Total Pages—5 Dec—2014

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

(*a*) What are the objectives of Camber ?

(*b*) State the values of gradients prescribed by IRC.

(*c*) What is curve resistance ?

(*d*) Explain the types of Kerbs provided in urban areas.

(*e*) What is PIEV theory ?

(*f*) Differentiate between skidding and slipping. Why skidding is dangerous ?

(*Turn Over*)

(*g*) Why superelevation is not provided in a rotary ?

(*h*) Give a classification of urban streets.

(*i*) Explain setback distance on a horizontal curve.

(*j*) What is the need of a gap in median at junctions ?

2. (*a*) Discuss briefly the factors which govern the geometric features of an ideal alignment. 5

(*b*) Derive an expression for OSD for a two lane two way movements on Highway. State the assumptions made in the derivation. 5

3. (*a*) 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

(*b*) 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

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. 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

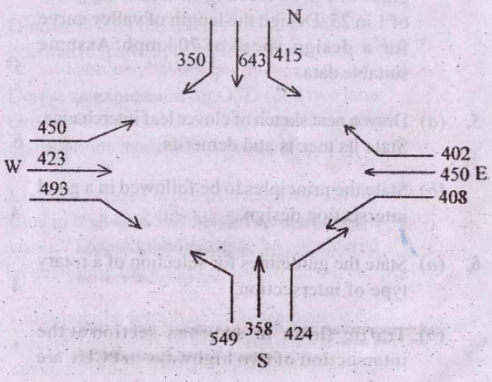
5. (*a*) Draw a neat sketch of clover leaf interchange. State its merits and demerits. 6

(*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-round abouts.