

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER • 2014****Subject Code: 150601****Date: 26-11-2014****Subject Name: Highway Engineering****Time: 10.30 am - 01.00 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) The area of a district in Gujarat state is 14000sq.km. There are 12 towns as per 2011 census. Determine the lengths of different categories of road to be provided in district. **07**
- (b) Discuss about various road authorities working in highway planning and development in India. **07**
- Q.2** (a) Discuss about various surveys to be carried out for finalization of highway alignment during highway project planning. **07**
- (b) (I) In the Marshall method of mix design, the coarse aggregate, fine aggregate, filler and bitumen having respective specific gravities of 2.62, 2.72, 2.70 and 1.02 are mixed in the ratio of 55, 34.6, 4.8 and 5.6 percent respectively. What will be theoretical specific gravity of the mix? **03**
- (II) A subgrade soil sample was tested using standard CBR test apparatus and observations are given below. **04**

LOAD in Kg	PENETRATION in mm
60.5	2.5
80.5	5.0

Assume that the load penetration curve is convex through out. What will be the CBR value in % for the given sample?

OR

- (b) The speeds of overtaking and overtaken vehicles on a highway are 85 kmph and 70 kmph respectively. Calculate OSD needed for two way traffic. Acceleration of the overtaking vehicle is 2.5 kmph/sec. Speed of the vehicle in the opposite direction as 85 kmph. PIEV time is 2.0 sec. **07**
- Q.3** (a) What is carriageway? Write recommended width of carriageway as per IRC. Also, write width of roadway for NH, SH and MDR. **07**
- (b) What is camber? Sketch different types of camber. Also write recommended values of camber as per IRC for C.C. and Bituminous surface. **07**

OR

- Q.3** (a) 1. Calculate superelevation for highway curve of 450m radius for 125 km/hr speed. There is mixed traffic condition. **03**
2. Calculate mechanical widening required on a horizontal pavement of a 7.0 m width. Longest wheel base of vehicle is 7.0 m. Radius of horizontal curve is 250m. **04**
- (b) Explain penetration test for bitumen with procedure of sample preparation and aim of the test with the name of apparatus and sketch. **07**

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| Q.4 | (a) | Write in brief about: 1. Road safety audit.
2. Highway lighting. | 07 |
| | (b) | Explain about road arboriculture as roadside development. | 07 |
| | | OR | |
| Q.4 | (a) | Write in brief about:
1. Catch water drain.
2. Prevention of landslide on hill roads. | 04 |
| | (b) | Explain procedure and importance of Shape test for coarse aggregate with name of apparatus used for it. | 03 |
| Q.5 | (a) | What is the need of parking study? Explain methods of parking with sketch. | 07 |
| | (b) | What is the need of volume study? Explain methods of traffic volume study. | 07 |
| | | OR | |
| Q.5 | (a) | Discuss about roaduser characteristics. | 07 |
| | (b) | Discuss about traffic signs with need, location and types with sketches. | 07 |