

Nov, 2015

M.Tech-I(TE-CE)  
GDTF

**GEOMETRIC DESIGN OF TRANSPORTATION FACILITIES**

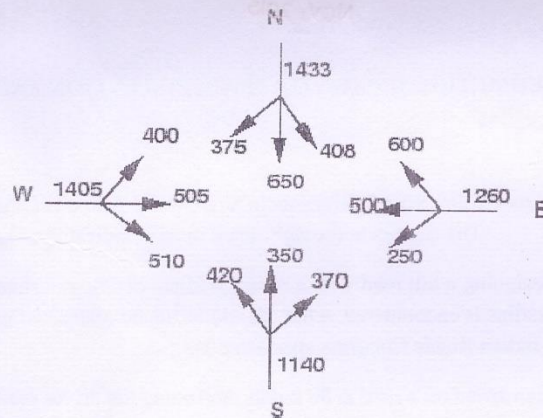
F.M:70

Duration: 3 hours

Answer any **Six** questions including Q.No.1 which is compulsory.

The figures in the right-hand margin indicate marks.

- Q.1(i) While designing a hill road with a ruling gradient of 5%, if a sharp horizontal curve of 50 m radius is encountered, what should be the compensated gradient at the curve as per the Indian Roads Congress specifications . [2x10]
- (ii) The design speed on a road is 80 kmph. Assuming the driver reaction time of 2.5 seconds and coefficient of friction of pavement surface as 0.35, what is the required stopping distance for two-way traffic on a single lane road?
- (iii) A crest vertical curve joins two gradients of +2% and -2% for a design speed of 80km/h and the corresponding stopping sight distance of 120m. The height of driver's eye and the object above the road surface are 1.20m and 0.15m respectively. What is the curve length (which is less than stopping sight distance) to be provided.
- (iv) Show the conflict points at the intersection of cross-roads, both two-way.
- (v) What are the advantages of traffic rotary?
- (vi) What are the various types of parking facilities?
- (vii) When a road is called a hill road?
- (viii) What is T-S concept in the design of pedestrian facilities?
- (ix) When is it required to provide separate cycle track?
- (x) Draw the cross-section of a rural highway and show all the geometric elements.
- Q.2 (i) Derive a suitable expression for overtaking sight distance for a two lane two way traffic. [5]
- (ii) The allowable side friction factor for a horizontal curve with design speed of 100 km/h is 0.15. What super elevation rate would be used for the curve of 420 m? A spiral transition curve is used to go from the normal crown with a camber of 2% to full super elevation for the curve described. If the maximum difference in grade between the centre line and the edge is 1/200 and the roadway consists of two 3.6m lanes, what is the minimum length of transition curve? [5]
- Q.3 (i) Discuss in detail the design consideration of a rotary intersection. [5]
- (ii) Design a rotary intersection using the following traffic flow values. Make suitable assumptions. [5]



- Q.4 (i) The expected 5- minute peak flow through the main entrance of a college building is 500 persons. If a LOS C is desired, find the number of doors and the approach corridor width required. [5]
- (ii) What are the objectives of Channelization? What are features of channelizing islands? [5]
- Q.5 (i) Draw a neat sketch of a full cloverleaf and show movements of traffic. Also state its advantages and disadvantages. [5]
- (ii) State the design standards for geometric elements of bicycle facilities. [5]
- Q.6 (i) Draw the figure of four arms channelized intersection showing arrangement of zebra crossing and state the geometric standards for zebra crossing. [5]
- (ii) What are different types of landslides? What are causes of it? How to prevent it? [5]
- Q.7 (i) Enumerate the various design factors controlling the alignment of highways. [5]
- (ii) Explain with sketch how sight distance is restricted on horizontal curve and how the desired sight distance can be obtained? [5]
- Q.8 (i) SSD for a 4 lane NH is 80m. Find the required setback distance from the centre line of a circular curve of radius 300m assuming the length of the curve is greater than the sight distance. [5]
- (ii) Discuss various bus facilities. [5]