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COUNTDOWN BEGINS

Transportation

CE

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Which of the following is the chronological sequence in regard to road construction/design development?

- (a) Telford, Tresaguet, C.B. R., Macadam.**
- (b) Tresaguet, Telford, Macadam, C.B.R.**
- (c) Macadam, C.B.R., Tresaguet, Telford**
- (d) Tresaguet, Macadam, Telford, C.B.R.**

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

Below are two lists:

List-I	List-II
A. Primary road system	1. Population distribution
B. Economic studies	2. Expressways
C. Engineering studies	3. Traffic volume
D. Road use studies	4. Topographic details

Codes:

	A	B	C	D
(a)	2	1	4	3
(b)	4	3	2	1
(c)	2	3	4	1
(d)	4	1	2	3

The maximum super elevation to be provided on a road curve is 1 in 15. If the rate of change of super elevation is specified as 1 in 120 and the road width is 10 m, then the minimum length of the transition curve on either end will be

- (a) 180 m (b) 125 m
(c) 80 m (d) 30 m

A summit curve is formed at the intersection of a 3% up gradient and 5% down gradient. To provide a stopping distance of 128 m, the length of summit curve needed will be

- (a) 271 m (b) 298 m
(c) 322 m (d) 340 m

Which of the following are the criteria associated with the design of sag vertical curve?

1. Provision of minimum stopping distance during day time.
2. Adequate drainage.
3. Comfortable operation
4. Pleasant appearance.

Select the correct answer using the codes given below:

- | | |
|----------------|-------------|
| (a) 1, 2 and 4 | (b) 2 and 3 |
| (c) 2, 3 and 4 | (d) 1 and 3 |

Assuming the safe stopping sight distance to be 80 m on a flat highway section and with a setback distance of 10 m, what would be the radius of the negotiable horizontal curve?

- (a) 800 m (b) 160 m
(c) 80 m (d) 70 m

Which of the criteria given below are used for the design of valley vertical curves on roads?

1. Rider comfort.
2. Headlight sight distance
3. Drainage

Select the correct answer using the codes given below:

- | | |
|----------------|-------------|
| (a) 1, 2 and 3 | (b) 1 and 3 |
| (c) 2 and 3 | (d) 1 and 2 |

For a circular curve of radius 200 m, the coefficient of lateral friction of 0.15 and the design speed is 40 kmph. The equilibrium superelevation (for equal pressure on inner and outer wheel) would be

(a) 21.3

(b) 7

(c) 6.3

(d) 4.6

If a descending gradient of 1 in 25 meets an ascending gradient of 1 in 40, then the length of valley curve required for a headlight sight distance of 100 m will be

- | | |
|-----------|-----------|
| (a) 30 m | (b) 130 m |
| (c) 310 m | (d) 630 m |

An ascending gradient of 1 in 100 meets a descending gradient of 1 in 50. The length of summit curve required to provide overtaking sight distance of 500 m will be

- (a) 938 m (b) 781 m
(c) 470 m (d) 170 m

Which one of the following expressions gives intermediate sight distance as per I.R.C. standards? (SSD : stopping sight distance ; OSD : overtaking sight distance)

(a) 2 SSD

(b) $\frac{(SSD + OSD)}{2}$

(c) $\frac{(OSD - SSD)}{2}$

(d) 2 OSD

Total reaction time of a driver does not depend upon

- (a) Perception time
- (b) Brake reaction time
- (c) Condition of mind of the driver
- (d) Speed of vehicle

A horizontal curve of 480 m for 7.5 m two-lane road is to be designed for a speed of 80 kmph. The raising of the outer edge of the pavement with respect to the inner edge to cater to the mixed traffic condition is

- (a) 0.14 m (b) 0.22 m
(c) 0.24 m (d) 0.27 m

While driving at a speed of 30 kmph (with available friction 0.4) down the grade, the driver requires a braking distance twice that required for stopping the vehicle when he travels up the same grade. The grade is

- (a) 7% (b) 10.6%
(c) 13.3% (d) 33.3%

Consider the following factors :

1. Reaction time
2. Speed
3. Coefficient of longitudinal friction
4. Gradient

Which of these factors are taken into account for computing braking distance ?

- (a) 1 and 3 (b) 1, 2 and 4
(c) 2, 3 and 4 (d) 2 and 3

Which of the following are the accepted criteria for design of valley curve for highways?

1. Headlight sight distance
2. Passing and non-passing sight distance
3. Aesthetic consideration
4. Motorist comfort
5. Drainage control

Select the correct answer using the codes given below :

- (a) 1, 2, 3 and 4 (b) 1, 3, 4 and 5
(c) 2, 3, 4 and 5 (d) 1 and 5

For a given road, safe stopping sight distance is 80 m and passing sight distance is 300 m. What is the intermediate sight distance?

- (a) 220 m (b) 190 m
(c) 160 m (d) 150 m

Consider the following statements : A transition curve is provided on a circular curve on a highway to provide

1. gradual introduction of centrifugal force
2. minimum stopping sight distance
3. gradual introduction of super elevation
4. comfort and security to passengers

Which of the statements given above are correct?

- (a) 1, 2 and 3 (b) 1, 3 and 4
(c) 2, 3 and 4 (d) 1, 2 and 4

What will be the ruling radius of a horizontal curve on a national highway for a design vehicle speed of 100 km/h assuming allowable super elevation to be 7% and lateral friction as 0.13?

- (a) 405 m (b) 395 m
(c) 385 m (d) 375 m

Which of the following are requirements for the design of a transition curve for a highway system?

1. Rate of change of grade
2. Rate of change of radial acceleration
3. Rate of change of super elevation
4. Rate of change of curvature

Select the correct answer using the code given below :

- | | |
|----------------|----------------|
| (a) 1, 2 and 3 | (b) 2, 1 and 4 |
| (c) 1, 3 and 4 | (d) 2, 3 and 4 |

What is the minimum length of a transition curve for a design speed of 80 kmph in a horizontal curve of 240 m radius ?

(a) 32 m

(b) 42 m

(c) 52 m

(d) 72 m

The design speed of a highway is 80 km/hr and the radius of circular curve is 150 m in plain topography. Which one of the following is the minimum length of transition curve?

- (a) 115 m (b) 85 m
(c) 65 m (d) 43 m

A rising gradient of 1 in 50 meets a falling gradient of 1 in 30. Which one of the following is the length of vertical curve if the stopping sight distance is 120 m?

- (a) 174 m (b) 158 m
(c) 140 m (d) 120 m

If a road surface is adequately super-elevated on horizontal curve, which one of the following is the proper distribution of pressure on the vehicle wheels?

- (a) Pressure on both outer and inner wheels is equal
- (b) Pressure on inner wheels is more than the outer wheels
- (c) Pressure on inner wheels is less than the outer wheels
- (d) Pressure on front wheels is thrice the pressure on rear wheels

If superelevation is not provided on a horizontal curve of a highway, then on which portion of the road, are pot holes likely to develop?

- (a) Outer edge of road (b) Inner edge of road
(c) Centre of road (d) Shoulder of road

Full amount of superelevation on a horizontal curve is provided at the

- (a) beginning of the transition curve
- (b) centre of the circular curve
- (c) end of the transition curve
- (d) centre of the transition curve

A 3% downgrade curve is followed by a 1% upgrade curve and rate of change of grade adopted is 0.1% per 20 m length. The length of the respective vertical curve is :

- (a) 800 m (b) 200 m
(c) 100 m (d) 400 m

List-I	List-II
A. Lateral friction	1. Disparity between relevant travel distances
B. Cut-off lagoons	2. Vehicle movement on a curve
C. Skid	3. Summit curves
D. Sight distance	4. Prevention of flooding

Code:

	A	B	C	D
(a)	2	1	4	3
(b)	3	1	4	2
(c)	2	4	1	3
(d)	3	4	1	2

An ideal horizontal transition curve is a

- (a) Parabola
- (b) Circle
- (c) Clothoid spiral
- (d) Hyperbola

If R is the radius of the curve and L is the length of the long chord, the shift of the curve is (all in metre units)

(a) $\frac{L^2}{R}$

(b) $\frac{L^2}{2R}$

(c) $\frac{L^2}{24R}$

(d) $\frac{L^2}{6R}$

For a bituminous carriageway surface having 2% camber and design speed of 100 kmph, radius beyond which super elevation is not essential is nearly

- (a) 1100 m (b) 1500 m
(c) 1800 m (d) 2200 m

The rate of super elevation for a horizontal curve of radius 500 m in a national highway for a design speed of 100 kmph is :

(a) 0.04

(b) 0.063

(c) 0.07

(d) 0.70

While aligning a hill road with a ruling gradient of 6%, a horizontal curve of 75 m radius is encountered. The compensated gradient at the curve will be

- (a) 1% (b) 2%
(c) 3% (d) 5%

A four-lane divided highway, with each carriageway being 7.0 m wide, is to be constructed in a zone of high rainfall. In this stretch, the highway has a longitudinal slope of 3% and is provided a camber of 2%. What is the hydraulic gradient on this highway in this stretch?

- (a) 4.0% (b) 3.6%
(c) 4.5% (d) 3.0%

A descending gradient of 4% meets an ascending grade of 1 in 40 where a valley curve of length 200 m is to be formed. What will be the distance of the lowest point on the valley curve from its first tangent point?

- (a) 100 m (b) 111 m
(c) 125 m (d) 118 m

What will be the non-passing sight distance on a highway for a design speed of 100 kmph when its ascending gradient is 2%? Assume coefficient of friction as 0.7 and brake efficiency as 50%.

- (a) 176 m (b) 200 m
(c) 150 m (d) 185 m

The rate of equilibrium superelevation on a road is

1. Directly proportional to the square of vehicle velocity
2. Inversely proportional to the radius of the horizontal curve
3. Directly proportional to the square of the radius of the horizontal curve

Which of the above statements are correct?

- (a) 1 and 2 only (b) 1 and 3 only
(c) 2 and 3 only (d) 1, 2 and 3

Consider two cars approaching from the opposite directions at 90km/h and 60km/h. If the reaction time is 2.5s, coefficient of friction is 0.7 and brake efficiency is 50% in both the cases, the minimum sight distance required to avoid a head-on collision will be nearly

- (a) 154m (b) 188m
(c) 212m (d) 236m

What is the extra widening required (as nearest magnitude) for a pavement of 7m width on a horizontal curve of radius 200m, if the longest wheel of vehicle expected on the road is 6.5m and the design speed is 65km/h?

- (a) 0.3m (b) 0.5m
(c) 0.7m (d) 0.9m

The sight distance available on a road to a driver at any instance depends on

1. Features of the road ahead
 2. Height of the driver's eye above the road surface
 3. Height of the object above the road surface
- (a) 1 and 2 only (b) 1 and 3 only
(c) 2 and 3 only (d) 1, 2 and 3

Consider the following data:

Design speed = 96 kmph

Speed of overtaken vehicle = 80 kmph

Reaction time for overtaking = 2 sec

Acceleration = 2.5 kmph/sec

The safe overtaking sight distance on a two-way traffic road will be nearly

- (a) 646 m (b) 556 m
(c) 466 m (d) 376 m

Which one of the following conditions shall be fulfilled when a transition curve is inserted between the tangent and circular curve?

- (a) It should not meet the original straight tangentially.
- (b) It should not meet the circular curve tangentially
- (c) Its radius at the junction with the circular curve should be the same as that of the circular curve.
- (d) The rate of decrease of curvature along the transition curve should be same as that of increase in superelevation.

What is the value of headlight sight distance for a highway with a design speed of 65 kmphs? [Take $f = 0.36$ and $t = 2.5$ sec.]

- (a) 66.5 m (b) 81.3 m
(c) 91.4 m (d) 182.8 m

What is the minimum stopping sight distance on a -3.5% grade for a design speed of 110 kmph?

(Consider friction coefficient $f = 0.28$, $t = 2.5$ sec and $G = 0.035$).

- (a) 76.4 m (b) 194.4 m
(c) 214.6 m (d) 270.8 m

In desire-line diagram

- (a) width of desire-line is proportional to the number of trips in one direction
- (b) length of the desire-line is proportional to the number of trips in both directions
- (c) width of desire-line is proportional to the number of trips in both direction
- (d) both length and width of desire-line are proportional to the number of trips in both directions

Consider the following situations:

1. Traffic volume entering from all roads is less than 3000 vehicles per hour.
2. Pedestrian volume is high.
3. Total right turning traffic is high.
4. A road in a hilly region.

A rotary will be more suitable than control by signals, in situations listed against

- | | |
|-------------|-------------|
| (a) 1 and 3 | (b) 1 and 4 |
| (c) 2 and 4 | (d) 2 and 3 |

For the relationship $u = 55 - 0.44 k$, where 'u' is the speed in kmph and 'k' is the density in vpkm, what will be the maximum flow in vph?

- (a) 1718 (b) 1250
(c) 625 (d) 125

In which one of the following grades of a highway is an emergency escape ramp provided?

- (a) 1 in 200 (b) Zero grade
(c) Down grade (d) Up grade

Consider the following parameters related to a rotary intersection:

1. Width of the weaving section.
2. Length of the weaving section.
3. Proportion of weaving traffic.
4. Weaving angle.
5. Width of the carriageway at entry.

Capacity is generally expressed in terms of

- (a) 1, 2, 3 and 4 (b) 1, 2, 3 and 5
(c) 1, 2 and 3 (d) 4 and 5

A vehicle was stopped in two seconds by fully jamming the brakes. The skid marks measured 9.8 meters. The average skid resistance coefficient will be

- (a) 0.7 (b) 0.5
(c) 0.4 (d) 0.25

It was noted that on a section of road, the free speed was 80 kmph and the jam density was 70 vpkm. The maximum flow in vph that could be expected on this road is

- | | |
|----------|----------|
| (a) 800 | (b) 1400 |
| (c) 2800 | (d) 5600 |

It is a common practice to design a highway to accommodate the traffic volume corresponding to

- (a) 30th hour
- (b) Peak hour
- (c) ADT
- (d) 15-min peak period

Brake is applied on a vehicle which then skids a distance of 16 m before coming to stop. If the developed average coefficient of friction between the tyres and the pavements is 0.4, then the speed of the vehicle before skidding would have been nearly

- (a) 20 kmph (b) 30 kmph
(c) 40 kmph (d) 50 kmph

When two roads with two-lane, two-way traffic, cross at an uncontrolled intersection, the total number of potential major conflict points would be

- (a) 32 (b) 24
(c) 16 (d) 4

4. If the normal flows on two approach roads at an intersection are respectively 500 pcu per hr and 300 pcu per hr, the saturation flows are 1600 pcu per hr on each road and the total lost time per signal cycle is 16 s, then the optimum cycle time by Webster's method is

(a) 72.5 s

(b) 58 s

(c) 48 s

(d) 19.3 s

Consider the following factors:

1. Length of vehicle
2. Width of vehicle
3. Approach speed
4. Stopping time for approaching vehicle.
5. Passing sight distance

Which of these factors are taken into consideration for determining yellow time of a traffic signal at an intersection?

- (a) 1, 2 and 5 (b) 2, 3 and 4
(c) 1, 3 and 5 (d) 1, 3 and 4

Which one of the following is the purpose of divisional island?

- (a) To divert the traffic into definite travel path at the intersection
- (b) To reduce the speed of traffic entering the intersection
- (c) To divert traffic from obstacles and expedite the flow of traffic
- (d) To segregate opposing flow of traffic in a multi-lane highway

Based on '30th' hourly volume, for how much percent time during the year can the designer willingly tolerate the unfavourable operating conditions?

(a) 30

(b) 29

(c) 2.5

(d) 0.33

Which one of the following is taken into consideration for computing traffic capacity per lane of the highway?

- (a) Passenger cars and light vehicles
- (b) Trucks and buses
- (c) Two-wheelers
- (d) Equivalent of passengers cars

The lost time due to starting delay on a traffic signal approach is noted to be 3 seconds, the actual green time is 25 seconds and amber time is 3 seconds. How much is the effective green time?

- (a) 19 sec (b) 25 sec
(c) 27 sec (d) 31 sec

List-I	List-II
A. Spot speed	1. By video tape
B. Traffic volume	2. By road side interview
C. O-D survey	3. By Doppler radar
D. Parking survey	4. By pneumatic tube

Codes:

	A	B	C	D
(a)	3	1	2	4
(b)	2	4	3	1
(c)	3	4	2	1
(d)	2	1	3	4

List-I	List-II
A. Cloverleaf interchange	1. Informatory sign
B. Traffic studies	2. Traffic control device
C. Rotary island	3. Traffic flow
D. Road junction approach sign	4. Grade-separation

Codes:

	A	B	C	D
(a)	4	3	2	1
(b)	2	1	4	3
(c)	4	1	2	3
(d)	2	3	4	1

List-I	List-II
A. Traffic Volume	1. Number of vehicles occupying a unit length of road at a given instant of time.
B. Traffic Density	2. Number of vehicles passing a given point on road in a given unit of time in a given direction.
C. Traffic Regulations	3. Where all converging vehicles are forced to move in one direction around a large central traffic island
D. Rotary Intersection	4. Rules covering all aspects of control of vehicles, drivers and all other road users

Codes:

	A	B	C	D
(a)	2	4	1	3
(b)	3	1	4	2
(c)	2	1	4	3
(d)	3	4	1	2

Which of the following factors are not strictly related to design of traffic rotary intersections?

1. Radius of central island
2. Weaving length
3. Ramps and interchanges.
4. Acceleration lanes

Which one of the following equipments is useful in determining spot speed in traffic engineering?

- (a) Enoscope
- (b) Periscope
- (c) Radar
- (d) Tachometer

List-I	List-II
A. Traffic volume study method	1. Workspot interview
B. Speed and delay	2. Doppler radar
C. Spot-speed study	3. Floating car method
D. Multiple character studies	4. Automatic vehicle counter and classifier
	5. Electronic detector

Code:

	A	B	C	D
(a)	5	3	2	4
(b)	1	3	2	5
(c)	5	2	3	4
(d)	1	2	3	4

Traffic capacity is the :

- (a) Ability of roadway to accommodate traffic volume in terms of vehicles/hr
- (b) Number of vehicles occupying a unit length of roadway at a given instant expressed as vehicles/km
- (c) Capacity of lane to accommodate the vehicles widthwise (across the road) .
- (d) Maximum attainable speed of vehicles

What is the value of the resultant retardation in m/s^2 when a longitudinal friction coefficient of 0.4 is allowed for stopping the vehicle on road?

(a) 0.98

(b) 1.95

(c) 2.93

(d) 3.93

If a vehicle travelling at 40 kmph stopped within 1.8 sec after the application of the brakes, then the average skid resistance coefficient is

- (a) 0.63 (b) 0.73
(c) 0.83 (d) 0.93

The duration of green time in a traffic signal depends on

- (a) traffic density
- (b) traffic volume
- (c) traffic speed
- (d) All of the above

The normal flows on two approach roads at an intersection are respectively 500 pcu/h and 300 pcu/h. The corresponding saturation flow is 1600 pcu/h on each road. The total lost time per single cycle is 16 s. The optimum cycle time by Webster's method is

- (a) 72.5 s (b) 58.0 s
(c) 48.0 s (d) 19.3 s

The main drawback of automatic counters-cum-classifiers, used for traffic volume studies, is that it is not yet possible to classify and record

- (a) Vehicle type
- (b) Axle spacing
- (c) Axle load
- (d) Speed

A vehicle moving at 40km/h speed was stopped by applying brake and the length of the skid marks was 12.2m. If the average skid resistance of the pavement is 0.70, the brake efficiency of the test vehicle will be nearly

- (a) 80% (b) 74%
(c) 68% (d) 62%

The free mean speed on a roadway is found to be 80 kmphs. Under stopped condition, the average spacing between the vehicles is 6.9 m. What is the capacity flow?

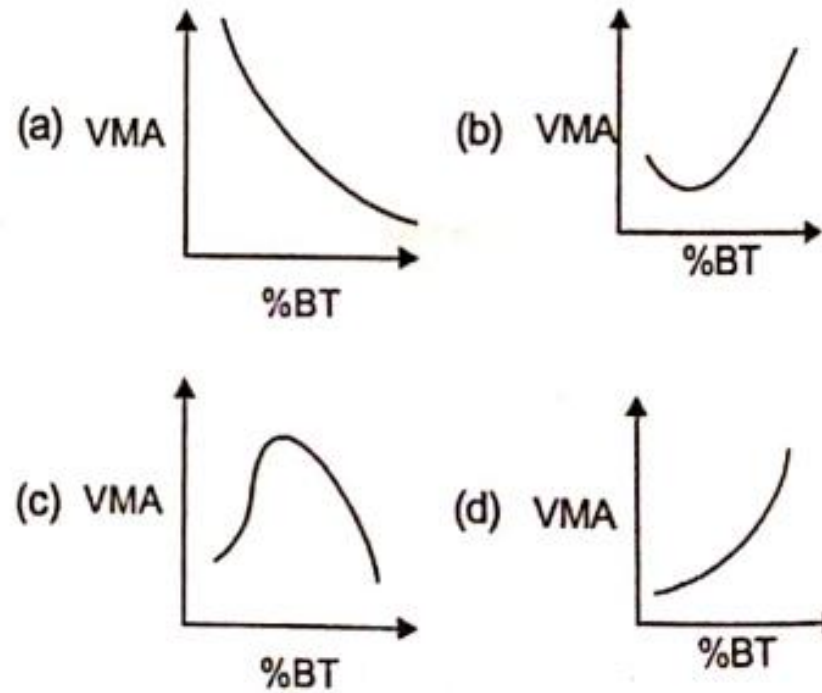
- (a) 5800 Vehicles/hour (per lane)
- (b) 7200 Vehicles/hour (per lane)
- (c) 1450 Vehicles/hour (per lane)
- (d) 2900 Vehicles/hour (per lane)

List-I	List-II
A. Disintegration of aggregates due to weathering	1. Attrition
B. The removal of material from the surface of the road by grinding action	2. Crushing
C. Mutual rubbing or grinding within the mass under the action of traffic	3. Soundness
D. Breaking up of road surface layer through cracking into irregular shaped areas	4. Abrasion
	5. Disintegration

Codes:

	A	B	C	D
(a)	3	1	5	2
(b)	2	5	1	4
(c)	3	4	1	2
(d)	1	4	3	5

Which one of the following diagrams illustrates the relationship between VMA and % bitumen content (BT) in Marshall test?



If the CBR value obtained at 5 mm penetration is higher than that at 2.5 mm, then the test is repeated for checking; and if the check test reveals a similar trend, then the CBR value is to be reported as the

- (a) Mean of the values of 5mm and 2.5 mm penetrations
- (b) Higher value minus the lower value
- (c) Lower value corresponding to 2.5 mm penetrations
- (d) Higher value obtained at 5 mm penetration

List-I	List-II
A. CBR test	1. Modulus of sub-grade reaction
B. Plate bearing test	2. Arbitrary soil strength
C. Triaxial test	3. Exudation and Expansion pressure
D. Stabilimeter and Cohesionmeter	4. Shear parameters test

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	2	1	3	4
(c)	1	2	4	3
(d)	2	1	4	3

List-I	List-II
A. Impact test	1. Bitumen
B. Los-Angeles abrasion test	2. Toughness
C. Crushing test	3. Hardness
D. Stripping test	4. Strength

Codes:

	A	B	C	D
(a)	2	3	4	1
(b)	4	1	2	3
(c)	4	3	2	1
(d)	2	1	4	3

Which one of the following tests is performed in the laboratory to determine the extent of weathering of aggregates for roadworks?

- (a) Soundness test (b) Crushing test
(c) Impact test (d) Abrasion test

Given that:

r = radius of load distribution

E = modulus of elasticity of concrete

K = modulus of subgrade reaction

μ = poisson's ratio of concrete

h = thickness of slab

P = wheel load

The combination of parameters required for obtaining the radius of relative stiffness of cement concrete slab is

(a) E, K, μ, r

(b) h, K, μ, r

(c) E, h, K, μ

(d) P, h, K, μ

A collapsible soil sub-grade sample was tested using Standard California Bearing Ratio apparatus; and the observations are given below

Sl. No.	Load	Penetration
1.	60.55 kg	2.5 mm
2.	80.55 kg	5.0 mm

Taking the standard assumption regarding the load penetration curve, CBR value of the sample will be taken as

- (a) 3.9% (b) 4.0%
(c) 4.4% (d) 5.5%

