Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2013**

**Subject code: 731303** **Date: 15-05-2013**

**Subject Name: Traffic Flow Theory and Simulation**

**Time: 10.30 am – 01.00 pm** **Total Marks: 70**

## Instructions:

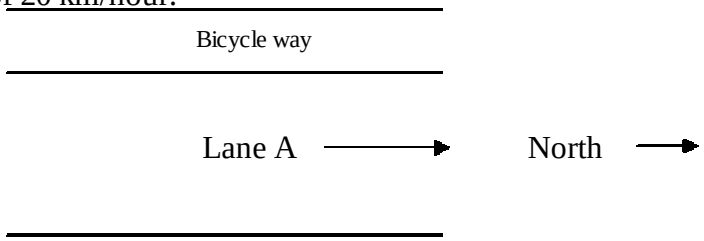
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

**Q.1** **(a)** Enlist any five Macroscopic Traffic Model. Explain any two in detail **07**

**(b)** Describe the Demand Service Characteristics. **07**

**Q.2** **(a)** Explain car following behavioral modal **07**

**(b)** A bicycle racer practices everyday at different times. His route includes a ride along a 0.5 km bicycle way and back. He is traffic engineer. He has made it a habit to count the number of cars in lane A that overtake him while riding northward ($M_O$ )and the number of cars in a lane A that he overtakes while riding northward ($M_P$). The summary of average measurements for each period is given as below. He travels at a constant speed of 20 km/hour. **07**




| Time of Day | Ms | Mo | Mp |
|---|---|---|---|
| 8:00 to 9:00 AM | 110 | 15 | 80 |
| 9:00 to 10:00 | 120 | 30 | 50 |
| 10:00 to 11:00 | 40 | 20 | 15 |
| 11:00 to 12:00 | 90 | 25 | 15 |

Find :- (i) Traffic stream condition for each period
(ii) calibrate u = a +bk
(iii) Estimate the capacity of lane A.

**OR**

**(b)** Explain the relationship between the speed-flow-concentration with neat sketch. **07**

**Q.3** **(a)** What are the types of Shock waves? Explain the shock wave theory with q-k diagram. **07**

**(b)** Explain Moving Observer method **07**

**OR**

**Q.3** **(a)** Traffic is moving on a one way road at $q_A$=1500 vph and $k_A$=18 VPKM. A truck enters the stream at point A (Which is at a distance of 1 km from an upstream benchmark point) at a speed of $u_B$=18 KMPH. Due to decreased speed, the density behind the truck increases to 80 vpkm. After 15 minutes, the truck leaves the stream. The platoon behind the truck then releases itself at capacity conditions, $q_c$=1600 vph and $k_c$=50 vpkm. Determine the **07**

(i) Speed of all shock wave generated

(ii) The starting point of the platoon (behind the truck) forming the shock wave

(iii) The starting point of the platoon dissipating shock waves

(iv) The maximum length of platoon.

**(b)** Explain the factors affecting Capacity and Level of Service **07**

**Q.4** **(a)** Describe the criteria for Level of Service specified in HCM Manual **07**

**(b)** Write a "C" programme which generates the Random Number. **07**

**OR**

**Q.4** **(a)** Enlist the traffic simulation languages. Explain any two in detail. **07**

**(b)** Explain the procedure of finding Highway Capacity. **07**

**Q.5** **(a)** Write a short note on Poisson Distribution of Vehicle Arrivals. **07**

**(b)** The off peak traffic flow arriving at random at toll booth facility is 100 vph and the peak flow is 200 vph. The service rate is exponentially distributed at the booth is 4 per minute. What is the average number of customers in the queue for each flow? **07**

**OR**

**Q.5** **(a)** What are the advantages of Simulation Technique? **07**

**(b)** Write a short note on "Goodness of Fit Test". **07**

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