

**M.Tech./1st/TE (CE)****Geometric Design of Transp. Facilities**

Full Marks : 70

Time : 3 hours

**Q. No. 1 is compulsory and answer any five from the rest**

*The figures in the right-hand margin indicate marks*

Assume suitable data, if required

1. Answer the following : 2 × 10
- What are the objectives of Camber ?
  - State the values of gradients prescribed by IRC.
  - What is curve resistance ?
  - Explain the types of Kerbs provided in urban areas.
  - What is PIEV theory ?
  - Differentiate between skidding and slipping. Why skidding is dangerous ?

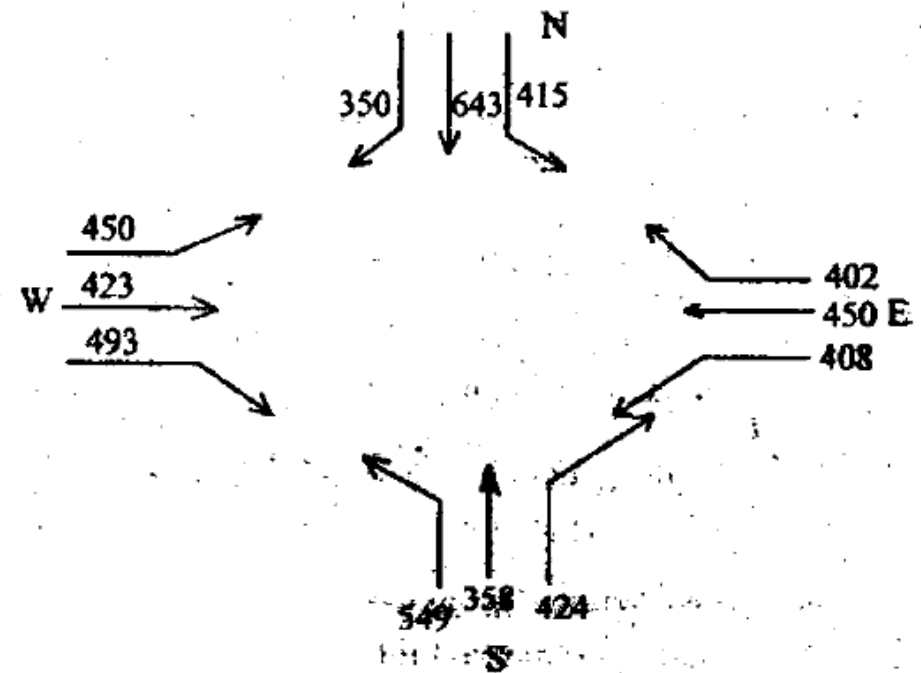
- Why superelevation is not provided in a rotary ?
- Give a classification of urban streets.
- Explain setback distance on a horizontal curve.
- What is the need of a gap in median at junctions ?

2. 5
- Discuss briefly the factors which govern the geometric features of an ideal alignment. 5
  - Derive an expression for OSD for a two lane two way movements on Highway. State the assumptions made in the derivation. 5
3. 5
- List the various types of transition curves used in highways. What is an ideal transition curve ? Discuss the factors to be considered in designing the length of transition curve. 5
  - Calculate the length of transition curve for a design speed of 80 kmph for a horizontal curve of radius 300 m in plain and rolling

( Turn Over )

- terrain, if the pavement width including extrawidening is 7.4 m. Assume suitable data, if required. 5
- 4. (a) Derive an expression for length of vertical summit curve, parabolic in shape, for the length of curve being greater than sight distance. <http://www.odishastudy.com> 5
- (b) A valley curve is formed by a descending grade of 1 in 30 meeting an ascending grade of 1 in 25. Design the length of valley curve for a design speed of 70 kmph. Assume suitable data. 5
- 5. (a) Draw a neat sketch of clover leaf interchange. State its merits and demerits. 6
- (b) State the principles to be followed in a good intersection design. 4
- 6. (a) State the guidelines for selection of a rotary type of intersection. 4
- (b) Traffic flows in an urban section at the intersection of two highways in PCUs are

given below. The highways intersect at right angles and have a minimum carriageway width of 15 m. A 4-lane road with moderate cross traffic interference has capacity 1400-1800 PCU/hr in one direction and width of carriageway at entry and exit is 10 m for 4-lane road in urban area. Minimum wearing length is 30-45 m for design speed of 30-40 kmph. Design rotary intersection making suitable assumptions. 6



7. (a) What do you mean by channelisation ? State its purpose. 5
- (b) Draw neat sketches of speed change lanes showing the geometrical features. Why these lanes are necessary ? 5
8. Write short notes on any four :  $2\frac{1}{2} \times 4$
- (i) Extrawidening on curves
- (ii) Design of superelevation on horizontal curves
- (iii) Grade compensation
- (iv) Shoulders
- (v) Hairpin bend
- (vi) Mini-roundabouts.

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