

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2021****Subject Code:2150601****Date:20/09/2021****Subject Name:Highway Engineering****Time:10:30 AM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Draw neat cross section of road in embankment and show various components of it. **03**
- (b) Which are the salient features of Bombay road development plan? **04**
- (c) State the objects of widening pavement on horizontal curves? What are the factors on which the design of widening depends? **07**
- Q.2** (a) Explain the factors controlling highway alignment. **03**
- (b) Explain softening point test for bitumen. **04**
- (c) Enlist tests to be carried out on aggregate. Explain shape test on bitumen. **07**
- OR**
- (c) What is the importance of Road Transportation in development of a nation? Discuss about “Vision 2021” for road development in India. **07**
- Q.3** (a) Define : (i) Skid (ii) Slip **03**
- (b) What is camber ? State recommended values of it as per IRC for different types of road surfaces. **04**
- (c) 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**
- OR**
- Q.3** (a) Explain overtaking sight distance. On which factors does it depend ? **03**
- (b) Calculate extra widening required on curve for a pavement of width 7 m on horizontal curve of radius 300 m. The largest wheel base of vehicle expected on the road is 6.5m. Design speed is 80 kmph. **04**
- (c) A vertical summit curve is formed at the intersection of two gradients +3.0 % and -5.0%. Design the length of summit curve to provide a stopping sight distance for a design speed of 80m kmph. Assume other data. **07**
- Q.4** (a) What are the objects of traffic volume studies? **03**
- (b) Explain Road user characteristics. **04**
- (c) Draw at least 5 signs of each (not to scale) Regulatory signs, Warning signs and Informatory signs. **07**
- OR**
- Q.4** (a) What are the advantages and disadvantages of Rotary intersection? **03**
- (b) Explain vehicular characteristics. **04**
- (c) Explain the basic relationship between Speed, Volume and Density. **07**
- Q.5** (a) Explain in brief about bitumen cutback and emulsion. **03**
- (b) Explain the types of joints provided in CC pavements with their functions. **04**
- (c) Explain subsurface drainage system with transverse drain with neat sketch. **07**

OR

- Q.5** (a) State the procedure adopted for the construction of the Earthen road. **03**
(b) Draw a neat typical cross section of **04**
(i) Flexible pavement and (ii) Rigid pavement and show all components.
(c) Explain in detail the PPP model of highway financing in India. **07**
