CIVIL ENGINEERING

Q. No. 1 to 25 Carry One Mark Each

1. [A] is a square matrix which is neither symmetric nor skew-symmetric and $[A]^T$ is it's transpose. The sum and difference of these matrices are defined as $[S]=[A]+[A]^T$ and $[D]=[A]-[A]^T$ respectively. Which of the following statements is true?

(A) Both [S] and [D] are symmetric

(B) Both [S] and [D] are skew-symmetric

(C) [S] is skew-symmetric and IDI is symmetric

(D) [S] is symmetric and [D] is skew-symmetric

Answer: (D)

2. The square root of number N is to be obtained by applying the Newton Raphsons iterations to the equation $x^2 - N = 0$. If i denotes the iteration index the correct iterative scheme will be

(A) $x_{i+1}=\frac{1}{2}\left(x_i+\frac{N}{x_i}\right)$

(B) $x_{i+1}=\frac{1}{2}\left(x_i^2+\frac{N}{x_i^2}\right)$

(C) $x_{i+1}=\frac{1}{2}\left(x_i+\frac{N^2}{x_i}\right)$

(D) $x_{i+1}=\frac{1}{2}\left(x_i+\frac{N}{x_i}\right)$

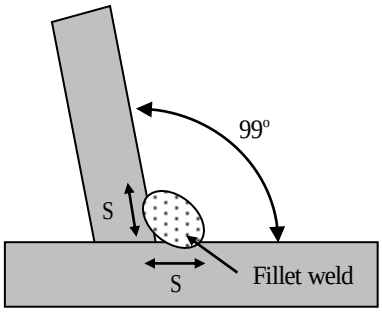
Answer: (A)

3. There are two containers, with one containing 4 Red and 3 Green balls and the other containing 3 blue and 4 Green balls. One ball is drawn at random from each container. The probability that one of the balls is Red and the other is Blue will be

(A) 1/7 (B) 9/49 (C) 12/49 (D) 3/7

Answer: (C)

4. For the fillet weld of size 's' shown in the adjoining figure the effective throat thickness is



(A) 0.61 s (B) 0.65s (C) 0.70s (D) 0.75s

Answer: (B)

5. A 16 mm thick plate measuring 650 mm $\times$ 420 mm is used as a base plate for an ISHB 300 column subjected to a factored axial compressive load of 2000 kN. As per IS 456-2000, the minimum grade of concrete that should be used below the base plate for safely carrying the load is

(A) M15 (B) M20 (C) M30 (D) M40

Answer: (B)

6. Consider a reinforcing bar embedded in concrete. In a marine environment this bar undergoes uniform corrosion, which leads to the deposition of corrosion products on its surface and an increase in the apparent volume of the bar. This subjects the surrounding concrete to expansive pressure. As a result, corrosion induced cracks appear at the surface of concrete. Which of the following statements is TRUE?

(A) Corrosion causes circumferential tensile stresses in concrete and the cracks will be parallel to the corroded reinforcing bar.

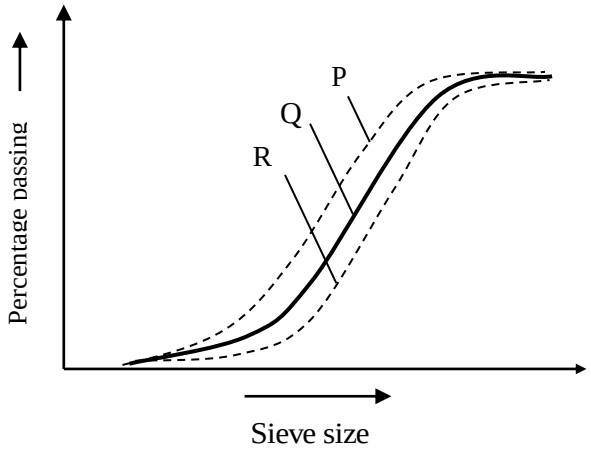
(B) Corrosion causes radial tensile stresses in concrete and the cracks will be parallel to the corroded reinforcing bar.

(C) Corrosion causes circumferential tensile stresses in concrete and the cracks will be perpendicular to the direction of the corroded reinforcing bar.

(D) Corrosion causes radial tensile stresses in concrete and the cracks will perpendicular to the direction of the corroded reinforcing bar.

Answer: (C)

7. The results for sieve analysis carried out for three types of sand, P, Q and R, are given in the adjoining figure, if the fineness modulus values of the three sands are given as FM_P, FM_Q and FM_R, it can be state that



(A) $FM_Q = \sqrt{FM_P \times FM_R}$

(B) $FM_Q = 0.5\left(FM_P + FM_R\right)$

(C) $FM_P > FM_Q > FM_R$

(D) $FM_P < FM_Q < FM_R$

Answer: (A)

8. The cross-section of a thermo-mechanically treated (TMT) reinforcing bar has

(A) soft ferrite-pearlite throughout

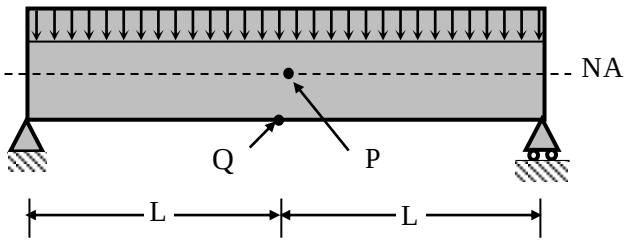
(B) hard martensite thoughout

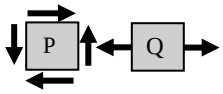
(C) a soft ferrite-pearlite core with a hard martensitic rim.

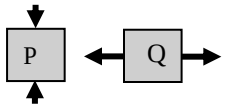
(D) a hard martensitic core with a soft pearlite-bainitic rim

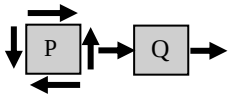
Answer: (C)

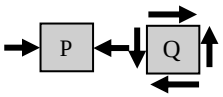
9. Consider a simply supportd beam with a uniformly distributed load having a neutral axis (NA) as shown for points P (on the neutral axis) and Q (at the bottom of the beam) the state of stress is best represented by which of the following pairs?



(A) 

(B) 

(C) 

(D) 

Answer: (A)

10. For a saturated sand deposit, the void ratio and the specific gravity of solids are 0.70 and 2.67 respectively. The critical (upward) hydraulic gradient for the deposit would be

(A) 0.54 (B) 0.98 (C) 1.02 (D) 1.87

Answer: (B)

11. Likelihood of general shear failure for an isolated footing in sand decreases with

(A) Decreasing footing depth

(B) Decreasing inter-granular packing of the sand

(C) Increasing footing width

(D) Decreasing soil grain compressibility

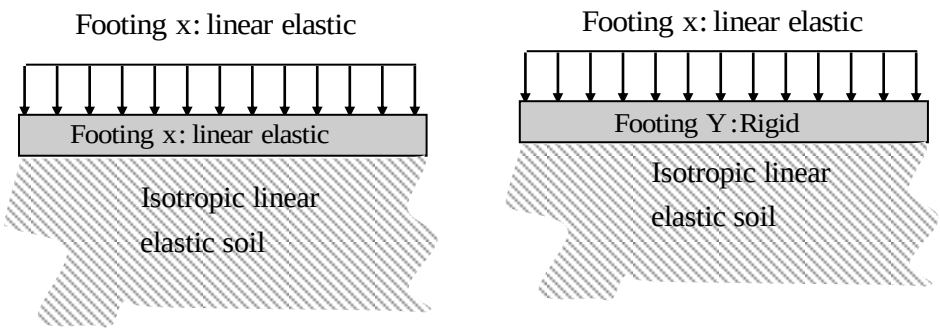
Answer: (B)

12. For a sample of dry, cohesion less soil with friction angle, ϕ, the failure plane will be inclined to the major principal plane by an angle equal to

(A) ϕ (B) $45°$ (C) $45°-\phi/2$ (D) $45°+\phi/2$

Answer: (D)

13. Two geometrically identical isolated footings, X (linear elastic) and Y (rigid), are loaded identically (shown alongside). The soil reactions will



(A) Be uniformly distributed for Y but not for X

(B) Be uniformly distributed for X but not for Y

(C) Be uniformly distributed for both X and Y

(D) Not be uniformly distributed for both X and Y

Answer: (A)

14. A soil is compressed of solid spherical grains of identical specific gravity and diameter between 0.075 mm and 0.0075 mm. If the terminal velocity of the largest particle falling through water without flocculation is 0.5 mm/s, that for the smallest particle would be

(A) 0.005 mm/s (B) 0.05 mm/s

(C) 5 mm/s (D) 50 mm/s

Answer: (A)

15. A watershed got transformed from rural to urban over a period of time. The effect of urbanization on storm runoff hydrograph from the watershed is to

(A) Decrease the volume of runoff

(B) Increase the time to peak discharge

(C) Decrease the time base

(D) Decrease the peak discharge

Answer: (C)

16. For a given discharge, the critical flow depth in an open channel depends on

(A) Channel geometry only

(B) Channel geometry and bed slope

(C) Channel geometry, bed slope and roughness

(D) Channel geometry, bed slope, roughness and Reynolds number

Answer: (A)

17. For a body completely submerged in a fluid, the centre of gravity (G) and centre of Buoyancy (O) are known. The body is considered to be in stable equilibrium if

(A) O does not coincide with the centre of mass of the displaced fluid

(B) G coincides with the centre of mass of the displaced fluid

(C) O lies below G

(D) O lies above G

Answer: (D)

18. The flow in a horizontal, frictionless rectangular open channel is supercritical. A smooth hump is built on the channel floor. As the height of hump is increased, choked condition is attained. With further increase in the height of the hump, the water surface will

(A) Rise at a section upstream of the hump

(B) Drop at a section upstream of the hump

(C) Drop at the lump

(D) Rise at the hump

Answer: (B)

19. Consider the following unit processes commonly used in water treatment; rapid mixing (RM). Flocculation (F). primary sedimentation (PS). Secondary sedimentation (SS), chlorination (C) and rapid sand filtration (RSF). The order of these unit processes (first to last) in a conventional water treatment plant is _____.

(A) $PS \rightarrow RSF \rightarrow F \rightarrow RM \rightarrow SS \rightarrow C$

(B) $PS \rightarrow F \rightarrow RM \rightarrow RSF \rightarrow SS \rightarrow C$

(C) $PS \rightarrow F \rightarrow SS \rightarrow RSF \rightarrow RM \rightarrow C$

(D) $PS \rightarrow RM \rightarrow F \rightarrow SS \rightarrow RSF \rightarrow C$

Answer: (D)

20. Anaerobically treated effluent has MPN of total coliform as 10^6/100mL.After chlorination, the MPN value declines to 10^2/100mL. The percent removal (%R) and log removal (log R) of total coliform MPN is

(A) $\%R = 99.90;\ \log R = 4$ (B) $\%R = 99.90;\ \log R = 2$

(C) $\%R = 99.99;\ \log R = 4$ (D) $\%R = 99.99;\ \log R = 2$

Answer: (C)

21. Consider four common air pollutants found in urban environments, NO, SO_2, Soot and O_3. Among these which one is the secondary air pollutant?

(A) O_3 (B) NO (C) SO_2 (D) Soot

Answer: (A)

22. The probability that k number of vehicles arrive (i.e, cross a predefined line) in time t is given as $(\lambda t)^k e^{-\lambda t} / k!$. where λ is the average vehicle arrival rate. What is the probability that the time headway is greater than or equal to time t_1?

(A) $\lambda e^{\lambda t_1}$ (B) λe^{-t_1} (C) $e^{\lambda t_1}$ (D) $e^{-\lambda t_1}$

Answer: (D)

23. A vehicle negotiates a transition curve with uniform speed v. If the radius of the horizontal curve and the allowable jerk are R and J, respectively, the minimum length of the transition curve is

(A) $R^3/(vJ)$ (B) $J^3/(Rv)$

(C) v^2R/J (D) $v^3/(RJ)$

Answer: (D)

24. In Marshall testing of bituminous mixes, as the bitumen content increases the *flow* value

(A) Remains constant

(B) Decreases first and then increases

(C) Increases monotonically

(D) Increases first and then decreases

Answer: (C)

25. Curvature correction to a staff in a differential leveling survey is

(A) always subtractive

(B) always zero

(C) always additive

(D) dependent on latitude

Answer: (A)

Q. No. 26 -55 Carry two Marks Each

26. For an analytic function, $f(x + iy) = u(x, y) + iv(x, y)$, u is given by $u = 3x^2 - 3y^2$. The expression for v, considering k to be a constant is

(A) $3y^2 - 3x^2 + k$ (B) $6x - 6y + k$ (C) $6y - 6x + k$ (D) $6xy + k$

Answer: (D)

27. What should be the value of λ such that the function defined below is continuous at $x = \pi / 2$?

$$f(x) = \begin{cases} \dfrac{\lambda \cos x}{\frac{\pi}{2} - x} & \text{if } x \neq \dfrac{\pi}{2} \\ 1 \text{ if } x = \dfrac{\pi}{2} \end{cases}$$

(A) 0 (B) $2/\pi$ (C) 1 (D) $\pi/2$

Answer: (C)

28. What is the value of the definite integral, $\int_0^a \dfrac{\sqrt{x}}{\sqrt{x} + \sqrt{a - x}} dx$?

(A) 0 (B) $\dfrac{a}{2}$ (C) a (D) 2a

Answer: (B)

29. If $\bar{a}$ and $\bar{b}$ are two arbitrary vector with magnitudes a and b respectively, $\left|\bar{a}\times\bar{b}\right|^2$ will be equal to

(A) $a^2b^2-\left(\vec{a}.\vec{b}\right)^2$ (B) $ab-\vec{a}.\vec{b}$

(C) $a^2b^2+\left(\vec{a}.\vec{b}\right)^2$ (D) $ab+\vec{a}.\vec{b}$

Answer: (A)

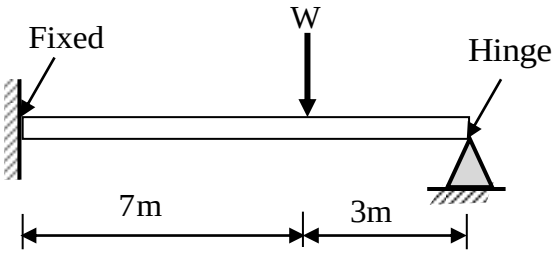
30. The solution of the D.E $\frac{dy}{dx}+\frac{y}{x}=x$; with the condition that y = 1 at x =1, is

(A) $y=\frac{2}{3x^2}+\frac{x}{3}$ (B) $y=\frac{x}{2}+\frac{1}{2x}$

(C) $y=\frac{2}{3}+\frac{x}{3}$ (D) $y=\frac{2}{3x}+\frac{x^2}{3}$

Answer: (D)

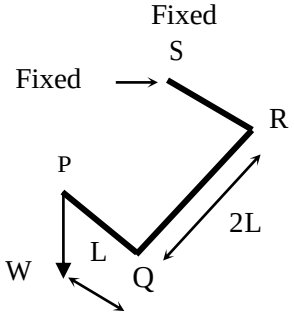
31. The value of W that results in the collapse of the beam shown in the figure and having a plastic moment capacity of M_p is



(A) $\left(\frac{4}{21}\right)M_p$ (B) $\left(\frac{3}{10}\right)M_p$ (C) $\left(\frac{7}{21}\right)M_p$ (D) $\left(\frac{13}{21}\right)M_p$

Answer: (D)

32. For the cantilever bracket, PQRS, loaded as shown in the adjoining figure (PQ = RS = L, and QR = 2L), which of the following statements is FALSE?



(A) The portion RS has a constant twisting moments with a value of 2WL.

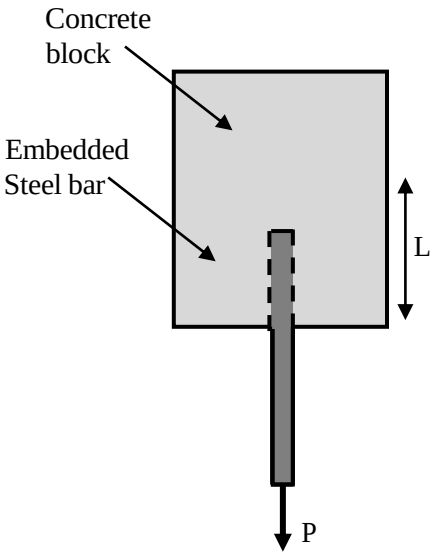
(B) The portion QR has a varying twisting moment with a maximum value of WL

(C) The portion PQ has a varying bending moment with a maximum value of WL

(D) The portion PQ has no twisting moment.

Answer: (B)

33. Consider a bar of diameter 'D' embedded in a large concrete blocks as shown in the adjoining figure, with a pull out force P being applied.



Let σ_b and σ_{st}, be the bond strength (between the bar and concrete) and the tensile strength of the bar, respectively. If the block is held in position and it is assumed that the material of the block does not fail, which of the following options represents the maximum value of P?

(A) Maximum of $\left(\frac{\pi}{4}D^2\sigma_b\right)$ and $\left(\pi DL\sigma_{st}\right)$

(B) Maximum of $\left(\frac{\pi}{4}D^2\sigma_{st}\right)$ and $\left(\pi DL\sigma_b\right)$

(C) Minimum of $\left(\frac{\pi}{4}D^2\sigma_{st}\right)$ and $\left(\pi DL\sigma_b\right)$

(C) Minimum of $\left(\frac{\pi}{4}D^2\sigma_b\right)$ and $\left(\pi DL\sigma_{st}\right)$

Answer: (C)

34. Consider two RCC beams, P and Q, each having the section 400 mm × 750 mm (effective depth, d = 750 mm) made with concrete having a $\tau_{max} = 2.1$ N/mm^2. For the reinforcement provided and the grade of concrete used, it may be assumed that the $\tau_c = 0.75\,N/mm^2$. The design shear in beam P is 400kN and in beam Q is 750kN. Considering the provisions of IS 456 – 2000, which of the following statements is TRUE?

(A) Shear reinforcement should be designed for 175 kN for beam P and the section for beam Q should be revised.

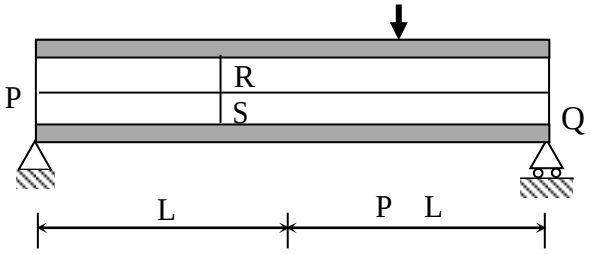
(B) Nominal shear reinforcement is required for beam P and the shear reinforcement should be designed for 120 kN for beam Q

(C) Shear reinforcement should be designed for 175 kN for beam P and the shear reinforcement should be designed for 525 kN for beam Q.

(D) The sections for both beams P and Q need to be revised.

Answer: (A)

35. The adjoining figure shows a schematic representation of a steel plate girder to be used as a simply supposed beam with a concentrated load. For stiffeners, PQ (running along the beam axis) and RS (running between the top and bottom flanges) which of the following pairs of statements will be **TRUE**?



(A) **(i)** RS should be provided under the concentrated load only.
(ii) PQ should be placed in the tension side of the flange

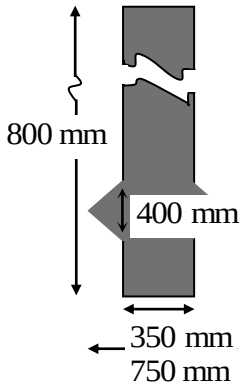
(B) **(i)** RS helps to prevent local buckling of the web.
(ii) PQ should be placed in the compression side of the flange

(C) **(i)** RS should be provided at supports
(ii) PQ should be placed along the neutral axis

(D) **(i)** RS should be provided away from points of action of concentrated loads.
(ii) PQ should be provided on the compression side of flange.

Answer: (B)

36. A singly under-reamed, 8m long, RCC pile (shown in the adjoining figure) weighing 20 kN with 350 mm shaft diameter and 750 mm under-ream diameter is installed within stiff, saturated silty clay (undrained shear strength is 50 kPa, adhesion factor is 0.3, and the applicable bearing capacity factor is 9) to counteract the impact of soil swelling on a structure constructed above. Neglecting suction and the contribution of the under-ream to the adhesive shaft capacity, what would be the estimated ultimate tensile capacity (rounded off to the nearest integer value of kN) of the pile?



(A) 132 kN

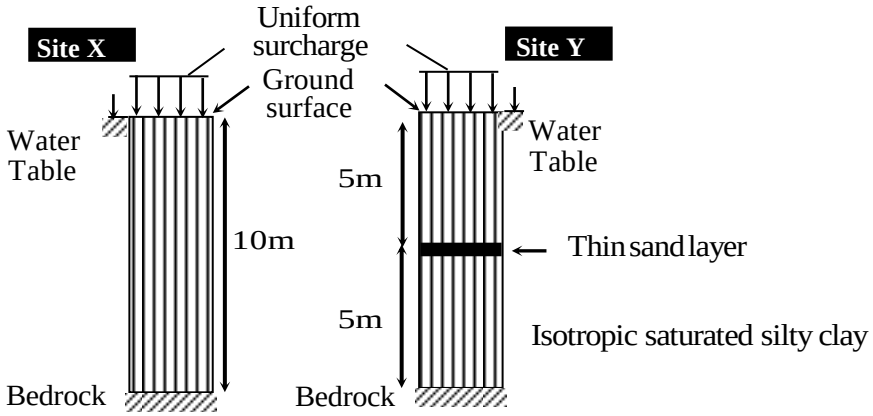
(B) 156 kN

(C) 287 kN

(D) 301 kN

Answer: (B)

37. Identical surcharges are placed at ground surface at sites X and Y, with soil conditions shown alongside and water table at ground surface.



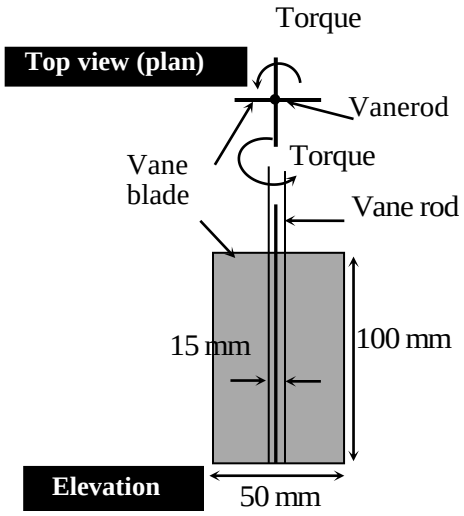
The silty clay layers at X and Y are identical. The thin sand layer at Y is continuous and free-draining with a very large discharge capacity. If primary consolidation at X is estimated to complete in 36 months, what would be the corresponding time for completion of primary consolidation at Y?

(A) 2.25 months (B) 4.5 months

(C) 9 months (D) 36 months

Answer: (C)

38. A field vane shear testing instrument (shown alongside) was inserted completely into a deposit of soft, saturated silty clay with the vane rod vertical such that the top of the blades were 500mm below the ground surface.



Upon application of a rapidly increasing torque about the vane rod, the soil was found to fail when the torque reached 4.6 Nm. Assuming mobilization of undrained shear strength on all failure surfaces to be uniform and the resistance mobilized on the surface of the vane rod to be negligible, what would be the peak undrained shear strength (rounded off to the nearest integer value of kPa) of the soil?

(A) 5kPa (B) 10kPa (C) 15kPa (D) 20kPa

Answer: (B)

39. A single pipe of length 1500 m and diameter 60 cm connects two reservoirs having a difference of 20m in their water levels. The pipe is to be replaced by two pipes of the same length and equal diameter d to convey 25% more discharge under the same head loss. If the friction factor is assumed to be the same for all the pipes, the value of d is approximately equal to which of the following options?

(A) 37.5 cm (B) 40.0 cm (C) 45.0 cm (D) 50.0 cm

Answer: (D)

40. A spillway discharges flood flow at a rate of 9 m^3/s per metre width. If the depth of flow on the horizontal apron at the toe of the spillway is 46 cm, the tail water depth needed to form a hydraulic jump is approximately given by which of the following options?

(A) 2.54m (B) 4.90m (C) 5.77m (D) 6.23m

Answer: (C)

41. In an aquifer extending over 150 hectare, the water table was 20m below ground level. Over a period of time the water table dropped to 23 m below the ground level. If the porosity of aquifer is 0.40 and the specific retention is 0.15, what is the change in ground water storage of the aquifer?

(A) 67.5 ha – m (B) 112.5 ha – m

(C) 180.0 ha – m (D) 450.0 ha – m

Answer: (B)

42. Total suspended particulate matter (TSP) concentration in ambient air is to be measured using a high volume sample. The filter used for this purpose had an initial dry weight of 9.787g. The 1.5 m^3/min. Sampling continued for 24 hours. The airflow after 24 hours was measured to be 1.4 m^3/min.

The dry weight of the filter paper after 24 hour sampling was 10.283 g. Assuming a linear decline in the air flow rate during sampling, what is the 24 hour average TSP concentration in the ambient air?

(A) $59.2\mu g/m^3$ (B) $118.6\mu g/m^3$

(C) $237.5\mu g/m^3$ (D) $574.4\mu g/m^3$

Answer: (C)

43. Chlorine gas (8 mg/L as Cl_2) was added to a drinking water sample. If the free chlorine residual and pH was measured to be 2 mg/L (as Cl_2) and 7.5, respectively, what is the concentration of residual OCL^- ions in the water? Assume that the chlorine gas added to the water is completely converted to HOCL and OCl. Atomic Weight of CL: 35.5 .

$$\text{Given}: OCL + H^+ \underset{\longleftarrow}{\overset{k}{\longrightarrow}} HOCL,\ k = 10^{7.5}$$

(A) 1.408×10^{-5} moles / L

(B) 2.817×10^{-5} moles / L

(C) 5.634×10^{-5} moles / L

(D) 1.127×10^{-4} moles / L

Answer: (B)

44. If the jam density is given as k_j and the free flow speed is given as u_f, the maximum flow for a linear traffic speed-density model is given by which of the following options?

(A) $\frac{1}{4} k_j \times u_f$ (B) $\frac{1}{3} k_j \times u_f$ (C) $\frac{3}{5} k_j \times u_f$ (D) $\frac{2}{3} k_j \times u_f$

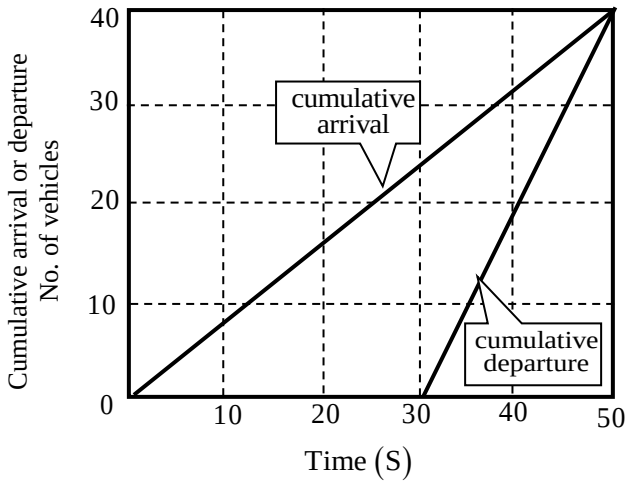
Answer: (A)

45. If v is the initial speed of a vehicle, g is the gravitational acceleration, G is the upward longitudinal slope of the road and f_r is the coefficient of rolling friction during braking, the braking distance (measured horizontally) for the vehicle to stop is

(A) $\frac{v^2}{g(G + f_r)}$ (B) $\frac{v^2}{2g(G + f_r)}$ (C) $\frac{vg}{(G + f_r)}$ (D) $\frac{vf_r}{(G + g)}$

Answer: (B)

46. The cumulative arrival and departure curve of one cycle of an approach lane of a signalized intersection is shown in the adjoining figure. The cycle time is 50 s and the effective red time is 30 s and the effective green time is 20 s. What is the average delay?



(A) 15 s (B) 25 s (C) 35 s (D) 45 s

Answer: (B)

47. The observation from a closed loop traverse around an obstacle are

Segment	Observation from station	Length (m)	Azimuth (clockwise from magnetic north)
PQ	P	Missing	33.7500°
QR	Q	300.000	86.3847°
RS	R	354.524	169.3819°
ST	S	450.000	243.9003°
TP	T	268.000	317.5000°

What is the value of the missing measurement (rounded off to the nearest 10 mm)?

(A) 396.86m (B) 396.79m (C) 396.056 (D) 396.05m

Answer: (B)

Common Data Questions: 48 & 49

A sand layer found at sea floor under 20 m water depth is characterized with relative density = 40%, maximum void ratio = 1.0, minimum void ratio = 0.5, and specific gravity of soil solids = 2.67. Assume the specific gravity of sea water to be 1.03 and the unit weight of fresh water to be 9.81 kN/m^3.

48. What would be the effective stress (rounded off to the nearest integer value of kPa) at 30 m depth into the sand layer?

(A) 77 kPa (B) 273 kPa (C) 268kPa (D) 281 kPa

Answer: (D)

49. What would be the change in the effective stress (rounded off to the nearest integer value of kPa) at 30m depth into the sand layer if the sea water level permanently rises by 2m

(A) 19 kPa (B) 0 kPa (C) 21 kPa (D) 22 kPa

Answer: (B)

Common Data Questions: 50 & 51

The ordinates of a 2 – h unit hydrograph at 1 hour intervals starting from time t = 0, are 0, 3, 8, 6, 3, 2 and 0 m^3/s. Use trapezoidal rule for numerical integration, if required.

50. What is the catchment area represented by the unit hydrograph?

(A) $1.00km^2$ (B) $2.00km^2$ (C) $7.92km^2$ (D) $8.64km^2$

Answer: (C)

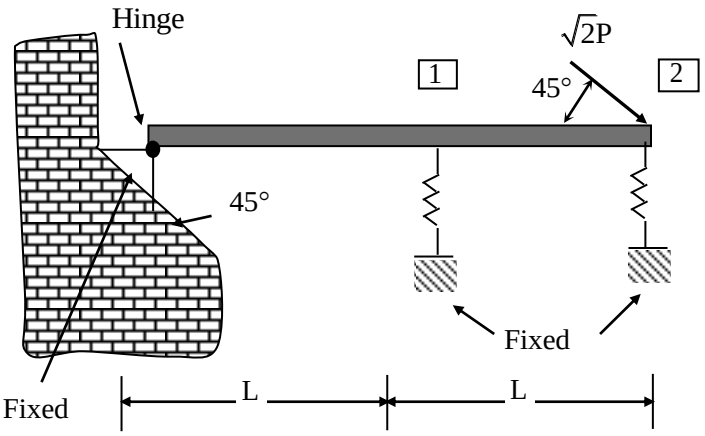
51. A storm of 6.6cm occurs uniformly over the catchment in 3 hours. If ϕ - index is equal to 2 mm/h and base flow is 5 m^3/s, what is the peak flow due to the storm?

(A) $41.0m^3/s$ (B) $43.4m^3/s$ (C) $53.0m^3/s$ (D) $56.2m^3/s$

Answer: (A)

Statement for Linked Answer Questions: 52 & 53

A rigid beam is hinged at one end and supported on linear elastic springs (both having a stiffness of 'k;) at points '1' and '2', and an inclined load acts at '2', as shown.



52. Which of the following options represents the deflections δ at points'1' and '2'?

(A) $\delta_1 = \frac{2}{5}\left(\frac{2P}{k}\right) = \delta_2 = \frac{4}{5}\left(\frac{2P}{k}\right)$

(B) $\delta_1 = \frac{2}{5}\left(\frac{P}{k}\right) = \delta_2 = \frac{4}{5}\left(\frac{P}{k}\right)$

(C) $\delta_1 = \frac{2}{5}\left(\frac{P}{\sqrt{2k}}\right) = \delta_2 = \frac{4}{5}\left(\frac{P}{\sqrt{2k}}\right)$

(D) $\delta_1 = \frac{2}{5}\left(\frac{\sqrt{2P}}{k}\right) = \delta_2 = \frac{4}{5}\left(\frac{\sqrt{2P}}{k}\right)$

Answer: (B)

53. If the load P equals 100kN, which of the following options represents forces R1 and R2 in the springs at points '1' and '2'?

(A) R_1 = 20kN and R_2 = 40kN

(B) R_1 = 50kN and R_2 = 50kN

(C) R_1 = 30kN and R_2 = 60kN

(D) R_1 = 40kN and R_2 = 80kN

Answer: (D)

Statement for Linked Answer Questions: 54 & 55

The sludge from the aeration tank of the activated sludge process (ASP) has solids content (by weight) of 2%. This sludge is put in a sludge thickener, where sludge volume is reduced to half. Assume that the amount of solids in the supernatant from the thickener is negligible, the specific gravity of sludge solids is 2.2 and the density of water is 1000 kg/m^3.

54. What is the density of the sludge removed from the aeration tank?

(A) $990\,kg/m^3$ (B) $1000\,kg/m^3$

(C) $1011\,kg/m^3$ (D) $1022\,kg/m^3$

Answer: (C)

55. What is the solids content (by weight) of the thickened sludge?

(A) 3.96% (B) 4.00%

(C) 4.04% (D) 4.10%

Answer: (A)

GENERAL APTITUDE (GA) QUESTIONS

Q. No. 56 to 60 Carry One Mark Each

56. If $\text{Log}(P)=(1/2)\text{Log}(Q)=(1/3)\text{Log}(R)$, then which of the following options is TRUE ?

(A) $P^2=Q^3R^2$ (B) $Q^2=PR$ (C) $Q^2=R^3P$ (D) $R=P^2Q^2$

Answer: (B)

57. Which of the following options is the closest in the meaning to the word below:

"Inexplicable"

(A) Incomprehensible (B) Indelible

(C) Inextricable (D) Infallible

Answer: (A)

58. Choose the word from the options given below that is most nearly opposite in meaning to the given word:

"Amalgamate"

(A) merge (B) split (C) collect (D) separate

Answer: (D)

59. Choose the most appropriate word from the options given below to complete the following sentence:

"If you are trying to make a strong impression on your audience, you cannot do so by being understated, tentative or _____."

(A) hyperbolic (B) restrained (C) argumentative (D) indifferent

Answer: (B)

60. Choose the most appropriate word(s) from the options given below to complete the following sentence:

"I contemplated _____ Singapore for my vacation but decided against it."

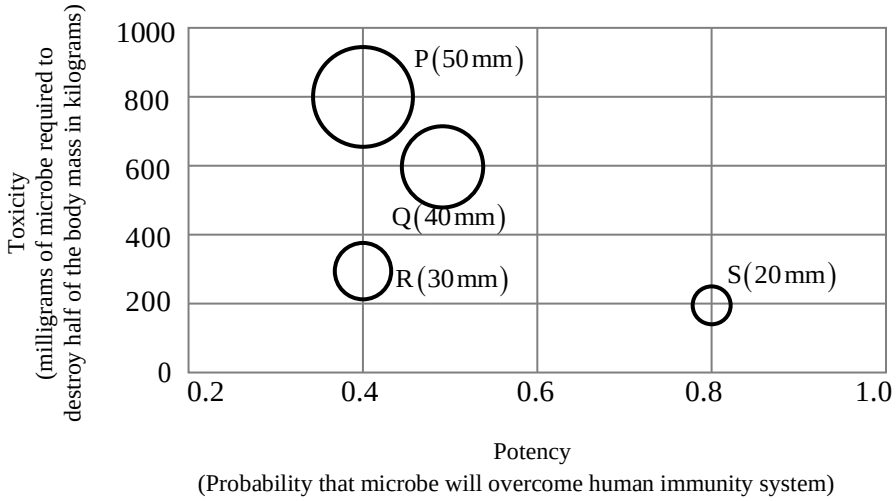
(A) to visit (B) having a visit

(C) visiting (D) for a visit

Answer: (C)

Q. No. 61 to 65 Carry Two Marks Each

61. P, Q, R and S are four types of dangerous microbes recently found in a human habitat. The area of each circle with its diameter printed in brackets represents the growth of a single microbe surviving human immunity system within 24 hours of entering the body. The danger to human beings varies proportionately with the toxicity, potency and growth attributed to a microbe shown in the figure below:



A pharmaceutical company is contemplating the development of a vaccine against the most dangerous microbe. Which microbe should the company target in its first attempt ?

(A) P (B) Q (C) R (D) S

Answer: (A)

62. Few school curricula include a unit on how to deal with bereavement and grief, and yet all students at some point in their lives suffer from losses through death and parting.

Based on the above passage which topic would not be included in a unit on bereavement?

(A) How to write a letter of condolence

(B) What emotional stages are passed through in the healing process

(C) What are the leading causes of death are

(D) How to give support to a grieving friend

Answer: (C)

63. A container originally contains 10 litres of pure spirit. From this container I litre of sprit is replaced with 1 litre of water. Subsequently, 1 litre of the mixture is again replace with 1 litre of water and this process is repeated one more time. How much spirit is now left in the container ?

(A) 7.58 litres (B) 7.84 litres (C) 7 litres (D) 7.29 litres

Answer: (D)

64. A transporter receives the same number of orders each day. Currently, he has some pending orders (backlog) to be shipped. If he uses 7 trucks, then at the end of the 4^{th} day he can clear all the orders. Alternatively, if he uses only 3 trucks, then all the orders are cleared at the end of the 10^{th} day. What is the minimum number of trucks required so that there will be no pending order at the end of the 5^{th} day?

(A) 4 (B) 5 (C) 6 (D) 7

Answer: (C)

65. The variable cost (V) of manufacturing a product varies according to the equation $v = 4q$, where q is the quantity produced. The fixed cost (F) of production of same product reduces with q according to the equation $F = 100/q$. How many units should be produced to minimize the total cost (V+F) ?

(A) 5 (B) 4 (C) 7 (D) 6

Answer: (B)