GATE Civil Engineering

Sample Paper – 6

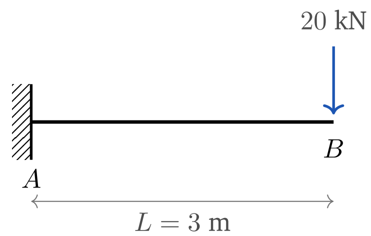
Duration: 128 Minutes **Maximum Marks: 72**

Instructions

- This paper contains **46 questions** covering the core **Civil Engineering** subject of the GATE paper conducted by the IITs and IISc (General Aptitude and Engineering Mathematics are provided as separate papers).
- **Q1–Q20 carry 1 mark each** and **Q21–Q46 carry 2 marks each**, for a total of **72 marks**.
- Each question carries **negative marking of one-third of its allotted marks**: a wrong 1-mark question costs **0.33** and a wrong 2-mark question costs **0.67**. Unattempted questions carry no penalty.
- Every question here is a single-correct **MCQ**. The real GATE paper also has Multiple Select (MSQ) and Numerical Answer Type (NAT) questions, and **those carry no negative marking**.
- Attempt this paper in one timed sitting of about **128 minutes**, the share this core subject earns at GATE's overall pace of 180 minutes for 65 questions. Take $g = 9.81$ m/s^2 and unit weight of water $\gamma_w = 9.81$ kN/m^3 unless stated otherwise.

Structural Engineering

Q1. A cantilever beam of length 3 m is fixed at A and carries a single concentrated load of 20 kN at its free end B, as shown. The magnitude of the maximum bending moment in the beam is: **[1 mark]**



(A) 20 kN·m

(B) 30 kN·m

(C) 6.67 kN·m

(D) 60 kN·m

Q2. A steel rod of length 2 m and cross-sectional area 500 mm^2 carries an axial tensile load of 50 kN. Taking the modulus of elasticity as $E = 200$ GPa, the elongation of the rod is: **[1 mark]**

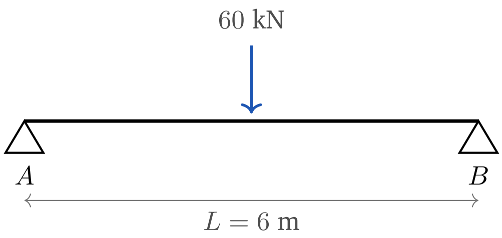
(A) 0.5 mm

(B) 2.0 mm

(C) 0.25 mm

(D) 1.0 mm

Q3. A simply supported beam AB of span 6 m carries a single central concentrated load of 60 kN at midspan, as shown. The maximum shear force in the beam is: **[1 mark]**



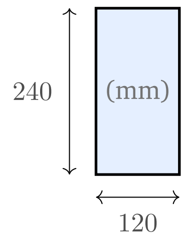
(A) 60 kN

(B) 15 kN

(C) 30 kN

(D) 45 kN

Q4. A beam has the solid rectangular cross-section shown below, of width 120 mm and depth 240 mm. The section modulus of this section about its horizontal (bending) axis is: **[1 mark]**



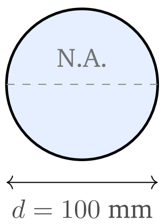
(A) 2.304×10^6 mm^3

(B) 1.152×10^6 mm^3

(C) 0.576×10^6 mm^3

(D) 6.912×10^6 mm^3

Q5. A beam of solid circular cross-section of diameter 100 mm carries a transverse shear force of 30 kN at a section, as shown. The maximum shear stress at that section is nearest to: **[1 mark]**



(A) 3.82 MPa

(B) 7.64 MPa

(C) 5.09 MPa

(D) 2.55 MPa

Q6. A solid circular shaft of diameter 80 mm is made of a material whose permissible torsional shear stress is 60 MPa. The maximum torque that the shaft can safely transmit is nearest to: **[1 mark]**

(A) 6.03 kN·m

(B) 3.02 kN·m

(C) 12.06 kN·m

(D) 1.51 kN·m

Q7. A cantilever beam of length L and flexural rigidity EI carries a single concentrated load W at its free end. The maximum vertical deflection of the beam is: **[1 mark]**

(A) $\dfrac{WL^3}{48EI}$

(B) $\dfrac{WL^3}{3EI}$

(C) $\dfrac{wL^4}{8EI}$

(D) $\dfrac{5wL^4}{384EI}$

Q8. A straight column is fixed (restrained against rotation and translation) at one end and completely free at the other end. For use in the Euler buckling formula, the effective length of this column is: **[1 mark]**

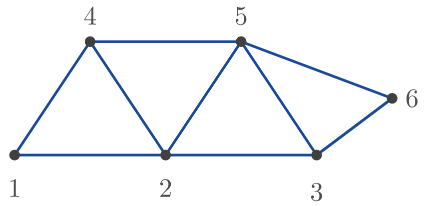
(A) $0.5\,L$

(B) $1.0\,L$

(C) $2.0\,L$

(D) $0.707\,L$

Q9. The plane truss shown below has 6 joints and 11 members, and is supported by 3 external reaction components. The degree of static indeterminacy of the truss, using $D_s = m + r - 2j$, is: **[1 mark]**



(A) 0

(B) 2

(C) 1

(D) 3

Q10. For a simply supported beam of span L, the influence line for the bending moment at the midspan section is a triangle. The maximum ordinate of this influence line (which occurs when the unit load stands at midspan) is: **[1 mark]**

(A) $L/2$

(B) $L/4$

(C) L

(D) $L/8$

Q11. In the moment-distribution method, a prismatic beam member is rigidly connected at a joint and has its far end fixed. When a moment is applied and distributed at the near joint, the carry-over factor to the fixed far end is: **[1 mark]**

(A) 0.5

(B) 1.0

(C) 0.25

(D) 0.75

Q12. In the limit state design of reinforced concrete to IS 456:2000, the design (ultimate) compressive strength of concrete used in the rectangular stress block is taken as a fraction of the characteristic strength f_{ck}. That fraction, obtained as $0.67/1.5$, is: **[1 mark]**

(A) 0.87

(B) 0.67

(C) 0.36

(D) 0.446

Q13. As per IS 800:2007, the characteristic yield stress f_y of structural steel of grade **Fe410** (E250) is: **[1 mark]**

(A) 250 MPa

(B) 410 MPa

(C) 350 MPa

(D) 165 MPa

Q14. In a PERT network, an activity has an optimistic time $t_o = 4$ days and a pessimistic time $t_p = 16$ days. The standard deviation of the activity duration, taken as $(t_p - t_o)/6$, is: **[1 mark]**

(A) 12 days

(B) 6 days

(C) 10 days

(D) 2 days

Geotechnical Engineering

Q15. A soil has a porosity of 37.5%. The corresponding void ratio of the soil is: **[1 mark]**

(A) 0.375

(B) 0.40

(C) 0.267

(D) 0.60

Q16. A fine-grained soil has a liquid limit of 50%, a plastic limit of 30% and a natural water content of 30%. Its consistency index $I_c = (\text{LL} - w)/I_p$ is: **[1 mark]**

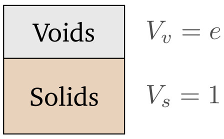
(A) 0.5

(B) 1.5

(C) 1.0

(D) 0.6

Q17. A soil has a void ratio of 0.68 and a specific gravity of solids of 2.67. Using the phase diagram shown (solids of volume 1, voids of volume e), the dry unit weight of the soil is nearest to: **[1 mark]**



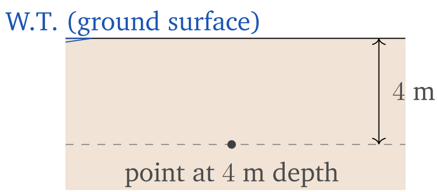
(A) 26.19 kN/m^3

(B) 15.59 kN/m^3

(C) 9.81 kN/m^3

(D) 18.50 kN/m^3

Q18. A saturated homogeneous soil deposit has its water table at the ground surface, as shown. The pore water pressure acting at a depth of 4 m below the surface is: **[1 mark]**



(A) 39.24 kN/m^2

(B) 78.48 kN/m^2

(C) 19.62 kN/m^2

(D) 76.0 kN/m^2

Q19. Water flows through a soil sample of cross-sectional area 100 cm^2 under a hydraulic gradient of 0.5. The coefficient of permeability of the soil is 0.02 cm/s. Using Darcy's law, the rate of discharge through the sample is: **[1 mark]**

(A) 2.0 cm^3/s

(B) 0.5 cm^3/s

(C) 1.0 cm^3/s

(D) 0.1 cm^3/s

Q20. A sand deposit has a maximum void ratio of 0.90, a minimum void ratio of 0.40 and an in-situ void ratio of 0.65. The relative density (density index) of the sand is: **[1 mark]**

(A) 25%

(B) 75%

(C) 50%

(D) 65%

Geotechnical Engineering (continued)

Q21. A dry cohesionless soil has an effective angle of internal friction $\phi = 30°$. Using Rankine's theory, the coefficient of active earth pressure $K_a = (1 - \sin\phi)/(1 + \sin\phi)$ for this soil is: **[2 marks]**

(A) 3.0

(B) 0.5

(C) 1.0

(D) 0.333

Q22. A clay layer of thickness 5 m is subjected to a uniform increase in vertical effective stress of 100 kPa. The coefficient of volume compressibility of the clay is $m_v = 0.0002\ \text{m}^2/\text{kN}$. The ultimate one-dimensional consolidation settlement of the layer is: **[2 marks]**

(A) 100 mm

(B) 50 mm

(C) 200 mm

(D) 10 mm

Q23. The ultimate bearing capacity of a shallow footing on a soil is found to be 270 kPa. Adopting a factor of safety of 3.0 against shear failure, the safe (gross) bearing capacity of the footing is: **[2 marks]**

(A) 270 kPa

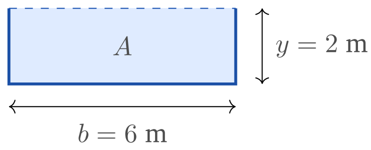
(B) 90 kPa

(C) 135 kPa

(D) 810 kPa

Water Resources Engineering

Q24. A rectangular channel of bottom width 6 m carries water at a depth of 2 m, as shown. The hydraulic radius (hydraulic mean depth) of the flow section is: **[2 marks]**



(A) 0.6 m

(B) 2.0 m

(C) 3.0 m

(D) 1.2 m

Q25. A vertical rectangular gate 3 m deep has its top edge coinciding with the free water surface on one side. The depth of the centre of pressure below the free surface, for such a gate, is: **[2 marks]**

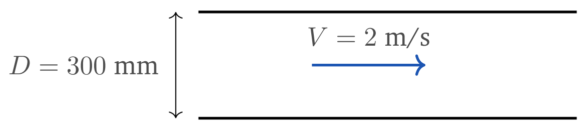
(A) 2.0 m

(B) 1.5 m

(C) 3.0 m

(D) 1.0 m

Q26. Water flows steadily through the pipe shown, of diameter 300 mm, at a mean velocity of 2 m/s. The volumetric rate of discharge through the pipe is nearest to: **[2 marks]**



(A) 0.283 m^3/s

(B) 0.0707 m^3/s

(C) 0.1414 m^3/s

(D) $0.566\ \text{m}^3/\text{s}$

Q27. Water at a kinematic viscosity of $1.0 \times 10^{-6}\ \text{m}^2/\text{s}$ flows through a pipe of diameter 50 mm at a mean velocity of 2 m/s. The Reynolds number of the flow is: **[2 marks]**

(A) 1.0×10^5

(B) 2.0×10^5

(C) 5.0×10^4

(D) 1.0×10^4

Q28. In a wide rectangular channel, water flows at a depth of 1 m with a mean velocity of 3 m/s. Taking $g = 9.81\ \text{m/s}^2$, the Froude number of the flow is nearest to: **[2 marks]**

(A) 0.305

(B) 3.0

(C) 1.5

(D) 0.958

Q29. A horizontal jet of water of diameter 50 mm moving at 20 m/s strikes a large flat plate that is itself moving at 5 m/s in the same direction as the jet. Taking $\rho_w = 1000\ \text{kg/m}^3$, the force exerted by the jet on the moving plate is nearest to: **[2 marks]**

(A) 392.7 N

(B) 441.8 N

(C) 1000 N

(D) 220.9 N

Q30. A storm of total rainfall 60 mm falls over a catchment of area 100 hectares. The runoff coefficient is 0.50. The total volume of direct runoff produced (runoff depth $\times$ area) is: **[2 marks]**

(A) $30{,}000\ \text{m}^3$

(B) 60,000 m^3

(C) 15,000 m^3

(D) 6,000 m^3

Q31. Over a catchment, a storm produces a total rainfall of 6 cm in 3 hours and the resulting direct runoff (effective rainfall) is 3 cm. Assuming a uniform loss rate, the ϕ-index of the storm is: **[2 marks]**

(A) 3.0 cm/hr

(B) 2.0 cm/hr

(C) 0.5 cm/hr

(D) 1.0 cm/hr

Q32. The duty of irrigation water for a crop at the field is 1500 hectares per cumec. The discharge required to irrigate a command area of 1500 hectares of this crop is: **[2 marks]**

(A) 1500 cumec

(B) 0.5 cumec

(C) 1.0 cumec

(D) 2.0 cumec

Q33. In an irrigation supply, 100 hectare-cm of water is delivered to a field, of which 80 hectare-cm is stored in the root zone of the crop. The (water) application efficiency of the irrigation is: **[2 marks]**

(A) 100%

(B) 80%

(C) 125%

(D) 20%

Q34. A flood magnitude has a return period of 10 years. The probability that a flood of this magnitude (or greater) occurs at least once during a period of 2 consecutive years (the hydrologic risk) is nearest to: **[2 marks]**

(A) 0.10

(B) 0.20

(C) 0.81

(D) 0.19

Environmental Engineering

Q35. A wastewater sample has a measured 5-day BOD of 220 mg/L. The deoxygenation rate constant is $k_D = 0.10$ day^{-1} (to base 10). Using BOD$_t$ $= L_0(1 - 10^{-k_D t})$, the ultimate (first-stage) BOD L_0 of the sample is nearest to: **[2 marks]**

(A) 321.7 mg/L

(B) 220 mg/L

(C) 150 mg/L

(D) 440 mg/L

Q36. A sedimentation tank has a liquid volume of 2000 m^3 and treats a flow of 4000 m^3/day. The theoretical detention (retention) time of the tank is: **[2 marks]**

(A) 6 hours

(B) 12 hours

(C) 24 hours

(D) 2 hours

Q37. A town of population $40{,}000$ has an average water supply of 150 litres per capita per day. Taking 80% of the water supplied to appear as sewage, the average daily sewage flow from the town is: **[2 marks]**

(A) 6000 m^3/day

(B) 4800 m^3/day

(C) 480 m^3/day

(D) 48000 m^3/day

Q38. In the chlorination of water, the chlorine dose applied is 3.0 mg/L and the chlorine demand of the water is 1.2 mg/L. The free residual chlorine remaining after the demand is satisfied is: **[2 marks]**

(A) 1.8 mg/L

(B) 4.2 mg/L

(C) 3.0 mg/L

(D) 1.2 mg/L

Q39. Municipal solid waste is loosely stored at a density of 100 kg/m^3 and, after compaction in a landfill, reaches a density of 400 kg/m^3. For a given mass of waste, the volume reduction ratio (loose volume to compacted volume) achieved is: **[2 marks]**

(A) 0.25

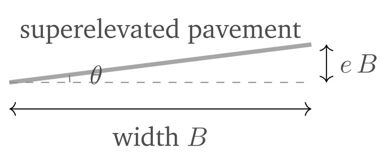
(B) 2

(C) 4

(D) 8

Transportation & Geomatics Engineering

Q40. A horizontal highway curve of radius 280 m is to be designed for a speed of 50 km/h. If the entire centrifugal effect is to be balanced by superelevation alone (side friction neglected), the superelevation required, using $e = V^2/(127R)$, is nearest to: **[2 marks]**



(A) 0.07

(B) 0.14

(C) 0.05

(D) 0.10

Q41. A vehicle travels at a design speed of 54 km/h on a level road. The longitudinal friction coefficient between tyre and pavement is 0.35 and $g = 9.81$ m/s^2. Considering the braking action only (that is, neglecting the reaction-time lag), the braking distance required to stop the vehicle is nearest to: **[2 marks]**

(A) 15 m

(B) 45 m

(C) 32.77 m

(D) 70 m

Q42. A traffic stream follows Greenshields' linear speed–density model with a jam density of 120 veh/km. The density of vehicles at which the traffic flow (volume) becomes maximum is: **[2 marks]**

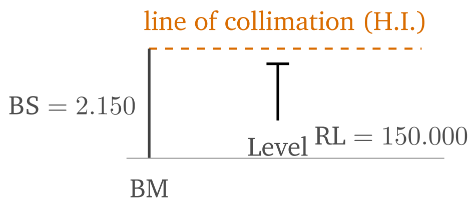
(A) 120 veh/km

(B) 30 veh/km

(C) 60 veh/km

(D) 90 veh/km

Q43. In differential levelling, a level is set up and a back sight of 2.150 m is taken on a benchmark whose reduced level is 150.000 m, as shown. The height of the instrument (height of the line of collimation) is: **[2 marks]**



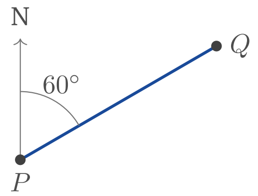
(A) 147.850 m

(B) 152.150 m

(C) 150.000 m

(D) 154.300 m

Q44. In a compass survey, the fore bearing of a survey line PQ is measured as 60°, as shown. The back bearing of the same line QP is: **[2 marks]**



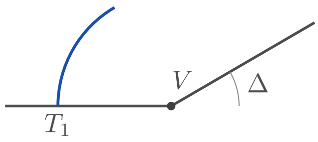
(A) 240°

(B) 120°

(C) 300°

(D) 60°

Q45. A simple circular curve of radius 200 m has a deflection (intersection) angle of 60°, as shown. The tangent length of the curve, $T = R\tan(\Delta/2)$, is nearest to: **[2 marks]**



(A) 200 m

(B) 115.47 m

(C) 230.9 m

(D) 100 m

Q46. In earthwork computation, the cross-sectional areas of cut at two successive stations, 10 m apart along a road, are 20 m^2 and 30 m^2. Using the average-end-area (trapezoidal) method, the volume of earthwork between the two stations is: **[2 marks]**

(A) 500 m^3

(B) 50 m^3

(C) 300 m^3

(D) 250 m^3

Detailed Solutions

Q1.

Solution

Concept – bending moment in a cantilever under an end load: For a cantilever, the maximum bending moment occurs at the fixed support and equals the load times its distance from that support.

Step 1 – list the data: Length $L = 3$ m, end load $W = 20$ kN.

Step 2 – the load acts at the free end, at distance L from the fixed end: Lever arm $= L = 3$ m.

Step 3 – compute the maximum moment at the fixed end: $M_{\max} = W \times L$

$M_{\max} = 20 \times 3$

$M_{\max} = 60$ kN·m

Step 4 – note the sense: The moment is hogging (tension on the top fibre), and is zero at the free end and greatest at the support.

Final Answer: $M_{\max} = 60$ kN·m $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q1

Q2.

Solution

Concept – axial elongation of a bar: $\delta = \dfrac{PL}{AE}$, where P is the axial load, L the length, A the area and E the modulus.

Step 1 – convert all quantities to consistent units (N, mm): $P = 50$ kN $= 50000$ N

$L = 2$ m $= 2000$ mm

$A = 500$ mm^2

$E = 200$ GPa $= 200000$ N/mm^2

Step 2 – substitute into the formula: $\delta = \dfrac{50000 \times 2000}{500 \times 200000}$

Step 3 – evaluate the numerator: $50000 \times 2000 = 1.0 \times 10^8$

Step 4 – evaluate the denominator: $500 \times 200000 = 1.0 \times 10^8$

Step 5 – divide: $\delta = \dfrac{1.0 \times 10^8}{1.0 \times 10^8}$

$\delta = 1.0$ mm

Final Answer: $\delta = 1.0$ mm $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q2

Q3.

Solution

Concept – shear force in a simply supported beam under a central point load: By symmetry each reaction carries half the load, and the shear force just beside a support equals the reaction.

Step 1 – list the data: Span $L = 6$ m, central load $W = 60$ kN.

Step 2 – find the reactions by symmetry: $R_A = R_B = \dfrac{W}{2} = \dfrac{60}{2}$

$R_A = R_B = 30$ kN

Step 3 – identify the maximum shear force: The shear force is constant at $+30$ kN from A to the load and -30 kN from the load to B; its greatest magnitude is 30 kN.

$V_{\max} = 30$ kN

Final Answer: $V_{\max} = 30$ kN $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q3

Q4.

Solution

Concept – section modulus of a rectangle: $Z = \dfrac{b\,d^2}{6}$, where b is the width and d the depth measured parallel to the load.

Step 1 – list the dimensions: $b = 120$ mm, $d = 240$ mm.

Step 2 – evaluate d^2: $240^2 = 57600$ mm^2

Step 3 – form the numerator $b\,d^2$: $120 \times 57600 = 6{,}912{,}000$ mm^3

Step 4 – divide by 6: $Z = \dfrac{6{,}912{,}000}{6}$

$Z = 1{,}152{,}000$ mm^3

$Z = 1.152 \times 10^6$ mm^3

Final Answer: $Z = 1.152 \times 10^6$ mm$^3 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept – maximum shear stress in a solid circular section: For a circular cross-section the shear stress peaks at the neutral axis, where $\tau_{\max} = \frac{4}{3}\tau_{\text{avg}}$.

Step 1 – compute the cross-sectional area: $A = \frac{\pi}{4}d^2 = \frac{\pi}{4}(100)^2$

$A = \frac{\pi}{4} \times 10000$

$A = 7853.98 \text{ mm}^2$

Step 2 – compute the average shear stress: $\tau_{\text{avg}} = \frac{V}{A} = \frac{30000}{7853.98}$

$\tau_{\text{avg}} = 3.82 \text{ MPa}$

Step 3 – apply the circular-section factor: $\tau_{\max} = \frac{4}{3} \times \tau_{\text{avg}} = \frac{4}{3} \times 3.82$

$\tau_{\max} = 5.09 \text{ MPa}$

Final Answer: $\tau_{\max} \approx 5.09 \text{ MPa} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q5

Q6.

Solution

Concept – torque capacity from the permissible shear stress: $T = \tau \times Z_p$, where the polar section modulus of a solid circular shaft is $Z_p = \frac{\pi D^3}{16}$.

Step 1 – list the data: $D = 80$ mm, $\tau = 60$ N/mm^2.

Step 2 – evaluate D^3: $80^3 = 512000 \text{ mm}^3$

Step 3 – compute the polar section modulus: $Z_p = \frac{\pi \times 512000}{16}$

$Z_p = \pi \times 32000$

$Z_p = 100530.96 \text{ mm}^3$

Step 4 – compute the torque: $T = 60 \times 100530.96$

$T = 6{,}031{,}857 \text{ N} \cdot \text{mm}$

Step 5 – convert to kN·m: $T = 6.03 \text{ kN} \cdot \text{m}$

Final Answer: $T \approx 6.03$ kN·m $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q6

Q7.

Solution

Concept – standard deflection of a cantilever with an end load: For a cantilever of length L carrying a concentrated load W at the free end, the maximum deflection is at the free end.

Step 1 – recall the standard formula: $\delta_{\max} = \dfrac{WL^3}{3EI}$

Step 2 – confirm the dependence: The deflection grows with the cube of the length and falls with the flexural rigidity EI, which matches option B.

Why the other options are wrong:

- A, $WL^3/48EI$: is the midspan deflection of a **simply supported** beam under a central point load.
- C, $wL^4/8EI$: is the free-end deflection of a cantilever under a **uniformly distributed** load w.
- D, $5wL^4/384EI$: is the midspan deflection of a simply supported beam under a **uniformly distributed** load.

Final Answer: $\delta_{\max} = \dfrac{WL^3}{3EI} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q7

Q8.

Solution

Concept – effective length depends on the end restraints: $L_e = k\,L$, where k is set by how the two ends are held.

Step 1 – identify the end conditions: One end is **fixed** and the other end is **free** (a flagpole-type column).

Step 2 – recall the factor for fixed–free: $k = 2.0$

Step 3 – write the effective length: $L_e = 2.0\,L$

Why the other options are wrong:

- A, $0.5L$: applies to a column **fixed at both ends**.
- B, $1.0L$: applies to a column **hinged at both ends**.
- D, $0.707L$: applies to a column **fixed at one end and hinged at the other**.

Final Answer: $L_e = 2.0L \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q8

Q9.

Solution

Concept – static indeterminacy of a plane truss: $D_s = m + r - 2j$, where m is the number of members, r the number of reaction components and j the number of joints.

Step 1 – list the data: $m = 11$, $r = 3$, $j = 6$.

Step 2 – form $2j$: $2j = 2 \times 6 = 12$

Step 3 – substitute into the formula: $D_s = 11 + 3 - 12$

Step 4 – evaluate: $D_s = 14 - 12 = 2$

Step 5 – interpret: Since $D_s = 2 > 0$, the truss is statically indeterminate to the second degree.

Final Answer: $D_s = 2 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q9

Q10.

Solution

Concept – influence line for the midspan bending moment: For a simply supported beam of span L, the influence line for the bending moment at the midspan section is a triangle with its apex under the section.

Step 1 – recall the peak ordinate: For a bending-moment influence line at a section dividing the span into a and b, the peak ordinate is $\frac{ab}{L}$.

Step 2 – set the section at midspan: $a = b = \frac{L}{2}$

Step 3 – substitute: ordinate $= \frac{(L/2)(L/2)}{L}$

Step 4 – simplify: $= \frac{L^2/4}{L} = \frac{L}{4}$

Final Answer: maximum ordinate $= \frac{L}{4} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q10

Q11.

Solution

Concept – carry-over factor in moment distribution: When a moment is applied at the near end of a prismatic member whose far end is fixed, a fraction of the balancing moment is "carried over" to the fixed end.

Step 1 – recall the standard result: For a prismatic member with the far end fixed, the carry-over factor is $\frac{1}{2}$.

Step 2 – state it: $\text{COF} = 0.5$

Step 3 – reason: The carried-over moment equals half the distributed moment at the near end and has the same sign.

Why the other options are wrong:

- B, 1.0: would mean the whole moment is transferred, which is not true for a prismatic member.
- C, 0.25 and D, 0.75: do not correspond to the standard prismatic carry-over.

Final Answer: $\text{COF} = 0.5 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q11

Q12.

Solution

Concept – design compressive strength of concrete in limit state design: The peak stress in the rectangular stress block is $0.67f_{ck}$ divided by the partial safety factor for concrete $\gamma_c = 1.5$.

Step 1 – write the expression: design strength $= \dfrac{0.67f_{ck}}{1.5}$

Step 2 – evaluate the coefficient: $\dfrac{0.67}{1.5} = 0.4467$

Step 3 – round to three decimals: ≈ 0.446

Step 4 – state the result: The design compressive strength is $0.446f_{ck}$.

Why the other options are wrong:

- A, 0.87: is the factor on f_y for the design strength of reinforcing steel $(f_y/1.15)$.
- B, 0.67: is the value *before* dividing by γ_c.
- C, 0.36: is the coefficient in $M_u = 0.36f_{ck}bx_u(\ldots)$, not the peak stress fraction.

Final Answer: $0.446 f_{ck} \Rightarrow \boxed{\text{D}}$

Answer: (D) **Go Back to Q12**

Q13.

Solution

Concept – yield stress of structural steel grades: In IS 800:2007, the grade designation of hot-rolled steel (for example Fe410 / E250) fixes the characteristic yield stress.

Step 1 – read the grade: Fe410 corresponds to E250 steel.

Step 2 – state the yield stress: $f_y = 250$ MPa.

Why the other options are wrong:

- B, 410 MPa: is the *ultimate* tensile strength f_u of Fe410, not the yield stress.
- C, 350 MPa: is the yield stress of the higher grade E350, not Fe410.
- D, 165 MPa: is not a standard yield value for this grade.

Final Answer: $f_y = 250$ MPa $\Rightarrow \boxed{\text{A}}$

Answer: (A) **Go Back to Q13**

Q14.

Solution

Concept – standard deviation of a PERT activity: $\sigma = \dfrac{t_p - t_o}{6}$, the spread of the beta distribution over its range.

Step 1 – list the two extreme estimates: $t_o = 4$ days, $t_p = 16$ days.

Step 2 – form the range in the numerator: $t_p - t_o = 16 - 4 = 12$

Step 3 – divide by 6**:** $\sigma = \dfrac{12}{6}$

$\sigma = 2$ days

Final Answer: $\sigma = 2$ days $\Rightarrow \boxed{\text{D}}$

Answer: (D) **Go Back to Q14**

Q15.

Solution

Concept – void ratio from porosity: $e = \dfrac{n}{1-n}$, the inverse relation to $n = e/(1+e)$.

Step 1 – express the porosity as a fraction: $n = 37.5\% = 0.375$.

Step 2 – evaluate the denominator: $1 - n = 1 - 0.375 = 0.625$

Step 3 – divide: $e = \dfrac{0.375}{0.625}$

$e = 0.60$

Final Answer: $e = 0.60 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q15

Q16.

Solution

Concept – consistency index: $I_c = \dfrac{\text{LL} - w}{I_p}$, where $I_p = \text{LL} - \text{PL}$ is the plasticity index.

Step 1 – compute the plasticity index: $I_p = \text{LL} - \text{PL} = 50 - 30 = 20\%$

Step 2 – form the numerator: $\text{LL} - w = 50 - 30 = 20\%$

Step 3 – divide: $I_c = \dfrac{20}{20}$

$I_c = 1.0$

Step 4 – interpret: $I_c = 1.0$ means the natural water content equals the plastic limit, so the soil is at the plastic-limit boundary.

Final Answer: $I_c = 1.0 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q16

Q17.

Solution

Concept – dry unit weight from G and e: $\gamma_d = \dfrac{G\,\gamma_w}{1+e}$, taken directly from the phase diagram with solids of unit volume.

Step 1 – list the data: $G = 2.67$, $e = 0.68$, $\gamma_w = 9.81\ \text{kN/m}^3$.

Step 2 – evaluate the numerator: $G\,\gamma_w = 2.67 \times 9.81 = 26.19$

Step 3 – evaluate the denominator: $1 + e = 1 + 0.68 = 1.68$

Step 4 – divide: $\gamma_d = \dfrac{26.19}{1.68}$

$\gamma_d = 15.59\ \text{kN/m}^3$

Final Answer: $\gamma_d \approx 15.59\ \text{kN/m}^3 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q17

Q18.

Solution

Concept – pore water pressure under hydrostatic conditions: $u = \gamma_w \times h_w$, where h_w is the depth of the point below the water table.

Step 1 – identify the water head: The water table is at the surface, so at 4 m depth $h_w = 4$ m.

Step 2 – substitute: $u = 9.81 \times 4$

Step 3 – evaluate: $u = 39.24\ \text{kN/m}^2$

Step 4 – note: The pore pressure depends only on the depth of water above the point, not on the soil unit weight.

Final Answer: $u = 39.24\ \text{kN/m}^2 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q18

Q19.

Solution

Concept – Darcy's law for discharge: $q = k\,i\,A$, where k is the permeability, i the hydraulic gradient and A the gross cross-sectional area.

Step 1 – list the data: $k = 0.02$ cm/s, $i = 0.5$, $A = 100\ \text{cm}^2$.

Step 2 – substitute: $q = 0.02 \times 0.5 \times 100$

Step 3 – multiply the first two factors: $0.02 \times 0.5 = 0.01$

Step 4 – multiply by the area: $q = 0.01 \times 100$

$q = 1.0\ \text{cm}^3/\text{s}$

Final Answer: $q = 1.0\ \text{cm}^3/\text{s} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q19

Q20.

Solution

Concept – relative density (density index): $I_D = \dfrac{e_{\max} - e}{e_{\max} - e_{\min}}$, which locates the in-situ void ratio between its loosest and densest states.

Step 1 – list the data: $e_{\max} = 0.90$, $e_{\min} = 0.40$, $e = 0.65$.

Step 2 – evaluate the numerator: $e_{\max} - e = 0.90 - 0.65 = 0.25$

Step 3 – evaluate the denominator: $e_{\max} - e_{\min} = 0.90 - 0.40 = 0.50$

Step 4 – divide: $I_D = \dfrac{0.25}{0.50} = 0.50$

$I_D = 50\%$

Final Answer: $I_D = 50\% \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q20

Q21.

Solution

Concept – Rankine active earth pressure coefficient: $K_a = \dfrac{1 - \sin\phi}{1 + \sin\phi}$ for a horizontal cohesionless backfill.

Step 1 – evaluate $\sin\phi$: $\sin 30^\circ = 0.5$

Step 2 – form the numerator: $1 - \sin\phi = 1 - 0.5 = 0.5$

Step 3 – form the denominator: $1 + \sin\phi = 1 + 0.5 = 1.5$

Step 4 – divide: $K_a = \dfrac{0.5}{1.5}$

$K_a = 0.333$

Step 5 – cross-check: For $\phi = 30^\circ$, $K_a = \tan^2(45^\circ - \phi/2) = \tan^2 30^\circ = 0.333$, which agrees.

Final Answer: $K_a = 0.333 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q21

Q22.

Solution

Concept – one-dimensional consolidation settlement: $S_c = m_v\,\Delta\sigma\,H$, where m_v is the coefficient of volume compressibility, $\Delta\sigma$ the stress increment and H the layer thickness.

Step 1 – list the data: $m_v = 0.0002\ \text{m}^2/\text{kN}$, $\Delta\sigma = 100$ kPa, $H = 5$ m.

Step 2 – substitute: $S_c = 0.0002 \times 100 \times 5$

Step 3 – multiply the first two factors: $0.0002 \times 100 = 0.02$

Step 4 – multiply by the thickness: $S_c = 0.02 \times 5 = 0.10$ m

Step 5 – convert to millimetres: $S_c = 100$ mm

Final Answer: $S_c = 100\ \text{mm} \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q22

Q23.

Solution

Concept – safe bearing capacity from the ultimate value: $q_{\text{safe}} = \dfrac{q_{\text{ult}}}{\text{FoS}}$, where the factor of safety guards against shear failure.

Step 1 – list the data: $q_{\text{ult}} = 270$ kPa, FoS $= 3.0$.

Step 2 – substitute: $q_{\text{safe}} = \dfrac{270}{3.0}$

Step 3 – evaluate: $q_{\text{safe}} = 90$ kPa

Final Answer: $q_{\text{safe}} = 90\ \text{kPa} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q23

Q24.

Solution

Concept – hydraulic radius of an open channel: $R = \dfrac{A}{P}$, the flow area divided by the wetted perimeter.

Step 1 – compute the flow area: $A = b \times y = 6 \times 2 = 12\ \text{m}^2$

Step 2 – compute the wetted perimeter (bottom plus the two wetted sides):

$P = b + 2y = 6 + 2(2)$

$P = 6 + 4 = 10$ m

Step 3 – divide: $R = \dfrac{12}{10}$

$R = 1.2$ m

Final Answer: $R = 1.2\ \text{m} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q24

Q25.

Solution

Concept – centre of pressure of a vertical surface with its top at the free surface: For a vertical rectangle of depth H with its top edge at the water surface, the centre of pressure lies at $\frac{2}{3}H$ below the surface.

Step 1 – recall the result: $\bar{h}_{cp} = \frac{2}{3}H$

Step 2 – substitute $H = 3$ m: $\bar{h}_{cp} = \frac{2}{3} \times 3$

Step 3 – evaluate: $\bar{h}_{cp} = 2.0$ m

Step 4 – interpret: The pressure grows linearly with depth, so the resultant acts below the centroid (which is at 1.5 m), at 2.0 m.

Final Answer: $\bar{h}_{cp} = 2.0 \text{ m} \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q25

Q26.

Solution

Concept – discharge through a pipe: $Q = A \times V$, where $A = \frac{\pi}{4}D^2$ is the cross-sectional area.

Step 1 – convert the diameter: $D = 300 \text{ mm} = 0.30 \text{ m}$

Step 2 – compute the area: $A = \frac{\pi}{4}(0.30)^2$

$A = \frac{\pi}{4} \times 0.09$

$A = 0.070686 \text{ m}^2$

Step 3 – multiply by the velocity: $Q = 0.070686 \times 2$

$Q = 0.1414 \text{ m}^3/\text{s}$

Final Answer: $Q \approx 0.1414 \text{ m}^3/\text{s} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q26

Q27.

Solution

Concept – Reynolds number for pipe flow: $Re = \frac{V\,D}{\nu}$, where ν is the kinematic viscosity.

Step 1 – convert the diameter: $D = 50 \text{ mm} = 0.05 \text{ m}$

Step 2 – substitute into the formula: $Re = \dfrac{2 \times 0.05}{1.0 \times 10^{-6}}$

Step 3 – evaluate the numerator: $2 \times 0.05 = 0.10$

Step 4 – divide: $Re = \dfrac{0.10}{1.0 \times 10^{-6}}$

$Re = 1.0 \times 10^5$

Step 5 – note: $Re > 4000$, so the flow is turbulent.

Final Answer: $Re = 1.0 \times 10^5 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q27

Q28.

Solution

Concept – Froude number of open-channel flow: $Fr = \dfrac{V}{\sqrt{g\,y}}$, where y is the flow depth.

Step 1 – list the data: $V = 3$ m/s, $y = 1$ m, $g = 9.81$ m/s^2.

Step 2 – evaluate the product $g\,y$: $g\,y = 9.81 \times 1 = 9.81$

Step 3 – take the square root: $\sqrt{9.81} = 3.132$

Step 4 – divide: $Fr = \dfrac{3}{3.132}$

$Fr = 0.958$

Step 5 – interpret: $Fr < 1$, so the flow is subcritical.

Final Answer: $Fr \approx 0.958 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q28

Q29.

Solution

Concept – force of a jet on a flat plate moving in the jet direction: $F = \rho\,A\,(V-u)^2$, where u is the plate velocity and $(V-u)$ the relative velocity.

Step 1 – compute the jet area: $A = \dfrac{\pi}{4}(0.05)^2$

$A = \dfrac{\pi}{4} \times 0.0025$

$A = 0.0019635$ m^2

Step 2 – compute the relative velocity: $V - u = 20 - 5 = 15$ m/s

Step 3 – square the relative velocity: $(15)^2 = 225$

Step 4 – substitute into the force equation: $F = 1000 \times 0.0019635 \times 225$

Step 5 – evaluate step by step: $1000 \times 0.0019635 = 1.9635$

$F = 1.9635 \times 225$

$F = 441.8$ N

Final Answer: $F \approx 441.8 \text{ N} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q29

Q30.

Solution

Concept – runoff volume from rainfall and runoff coefficient: Runoff depth $= C\times$ rainfall depth; runoff volume $=$ runoff depth $\times$ area.

Step 1 – compute the runoff depth: $d = C \times P = 0.50 \times 60$ mm

$d = 30$ mm $= 0.030$ m

Step 2 – convert the area to square metres: $A = 100$ ha $= 100 \times 10{,}000 = 1{,}000{,}000$ m^2

Step 3 – compute the runoff volume: Volume $= d \times A = 0.030 \times 1{,}000{,}000$

Volume $= 30{,}000$ m^3

Final Answer: Volume $= 30{,}000 \text{ m}^3 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q30

Q31.

Solution

Concept – ϕ-index (uniform loss rate): ϕ-index $= \dfrac{\text{total rainfall} - \text{runoff}}{\text{duration}}$, giving the average rate of loss.

Step 1 – find the total infiltration loss: loss $= P - R = 6 - 3 = 3$ cm

Step 2 – divide by the storm duration: $\phi = \dfrac{3 \text{ cm}}{3 \text{ hr}}$

Step 3 – evaluate: $\phi = 1.0$ cm/hr

Final Answer: $\phi = 1.0 \text{ cm/hr} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q31

Q32.

Solution

Concept – discharge from duty and area: Duty D (in ha/cumec) relates the command area A to the discharge by $Q = \frac{A}{D}$.

Step 1 – list the data: $A = 1500$ ha, $D = 1500$ ha/cumec.

Step 2 – substitute: $Q = \frac{1500}{1500}$

Step 3 – evaluate: $Q = 1.0$ cumec

Step 4 – interpret: A duty of 1500 ha/cumec means one cumec of continuous supply irrigates 1500 ha, so 1500 ha needs exactly 1 cumec.

Final Answer: $Q = 1.0$ cumec $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q32

Q33.

Solution

Concept – water application efficiency: $\eta_a = \frac{\text{water stored in the root zone}}{\text{water delivered to the field}} \times 100\%$.

Step 1 – list the data: Water stored $= 80$ ha-cm, water delivered $= 100$ ha-cm.

Step 2 – substitute: $\eta_a = \frac{80}{100} \times 100\%$

Step 3 – evaluate: $\eta_a = 0.80 \times 100\%$

$\eta_a = 80\%$

Final Answer: $\eta_a = 80\% \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q33

Q34.

Solution

Concept – hydrologic risk over a design life: Risk $= 1 - \left(1 - \frac{1}{T}\right)^n$, the probability of at least one exceedance in n years.

Step 1 – list the data: $T = 10$ years, $n = 2$ years.

Step 2 – find the probability of non-exceedance in one year: $1 - \frac{1}{T} = 1 - \frac{1}{10} = 0.9$

Step 3 – raise to the power n: $(0.9)^2 = 0.81$

Step 4 – subtract from one: Risk $= 1 - 0.81$

Risk $= 0.19$

Final Answer: Risk $= 0.19 \Rightarrow \boxed{\text{D}}$

$\boxed{\textbf{Answer: (D)}}$ Go Back to Q34

Q35.

Solution

Concept – ultimate BOD from the 5-day BOD: $\text{BOD}_t = L_0(1 - 10^{-k_D t})$, so $L_0 = \dfrac{\text{BOD}_t}{1 - 10^{-k_D t}}$.

Step 1 – compute the exponent: $k_D\,t = 0.10 \times 5 = 0.5$

Step 2 – evaluate $10^{-0.5}$: $10^{-0.5} = 0.3162$

Step 3 – form the bracket: $1 - 0.3162 = 0.6838$

Step 4 – divide the measured BOD by the bracket: $L_0 = \dfrac{220}{0.6838}$

Step 5 – evaluate: $L_0 = 321.7$ mg/L

Final Answer: $L_0 \approx 321.7$ mg/L $\Rightarrow \boxed{\text{A}}$

$\boxed{\textbf{Answer: (A)}}$ Go Back to Q35

Q36.

Solution

Concept – detention (retention) time of a tank: $t = \dfrac{V}{Q}$, the tank volume divided by the flow rate.

Step 1 – list the data: $V = 2000\ \text{m}^3$, $Q = 4000\ \text{m}^3/\text{day}$.

Step 2 – substitute: $t = \dfrac{2000}{4000}$

Step 3 – evaluate in days: $t = 0.5$ day

Step 4 – convert to hours: $t = 0.5 \times 24 = 12$ hours

Final Answer: $t = 12$ hours $\Rightarrow \boxed{\text{B}}$

$\boxed{\textbf{Answer: (B)}}$ Go Back to Q36

Q37.

Solution

Concept – sewage flow as a fraction of water supply: Sewage flow $=$ (population) $\times$ (per-capita supply) $\times$ (return factor).

Step 1 – compute the total water supplied per day (in litres): $Q_w = 40{,}000 \times 150 = 6{,}000{,}000$ L/day

Step 2 – apply the 80% return factor: $Q_s = 0.80 \times 6{,}000{,}000$

$Q_s = 4{,}800{,}000$ L/day

Step 3 – convert litres to cubic metres (1000 L $= 1$ m^3): $Q_s = \dfrac{4{,}800{,}000}{1000}$

$Q_s = 4800\ \text{m}^3/\text{day}$

Final Answer: $Q_s = 4800\ \text{m}^3/\text{day} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q37

Q38.

Solution

Concept – free residual chlorine: residual $=$ dose $-$ demand, the chlorine left after the demand is met.

Step 1 – list the data: Dose $= 3.0$ mg/L, demand $= 1.2$ mg/L.

Step 2 – subtract: residual $= 3.0 - 1.2$

Step 3 – evaluate: residual $= 1.8$ mg/L

Final Answer: residual $= 1.8$ mg/L $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q38

Q39.

Solution

Concept – volume reduction ratio on compaction: For a fixed mass, volume is inversely proportional to density, so the ratio of loose to compacted volume equals the ratio of compacted to loose density.

Step 1 – write the volumes for a mass M: Loose volume $V_1 = \dfrac{M}{100}$, compacted volume $V_2 = \dfrac{M}{400}$.

Step 2 – form the reduction ratio: $\dfrac{V_1}{V_2} = \dfrac{M/100}{M/400}$

Step 3 – simplify (the mass cancels): $\dfrac{V_1}{V_2} = \dfrac{400}{100}$

$\dfrac{V_1}{V_2} = 4$

Step 4 – interpret: Compaction reduces the volume to one-quarter, a reduction ratio of 4.

Final Answer: reduction ratio $= 4 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q39

Q40.

Solution

Concept – superelevation with friction neglected: When the full centrifugal effect is balanced by superelevation alone, $e = \dfrac{V^2}{127R}$ with V in km/h and R in metres.

Step 1 – list the data: $V = 50$ km/h, $R = 280$ m.

Step 2 – square the speed: $V^2 = 50^2 = 2500$

Step 3 – evaluate the denominator: $127 \times 280 = 35560$

Step 4 – divide: $e = \dfrac{2500}{35560}$

$e = 0.0703$

Step 5 – round: $e \approx 0.07$

Final Answer: $e \approx 0.07 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q40

Q41.

Solution

Concept – braking distance on a level road: $d_b = \dfrac{V^2}{2\,g\,f}$, where V is in m/s, f the longitudinal friction coefficient.

Step 1 – convert the speed to m/s: $V = 54 \text{ km/h} = \dfrac{54}{3.6} = 15 \text{ m/s}$

Step 2 – square the speed: $V^2 = 15^2 = 225$

Step 3 – evaluate the denominator: $2 \times g \times f = 2 \times 9.81 \times 0.35$

$= 6.867$

Step 4 – divide: $d_b = \dfrac{225}{6.867}$

$d_b = 32.77$ m

Final Answer: $d_b \approx 32.77 \text{ m} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q41

Q42.

Solution

Concept – density at maximum flow in Greenshields' model: In the linear speed–density model the flow is maximum at the optimum density $k_o = \frac{k_j}{2}$, one half of the jam density.

Step 1 – list the data: Jam density $k_j = 120$ veh/km.

Step 2 – take half of it: $k_o = \frac{120}{2}$

Step 3 – evaluate: $k_o = 60$ veh/km

Step 4 – note: At this density the speed is half the free-flow speed and the product (flow) reaches its peak.

Final Answer: $k_o = 60 \text{ veh/km} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q42

Q43.

Solution

Concept – height of the instrument (line of collimation): H.I. $=$ RL of BM $+$ back sight on BM.

Step 1 – list the data: RL of BM $= 150.000$ m, BS $= 2.150$ m.

Step 2 – add the back sight to the RL: H.I. $= 150.000 + 2.150$

Step 3 – evaluate: H.I. $= 152.150$ m

Step 4 – interpret: The back sight is added because the line of sight is above the point on which the staff is held.

Final Answer: H.I. $= 152.150 \text{ m} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q43

Q44.

Solution

Concept – back bearing from fore bearing: Back bearing $=$ Fore bearing $\pm 180^\circ$ (add 180° when the fore bearing is less than 180°).

Step 1 – note the fore bearing: $\text{FB} = 60^\circ$, which is less than 180°.

Step 2 – add 180°: $\text{BB} = 60^\circ + 180^\circ$

Step 3 – evaluate: $\text{BB} = 240^\circ$

Step 4 – check the range: 240° lies within 0°–360°, so no further correction is needed.

Final Answer: $\text{BB} = 240^\circ \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q44

Q45.

Solution

Concept – tangent length of a simple circular curve: $T = R\tan\left(\frac{\Delta}{2}\right)$, where Δ is the deflection angle.

Step 1 – list the data: $R = 200$ m, $\Delta = 60^\circ$.

Step 2 – halve the deflection angle: $\frac{\Delta}{2} = \frac{60^\circ}{2} = 30^\circ$

Step 3 – evaluate the tangent: $\tan 30^\circ = 0.5774$

Step 4 – multiply by the radius: $T = 200 \times 0.5774$

$T = 115.47$ m

Final Answer: $T \approx 115.47 \text{ m} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q45

Q46.

Solution

Concept – average-end-area (trapezoidal) method for earthwork volume: $V = \frac{A_1 + A_2}{2} \times L$, the mean of the two end areas times the distance between them.

Step 1 – list the data: $A_1 = 20 \text{ m}^2$, $A_2 = 30 \text{ m}^2$, $L = 10$ m.

Step 2 – average the two end areas: $\frac{A_1 + A_2}{2} = \frac{20 + 30}{2} = \frac{50}{2} = 25 \text{ m}^2$

Step 3 – multiply by the length: $V = 25 \times 10$

$V = 250 \text{ m}^3$

Final Answer: $V = 250\ \mathrm{m}^3 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q46

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	2	D	3	C	4	B	5	C
6	A	7	B	8	C	9	B	10	B
11	A	12	D	13	A	14	D	15	D
16	C	17	B	18	A	19	C	20	C
21	D	22	A	23	B	24	D	25	A
26	C	27	A	28	D	29	B	30	A
31	D	32	C	33	B	34	D	35	A
36	B	37	B	38	A	39	C	40	A
41	C	42	C	43	B	44	A	45	B
46	D								