) 2.0 m
9. Water content of soil can
A) Never be more than 100% B) Take values only from 0 to 100%
C) Be less than 0% D) Be greater than 100%
10. Hardness of the concrete can be tested in-situ using
A) Smith test B) Schmidt Rebound Hammer Test
C) Acid test D) Crystallization test
11. In a consolidated drained test on a normally consolidated clay, the volume of the soil sample during shear
A) Increases
B) Decreases
C) Remains Constant
D) Can either increase or decrease randomly

12. If the water content of a fully saturated soil mass is 100%, then the void ratio of the sample
- A) Less than the specific gravity
 - B) More than the specific gravity
 - C) Equal to the specific gravity
 - D) Independent of the specific gravity
13. Determine the compression index for an undisturbed clay with liquid limit of 36%.
- A) 0.005
 - B) 0.113
 - C) 0.234
 - D) 0.333
14. A dry soil sample has a porosity of 35 percent. The specific gravity of the soil solids is 2.65. What is the void ratio and dry density? Take density of water as 9.81 kN/m^3 .
- A) 0.54, 32.9 kN/m^3
 - B) 0.74, 32.9 kN/m^3
 - C) 0.54, 16.9 kN/m^3
 - D) 0.74, 16.9 kN/m^3
15. The height to diameter ratio of in-situ vane shear test is
- A) 0.5
 - B) 1.0
 - C) 1.5
 - D) 2.0
16. The correction for addition of dispersing agent to the hydrometer corrections is
- A) Always negative
 - B) Always positive
 - C) Always zero
 - D) Can be positive or negative
17. A clay specimen has unconfined compressive strength of 200 kN/m^2 in undisturbed state. Later, on remoulding the unconfined compressive strength is found to be 50 kN/m^2 . Determine its sensitivity.
- A) 2
 - B) 4
 - C) 6
 - D) 8
18. A horizontal stratified soil deposit consists of three uniform layers of thickness 8, 6 and 4 m respectively. The permeability of these layers are $5 \times 10^{-4} \text{ cm/s}$, $12 \times 10^{-4} \text{ cm/s}$, $7 \times 10^{-4} \text{ cm/s}$. Find the effective average permeability of the deposit in vertical direction.
- A) $3.74 \times 10^{-4} \text{ cm/s}$
 - B) $6.74 \times 10^{-4} \text{ cm/s}$
 - C) $9.74 \times 10^{-4} \text{ cm/s}$
 - D) $12.74 \times 10^{-4} \text{ cm/s}$
19. A concentrated point load of 31.4 kN is applied. Find the intensity of vertical pressure at a point 2 m below and 1 m horizontally away from point load acting at horizontal ground surface.
- A) 0.145 kN/m^2
 - B) 1.145 kN/m^2
 - C) 2.135 kN/m^2
 - D) 4.145 kN/m^2
20. An undisturbed sample of clay, 40 mm thick, consolidated 50% in 20 minutes in laboratory testing with drainage allowed at bottom and top. The clay layer in field is 4 m thick. How much time (approximately) it will take to consolidate 50% with double drainage ?
- A) 99 days
 - B) 119 days
 - C) 139 days
 - D) 169 days

21. The N value correction applied due to the effect of water table in sandy soils is applicable when N observed is
- A) N is More than 15 B) N is Less than 15
C) All N values D) N is less than 10
22. At shrinkage limit the soil is
- A) Fully Saturated B) Dry
C) Partially Saturated 50% D) Partially Saturated 25%
23. The range of particle size of silt is
- A) Less than 0.002 mm B) 0.002 mm to 0.075 mm
C) 0.075 mm to 4.75 mm D) More than 4.75 mm
24. For a soil deposit having porosity = 40% and specific gravity $G = 2.70$ the critical gradient is
- A) 1.0 B) 1.02 C) 0.95 D) 1.12
25. Quick sand is
- A) A type of sand
B) A condition in which a cohesionless soil losses its strength due to upward flow of water
C) A condition in which a cohesionless soil gains its strength due to upward flow of water
D) A condition in which a cohesive soil losses its strength due to upward flow of water
26. OMC-SP and MDD-SP denote the optimum moisture content and maximum dry density obtained from standard Proctor compaction test, respectively. OMC-MP and MDD-MP denote the optimum moisture content and maximum dry density obtained from the modified Proctor compaction test, respectively. Which one of the following is correct?
- A) $OMC-SP < OMC-MP$ and $MDD-SP < MDD-MP$
B) $OMC-SP > OMC-MP$ and $MDD-SP < MDD-MP$
C) $OMC-SP < OMC-MP$ and $MDD-SP > MDD-MP$
D) $OMC-SP > OMC-MP$ and $MDD-SP > MDD-MP$
27. The angle of the failure plane with the major principle plane is given by
- A) $45 + \phi$ B) $45 + \phi/2$ C) $45 - \phi$ D) $45 - \phi/2$
28. In an un-drained triaxial compression test, the sample failed at deviator stress 200 kN/m^2 when the cell pressure was 100 kN/m^2 . The cohesion intercept is
- A) 50 kN/m^2 B) 100 kN/m^2 C) 150 kN/m^2 D) 200 kN/m^2
29. For a standard compaction test, the mass of hammer and the drop of hammer are
- A) 2.6 kg and 450 mm B) 4.5 kg and 450 mm
C) 2.6 kg and 310 mm D) 4.5 kg and 310 mm

30. If the gross bearing capacity of a strip footing 3 m wide and 3 m deep in clay is 300 kN/m², the net bearing capacity for clay is (Take bulk density of clay=20 kN/ m³)
 A) 280 kN/m² B) 240 kN/m² C) 220 kN/m² D) 200 kN/m²

31. A level was set up at point A and distance to the staff station B was 100 m. The net combined correction due to curvature and refraction as applied to the staff reading is
 A) 0.00673 m B) 0.000673 m C) -0.000673 m D) -0.00673 m

32. In levelling between two points A and B on opposite banks of a river, following readings were taken

Level Position	Staff Readings	
	A	B
A	1.600	1.100
B	1.450	0.950

If R.L. of A. is 200.0 m, the R.L. of B

- A) 99.5 B) 100.5 C) 199.5 D) 200.5
33. If the focal length of the object glass is 30 cm and the distance from the object glass to the trunnion axis is 20 cm. The additive constant is
 A) 0.1 B) 0.25 C) 0.5 D) 0.75

34. If the spacing of cross hairs in a stadia diaphragm of a tacheometer is 1.2 mm and the focal length of object glass is 12 cm then the multiplying constant is
 A) 25 B) 50 C) 100 D) 200

35. If the average daily consumption of a city is 200,000 m³ the maximum consumption on peak hourly demand will be.
 A) 27000 m³ B) 270000 m³ C) 54000 m³ D) 540000 m³

36. Which of the following values of pH represents a stronger acid ?
 A) 2 B) 6 C) 8 D) 10

37. If the total hardness of water is greater than its total alkalinity, the carbonate hardness will be
 A) Total alkalinity B) Total hardness
 C) Total hardness-Total alkalinity D) Non-carbonate hardness

38. The process in which chlorination is done beyond the break point is known as
 A) Pre chlorination B) Post chlorination
 C) Super chlorination D) Break point chlorination

39. If biological oxygen demand BOD of a town is 40000 kg/day and BOD per capita is 0.1 kg, then population equivalent is
 A) 1000 B) 4000 C) 100000 D) 400000

40. The minimum dissolved oxygen which should always be present in water in order to save the aquatic life is

- A) 1 ppm B) 2 ppm C) 4 ppm D) 40 ppm
41. The specific standard for SO₂ under US Ambient Air Quality standards is 80 µg/m³. This is approximately equal to
 A) 0.03 ppm B) 0.3 ppm C) 1.0 ppm D) 3.0 ppm
42. Calculate the safe stopping sight distance for design speed of 40 km per hour for single lane two way traffic. Take reaction time 2.5 seconds, $g = 9.8 \text{ m/s}^2$ and coefficient of friction = 0.37
 A) 22.5 m B) 45 m C) 90 m D) 180 m
43. The radius of horizontal curve is 120 metres. For a design speed of 50 km per hour and design coefficient of friction = 0.14, calculate the super-elevation required if full lateral friction is assumed. Take $g = 9.8 \text{ m/s}^2$.
 A) 0.024 B) 0.048 C) 0.096 D) 0.148
44. Calculate the group index of subgrade soil with % passing 0.075 mm sieve = 55%, liquid limit = 50% and plastic limit = 41%
 A) 3 B) 5 C) 7 D) 9
45. The standard time for which the needle is allowed to penetrate under 100 gram load during the penetration test for bitumen at 25°C temperature is
 A) 3 seconds B) 5 seconds C) 10 seconds D) 50 seconds
46. Which of the following statements are correct for modified Marshall method for testing bituminous mixes.
 A) The number of blows on each face is 75
 B) The number of blows on each face is 100
 C) The number of blows on each face is 112
 D) The number of blows on each face is 150
47. Compute the radius of relative stiffness of 12 cm thick cement concrete slab using the following data.
 Modulus of elasticity of cement concrete: $2 \times 10^5 \text{ kg/cm}^2$
 Poisson ratio for concrete = 0.2
 Modulus of subgrade reaction $K = 4 \text{ kg/cm}^2$
 A) 42.3 B) 52.3 C) 62.3 D) 72.3
48. Compute the equivalent radius of resisting section of 20 cm thick slab, given that the radius of contact area wheel load is 40 cm.
 A) 20 B) 40 C) 80 D) 160
49. The most suitable technique for stabilizing desert sand is
 A) Cement Stabilization B) Bitumen Stabilization
 C) Lime Stabilization D) Flyash Stabilization

50. According to IS 800, the effective length of compression members with end conditions: Effectively held in position and restraint in directions at both ends.
 A) $0.25 l$ B) $0.50 l$ C) $0.65 l$ D) $0.80 l$
51. Basic values of span to effective depth ratio for spans upto 10m to satisfy the vertical deflection limits in case of cantilever as per BIS 456 should be:
 A) 5 B) 6 C) 7 D) 8
52. If the thickness of thinnest outside plate is 20 mm, then the maximum pitch of rivets in tension will be taken as (in mm)
 A) 100 B) 200 C) 320 D) 640
53. The difference between gross diameter and nominal diameter for the rivets of 38 mm diameter is
 A) 1 mm B) 1.5 mm C) 2 mm D) 2.5 mm
54. If the thickness of plate to be connected by a rivet is 16 mm, then suitable size of rivets as per Unwin's formula will be approximately equal to
 A) 16 mm B) 24 mm C) 32 mm D) 48 mm
55. Minimum pitch of the rivets shall not be less than
 A) $1.5 d$ B) $2.0 d$ C) $2.5 d$ D) $3.0 d$
56. The property of fresh concrete, in which the water in the mix tends to rise the surface while placing is called
 A) Segregation B) Bleeding C) Bulking D) Creep
57. The theoretical relationship between Modulus of Rupture F_{cr} , Splitting Strength F_{cs} and Direct Tensile Strength F_{ct} is given by
 A) $F_{cr} > F_{cs} > F_{ct}$ B) $F_{cr} < F_{cs} < F_{ct}$
 C) $F_{cr} = F_{cs} = F_{ct}$ D) $F_{cs} > F_{cr} > F_{ct}$
58. As compared to ordinary cement, high alumina cement has
 A) Higher initial setting time but lower final setting time
 B) Lower initial setting time but higher final setting time
 C) Higher initial setting time but higher final setting time
 D) Lower initial setting time but lower final setting time
59. If nominal shear stress t_v exceeds the design shear strength of concrete t_c the nominal shear reinforcement as per BIS 456 shall be provided for carrying shear stress equal to
 A) t_v B) t_c C) $t_v - t_c$ D) $t_c - t_v$
60. For a continuous slab of 4 m x 6.0 m size, the minimum overall depth of slab to satisfy vertical deflection limits is

- A) 50 mm B) 75 mm C) 100 mm D) 120 mm

61. Lap length in compression shall not be less than

- A) 10 x diameter B) 16x diameter C) 24 x diameter D) 48 x diameter

62. A rectangular bar of cross sectional area A is subjected to an axial load P. The maximum shear stress will occur at a plane X° to any normal cross sectional area. The value of X is

- A) 45° B) 90° C) 180° D) 270°

63. In a slab the transverse reinforcement is provided at.....degrees to the span of slab

- A) 45° B) 60° C) 90° D) 120°

64. When the diameter of a reinforcement bar is D, the anchorage value of hook alone is

- A) 8 D B) 16 D C) 24 D D) 32 D

65. In a chute spillway the flow is usually

- A) Uniform B) Subcritical C) Critical D) Supercritical

66. The ratio of modulus of rigidity (G) to modulus of elasticity (E) of a material for poisson's ratio of 0.3 would be

- A) 0.18 B) 0.38 C) 0.58 D) 0.78

67. Water absorption of Class 1 bricks after 24 hour of immersion in water should not exceed ----- of self weight

- A) 15% B) 20% C) 25% D) 30%

68. Before testing setting time of cement one should test for

- A) Soundness B) Fineness C) Strength D) Consistency

69. Percentage increase of carbon in steel decreases

- A) Brittleness B) Strength C) Hardness D) Ductility

70. The Whole circle bearing of a line is 300° . Its reduced bearing is

- A) N 10° E B) N 10° W C) N 60° W D) S 60° E

71. The bearing of a lines OA and OB are 15° and 330° the value of the included angle BOA is

- A) 45° B) 90° C) 135° D) 315°

72. A hydraulic jump is formed when

- A) A sub-critical flow strikes a super-critical flow
B) A super-critical flow strikes a sub-critical flow
C) The two flows of super-critical flows meet each other
D) The two flows of sub-critical flows meet each other

73. In Marshall method of mix design, the coarse aggregate, fine aggregate, fines and bitumen having respective values of specific gravity 2.68, 2.72, 2.64 and 1.02, are mixed

in the relative proportions (% by weight) of 50.0, 30, 15 and 5 respectively. The theoretical specific gravity of the mix is

- A) 2.18 B) 2.48 C) 2.68 D) 2.88

74. Which of the following loads shall be applied on a simply supported beam so that the shear force is constant throughout its span ?

- A) UDL over the entire span
B) A couple anywhere in the span
C) A central concentrated load and UDL all over the span
D) Two concentrated loads spaced equally on the span

75. Which of the following methods is used to determine the dynamic modulus of concrete

- A) Compressive Strength Test B) Ultrasonic Pulse Velocity Test
C) Split tensile Test D) Direct Tension Test

x-x-x