

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-I Regular Examination January / February 2011****Subject code: 711308N****Subject Name: Highway Geometric Design****Date: 03 /02 /2011****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Describe the classification system of rural highways adopted in India. Define the various classes. **07**
- (b) Define Design speed in Geometric Design. What percentile speed is usually taken as Design speed? What are the suggested Design speeds in India for Rural and Urban conditions? What is the distinction between ruling and minimum design speeds and where are they adopted? **07**
- Q.2** (a) Explain total reaction time of driver and the factors on which it depends. Explain “PIEV” theory. **07**
- (b) Explain camber. What are the objects of camber? Discuss the factors on which the amount of camber to be provided depends. Specify the recommended ranges of camber for different types of pavement surfaces **07**
- OR**
- (b) Explain the role of pavement surface characteristics in highway geometric design. State the factors affecting friction between pavement and tyres of vehicles. **07**
- Q.3** (a) Derive an expression for calculating the overtaking sight distance on a highway. **07**
- (b) Explain the factors affecting Stopping sight distance. **03**
- (c) Calculate safe stopping sight distance for design speed of 75kmph and a descending gradient of 3%. **04**
- OR**
- Q.3** (a) Derive an expression for finding the stopping sight distance at level and at grades. **07**
- (b) The speed of the overtaking vehicle is 96kmph. If the acceleration of the overtaking vehicle is 2 kmph per second, calculate safe OSD for (i) One-way traffic and (ii) Two-way traffic road. **07**
- Q.4** (a) Explain ruling, limiting and exceptional gradients. Specify the values recommended by IRC for plains and hilly areas. **07**
- (b) A two-lane (7m wide) pavement on a National Highway has a curve of radius 400m. Determine the length of transition curve making suitable assumptions. **07**
- OR**
- Q.4** (a) Write short note on Horizontal Transition curve. **07**
- (b) What is Super-elevation? Explain any two factors affecting it. **03**
- (c) Design the super-elevation for a National Highway in rolling terrain with the radius of 350m. Comment on the results. What is the co-efficient of lateral friction mobilized if super-elevation is restricted to 0.07. **04**

- Q.5** (a) What is channelization? What are the objectives of channelization? **07**
(b) List out important elements of intersection design. Explain any two of them briefly. **07**

OR

- Q.5** (a) What are the basic principles of intersection design to provide safety of traffic? **07**
(b) State the conditions under which grade separated intersections are justified? **07**
Also give classification of grade separated intersections.
