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Assistant Executive Engineer Examination (AEE)

Questions With Detailed Solutions

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SUBJECTWISE WEIGHTAGE

S.No.	Name of the Subject	No. Of Questions
1	Building Materials	17
2	Surveying	15
3	FM & HM, OCF	15 + 10
4	Geotechnical Engineering	16
5	RCC & PSC	6
6	Hydrology	10
7	Irrigation Engineering	8
8	Construction Management	6
9	Estimation Costing	4
10	Structural Analysis	10
11	Steel Structures	2
12	Strength of Materials	15
13	Transportation Engineering & Railway	16
Total No. Of Questions		**150**

01. Arrange the steps of production of cement in chronological order.

A. Blending the materials in the correct proportions

B. Grinding the clinker and gypsum

C. Crushing and grinding the raw materials

D. Burning the prepared mix in a kiln

(a) C, A, D, B (b) A, B, C, D

(c) A, C, D, B (d) A, D, B, C

01. Ans: (c)

02. The centre of buoyancy of a submerged body

(a) Coincides with the centroid of displaced volume of fluid

(b) It is always below the center of gravity of the body

(c) It is always above the centroid of the displaced volume of liquid

(d) Coincides with the center of gravity of body

02. Ans: (a)

03. The estimated value of the property at the end of its life period, without being dismantled is called as

(a) Market value (b) Scrap value

(c) Book value (d) Salvage value

03. Ans: (d)

04. In a 1 : 50 model of stilling basin filled with water, energy dissipation in model is 0.5 kW. The corresponding energy dissipation in prototype for same fluid will be

(a) 62.5 MW (b) 321.5 MW

(c) 441.94 MW (d) 1.25 MW

04. Ans: (c)

05. Match the following

A. Cautionary sign	i. Downward equilatera triangle
B. Indication sign	ii. Octagonal
C. Indication sign	iii. Upward equilateral triangle
D. Prohibitory sign	iv. Rectangular
E. Stop sign	v. Circular

(a) A-iii, B-iv, C-i, D-v, E-ii

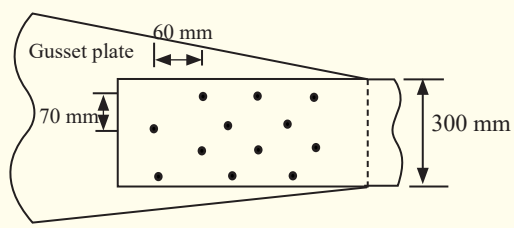
(b) A-ii, B-i, C-v, D-iii, E-iv

(c) A-v, B-iv, C-ii, D-i, E-iii

(d) A-i, B-ii, C-iii, D-iv, E-v

05. Ans: (a)

06. A 300 mm plate with a thickness of 6 mm of grade Fe 410 is used as a tension member, as shown in the figure. The plate is connected to a 12 mm thick gusset plate using 20 mm diameter bolts of grade 4.6. The distances between the bolts are the same as the ones mentioned in the figure. What is the effective net area for the tension member ?



(a) 1503.43 mm^2 (b) 1481.14 mm^2

(c) 1473.24 mm^2 (d) 1536.00 mm^2

06. Ans: (b)

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07. In channel routing using the Muskingum method, the value of the routing coefficients C_0 and C_1 are estimated as -0.3 and 0.6 respectively. The value of the C_2 is

(a) 0.7 (b) 0.4
(c) -0.5 (d) 0.3

07. Ans: (a)

08. A steel pipe of length 3 m has outer and inner diameters of 150 mm and 125 mm, respectively. The pipe was held fixed at both ends and the pipe temperature was 20° C when fixed. During the use, cold fluid moves through the pipe. As a result, the uniform temperature of the pipe becomes -15° C. What will be the force on the fixed joint neglecting gravitational forces ? The coefficient of linear expansion and the modulus of elasticity for the pipe are 10×10^{-6}/°C and 200 GPa respectively.

(a) 110.31 π kN (b) 125.31 π kN
(c) 130.31 π kN (d) 120.31 π kN

08. Ans: (d)

09. A precast concrete pile of size 50 cm × 50 cm is to be driven into clay strata whose unconfined compressive strength is 220 kN/m^2 and adhesion factor = 0.6. The length of the pile required to carry safe working load of 450 kN with factor of safety of 2.5 is

(a) 3.3 m (b) 2 m
(c) 10.23 m (d) 6.647 m

09. Ans: (d)

10. What is the anchorage length of d diameter Fe 415 bars in M30 concrete column in compression ? Assume $\sigma_s = 0.75f_y$

(a) 25.94d (b) 32.42d
(c) 51.87d (d) 41.50d

10. Ans: (a)

11. For sand beds, the Darcy's law would be valid if the Reynold's number defined by R = ud50/v is less than

(a) 1 (b) 10
(c) 1000 (d) 0.2

11. Ans: (a)

12. Consider the following

A. Honeycombing	i. Rise of water to surface of freshly placed concrete
B. Bleeding	ii. Separation of concrete constituent materials due to gravity
C. Thermal shrinkage	iii. Hollow spaces and cavities left in concrete mass
D. Segregation	iv. Volume reduction of concrete due to temperature variation

Choose the option in which given pairs are correctly matched

(a) A-iii, B-iv, C-i, D-ii
(b) A-iii, B-i, C-iv, D-ii
(c) A-ii, B-i, C-iv, D-iii
(d) A-i, B-iv, C-ii, D-iii

12. Ans: (b)

13. A triangular section is hydraulically efficient when the vertex angle is

(a) 120° (b) 30°

(c) 75° (d) 90°

13. Ans: (d)

14. The manometer shown in the given figure, connects two pipes carrying oil and water then

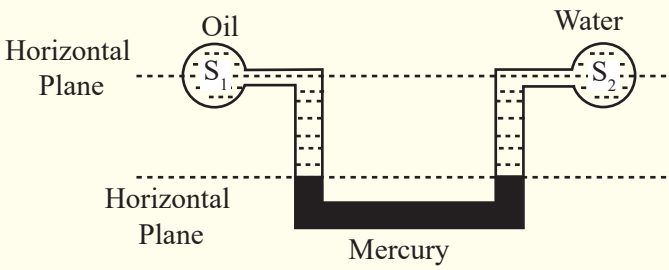
(a) If $S_1 < S_2$ the pressure in oil pipe is higher

(b) If $S_1 < S_2$ the pressure in the water pipe is higher

(c) Insufficient data to compare

(d) If $S_1 < S_2$ the pressure in the pipes are equal

where S_1 and S_2 are Specific Gravity of oil and water respectively.



14. Ans: (a)

15. For a plane strain problem, the number of non-zero stress components will be

(a) 3 (b) 4

(c) 1 (d) 2

15. Ans: (b)

16. Arrange the following in chronological order.

A. Integration and regrouping

B. Modified Guarantee system

C. Old Guarantee system

D. State construction and ownership

E. Nationalization

(a) E, D, B, A, C (b) C, D, B, E, A

(c) D, E, A, B, C (d) A, C, B, D, E

16. Ans: (d)

17. The hydraulic radius of an efficient triangular section channel is

(a) $y/(2\sqrt{2})$ (b) y/2

(c) y (d) $2\sqrt{2}\,y$

Where, y is the depth of the water

17. Ans: (a)

18. The actual velocity of water flowing in a medium is observed as 0.30 m/s. The porosity of the medium is 0.40. The Darcy's velocity is

(a) 0.075 m/s (b) 0.133 m/s

(c) 1.2 m/s (d) 0.12 m/s

18. Ans: (d)

19. The correct arrangement of different voids of concrete according to their size is

(a) entrained voids > entrapped voids > capillary voids > gel voids

(b) capillary voids > entrapped voids > entrained voids > gel voids

(c) entrapped voids > entrained voids > gel voids > capillary voids

(d) entrapped voids > entrained voids > capillary voids > gel voids

19. Ans: (d)

20. Match the following errors in chaining

A. Errors in reading the tape	i. Cumulative + or –
B. Errors due to temperature	ii. Cumulative +
C. Incorrect counting of tape lengths	iii. Mistake
D. Bad ranging	iv. Compensating ±
E. Variation in pull	v. Blunder

(a) A-i, B-iv, C-ii, D-iii, E-v
(b) A-iii, B-i, C-v, D-ii, E-iv
(c) A-iv, B-iii, C-i, D-v, E-ii
(d) A-v, B-ii, C-iii, D-iv, E-i

20. Ans: (b)

21. Order the following structures with respect to their increasing static indeterminacy.

A. A two-span continuous beam hinged at one end and rollers at the other supports.
B. A two span continuous beam fixed at one end and rollers at the other supports.
C. A fixed-fixed beam with two internal hinges.
D. A one bay one storey fixed-fixed frame.

(a) C, D, B, A
(b) C, B, D, A
(c) C, A, B, D
(d) C, A, D, B

21. Ans: (c)

22. Convert the circle bearing of 211°54' to quadrantal bearing.

(a) S 31° 54' E (b) N 31° 54' E
(c) N 31° 54' W (d) S 31° 54' W

22. Ans: (d)

23. According to IS 10262:2019, the relationship between target mean compressive strength (f_t) and characteristic compressive strength (f_{ck}) of concrete is

(a) $f_t = f_{ck} + 1.65 \times$ standard deviation
(b) $f_t = f_{ck} + 0.65 \times$ standard deviation
(c) $f_t = f_{cx} + 1.25 \times$ standard deviation
(d) $f_t = f_{ck} + 1.05 \times$ standard deviation

23. Ans: (a)

24. Find out the length of transition curve for a broad-gauge curve of 3 degrees having a cant of 12 cm. The maximum permissible speed on the curve is 100 km/hr and the allowable cant deficiency is 85 mm.

(a) 62.04 (b) 87.60
(c) 89.40 (d) 86.40

24. Ans: (b)

25. A circular dug well in fine sand region has a yield of 15 *l*/s under a depression head of 4 m. Assuming specific capacity per unit area as 0.8/h, the bottom diameter of the dug well is

(a) 4.64 m (b) 1.7 m
(c) 3.5 m (d) 2.65 m

25. Ans: (a)

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26. A beam is prestressed by a straight tendon carrying a prestressing load P at an eccentricity e towards the bottom direction of the beam.

Which match is the correct one for the beam ?

A. Direct stress contribution to resultant stress at the top fibre due to prestressing force	i. Minimum
B. Stress contribution to resultant stress at the bottom fibre due to live load	ii. Subtractive
C. Maximum stress due to eccentricity	iii. Additive
D. Resultant stress at the bottom fibre	iv. Bottom

(a) A-ii, B-i, C-iv, D-iii
(b) A-iii, B-ii, C-iv, D-i
(c) A-iv, B-ii, C-i, D-iii
(d) A-iii, B-i, C-iv, D-ii

26. Ans: (b)

27. A two-dimensional water jet strikes a fixed two-dimensional plate and splits into two streams such that the ratio of discharge is 3.

The angle of water jet striking normal to a plates is

(a) 75° (b) 60° (c) 30° (d) 45°

27. Ans: (b)

28. The bending moment, modulus of elasticity and the moment of inertia of a beam are given by M, E and I, respectively. According to elastic beam theory, what is the radius of curvature ?

(a) $\frac{EI}{M}$ (b) $\frac{1}{EI}$ (c) EI (d) $\frac{M}{EI}$

28. Ans: (a)

29. A retaining wall, 8m high with a smooth vertical back, retains a clay backfill with C' = 15 kN/m^2, $\varnothing' = 15^o$ and $\gamma = 18$ kN/m^3 Assume that the tension cracks may develop to the full theoretical depth, the active thrust on the wall is

(a) 61.67 kN/m^2 (b) 46 kN/m^2
(c) 20 kN/m^2 (d) 23 kN/m^2

29. Ans: (*)

30. Compressive strength of concrete mainly depends upon

(a) Quantity of cement
(b) Water-cement ratio
(c) Quantity of aggregate
(d) Grading of aggregate

30. Ans: (b)

31. Match the following

A. Tacheometry	i. Angular Surveying
B. Contouring	ii. Horizontal and Vertical angles
C. Levelling	iii. Bearing
D. Theodolite	iv. Equal elevation
E. Compass	v. Elevation

(a) A-ii, B-iii, C-i, D-iv, E-v
(b) A-iii, B-i, C-ii, D-v, E-iv
(c) A-ii, B-v, C-iv, D-iii, E-i
(d) A-i, B-iv, C-v, D-ii, E-iii

31. Ans: (d)

32. Which of the following statements cannot be used to describe free flow speed (u_f) of a traffic stream?
(a) u_f is the speed when density is negligible
(b) u_f is affected by geometry of the road
(c) u_f is the speed at which flow is maximum and density is optimum
(d) u_f is the speed when flow is negligible

32. Ans: (a)

33. A beam is designed using M20 grade concrete and Fe415 is used for the tension reinforcement. If the diameter of the main steel is 12 mm, what is the minimum value of the development length (L_d) in mm to be provided in the support section ?
(a) 260 (b) 564
(c) 470 (d) 300

33. Ans: (b)

34. A rectangular channel 2m wide carries a discharge of $10m^3/s$ at a depth of 2 m.
Calculate the specific energy of the channel.
(a) 3.0 m (b) 2.3 m
(c) 4.6 m (d) 1.8 m

34. Ans: (b)

35. In which type of contract, measurement of executed items are NOT required to keep ?
(a) Item-Rate Contract
(b) Cost Plus Contract
(c) Lump-Sum Contract
(d) Percentage Rate Contract

35. Ans: (c)

36. Which of the following statements is/are correct while analyzing an indeterminate structure ?
A. The force method requires to satisfy equilibrium condition.
B. The force method requires to satisfy compatibility condition.
C. The displacement method requires to satisfy force-displacement for a structure.
D. The displacement method requires to satisfy compatibility condition.

(a) A and C only
(b) B only
(c) D only
(d) B and C only

36. Ans: (d)

37. A point load of 500 kN applied on the surface of thick layer of saturated clay. Using Boussinesq's elastic analysis the estimated vertical stress at a depth of 3 m and a radial distance of 2 m from the point of application of load is
(a) 10.58 kPa (b) 5.5 kPa
(c) 2.3 kPa (d) 6.7 kPa

37. Ans: (a)

38. A fluid of jet of cross section Area A and velocity V strikes a flat plate moving with a velocity u. The fluid mass striking it per second is
(a) $\rho A(V - u)$ (c) $\rho A(u - V)$
(c) ρAu (d) ρAV

38. Ans: (a)

39. Corrosion of reinforcement in concrete can be caused by the ingress of
(a) Chlorides and carbon dioxide
(b) Alkalis and sulphates
(c) Carbon dioxide and alkalis
(d) Sulphates and chlorides

39. Ans: (a)

40. Calculate the critical depth corresponding to a discharge of $8m^3$ /s in a rectangular channel of width 4m. Take g =$10m/s^2$
(a) $(0.8)^{1/3}$m (b) $(0.2)^{1/3}$ m
(c) $(0.4)^{1/3}$m (d) $(0.5)^{1/3}$m

40. Ans: (c)

41. Match the kinematic indeterminacy of the following structures neglecting axial strain.

A. One span beam fixed at both ends	i. 5
B. Two span continuous beam hinged at all supports	ii. 24
C. Five span continuous beam with fixed at one end and rollers at other supports	iii. 0
D. One bay one storey space frame fixed at all supports	iv. 3

(a) A-iii, B-iv, C-i, D-ii
(b) A-iii, B-i, C-iv, D-ii
(c) A-iv, B-i, C-iii, D-ii
(d) A-iv, B-iii, C-i, D-ii

41. Ans: (a)

42. The diurnal variation is
A. More at magnetic poles and less at equator
B. Does not changes from year to year
C. More in winter and less in summer
D. More in day time and less in night time
(a) B and C (b) A and B
(c)B and D (d) A and D

42. Ans: (d)

43. For a three-dimensional problem, the stress components altogether is a tensor of order
(a) 1 (b) 2
(c) 3 (d) 0

43. Ans: (b)

44. If the plate load test shows settlement of plate as 15 mm, for a 400 mm wide plate then how much more settlement a footing of width 1.2 m will have for a clayey soil compared to sandy soil ?
(a) 45.6 mm (b) 15.6 mm
(c) 12.4 mm (d) 74.4 mm

44. Ans: (a)

45. Consider the following statement with respect to cements :
A. Vinsol resin or vegetable fats and oils and fatty acids are ground with ordinary cement to air entraining cement.
B. Extra rapid hardening cement is prepared by adding 2% of calcium chloride.
Identify the correct statement.

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(a) Statement B is false and A is true
(b) Both A and B are false
(c) Both A and B are true
(d) Statement B is true and A is false

45. Ans: (c)

46. Write the correct decreasing order with respect to the number of stress components for the following case.

A. An axially loaded member
B. Plane strain problem
C. Plane stress problem
D. A single point of a three-dimensional structure

(a) D, C, B, A (b) B, D, C, A
(c) C, D, B, A (d) D, B, C, A

46. Ans: (d)

47. The coefficient of average rolling friction of a road is f_r, and its grade is + G%. If the grade of this road is doubled, what will be the percentage change in the braking distance (for the design vehicle to come to a stop) measured along the horizontal (assume all other parameters are kept unchanged)?

(a) $\frac{0.01G}{f_r + 0.02G} \times 100$

(b) $\frac{f_r}{f_r + 0.02G} \times 100$

(c) $\frac{0.02G}{f_r + 0.01G} \times 100$

(d) $\frac{2f_r}{f_r + 0.01G} \times 100$

47. Ans: (a)

48. A vertical cut is made in saturated clay with c = 30 kN/m^2, phi = 0^o and γ = 20 kN/m^3. What is the theoretical depth to which clay can be excavated without side collapse ?

(a) 12 m (b) 2.8 m
(c) 6 m (d) 1.4 m

48. Ans: (c)

49. Arrange the steps of preparation of brick earth in chronological order :

A. Unsoiling
B. Cleaning
C. Digging
D. Blending
E. Weathering
F. Tempering

(a) A, C, B, E, D, F
(b) A, F, B, E, D, C
(c) A, C, B, D, E, F
(d) A, B, C, D, E, F

49. Ans: (a)

50. In a particular season, the catchment was found to have a phi-index of 0.4 cm/h. If a rainfall of 2.4 cm occurs in that season at a uniform rate in a 8 hour storm, the resulting direct runoff depth on the catchment in cm will be

(a) 0 (b) 2 cm
(c) 2.8 cm (d) 0.8 cm

50. Ans: (a)

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51. The total float can be expressed as
A. latest start time - earliest start time
B. latest finish time - earliest finish time
Identify the correct statement.
(a) Statement B is false and A is true
(b) Both A and B are false
(c) Both A and B are true
(d) Statement B is true and A is false

51. Ans: (c)

52. The separation of the boundary layer takes place when the pressure gradient is
(a) Positive (b) Zero
(c) Constant (d) Negative

52. Ans: (a)

53. The frequency distribution of duration of an individual activity takes the shape of _____ as per the PERT analysis.
(a) Gamma distribution
(b) Log-Normal distribution
(c) Beta distribution
(d) Normal distribution

53. Ans: (c)

54. An instantaneous unit hydrograph is a hydrograph of
(a) instant duration and infinite rainfall excess
(b) infinitely small duration and of unit rainfall excess
(c) instant runoff from a unit area of catchment
(d) unit duration and indefinitely small rainfall excess

54. Ans: (b)

55. If in a gradually varied flow dy/dx is positive, then dE/dx is equal to
(a) $S_f - S_o$ (b) $S_o - S_f - dy/dx$
(c) $S_o(1 - F^2)$ (d) $S_o - S_f$

55. Ans: (d)

56. Which of the following statements is/are correct for a plane stress isotropic material problem ?
A. Three stress components can exist at a point.
B. Six stress components can exist at a point.
C. Three principal stresses can exist at a point.
D. Two principal stresses can exist at a point.
(a) B and D only (b) D only
(c) A and D only (d) A and C only

56. Ans: (c)

57. The extra widening required for a three-lane national highway at a horizontal curve of 900 m radius, considering a wheel base of 6 m and a design speed of 100 kmph is
(a) 0.31 (b) 0.51
(c) 0.61 (d) 0.41

57. Ans: (c)

58. In long and short wall method of estimation, the length of long wall is the centre to centre distance between the walls and
(a) half breadth of wall on each side
(b) breadth of wall only on one side
(c) half the breadth of the wall on one side
(d) breadth of the wall on each side

58. Ans: (a)

59. While aligning the hill road with a rolling gradient of 7 percent, a horizontal curve of radius 100 m is encountered. What is the compensated gradient in percentage as per IRC ?

(a) 6.25 (b) 5.7

(c) 6.0 (d) 5.5

59. Ans: (a)

60. For a beam element, the bending moment, modulus of elasticity and the moment of inertia are given by M , E and I, respectively. What is the flexural rigidity of the beam element ?

(a) EI (b) $\frac{1}{EI}$

(c) $\frac{EI}{M}$ (d) $\frac{M}{EI}$

60. Ans: (a)

61. In a model experiment with weir, if the dimension of the model weir are reduced by a factor k, the flow rate through the model weir is the following fraction of the flow rate through the prototype

(a) k^2 (b) 1 (c) $k^{3/2}$ (d) $k^{5/2}$

61. Ans: (d)

62. A prismatic circular bar is situated in the x-y-z coordinate system with the length L measured in the x direction. We measure the shear stress at a radius ρ from the center and the shear modulus of elasticity is G. The polar moment of inertia of the bar is J. What is the strain energy for the member when subjected to torsion T ?

(a) $\int_L \frac{T^2}{2GJ^2}\left[\iint \rho^2 dy\, dz\right]dx$

(b) $\iiint \frac{T^2}{2GJ^2} dxdydz$

(c) $\iiint \frac{T^2}{2GJ} dxdydz$

(d) $\int_L \frac{T^2}{2GJ}\left[\iint \rho^2 dy\, dz\right]dx$

62. Ans: (a)

63. An oven dry soil sample of volume 250 cc weigh 430 g. If the specific gravity of solids is 2.70. What will be water content which willfully saturate the sample ?

(a) 26.9% (b) 19.6%

(c) 73.1% (d) 29.8%

63. Ans: (b)

64. The field capacity of a certain soil is 20% and the specific gravity is 1.6. Before applying irrigation water, a wet sample of soil was taken and its mass was found as 150 gm after oven drying its mass was 136 g. Determine the depth of water that must be applied to irrigate the soil to a depth of 0.9 m.

(a) 210 mm

(b) 140 mm

(c) 180 mm

(d) 90 mm

64. Ans: (b)

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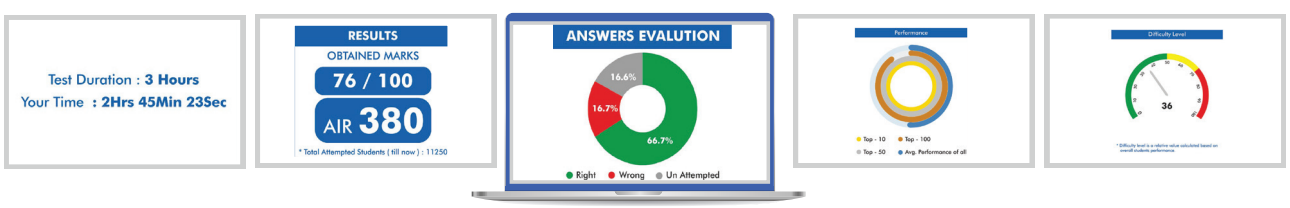

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65. Consider the following statements :

A. Running speed is higher than journey speed

B. Journey speed includes delays

C. Journey speed is the average speed maintained by a vehicle over a given course while vehicle is in motion

D. Running speed is known as the overall travel speed.

Which one of the above statements is/ are correct ?

(a) B and C only (b) A and B only

(c) A and D only (d) C and D only

65. Ans: (b)

66. A pitot tube is an instrument for measuring

(a) Discharge of fluid

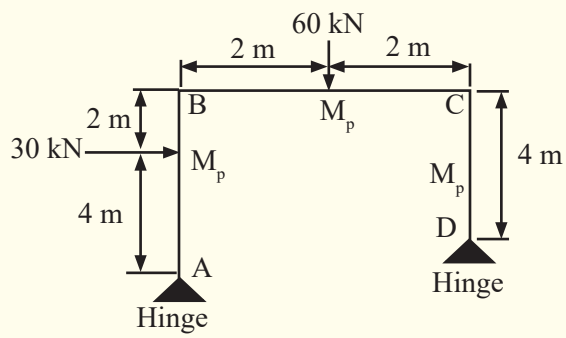
(b) Velocity of flow

(c) Total energy

(d) Pressure of flow

66. Ans: (b)

67. What is the plastic moment for the frame as shown in the figure ? All members of the frame have the same plastic moment capacity M_p.



(a) 63.33 kNm (b) 48 kNm

(c) 36.92 kNm (d) 53.33 kNm

67. Ans: (d)

68. The specific gravity of particles of a sand is 2.64 and their porosity is 45% in loose state. The critical hydraulic gradient will be

(a) 0.747 (b) 0.901

(c) 0.947 (d) 0.66

68. Ans: (b)

69. Match the name of stone in List 1 with the use of that stone in List 2 :

List - 1	**List - 2**
A. Granite	i. Ornamental work
B. Limestone	ii. Bridges
C. Marble	iii. Production of cement
D. Slate	iv. Flooring

(a) A-ii, B-iii, C-i, D-iv

(b) A-iii, B-iv, C-i, D-ii

(c) A-ii, B-iv, C-i, D-iii

(d) A-iii, B-ii, C-i, D-iv

69. Ans: (a)

70. The weight of water to be added in kN per m^3 to make the soil saturated (with specific gravity = 2.7) having moisture content = 20% and void ratio = 0.72 is

(a) 10.025 (b) 9.81

(c) 0.51 (d) 1.025

70. Ans: (d)

71. For an isotropic material, which of the following statements is/are correct ?

A. The properties are same at all the points throughout the material, but different properties can be there in three directions at a point.

B. The properties at a point are same in three different directions.

C. The property in two directions is same, but it is different in one direction at a point.

D. The properties are same at all the points throughout the material, and same properties observed in all three directions at a point.

(a) B and D only (b) C and D only
(c) A and D only (d) A and B only

71. Ans: (a)

72. The design speed on a road is 72 kmph. Assuming the driver reaction time of 2.0 seconds and coefficient of friction of pavement surface as 0.30, the required stopping distance (in meters) for a two-lane two-way traffic is

(a) 96.6 (b) 106.67
(c) 43.30 (d) 40.0

72. Ans: (b)

73. Consider the following statements related to a horizontal venturimeter.

A. The velocity of flow in the main pipe is greater and the pressure is lesser than that at the throat section.

B. The velocity of flow in the main pipe is lower and the pressure is larger than that at the throat section.

C. The pressure difference between the main pipe and throat section is positive.

D. The pressure difference between the main pipe and throat section is negative.

Which of these statements are NOT correct ?

(a) A and B only (b) B and D only
(c) C and D only (d) A and D only

73. Ans: (d)

74. Convective precipitation is caused when

(a) there is a frontal mechanism
(b) when the cooler air mass forms wedge and lifts the warm air mass
(c) when air mass pass over the mountain region and gets cooled
(d) rising of moist air due to surface heating

74. Ans: (d)

75. Consider the following sets of derivatives for a prismatic beam.

A. Shear force i. $\frac{d^2y}{dx^2}$

B. Loading intensity ii. $\frac{d^3y}{dx^3}$

C. Bending moment iii. $\frac{d^4y}{dx^4}$

D. Slope iv. $\frac{dy}{dx}$

Which combination is the correct combination ?

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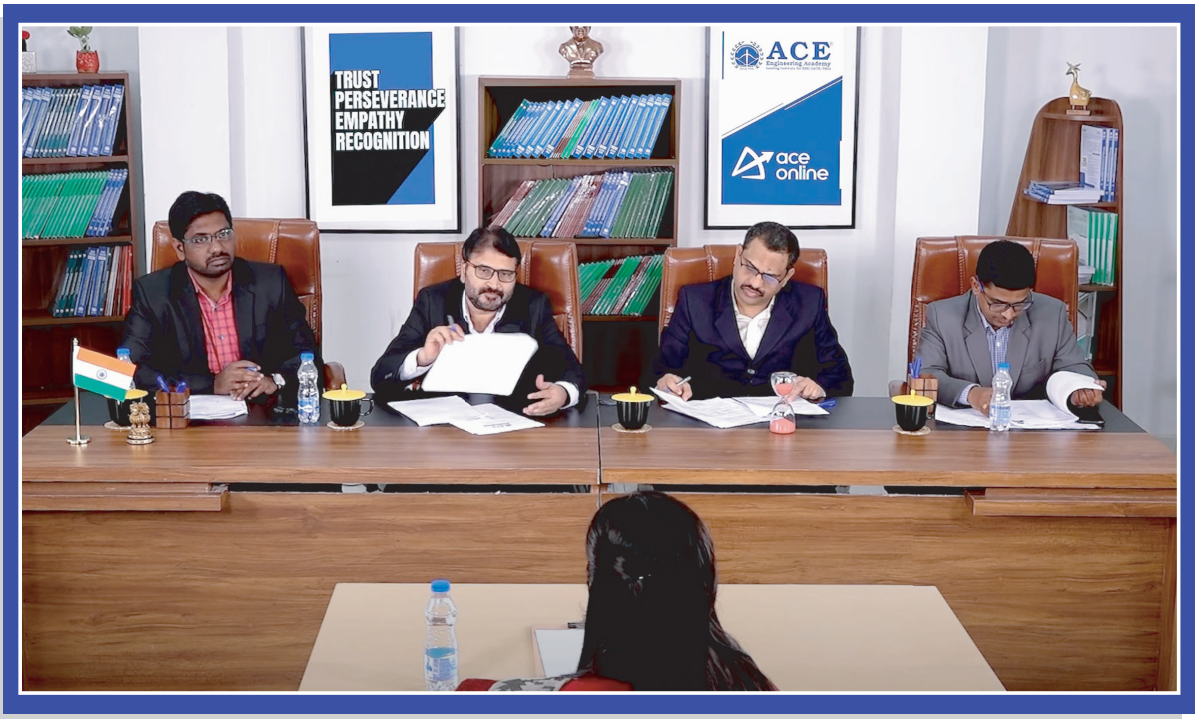

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(a) A-ii, B-i, C-iii, D-iv
(b) A-ii, B-i, C-iv, D-iii
(c) A-ii, B-iii, C-i, D-iv
(d) A-iv, B-i, C-ii, D-iii

75. Ans: (c)

76. For a long pipe carrying liquid from one reservoir to another, at the exit section of the pipe, the energy grade line will
(a) lie at a distance ($v^2/2g$) above the liquid surface
(b) lie at a distance ($v^2/4g$) below the liquid surface
(c) lie at a distance ($v^2/2g$) below the liquid surface
(d) meet the liquid surface

76. Ans: (a)

77. In a Lacey's regime channel, the discharge is 100m ^{3}/s and the silt factor is 1 : 1. The regime longitudinal slope is about
(a) 1/6140 (b) 1/7100
(c) 1/4100 (d) 1/5100

77. Ans: (b)

78. Premature stiffening of cement pastes due to conversion of hemihydrate ($CaSO_4.H_2O$) or anhydrite ($CaSO_4$) to gypsum can be eliminated by
(a) Reducing gypsum content of cement
(b) Continuous mixing or by reworking
(c) Adding accelerating admixtures to concrete
(d) Reducing C_3A content of cement

78. Ans: (b)

79. The maximum number of vehicles observed in any five-minute period during the peak hour is 150. If the total flow in the peak hour is 1200 vehicles, the five-minute peak hour factor (round off to 2 decimal places) is
(a) 0.78 (b) 0.52
(c) 0.45 (d) 0.67

79. Ans: (d)

80. dy/dx is negative in the following GVF profiles
(a) M2, A2, S3 (b) M2, A2, H2
(c) A3, A2, M2 (d) MI, S2, A2

80. Ans: (b)

81. Consider the following :

A. Earnest money deposit	i. Settlement of a dispute by the decision of third person
B. Security deposit	ii. Offer in writing to execute some specified works
C. Arbitration	iii. Deposited by the contractor to safeguard the interests of the owner in the event of improper performance of the contract
D. Tender	iv. Guarantee in the form of cash on the part of the contractor to keep open the offer for consideration

Choose the option in which given pairs are correctly matched
(a) A-iii, B-iv, C-i, D-ii
(b) A-i, B-ii, C-iv, D-iii
(c) A-ii, B-i, C-iv, D-iii
(d) A-iv, B-iii, C-i, D-ii

81. Ans: (d)

82. While designing the abutments of a bridge, the lateral earth pressure to be considered is
(a) Passive earth pressure
(b) At the bottom of the bridge
(c) At the rest pressure
(d) Active earth pressure

82. Ans: (c)

83. For a catchment, the s-curve due to a rainfall intensity 1 cm/h is given by $Q = 3 - (2 + t)\, t^{-2}$ where t is in hour, Q in m^3/s. At t = 1 hour, ordinate of instantaneous unit hydrograph will be
(a) 500 m^3/s (b) 3 m^3/s
(c) 50 m^3/s (d) 5 m^3/s

83. Ans: (d)

84. Which of the following pairs are NOT correctly matched ?
(a) PERT -Activity-oriented network model
(b) PERT - Three-time estimate
(c) CPM - Float concept
(d) PERT - Probabilistic approach

84. Ans: (a)

85. If duty is 1500 hec/cumec and base period of 150 days for an irrigated crop, the delta of the crop will be
(a) 864 cm (b) 86.4 mm
(c) 0.864 mm (d) 86.4 cm

85. Ans: (d)

86. What is the correct increasing order of the following materials with respect to their Poisson's ratio?
A. Magnesium alloys
B. Cast iron
C. Aluminum alloys
D. Nickel
(a) C, A, B, D (b) B, D, C, A
(c) A, C, B, D (d) D, B, A, C

86. Ans: (b)

87. A linear relationship is observed between speed and density on a certain section of a highway. The free flow speed is observed to be 100 km per hour and the jam density is estimated as 120 vehicles per km length. Based on the above relationship, the maximum flow expected on this section and the speed at the maximum flow will be respectively
(a) 3000 vehicles per hour and 50 km per hour
(b) 3000 vehicles per hour and 100 km per hour
(c) 6000 vehicles per hour and 50 km per hour
(d) 6000 vehicles per hour and 100 km per hour

87. Ans: (a)

88. Consider the following statements :
A. Efflorescence is the appearance of white powder on the surface of bricks
B. Efflorescence is caused by the presence of chalk in the brick earth.
C. Moderate efflorescence - covering upto 50% area of the brick.

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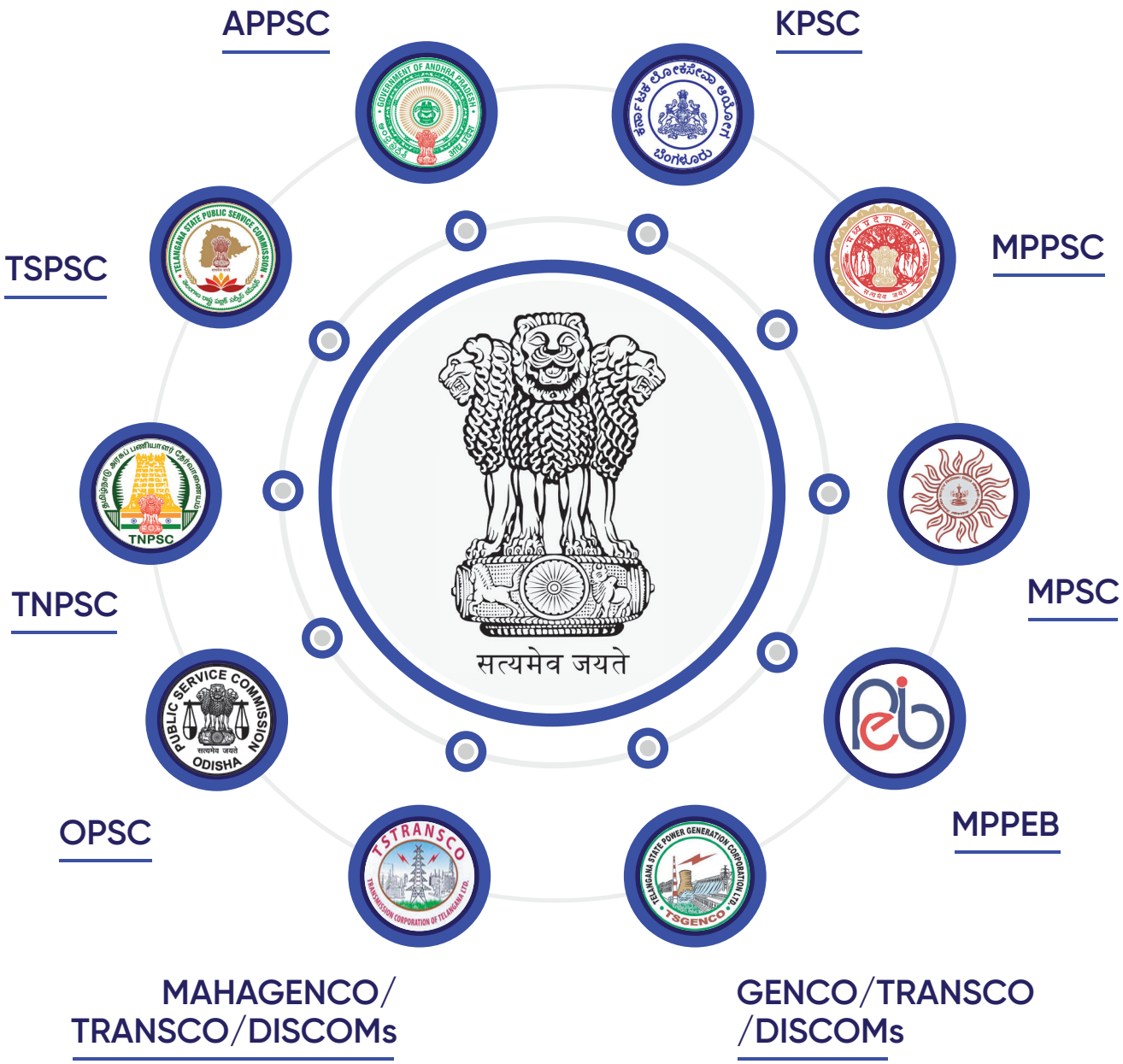

D. Moderate efflorescence - covering less than 10% area of brick.

Which of the above statements is/are correct ?

(a) A and C (b) B and D

(c) B and C (d) A and B

88. Ans: (a)

89. A vehicle has a wheel base of 6.0 m. What is the off-tracking in metres while negotiating a curve path with a mean radius of 60 m?

(a) 0.15 (b) 0.60

(c) 0.30 (d) 0.50

89. Ans: (c)

90. For a pure shear problem with shear stress τ_{xy}, what would be the maximum principal stress?

(a) $2\tau_{xy}$ (b) $\sqrt{\tau_{xy}}$

(c) τ_{xy} (d) $\frac{\tau_{xy}}{2}$

90. Ans: (c)

91. At a rated capacity of 44 cumecs, centrifugal pump develops 36 m of head when operating at 1450 rpm. The specific speed of the pump is

(a) 654.44 (b) 1654.44

(c) 100.44 (d) 65.44

91. Ans: (a)

92. Consider the following statements.

A. Cumulative errors are more important than compensating errors

B. All cumulative errors are equally important

C. The more times a line is measured, the more likely the accidental errors to disappear from mean

D. Variation in temperature results in compensating error

Which of the above statements is/are correct ?

(a) B and C (b) A and C

(c) B and D (d) A and B

92. Ans: (*) (All statemens are correct)

93. M20 grade of concrete is approximately

(a) 1 : 2 : 4 (b) 1 : 1.5 : 2

(c) 1 : 4 : 8 (d) 1 : 1.5 : 3

93. Ans: (d)

94. A theodolite is placed at P and a 5 m long vertical staff is held at Q. The depression angle made at reading 3.5 m marking on staff is 7°15'. The horizontal distance between P and Q is 2500 m. The height of instrument at P is 1.5 m and reduced level of point P is 980.450 m. Using curvature correction and refraction correction determine the RL of point Q (in m).

(a) 976.950 (b) 660.410

(c) 975.450 (d) 660.830

94. Ans: (d)

95. Consider the following statement with respect to cements :

A. Low heat cement is produced by reducing the amount of tricalcium aluminate and increasing the amount of dicalcium silicate.

B. Rapid hardening cement is produced by decreasing the amount of tricalcium silicate. Identify the correct statement.

(a) Statement B is false and A is true
(b) Both A and B are false
(c) Both A and B are true
(d) Statement B is true and A is false

95. Ans: (a)

96. A confined aquifer of thickness 5 m gives a steady discharge of 20 litre/sec through a well of 0.3 m radius. The height of water in the well dropped from 10 m to 8 m after pumping. What is the coefficient of permeability when the radius of influence is taken as 300 m ?

(a) $0.101*(l\text{n } 1000/\pi)$
(b) $0.011*(l\text{n } 1000/\pi)$
(c) $0.001*(l\text{n } 1000/\pi)$
(d) $0.0001*(l\text{n } 1000/\pi)$

96. Ans: (c)

97. Analysis of data on maximum one day rainfall depth at Hyderabad showed that a depth of 300 mm had a return period of 80 years. The probability of a one-day rainfall depth equal to or greater than 300 mm at Hyderabad occurring at least once is 80 years is

(a) 0.341 (b) 0.125
(c) 0.0125 (d) 0.314

97. Ans: (*)

98. The resistance of stones against the grinding action under traffic is measured by

(a) Attrition test
(b) Hardness test
(c) Crushing strength test
(d) Abrasion test

98. Ans: (a)

99. The St. Venat Equations for unsteady open channel flow are

(a) Momenturn in two different forms
(b) Momentum and energy equations
(c) Energy and continuity equations
(d) Continuity and momentum equations

99. Ans: (d)

100. Match the following for a body under plane

A. Distance of the center of the Mohr's circle from origin of coordinates	i. Difference between normal stresses divided by 2
B. The diameter of the Mohr's circle	ii. Shear stress
C. Distance of maximum normal stress from the center of Mohr's circle	iii. Average normal stress
D. Vertical direction of the Mohr's circle	iv. Difference between major principal stresses

(a) A- iv, B-iii, C-i, D-ii
(b) A-iii, B-iv, C-i, D-ii
(c) A-iv, B-i, C-iii, D-ii
(d) A-iii, B-iv, C-ii, D-i

100. Ans: (b)

101. A compacted fill was 8m thick has its void rainfall ratio as 1.2. The fill was loaded on surface by constructing an embankment covering a large area of fill. Some days after the embankment was constructed measurements of fill indicated an average void ratio of 0.8. Estimate compression of fill.

(a) 1.45 (b) 1.35 (c) 2.45 (d) 2.5

101. Ans: (a)

102. Which method of Quarrying is suitable for costly, soft and stratified rocks ?

(a) Wedging (b) Blasting
(c) Heating (d) Excavating

102. Ans: (a)

103. The type of surveying in which the curvature of the earth is considered is called

(a) Topographical surveying
(b) Geodetic surveying
(c) Plane surveying
(d) Preliminary surveying

103. Ans: (b)

104. A tube well commands 20 hectares of land under rice. When the well is discharging at a constant rate, the water level in the well drops to 120.2 m. The level of highest land is 129 m. The duty of rise is 800 ha/cumec on the field. For the pump efficiency of 60%, input power of the pump is

(a) 4.82 Kw (b) 4.56 KW
(c) 3.59 KW (d) 4.32 Kw

104. Ans: (c)

105. What is the far end moment for a beam element of length L due to a settlement of δ at the near end ? The beam has the modulus of elasticity and moment of inertia as E and I, respectively.

(a) $\frac{4EI\delta}{L^2}$ anti-clockwise

(b) $\frac{6EI\delta}{L^2}$ clockwise

(c) $\frac{6EI\delta}{L^2}$ anti-clockwise

(d) $\frac{4EI\delta}{L^2}$ clockwise

105. Ans: (b)

106. On a section of a highway the speed-density relationship is linear and is given by $v = 100 - \frac{5}{6}k$; where v is in km/h and k is in veh/km. The capacity (in veh/h) of this section of the highway would be

A. Free flow speed is 100 kmph and jam density is 120 veh/km
B. Maximum flow rate is 3000 veh/h and critical density is 60 veh/km
C. Maximum flow rate is 6000 veh/h and critical density is 120 kmph
D. Free flow speed is 120 kmph and jam density is 100 veh/km

Which of the above statement is/are correct ?

(a) B and D only
(b) D and C only
(c) A and B only
(d) A and C only

106. Ans: (c)

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CE - PAPER-1

Category	2020	2019	2018	2017	2016
UR	120.02	123.52	127.4	136.25	100
OBC	114.21	115.93	122.91	133.25	92.5
EWS	108.14	112.28	118.99	–	–
SC	99.15	101.70	107.61	120	84.5
ST	99.15	102.61	107.01	114.5	85.5
OH	79.83	92.24	–	113	72.5
HH	48.86	55.73	–	83.5	40

ME | EE - PAPER 1

Category	2020	2019	2018	2017	2016
UR	141.59	157.47	152.16	117c	115
OBC	137.46	153.26	149.3	110.75	109.5
EWS	131.23	151.04	147.47	–	–
SC	123.23	140.59	133.39	101.75	99
ST	115.34	135.88	125.49	105	94.5
OH	99.43	127.29	–	91.5	87
HH	63.07	92.49	–	61.75	54

107. Le-Chateliers Apparatus is used to measure the unsoundness of cement caused due to the presence of
(a) Unburnt magnesia (MgO)
(b) Calcium sulphate ($CaSO_4$)
(c) Unburnt lime (CaO) and unburnt magnesia (MgO) both
(d) Unburnt lime (CaO)

107. Ans: (d)

108. The length of a line measured with a 25 m chain was found to be 300 m. Calculate the true length of the line if the chain was 15 cm too long.
(a) 301.8 (b) 251.5
(c) 298.2 (d) 300.2

108. Ans: (a)

109. A surveyor measured the distance between two points on a plan drawn to a scale of 1 cm = 100 m and the result was 333 m. Later, however, he discovered that he used a scale of 1 cm = 25 m. Find the true scale distance between the points.
(a) 1332 (b) 1665
(c) 999 (d) 666

109. Ans: (a)

110. Consider the following statements from IS 800 : 2007
A. The maximum value of the effective slenderness ratio of compression flange of a beam against lateral torsional buckling is 300.
B. The partial safety factor for the combination of dead load, live load, crane load and wind load under the limit state of serviceability is 1.0
C. The partial safety factor for the resistance of members to buckling is 1.25.
D. The design strength for bolted connections due to block shear failure requires only net areas.
Which of the above-mentioned statements is/are correct ?
(a) B and D only (b) A and B only
(c) B and C only (d) A and C only

110. Ans: (*)

111. A water tank supported by a ring foundation having outer diameter of 8 m and thickness of 1 m carries a uniform load intensity of 200 kN/m^2. The vertical stress (in kN/m^2) caused by the water tank at a depth of 4 m below the center of foundation is
(a) 31.7 kN/m^2 (b) 10 kN/m^2
(c) 51.4 kN/m^2 (d) 15.8 kN/m^2

111. Ans: (*)

112. Match the type of work in List 1 with the use requirements from fresh concrete in List 2 :

List - 1
A. Road
B. Mass concrete
C. Heavy reinforced RCC section
D. RCC congested reinforcement

List - 2
i. high workability and semi fluid consistency
ii. very low workability and very dry consistency
iii. low workability and dry consistency

iv. medium workability and plastic consistency

(a) A-ii, B-iii, C-iv, D-i
(b) A-iii, B-iv, C-i, D-ii
(c) A-ii, B-iv, C-i, D-iii
(d) A-iii, B-ii, C-i, D-iv

112. Ans: (a)

113. The saturated unit weight of sand in the bed of a pond 20 m deep is 20 kN/m^3. Unit weight of water is 10 kN/m^3. The effective stress at 4 m below bed level of pond is

(a) 40 kN/m^2 (b) 60 kN/m^2
(c) 80 kN/m^2 (d) 20 kN/m^2

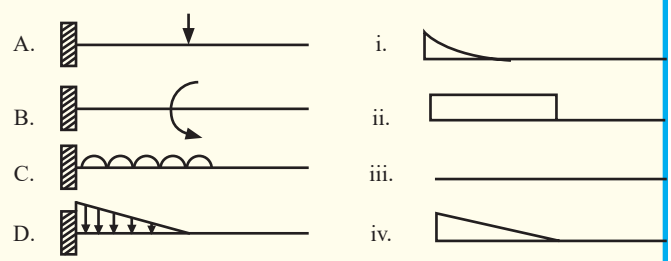
113. Ans: (a)

114. Admixtures used to produce high strength concrete and reduce the water-cement ratio of concrete are called

(a) Retarders
(b) Accelerators
(c) Superplasticizers
(d) Air entraining admixtures

114. Ans: (c)

115. Match the shear force diagrams for the beams with different loadings.



(a) A-ii, B-iii, C-i, D-iv
(b) A-ii, B-iii, C-iv, D-i
(c) A- i, B-iii, C-iv, D-ii
(d) A-i, B- ii, C-iv, D-iii

115. Ans: (b)

116. The inner dimensions of a room are 6 m × 5 m with 35 cm wall thickness. The total central line length of the room will be

(a) 23.4 m (b) 36.0 m
(c) 25.0 m (d) 21.2 m

116. Ans: (a)

117. The observed bearings of a traverse are given below

Line	Bearing	Line	Bearing
PQ	40° 15'	QP	225° 15'
QR	107° 15'	RQ	286° 15'
RS	202° 30'	SR	21° 30'
ST	320° 45'	TS	141° 45'

The stations(s) most likely to be affected by the local attraction is/are

(a) Only S (b) R and S
(c) Q and R (d) Only R

117. Ans: (*)

118. Cavitation in fluid flow occurs when
(a) the total energy suddenly decreases
(b) the pressure of flow decreases to a value close to its vapour pressure
(c) the velocity head reduces to zero
(d) the total energy suddenly increases

118. Ans: (b)

119. A dry sand specimen failed in a traxial test when the major and minor principal stresses were respectively 900 kN/m^2 and 250 kN/m^2. If same specimen is tested in direct shear test under a normal stress of 100 kN/m^2 shear stress will be equal to
(a) 650 kN/m^2
(b) 550 kN/m^2
(c) 575 kN/m^2
(d) 68.5 kN/m^2

119. Ans: (d)

120. Which of the following pairs is/are incorrect ?
A. Castigliano's theorem - Deflection
B. Flexibility method - Consistent displacement method
C. Stiffness method- Degree of static indeterminacy
D. Betti's law- Reciprocal deflection

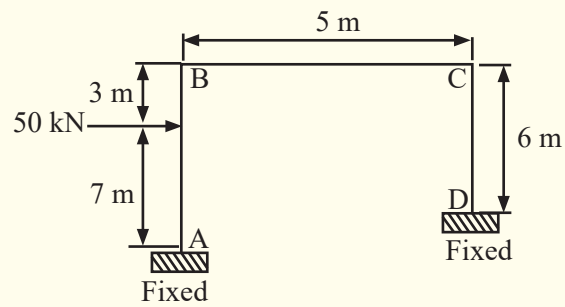
(a) C and D only
(b) D and B only
(c) A and B only
(d) C only

120. Ans: (d)

121. The 3-hr UH of a basin can be approximated as a triangle with a base period of 20 hour and peak coordinate of 300 m^3/s. The area of the basin is
(a) 1080 km^2
(b) 300 km^2
(c) 6000 km^2
(d) 540 km^2

121. Ans: (a)

122. What is the kinematic indeterminacy of the frame shown in the figure ?



(a) 3 (b) 1 (c) 4 (d) 2

122. Ans: (a)

123. A 24 hr rainfall of 50 cm magnitude at a station located in hilly terrains has a return period of 50 years. The probability of having 3 succeeding years in which rainfall is greater than or equal to 50 cm is
(a) 4×10^{-6}
(b) 6×10^{-6}
(c) 8×10^{-6}
(d) 8×10^{-4}

123. Ans: (c)

124. The initial depth of hydraulic jump in a rectangular channel is 0.2 m and the sequent depth ratio is 10. The length of the jump is about

(a) 6 m (b) 12 m

(c) 20 m (d) 4 m

124. Ans: (b)

125. A 1.25 m layer of soil having the porosity 0.35 and specific gravity 2.65 is subjected to an upward seepage head of 1.85 m. What depth of coarse sand would be required above the existing soil to provide a factor of safety of 2 against piping ? Assume that coarse sand has the same porosity and specific gravity as the soil and there is negligible head loss in sand.

(a) 2.7 (b) 2.2

(c) 4.4 (d) 1.25

125. Ans: (b)

126. The average spacing between vehicles in a traffic stream is 20 m, then the density (in veh/km) of the stream is

(a) 20 (b) 50

(c) 80 (d) 120

126. Ans: (b)

127. A steady, incompressible flow is given by $u = 2x^2 + y^2$ and $v = -4xy$. What is the convective acceleration along x-direction at point (1, 2) ?

(a) + 8 units (b) – 24 units

(c) – 8 units (d) + 24 units

127. Ans: (c)

128. The survey carried out to delineate natural features such as hills, rivers, forests and man made features, such as towns, villages, buildings, roads, transmission lines and canals is classified as

(a) Engineering survey (b) Geological survey

(c) Topographic survey (d) Land survey

128. Ans: (c)

129. Which of the following statements is/are correct for Maxwell's law of deflection ?

A. The work done by a set of external forces F_m acting through displacements δ_{mn} produced by another set of forces F_n is equal to the work done by the set of forces F_n acting through displacements δ_{nm} produced by forces F_m. m and n are different set of points of a structure.

B. The deflection at any point δ_{nm} due to the force F_m is equal to the deflection at the other point δ_{mn} due to the force F_n. m and n are two different points of a structure.

C. The slope at any point θ_{nm} due to the force F_m is equal to the slope at the other point θ_{mn} due to the force F_n. m and n are two different points of a structure.

D. The moment at any point M_{nm} due to the force F_m is equal to the moment at the other point M_{mn} due to the force F_n . m and n are two different points of a structure.

(a) B only (b) A and B only

(c) C only (d) A and D only

129. Ans: (d)

130. The silt factor f as used by Lacey's in his regime theory was adjusted to be equal to 1 for silt in an alluvium region. What is the median size of the alluvium soil?
(a) 0.32 mm (b) 3.2 mm
(c) 2.8 mm (d) 0.28 mm

130. Ans: (a)

131. Cube rate estimate is_____ as compared to the plinth area estimate.
(a) less accurate (b) more accurate
(c) similar (d) equally accurate

131. Ans: (b)

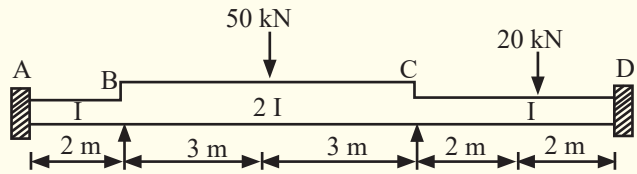
132. Calculate the area in square meters enclosed between the survey line, the irregular boundary line, and the first and last offsets by Simpson's rule. The perpendicular offsets were taken at 20 m intervals from a survey line to an irregular boundary line: 2.35, 6.50, 5.40, 6.65, 7.85, 6.2, 2.35, 6.5, 5.65
(a) 850 (b) 900
(c) 950 (d) 800

132. Ans: (c)

133. The depth of scour according to Lacey's formula in a river represents the depth below the
(a) bed level of the river
(b) 1.2 m above the flood level
(c) maximum depth of scour in the channel
(d) maximum flood level in the river

133. Ans: (c)

134. What is the distribution factor for the CB element at point C in the beam given below ?



(a) 0.57 (b) 0.40
(c) 0.62 (d) 0.50

134. Ans: (a)

135. A level instrument at a height of 1.350 m has been placed at a station having a Reduced Level (RL) of 102.365 m. The instrument reads -3.735 m on a levelling staff held at the bottom of a bridge deck. The RL (in m) of the bottom of the bridge deck is
(a) 99.98 (b) 107.45
(c) 116.72 (d) 104.75

135. Ans: (b)

136. If the Froude number of hydraulic jump is 5.5 it can be classified as
(a) a weak jump (b) a strong jump
(c) a steady jump (d) an oscillating jump

136. Ans: (c)

137. Isogonic line is line of
(a) Zero declination (b) Same declination
(c) Negative declination (d) Positive declination

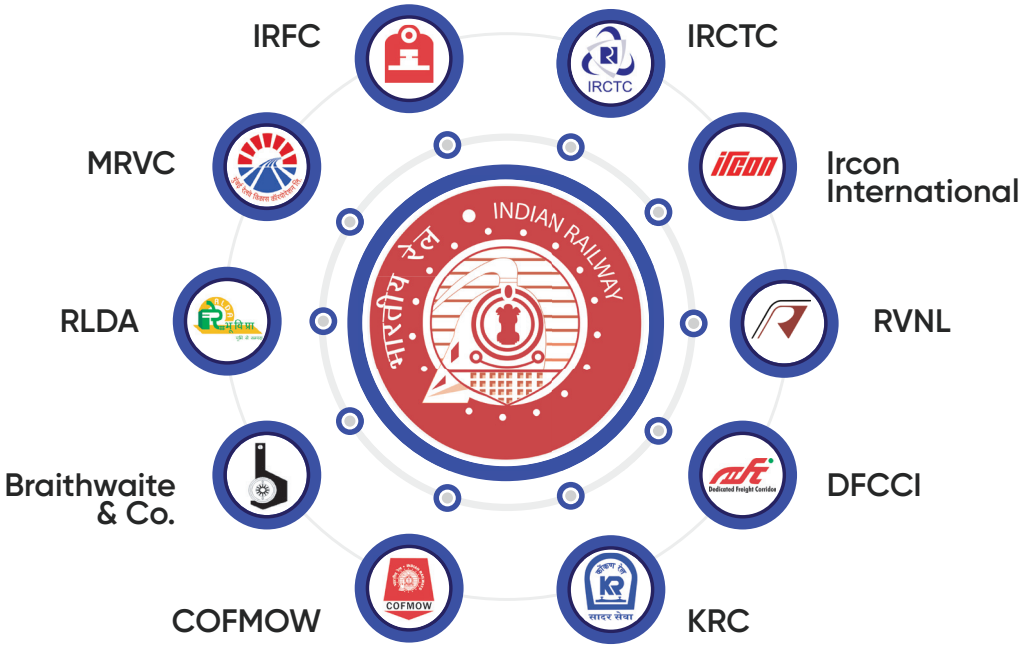
137. Ans: (b)

138. Consider the following statements :
A. The pH value of water for making concrete should be more than 8.5 to produce corrosion-resistant concrete.

Railway Recruitment Board JE

About

Railway Recruitment Board is a government organization in India that was set up in 1998 by the Ministry of Railways. Every year RRB organizes the recruitment for 21 boards situated in Different parts of India to work in Indian railways. It is primarily responsible for recruiting group 'C' staff across the nation.



CUT-OFF MARKS

RRB JE CBT - 1

Category	Ahmedabad	Allahbad	Mumbai
Gen	53.25	74.67	65.4
SC	35.06	59.89	52.55
ST	41.59	51.48	44.025
OBC	39.86	62.61	54.01
-	-	-	-

RRB JE CBT - 2

Category	Min. Qualifying Perc	Min. Qualifying Marks (Out of 150)
Gen	40%	60
EWS	40%	60
SC	30%	45
ST	25%	37.5
OBC	30%	45

B. The presence of sugar causes retardation in the setting of concrete.
C. Entertained air voids reduce resistance against freeze-thaw deterioration.
D. Chlorides should be less than 0.6 kg/m^3 in the water used for construction of reinforced concrete.

Which of the above statements is/are correct ?

(a) A and C (b) B and D
(c) B and C (d) A and B

138. Ans: (b)

139. What will be depth of d/s cutoff wall if maximum static head, length of floor and safe exit gradient is 2.4 m, 21.45 m and 1/5 respectively ?

(a) 0.9 m (b) 1.28 m
(c) 0.64 m (d) 2.56 m

139. Ans: (b)

140. A road is being designed for a speed of 100 km/hr on a horizontal curve with a super elevation of 7%. If the coefficient of side friction is 0.15, the minimum radius of the curve (in m) required for safe vehicular movement is

(a) 202.1 (b) 178.9
(c) 357.9 (d) 144.8

140. Ans: (c)

141. Consider the following statements from IS 456 : 2000 code

A. The standard deviation for M 15 concrete is 4.0 N/mm^2 in case of concrete mix.
B. A minimum 2 samples should be tested for 15 m^3 of concrete.
C. Basic value of span to effective depth ratio for a cantilever beam up to 10 m is 7.
D. Design bond stress for M35 concrete in limit state method for plain bars in tension is 1.5 N/mm^2.

Which of the above mentioned statements is/are incorrect ?

(a) B and C only (b) A and D only
(c) B and D only (d) A and B only

141. Ans: (b)

142. A hydraulic jump occurs when there is a break in grade from a

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

142. Ans: (a)

143. Calculate the coefficient of permeability in m/sec, if the coefficient of consolidation and volume changes are 4.8 mm^2/min and 1.02×10^{-3} m^2/kN.

(a) 8.0×10^{-9} (b) 8.0×10^{-10}
(c) 4.8×10^{-10} (d) 4.8×10^{-8}

143. Ans: (b)

144. If the formation level of a highway has a uniform gradient for a particular length and the ground is also having a longitudinal slope, the earthwork cannot be calculated by

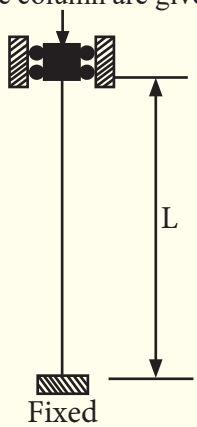
(a) Trapezoidal formula
(b) Prismoidal formula
(c) Central line method
(d) Mid-section formula

144. Ans: (c)

145. A surveyor was reading a level staff as 4.935 m. Later he found that the staff was 20 cm off the vertical through the bottom. Find the error of reading.
(a) 5.135 (b) 4.939
(c) 4.931 (d) 4.735

145. Ans: (c)

146. What is the critical buckling load for the column shown in the figure ? The modulus of elasticity and the moment of inertia of the column are given by E and I, respectively.



(a) $\frac{\pi^2 EI}{4L^2}$
(b) $\frac{2.046\pi^2 EI}{L^2}$
(c) $\frac{4\pi^2 EI}{L^2}$
(d) $\frac{\pi^2 EI}{L^2}$

146. Ans: (c)

147. The momentum correction factor is used to correct for
(a) change in mass rate of flow
(b) change in total energy
(c) non-uniform distribution of velocities at inlet and outlet sections
(d) change in pressure

147. Ans: (c)

148. In steady flow through a pipe the density, velocity and area of a section are 3 kg/m^3, 8m/s and 0.5m^2 respectively. The velocity at another section having area of 1 m^2 and density of 4 kg/m^3 will be
(a) 3 m/s (b) 4 m/s
(c) 1 m/s (d) 2 m/s

148. Ans: (a)

149. A syphon aqueduct is provided when
(a) the canal bed level lies between the bed level and HFL of the drain
(b) the drain bed level is well below FSL of the canal
(c) the canal bed level is above the flood level of the drain
(d) the canal bed level is well below the flood level of the drain

149. Ans: (a)

150. For any material, the modulus of elasticity at a point can be given by E_x, E_y, E_z. Which of the following properties is true for a homogeneous material ?

(a) $E_x \neq E_y \neq E_z$ at a point and the same property exists at all the points throughout the material

(b) $E_x \neq E_y \neq E_z$ at a point and $E_x = E_y = E_z$ at the other points throughout the material

(c) $E_x = E_y \neq E_z$ at a point and $E_x = E_y = E_z$ at the other points throughout the material

(d) $E_x = E_y = E_z$ at a point and $E_x \neq E_y \neq E_z$ at the other points throughout the material

150. Ans: (a)

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