

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE – SEMESTER V • EXAMINATION – WINTER – 2012****Subject code: 150601****Date: 11-01-2013****Subject Name: Highway Engineering****Time: 02:30 pm to 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) What is the importance of Road Transportation in development of a nation? Discuss about “Vision 2021” for road development in India. **07**
- (b) Show in the sketch various cross sectional elements of typical highway. Discuss about the factors which control the geometric elements of highway. **07**
- Q.2** (a) Discuss briefly about vehicular characteristics, which are affecting road design and traffic performance. **07**
- (b) Explain briefly various planning surveys required for the road projects. **07**
- OR**
- (b) What are the desirable properties of (i) Sub-grade soil, (ii) Aggregates for the road construction? **07**
- Q.3** (a) Explain the PIEV theory and derive the expression for SSD at gradient  $n\%$ . What is ISD? **07**
- (b) Design the rate of super elevation for the design speed of 80 kmph on a horizontal highway curve of radius 300m having coefficient of lateral friction ( $f$ ) = 0.15. If the  $f = 0$  and maximum super elevation of 0.07 is not to be exceeded, calculate maximum allowable speed on this curve. **07**
- OR**
- Q.3** (a) Explain with sketches summit curve and valley curve. Discuss their design aspects on highways. **07**
- (b) The speeds of overtaking and overtaken vehicles are 85 and 60 kmph respectively. If the acceleration of the overtaking vehicle is 2.6 kmph per second, calculate the safe OSD for (i) Two-lane one way traffic, and (ii) Two-lane two way traffic. **07**
- Q.4** (a) Explain with sketch Impact Value Test of aggregates. **07**
- (b) Briefly explain: Bitumen, Tar, Cutback, and Emulsion. **07**
- OR**
- Q.4** (a) Explain with sketch Standard Penetration Test of bitumen. **07**
- (b) What are the objects of soil stabilization for road construction? How will you stabilize black cotton soil for the road construction? **07**
- Q.5** (a) Explain with sketches Speed-Flow-Density relationships of road traffic. **07**
- (b) Explain with sketches (i) surface and (ii) sub-surface drainage system for rural highways. **07**
- OR**
- Q.5** (a) Explain: (i) Preventive measures of road accidents, (ii) Road traffic signs. **07**
- (b) Explain with sketches road side arboriculture and street lighting. **07**

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