

**GUJARAT TECHNOLOGICAL UNIVERSITY****B. E. Sem. - V - Examination – June- 2011****Subject code: 150601****Subject Name: Highway Engineering****Date: 20/06/2011****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) Discuss about various road authorities working in highway planning and development in India. **07**
- (b) Discuss about maintenance of highway along with failures of flexible and rigid pavements. **07**

- Q.2** (a) Discuss about various engineering surveys to be carried out before a highway alignment is finalized in highway project. **07**
- (b) Enlist various components of highway. Sketch cross section of divided highway in urban area. **07**

**OR**

- (b) The speed of overtaking and overtaken vehicles is 80 kmph and 50 kmph respectively on a two way traffic road. The acceleration of overtaking vehicle is  $0.99 \text{ m/sec}^2$ . Calculate Safe overtaking sight distance and minimum length of overtaking zone. Also draw sketch of overtaking zone and show the positions of sign posts. **07**

- Q.3** (a) Enlist the types of horizontal and vertical curves. **07**  
Calculate the extra widening required for a two lane pavement on a horizontal curve of radius 240m.  
The longest wheel base of vehicle expected on the road is 7.0m.  
Design speed is 60 kmph.
- (b) (i) Write physical and engineering properties of road aggregates. **03**  
(ii) Find out CBR value for soil subgrade for 1200 ADT of commercial vehicle. Annual growth rate of traffic is 8%. Construction period is 3 years. Loads at 2.5 mm and 5.0 mm penetration are 55 and 78 kg respectively. Also find out number of vehicles per day for design. **04**

**OR**

- Q.3** (a) Evaluate wheel load stresses for a 18 cm thick cement concrete pavement. **07**  
Wheel load is 5100 kg.  
Poisson's ratio of concrete is 0.15.  
Radius of contact area is 15 cm.  
Modulus of elasticity of cement concrete is  $3.00 \times 10^5 \text{ kg/cm}^2$ .  
Modulus of subgrade reaction is  $6.0 \text{ kg/cm}^3$ .
- (b) (i) Write about empirical method-Group Index for pavement design. **03**  
(ii) Calculate superelevation required for a horizontal circular curve of radius 97 m. The design speed is 60 kmph and design coefficient of lateral friction is 0.15. **04**

- Q.4** (a) (i) Write about design of filter material in highway drainage. **04**

	( ii ) Role of arboriculture in aesthetics value of highway.	<b>03</b>
<b>(b)</b>	( i ) Explain the terms: Skid and Slip.	<b>03</b>
	( ii ) Write in brief about low cost and high cost roads.	<b>04</b>
	<b>OR</b>	
<b>Q.4</b>	<b>(a)</b> ( i ) What is PPP models?	<b>04</b>
	( ii ) State elementary principles of alignment in hilly areas.	<b>03</b>
	<b>(b)</b> ( i ) What are the methods of highway financing?	<b>03</b>
	( ii ) Write recommended values of Camber and Right of way.	<b>04</b>
<b>Q.5</b>	<b>(a)</b> ( i ) What is roaduser characteristics?	<b>04</b>
	( ii ) Write causes of accident.	<b>03</b>
	<b>(b)</b> Discuss about various traffic control devices.	<b>07</b>
	<b>OR</b>	
<b>Q.5</b>	<b>(a)</b> Sketch various types of intersection. Which types of movements are observed at an intersection? Write design criteria for intersection.	<b>07</b>
	<b>(b)</b> ( i ) Draw relationship between flow, speed and density.	<b>03</b>
	( ii ) what is off street parking?	<b>04</b>

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