Transportation Engineering (C.E-205) MM-15
II class Test

Attempt any three questions

Q1 Why are curves provided in highways? Discuss the advantages of transition curves in highways what is widening of curves.

Q2 What do you understand by traffic ~~Island~~ or rotary? What are its benefits & drawbacks

Q3 Explain various types of highway parkings

Q4 What is stopping sight distance? What are factors effecting SSD?

Q5 Explain various types of Gradients.

Q6 Write short notes on any two

(i) PCU

(ii) Highway cross section elements.

(iii) Camber.

Ans: Curves are provided at the change of gradient of a road due to the following reasons

- To lay the road according to topography of the country
- To avoid costly land
- To avoid excessive cutting and filling
- To avoid certain important structures.
- To make use of the existing road, bridge etc
- To provide access to the particular place.

The advantages of the transition curves in highways are

- They provide gradual and easy transformation from straight to circular curve and from circular to the straight roads.
- They enable gradual introduction of the designed superelevation and extra widening of pavement at the start of the circular curve
- Also improves the aesthetic appearance of the road

The ~~road~~ carriage width for horizontal curves of especially smaller radii (<300m) are increased due to following reasons

- To get greater visibility in larger radius on a curved path, as the drivers have a tendency to use the outer edge of the curve
- While negotiating a horizontal curve, the rear wheels of a vehicle do not follow the same path as that of front wheels due to rigidity of axles. When the inner front wheel takes a path on the inner edge of the curve the inner rear wheel will be off the pavement. It requires more width of the pavement.

Ans 2 A traffic rotary is an enlarged road intersection laid out for movement of traffic in one direction round a central Island. The vehicles from the converging areas are forced to move around the central Island in a clockwise direction in an orderly manner and weave out of the rotary movement into the desired direction

Advantages of Rotary

- It ensures one way movement of traffic
- All traffic proceeds simultaneously and continuously at fairly uniform speed. Frequent stopping & starting are avoided
- It reduces cross conflicts from 16 to 04.
- Reduces vehicle operation cost
- No traffic police or signal regd at rotary
- The maintainance cost of traffic rotary is negligible
- Provides easy movement for right turn traffic
- Enforces check in the design speed.

Disadvantages of Rotary

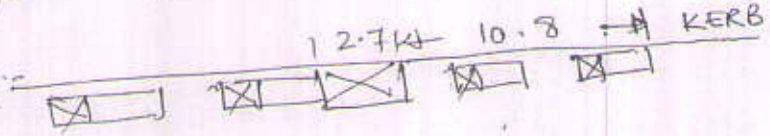
- Requires larger area for effective operation
- Doesn't provide any provision for pedestrian
- It is difficult to separate slow moving traffic
- Not suitable where angle of intersection between two roads is too acute.
- Traffic turning right has to travel extra distance
- Requires many warnings & directional signs for safety

Ans 3 Various types of highway parkings are Parking may be divided, in two types

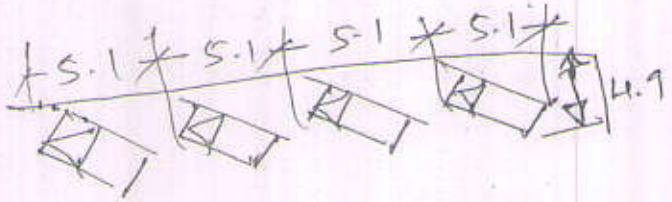
(i) On-street or Kerb parking
(ii) Off-street parking.

Angle parking or parallel parking may be designed for parking. Angel parking or parallel parking may be allowed in the Kerb parking.

$N = \frac{L}{6.6}$



$N = \frac{L}{4.75}$



30° Angle Paring.

$N = \frac{L - 0.85}{5.1}$

when parking facility is provided at a separate place away from the Kerb, it is known as off street parking.

Ans 4 Stopping sight distance is the minimum sight distance available on a road to stop vehicle without collision. It depends upon the following factors

- Total reaction time of the driver
- speed of the vehicle
- Efficiency of brakes
- Slope of road surface
- Frictional resistance between the road and the tyres.

Ans 5. ~~Expts~~ Gradients are of the following types:

(1) Ruling Gradient - It is the maximum gradient within which designer fix the vertical profile of the road.

(2) Limiting gradient - It is steeper than ruling gradient and is provided places where topography compels to adopt steeper gradient to avoid increase in cost in gentler gradients. The length of limiting grades should ~~not~~ be limited in short length.

(3) Exceptional gradient - Exceptional gradient is steeper than ruling gradient and may be provided in short lengths A the road in some extraordinary situation

(4) Minimum Gradient! - It is the minimum desirable slope essential for effective drainage of rain water from the road surface. 1 in 500 for concrete & 1 in 250 for kutcha open drains.

Ans 6 (i) PCU - stands for Passenger Car Unit: It is common practice to consider the passenger car as the standard vehicle unit to convert the other vehicle classes. For mixed traffic flow, the traffic volume and capacity are generally expressed as PCU per hour or PCU/lane/hour.

(ii) Highway cross section elements are
- Pavement surface characteristics.
- Cross slope or Camber
- Width of pavement or carriageway
- Kerbs
- Road margins
- Right of way
- Width of formation

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