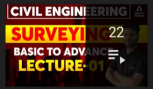
For All Engineering Exam

Civil Engineering

Most Important Questions

by Rajat Sir

Civil Engineering | All Subjects | By Rajat Sir



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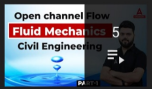

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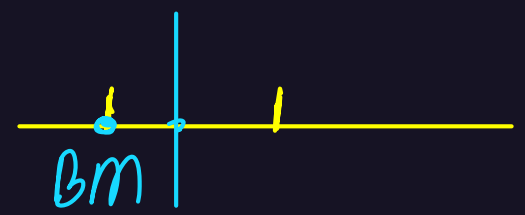
Q. When a series of wheel loads crosses a simply supported girder, the maximum bending moment under any given wheel load occurs when



(a) the centre of gravity of the load system is midway between the centre of span and wheel load under consideration

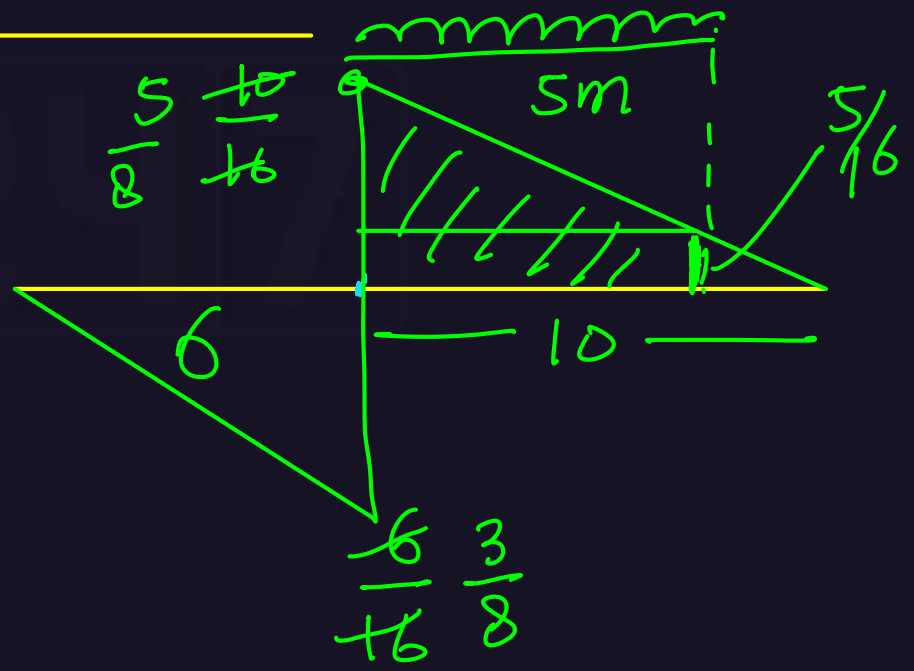
(b) the centre of span is midway between the centre of gravity of the load system and the wheel load under consideration

(c) the wheel load under consideration is midway between the centre of gravity of the load system

(d) None of the above

Q. A uniformly distributed line load of 60 kN per metre run of length 5 meters on a girder of span 16 metres. What is the maximum positive shear force at a section 6 metres from the left end.

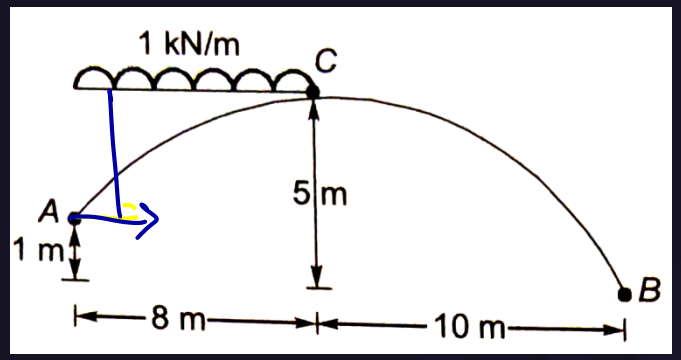
(a) 140.625 kN (b) 65.625 kN
(c) 90.625 kN (d) 45.625 kN



$= 60 \times \frac{1}{2}\left(\frac{5}{8} + \frac{5}{16}\right) \times 5$

$= 140.625$

Q. The horizontal thrust at support A in a three hinged arch shown in the given figure is



$\Sigma M_C = 0$

$V_B \times 10 - H \times 5 = 0$

$V_A + V_B = 8 \times 1$

$V_A \times 8 - H \times 4 - 8 \times 4 = 0$

$H = 4$ kN

(a) 2 kN (b) 4 kN
(c) 8kN (d) 10kN

Q. A three hinged semicircular arch of radius Ft carries a uniformly distributed load w per unit run over the whole span. The horizontal thrust is

$\frac{wR}{2}$

(a) wR

(b) $\frac{wR}{2}$

(c) $\frac{4wR}{3\pi}$

(d) $\frac{2wR}{3\pi}$

Q. The natural void ratio of a sand sample is 0.6 and its density index is 0.6. If its void ratio in the loosest state is 0.9, then the void ratio in the densest state will be :-

(a) 0.2 (b) 0.3 (c) 0.4 (d) 0.5

$e_{min} = 0.4$

$$I_D = \frac{e_{max} - e}{e_{max} - e_{min}}$$

$$0.6 = \frac{0.9 - 0.6}{0.9 - e_{min}}$$

Q. A soil has bulk density of 22 kN/m³ and water content 10%. The dry density is

(a) 20 kN/m³ (b) 15 kN/m³

(c) 18 kN/m³ (d) 19 kN/m³

$$\gamma_d = \frac{\gamma_b}{1+\omega}$$

$$= \frac{22}{1+0.1}$$

$$= 20$$

Q. Select the correct range of Density Index I_D

(a) $I_D > 0$

(b) $I_D > 0$

(c) $0 < I_D < I$

(d) $0 \leq I_D \leq 1$

$e = e_{max}$ $I_D = 0$

$I_D = 100\%$

Q. A soil has plastic limit of 20% and plasticity index of 40%. If the natural water content of the soil is 34%, then the consistency index is equal to:-

(a) 0.35 (b) 0.65

(c) 0.80 (d) 1.00

$I_p = w_L - w_p$

$40 = w_L - 20$

$w_L = 60$

$I_C = \frac{w_L - w}{I_p}$

$= \frac{60 - 34}{40} = \frac{26}{40} \frac{13}{20}$

65%

Q. Stoke's law is valid only if the size of the particle is

(a) between 0.2 mm and 0.0002 mm
(b) greater than 0.2 mm
(c) less than 0.0002 mm
(d) All of the above

Q. Liquid limit of a soil indicates its

(a) compressibility
(b) permeability
(c) optimum moisture content
(d) shear strength

w_L ↑P

Q. Which of the following methods is most accurate for the determination of the water content of soil?

(a) oven drying method
(b) sand bath method
(c) calcium carbide method
(d) pycnometer method

105°-110° → Inorganic
80° → gypsum
60° → organic

24hr

Sand → 4 hr

Silt → 12-16 hr

Q. A pycnometer is used to determine

(a) water content and voids ratio

(b) specific gravity and dry density

(c) water content and specific gravity

(d) voids ratio and dry density

Q. In hydrometer analysis for a soil mass

(a) both meniscus correction and dispersing agent correction are additive

(b) both meniscus correction and dispersing agent correction are subtractive

(c) meniscus correction is additive and dispersing agent correction is subtractive

(d) meniscus correction is subtractive and dispersing agent correction is additive

Q. The relationship between water content (w%) and number of blows (N) in soils, as obtained from Casagrande's liquid limit device, is given by

$$w = 20 - \log_{10} N$$

The liquid limit of soil is:

(a) 15.6% (b) 16.6%

(c) 17.6% (d) 18.6%

$N = 25$

$w = 20 - \log_{10} 25$

$= 20 - 2 \log 5$

$= 18.6\%$

log 2
log 3
log 5

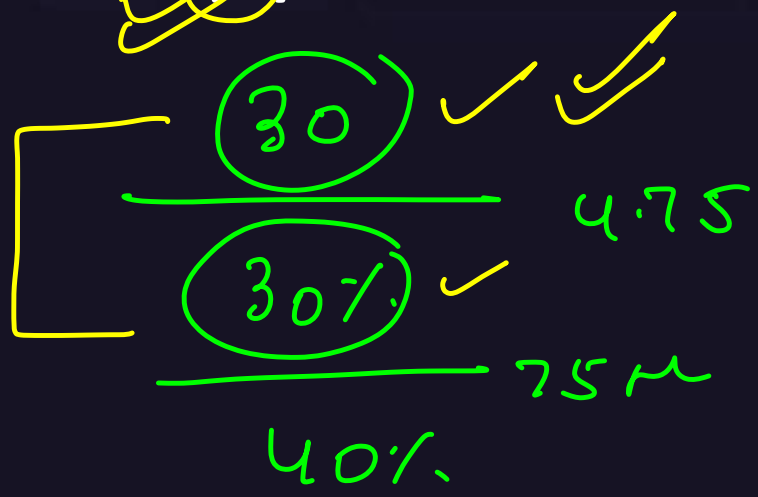
Q. In a soil specimen, 70% of particles are passing through 4.75 mm IS sieve and 40% of particles are passing through 75 μ IS sieve. Its uniformity coefficient is 8 and coefficient of curvature is 2. AS per IS classification, this soil is classified as

(a) SP (b) GP (c) SW (d) GW

$C_u > 6$

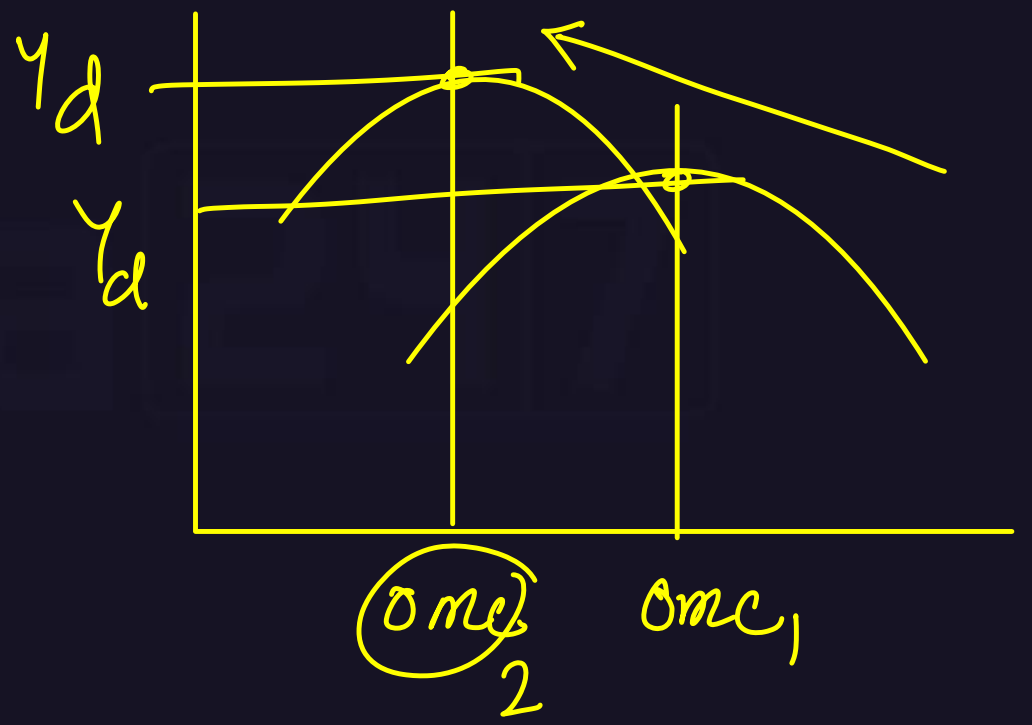
8

$1 < C_c < 3$



Q. When the compactive effort is increased in a standard compaction test, the Optimum Moisture Content (OMC)

(a) Decreases
(b) Increases
(c) Does not change
(d) Is unpredictable



Q. Compaction of soil is measured in terms of

(a) dry density (b) specific gravity

(c) compressibility (d) permeability

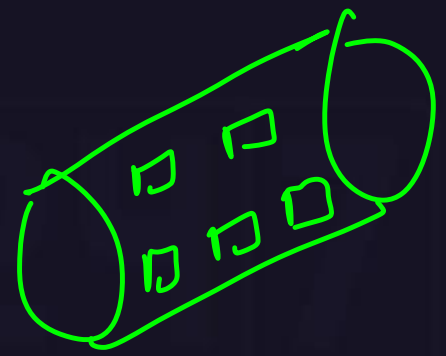
Q. Why are sheep foot rollers more effective in compacting clayey soils?

(a) There is differential expulsion of water under the roller

(b) Contact pressure is high

(c) Roller speed is high

(d) Drum width is large



Q. Approximate ratios of the permeabilities of two clean soils having D_{10} = 0.6 mm and D_{10} = 0.3 mm respectively is

(a) 4.0 (b) 3.75 (c) 4.25 (d) 3.5

$K \propto D_{10}^2$

$K = CD_{10}^2$

$\frac{K_1}{K_2} = \left(\frac{0.6}{0.3}\right)^2$

$= 4$

Q. Due to rise in temperature, the viscosity and the unit weight of the percolating fluid are reduced to 60% and 90% respectively. If other things remain constant, the coefficient of permeability

(a) Increases by 25%
(b) Increases by 50%
(c) Increases by 33.3%
(d) Decreases by 33.3%

$$K \propto \frac{\gamma}{\mu} \frac{e^3}{1+e} d^2$$

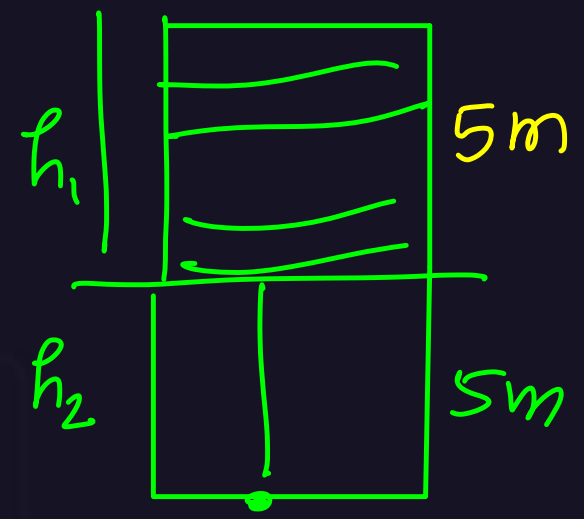
$$= \frac{0.9}{0.6}$$

$$= 1.5$$

Q. The water level in a lake is 5 m above the bed. The saturated unit weight of the lake bed soil is 20 kN/m³. The unit weight of water is 10 kN/m³. The effective vertical stress at 5 m depth below the lake bed is

(a) 50 kN/m² (b) 75 kN/m²

(c) 100 kN/m² (d) 150 kN/m²



$\sigma' = \sigma - u$

$u = \gamma_w (h_1 + h_2)$

$\sigma = \gamma_w h_1 + \gamma_{sat} h_2$

$\sigma' = (\gamma_{sat} - \gamma_w) h_2$

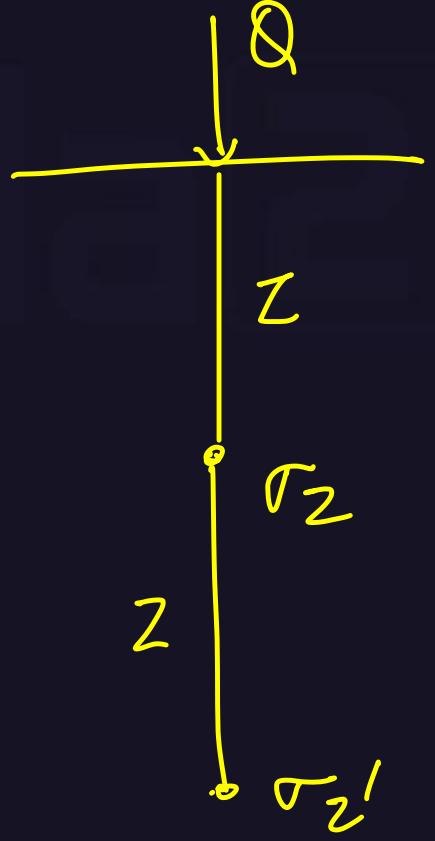
$= (20 - 10) 5$

Q. σ_z is the vertical stress at a depth equal to z in the soil mass due to a surface point load Q. The vertical stress at depth equal to 2z will be

(a) $0.25\sigma_z$ (b) $0.50\,\sigma_z$

(C) $1.0\,\sigma$ (d) $2.0\,\sigma$

$\sigma_z \propto \frac{Q}{z^2}$



$\sigma_z' \propto \frac{Q}{(2z)^2}$

$\sigma_z' = \frac{\sigma_z}{4}$

Q. In case of 2-way slab, the limiting deflection of the slab is

(a) primarily a function of the long span

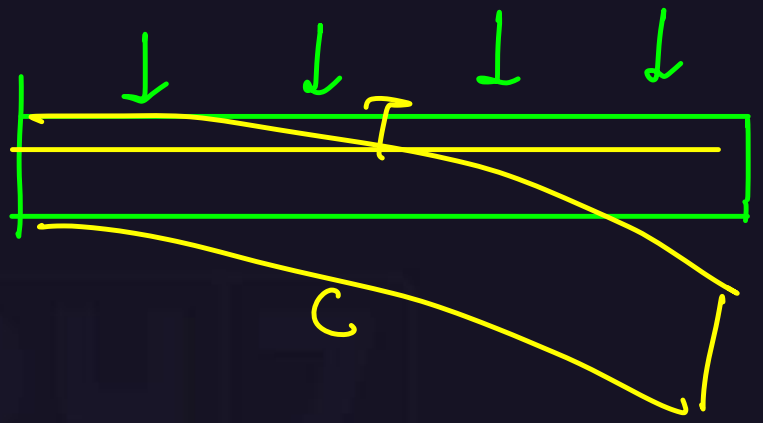
(b) primarily a function of the short span

(c) independent of long or short spans

(d) dependent on both long and short spans

Q. In a cantilever beam carrying gravity load, main reinforcement is provided

(a) above the neutral axis
(b) as vertical stirrups
(c) as a helical reinforcement
(d) below the neutral axis



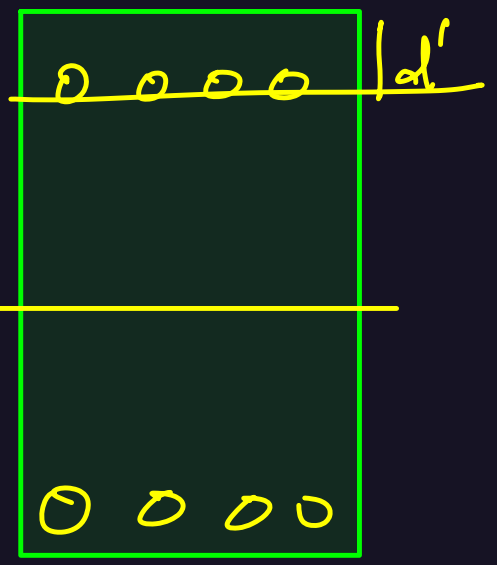
Q. A doubly reinforced concrete beam has effective cover d' to the centre of compression reinforcement. 'x' is the depth of neutral axis and 'd' is the effective depth to the centre of tension reinforcement. What is the maximum strain in concrete at the level of compression reinforcement?

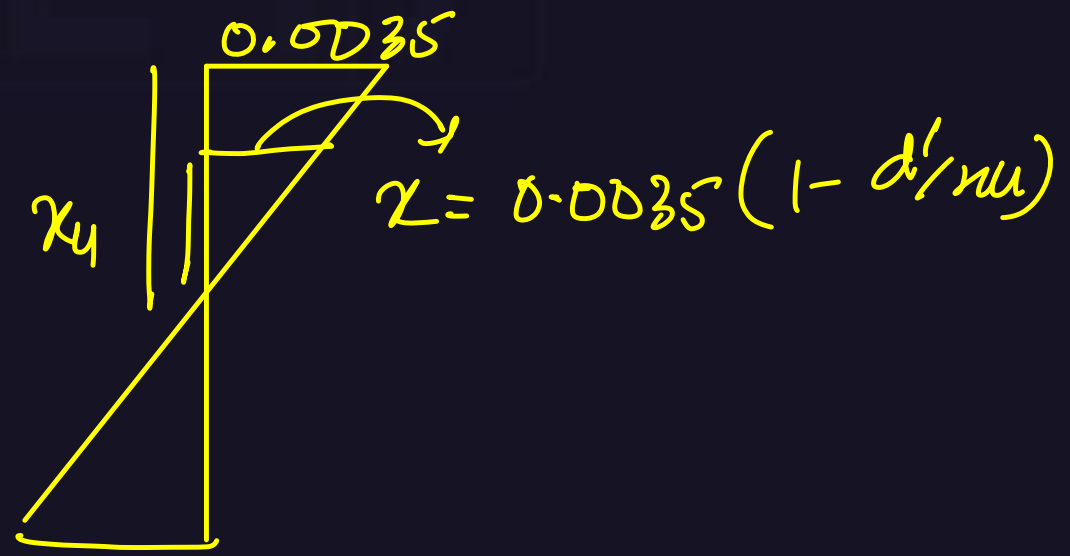
(a) $0.0035\ (1 - d'/d)$

(b) $0.0035\ (1 - d'/x_u)$

(c) $0.002\ (1 - d/x_u)$

(d) $0.002\ (1 - d'/d)$





Q. In limit state design method, the moment of resistance for a balanced section using M20 grade concrete and HYSD steel of grade Fe 415 is given by $M_{uljm} = Kbd^2$, what is the value of K?

(a) 2.98 (b) 2.76 (c) 1.19 (d) 0.89

$M_{ulim} = 0.138 f_{ck} bd^2$

$= (0.138 \times 20)\ bd^2$

2.76

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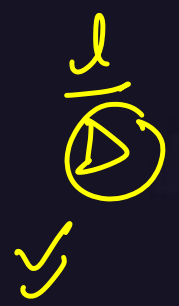
Q. A continuous beam is deemed to be a deep beam when the ratio of effective span to overall depth (l/D) is less than

(a) 1.5 (b) 2.0 (c) 2.5 (d) 3.0



2 → SS

2.5 → Cont.

Q. Which one of the following statements about the percentage of tensile steel required to produce a balanced reinforced concrete section is correct?
The required percentage of steel

(a) Reduces as the yield strength of steel increases
(b) Remains unchanged irrespective of the yield strength of steel
(c) Is the same for a given quality of steel irrespective of whether working stress method is followed or ultimate load method is used
(d) Is only a function of the modulus of elasticity of steel.

$C = T$ ✓

$x_u = x_{u\,lim}$

✓

$\frac{A_{st}}{bd} \propto \frac{1}{f_y}$

$0.36 f_{ck} b x_{u\,lim} = 0.87 f_y A_{st}$

Q. In the reinforced concrete slab, the spacing between main reinforcement should not exceed

(a) Three times its effective depth
(b) Four times its effective depth
(c) Five times its effective depth
(d) Six times its effective depth

3d & 300mm

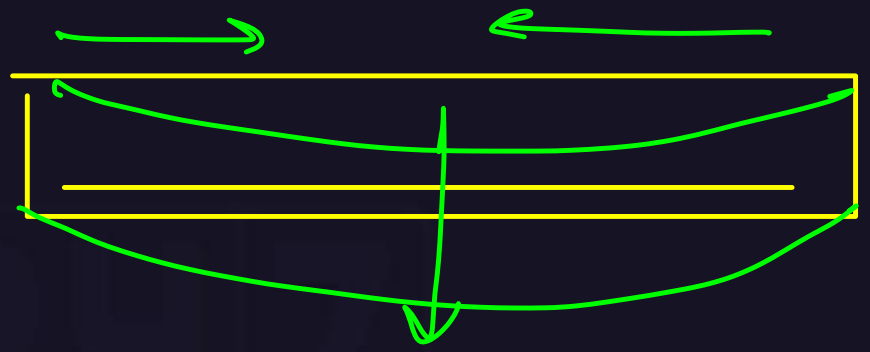
(5d & 300)

Q. The reinforced concrete beam curved in plane is designed for

(a) Bending moment and shear
(b) Bending moment and torsion
(c) Bending moment and torsion
(d) Bending moment, shear and torsion

Q. Due to shrinkage stresses, a simply supported beam having reinforcement only at bottom tends to :

(a) deflect downward
(b) deflect upward
(c) deflect downward or upward
(d) None of the above



Q. A reinforced cantilever beam of span 4 m has a cross-section of 150 x 500 mm. If checked for lateral stability and deflection, the beam will

(a) fail in deflection only

(b) fail in lateral stability only

(c) fail in both deflection and lateral stability

(d) satisfy the requirements of deflection and lateral stability

$\frac{l}{d}$ ≯ 7 ✗

4000 / 375

$L \not> 25b$

$= 25 \times 150$

$= 3750$

$4000 > 25b$

fail 3750

Q. A two way RCC slab is simply supported on all its edges with corners free to lift. The area of steel in the short span is 412 mm^2 The torsional reinforcement required at corner is -

(a) 309 mm^2 (b) 206 mm^2

(c) 155 mm^2 (d) 247 mm^2

$\frac{3}{4} \times 412$ (103)

$= 309$

Q. Which of the following statements is incorrect?

(a) Minimum cross-sectional area of longitudinal reinforcement in a column is 0.8%.

(b) Spacing of longitudinal bars measured along the periphery of column should not exceed 300 mm.

(c) Reinforcing bars in a column should not be less than 12 mm in diameter.

(d) The number of longitudinal bars provided in a circular column should not be less than four.

six

Q. An axially loaded column is of 300 mm x 300 mm size. Effective length of column is 3 m. What is the minimum eccentricity of the axial load for the column?

(a) 0 (b) 10 mm (c) 16 mm (d) 20 mm

$$e_{min} = \max\left\{ \frac{L}{500} + \frac{B}{30} = \frac{3000}{500} + \frac{300}{30} = 16 \right.$$

$$\left. 20\,mm = 20 \right\}$$

$$\underline{\underline{20\,mm}}$$

Q. The standard Symons' type raingauge has a collecting area of diameter

(a) 12.7 cm (b) 10 cm

(c) 5.08 cm (d) 25.4 cm

12.7 cm

Q. The Double mass curve technique is adopted to :-

(a) check the consistency of raingauge records

(b) to find the average rainfall over a number of years

(c) to find the number of rainguages required

(d) to estimate the missing rainfall data

Q. According to Indian Standards, the number of raingauge stations for an area of 5200 km^2 in plains should be :-

(a) 10 (b) 15 (c) 20 (d) 40

520 km^2 → 1

5200 km^2 → 10

Q. Consumptive use of water for a crop represents

(a) The transpiration needs of the crop

(b) evaporation needs of the cropped area

(c) evapotranspiration needs of the cropped area plus the minor quantity required in plant metabolism

(d) None of the above

Q. Commonly adopted moisture tension, in atmosphere, of a soil at permanent wilting point is

(a) 15 (b) 7 (c) 45 (d) 150

7-8

7

7-32

Q. The outlet discharge factor is

(a) the ratio of the actual discharge of an outlet to its designed value

(b) the ratio of the discharge out of an outlet to the discharge in the parent channel

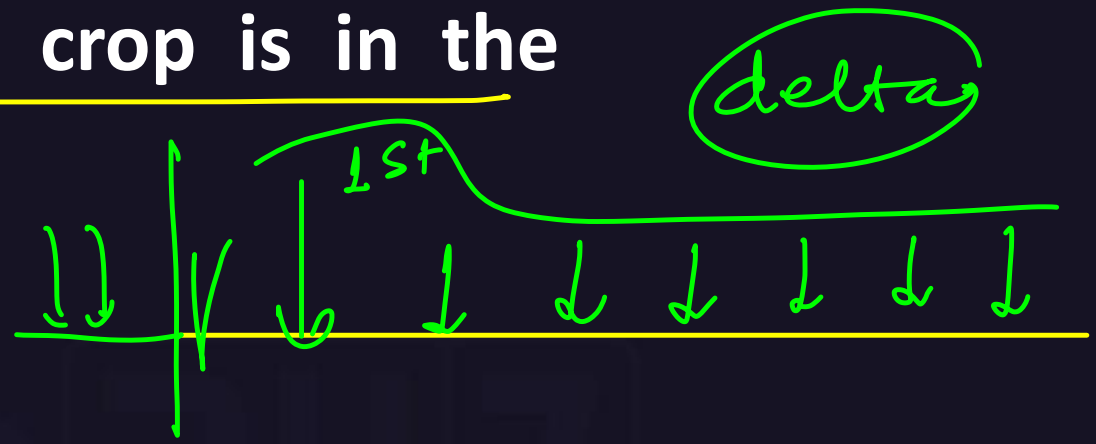
(c) the duty based on the discharge passing through the outlet

(d) the flow loss at the outlet

Q. The total depth of water required by a crop during the entire period, the crop is in the field is called

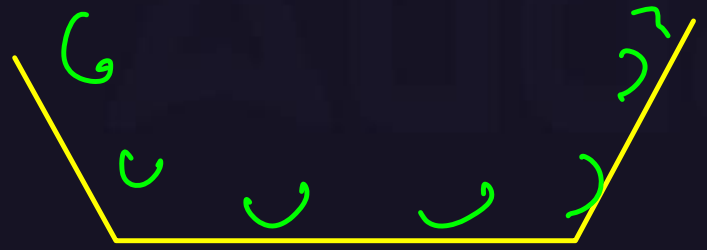
(a) duty (b) delta

(c) base period (d) crop period



Q. Lacey assumed that the slit is kept in suspension because of normal components of eddies generated from

(a) bed only
(b) sides only
(c) whole perimeter
(d) None of these



Q. If the discharge of a river is 3.0 cumec per meter width and the silt factor is 1.2, Lacey's scour depth will be

(a) 1.50 m (b) 4.00 m (c) 2.64 m (d) 4.50 m

$$d_s = 1.35\left(\frac{q^2}{f}\right)^{1/3}$$

$$= 1.35\left(\frac{(3)^2}{1.2}\right)^{1/3}$$

$$1.35 \times 2 = 2.7$$

$$\left(\frac{15}{2}\right)^{2/3} = 7.5$$

$$\frac{30}{4}\,\frac{15}{2}$$

Q. The difference between the most probable value of a quantity and its observer value is

(a) true error

(b) weighted observations

(c) conditional error

(d) residual error

Q. An invar tape is made of an alloy of

(a) copper and steel
(b) brass and nickel
(c) brass and steel
(d) nickel and steel

Q. If L is the measured length of a line, then the compensating errors are proportional to

(a) L^3 (b) L^2

(C) L (d) $\sqrt{L}$

$\propto \sqrt{L}$

Q. The maximum tolerance in a 20 m chain is

(a) ± 2 mm (b) ± 3 mm

(c) ± 5 mm (d) ±8 mm

± 5 mm

30 m

↳ ± 8 mm

Q. A 30 m metric chain is found to be 0.1 m too short throughout the measurement. If the distance measured is recorded as 300 m. then the actual distance measured will be:-

(a) 300.1 m (b) 301.0 m

(c) 299.0 m (d) 310.0 m

$29.9 \times 300 = 30 \times l$

$l = 299$

Q. A negative declination shows that the magnetic meridian is to the

(a) eastern side of the true meridian

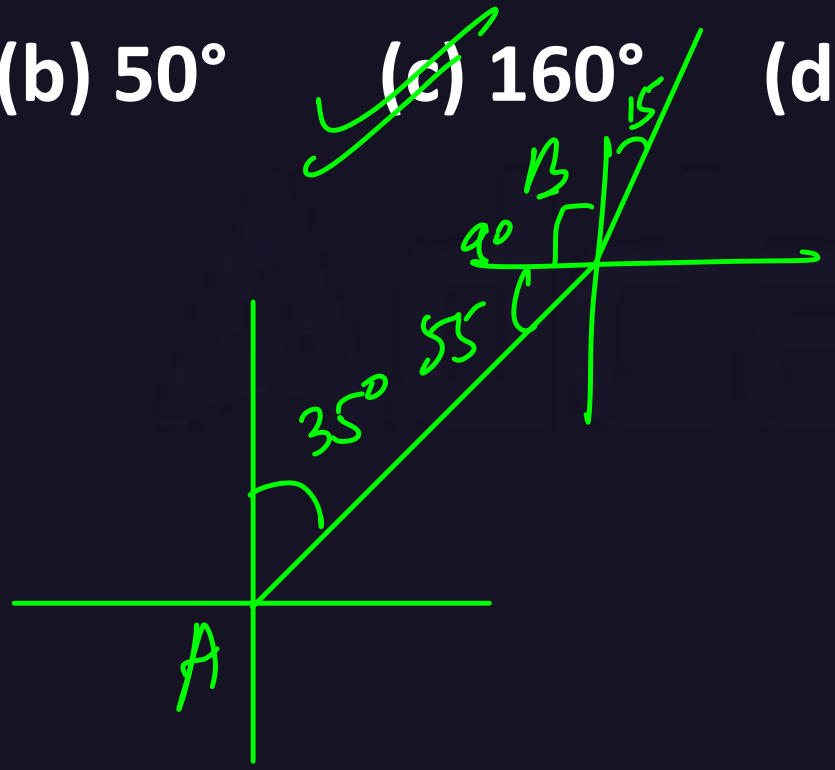
(b) western side of the true meridian

(c) southern side of the true meridian

(d) None of the above

Q. If the forebearing of a line AB is 35° and that of line BC15°, then the included angle between the lines is

(a) 20°(b) 50° (c) 160° (d) 230°



55 + 90 + 15

160°

Q. In an old map a line was drawn to a magnetic bearing of 10°30', the magnetic declination being 2° East at that time. The magnetic bearing to which the line should be set now if the present magnetic declination is 4°30' west

(a) 17° (b) 15° (C) 10° (d) 8°

$TB = 10°30' + 2°$

$= 12°30'$

$TB = MB - \delta w$

$12°30' = MB - 4°30'$

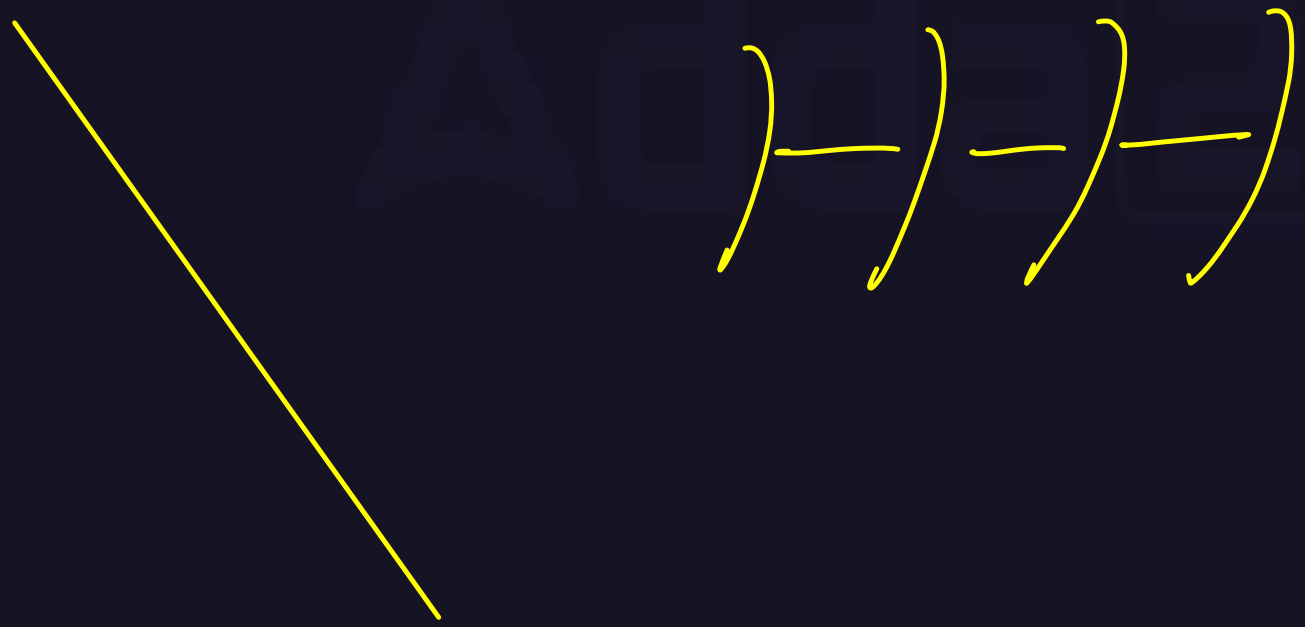
$MB = 12°30' + 4°30'$

$\boxed{MB = 17°}$

Q. A series of closely spaced contour lines - epresents a :-

(a) steep slope (b) gentle slope

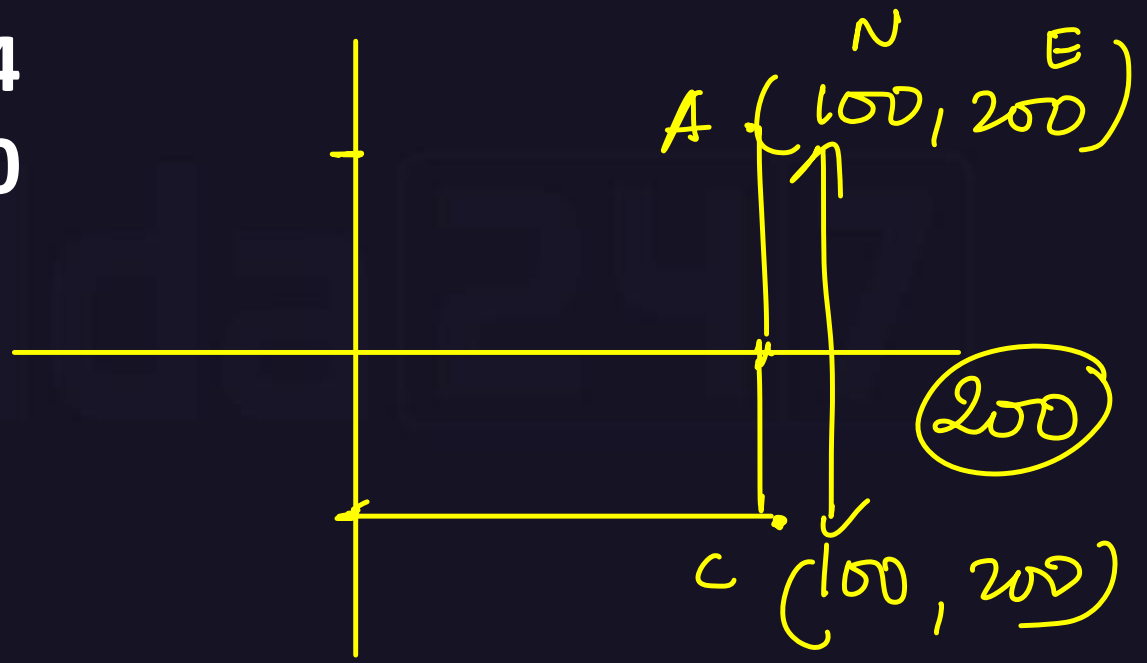
(c) uniform slope (d) plane surface



Q. If the coordinates of A are 100 N and 200 E and those of C are 100 S and 200 E, then the length AC is

(a) 400.00 (b) 282.84

(c) 244.94 (d) 200.00

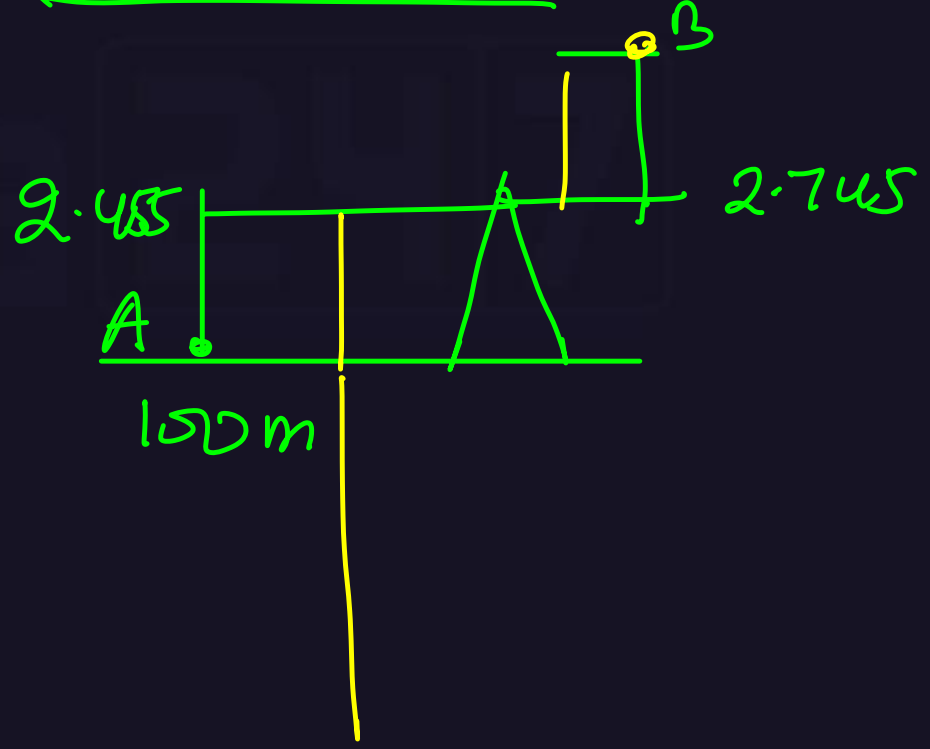


Q. The RL, of the point A which is on the floor is 100 m and back sight reading on A is 2.455 m. If the foresight reading on the point B which is one the ceiling is 2.745 m, the RL of point B will

(a) 94.80 m (b) 99.71 m

(c) 100.29 m (d) 105.20

100 + 2.455 + 2.745



Q. The time by which a particular activity can be delayed without affecting the preceding and succeeding activities is known as

(a) Total Float (b) Free Float

(c) Interfering Float (d) Independent Float

Q. The probability distribution taken to represent the completion time in PERT analysis is

(a) gamma distribution
(b) normal distribution
(c) Beta distribution
(d) Log normal distribution

Q. CPM analysis presumes that

(a) activities are divided properly and carried out

(b) times are related to costs

(c) events are logically devised & stipulated

(d) all uncertainties involved have been accounted for

Q. In a PERT network, expected project duration is found to be 36 days from the start of the project The variance is four days. The probability that the project will be completed in 36 days is:

(a) zero (b) 34%

(c) 50% (d) 84%

$\sigma = \sqrt{4} = 2$

$Z = \frac{x - \bar{x}}{\sigma} = \frac{36 - 36}{\sigma}$

$= 0$

50%

Q. In time-cost optimization of a project, crashing is done

(a) on all the activities

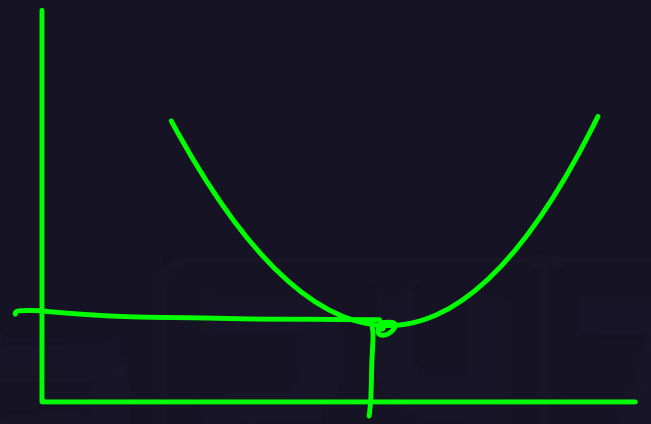
(b) on all the activities lying on the critical paths

(c) only on activities lying on the original critical path and having flatter cost slopes

(d) on original critical activities and those that become critical

Q. Total project cost versus item curve is a/an

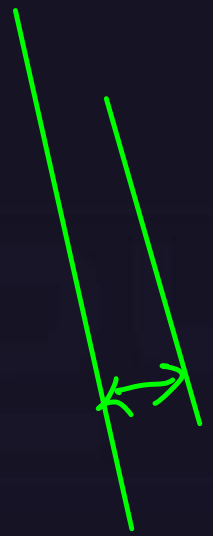
(a) S-shaped curve
(b) parabola
(c) U-shaped curve
(d) straight line



Q. Maximum value of 'throw of switch' for Broad Gauge track is

(a) 89 mm (b) 95 mm

(c) 100 mm (d) 115 mm



Q. Minimum composite sleeper index prescribed on Indian Railways for a track sleeper is

(a) 552 (b) 783

(c) 1352 (d) 1455

Track sleeper → 783

Crossing sleeper → 1352

Bridge sleeper → 1455

Q. The length of National Highways as per 3rd 20 year (Lucknow) road plan is given by

(a) area of the country/75

(b) area of the country/50

(c) area of the country/40

(d) area of the country/25

$$NH\ (km) = \frac{Area\ (km^2)}{50}$$

$$SH = \frac{Area}{25}$$

Q. In 1927, Jayakar committee was set up to examine and report on road development in India, based on which certain institutions were subsequently set up. Which of the following were the direct out come of Jayakar committee recommendations.

1. Indian Road Congress
2. Central Road Fund
3. CRRI
4. National Highway Act

(a) 1,2 and 3 (b) 2, 3 and 4
(c) 1,3 and 4 (d) All the above

Q. Nagpur road plan has recommended the use of road pattern type of

1943 - 63

(a) star and circular pattern
(b) star and block pattern
(c) star and grid pattern
(d) star and hexagonal pattern

Q. The shape of the camber, best suited for cement concrete pavements, is

(a) Straight line
(b) Parabolic
(c) Elliptical
(d) Combination of straight and parabolic

Q. For water bound macadam roads in localities of heavy rainfall, the recommended value of camber is

(a) 1 in 30 (b) 1 in 33

(c) 1 in 48 (d) 1 in 60

Heavy Rain

1 in 33

Light Rain

1 in 40

Q. Coefficient of friction is less when the pavement surface is

(a) rough

(b) dry

(c) smooth and dry

(d) smooth and wet

Q. The desirable length of overtaking zone as per IRC recommendation is equal to :-

(a) overtaking sight distance

(b) two times the overtaking sight distance

(c) three times the overtaking sight distance

(d) five times the overtaking sight distance

min. length

3 X OSD

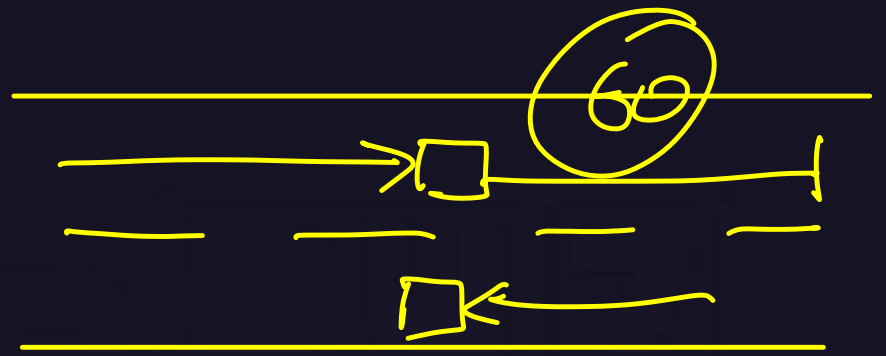
Desirable

5 X OSD

Q. If the stopping distance is 60 metres, then the minimum stopping sight distance for two lane, two way traffic is :-

(a) 30 m (b) 60 m

(c) 120 m (d) 180 m



Q. The ruling design speed on a National Highway in plain terrain as per IRC recommendation is

(a) 60kmph (b) 80kmph

(c) 100kmph (d) 120kmph

	ruling	min.
NH	100	80
MDR	80	65
ODR	65	50
VR	50	40

Q. The equilibrium superelevation required to counteract the centrifugal force fully is given by:-

(a) $\frac{V^2}{27.5\,R}$

(b) $\frac{V^2}{75\,R}$

(c) $\frac{(0.75\,V)^2}{127\,R}$

(d) $\frac{V^2}{127\,R}$

$\frac{V^2}{127R}$

Q. The maximum width of a vehicle as recommended by IRC is

(a) 1.85 m (b) 2.44 m

(c) 3.81 m (d) 4.72 m

width

2.44 m

height

3.8 m

Double

4.75 m

Q. The off-tracking of a vehicle having a wheel base of 6.0 m and negotiating a curved path of mean radius 25 m is :-

(a) 0.82 m (b) 0.72 m

(c) 0.65 m (d) 1.44 m

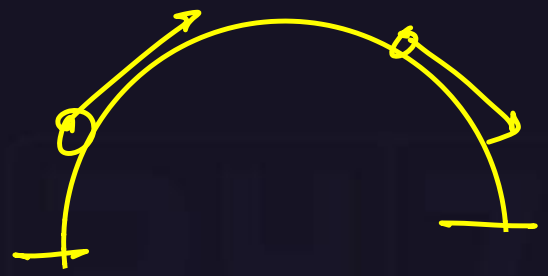
$$E_{mw} = \frac{nl^2}{2R} = \frac{(6)^2}{2 \times 25}$$

$$= \frac{36}{50} = 0.72$$

Q. The ideal form of curve for the summit curve is

(a) spiral (b) parabola

(c) circle (d) lemniscate



Q. The reaction time for calculation of stopping distance may be assumed as:-

(a) 5 secs (b) 2.5 secs

(c) 0.5 secs (d) 10.0 secs

$t_R = 2.5$ sec.

OSD

2 sec

Q. The reaction time for calculation of stopping distance may be assumed as

(a) 5 secs (b) 2.5 secs (c) 0.5 secs (d) 10.0 secs

Q. Stopping sight distance is the minimum distance available on a highway which is the

a) distance of sufficient length to stop the vehicle without collision

b) distance visible to a driver during night driving

(c) height of the object above the road surface

(d) distance equal to the height of the driver's eye above the road surface

Q. The design value of lateral friction coefficient on highway is

(a) 1.5 (b) 0.50

(c) 0.35 (d) 0.15

Q. Parabolic camber is preferred for

(a) slow moving vehicle (b) steel tyred vehicle

(c) fast moving vehicle (d) all the above

Q. The compensated gradient provided at the curve of radius 60 m with a ruling gradient of 6 percent is:

(a) 5.25% (b) 4.75%

(c) 4.5% (d) 3.75%

$\frac{30+R}{R}$ $\frac{75}{R}$ $\frac{75}{60}$

1.25

6% − 1.25

4.75 %

Q. The rate of change of radial acceleration as per IRC recommendations for computing length of transition curve for a vehicle with design speed 1/ kmph is given by :-

(a) $\frac{85}{70+V}$ m/sec^3 (b) $\frac{65}{70+V}$ m/sec^3

(c) $\frac{80}{75+V}$ m/sec^3 (d) $\frac{72}{65+V}$ m/sec^3

Q. The absolute minimum radius for a horizontal curve designed for speed of 100 kmph given the permissible values of super elevation 0.08 and coefficient of friction 0.12 will be

(a) 394 m (b) 295 m
(c) 364 m (d) 225 m

$$e + f = \frac{v^2}{127R}$$

$$(0.08 + 0.12) = \frac{(100)^2}{127R}$$

$$R = 394\ m$$

Q. Which of the following is indicated by a warning sign?

(a) level crossing
(b) no parking
(c) end of speed limit
(d) overtaking prohibited

Q. Maximum number of vehicles can be parked with

(a) parallel parking
(b) 30° angle parking
(c) 45° angle parking
(d) 90° angle parking

Q. Moving car observer method is a procedure

(a) to find the traffic flow of traffic stream

(b) to estimate the traffic capacity of a road section

(c) to carry out origin-destination studies

(d) to identify accident prone locations on highways

Q. Desire lines are drawn based on

(a) spot speed studies
(b) traffic volume studies
(c) accident studies
(d) origin and destination studies

Q. The PCU (passenger car unit) value for car on an urban road is

(a) 0.5 (b) 1.0

(c) 3.0 (d) 4.0

Q. Traffic flow equation for a section of road is u = 80 - 0.7 K where 'u' is the speed in kmph and 'K is the density in vpkm (vehicles per km). The maximum expected flow is

(a) 4572 vph (b) 2286 vph

(c) 1143 vph (d) 572 vph

$\frac{80}{1.4} = K$

$q = ku = K(80 - 0.7K)$

$\frac{dq}{dK} = 80 - 1.4K = 0$

$K =$

$q = 2280$