

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 2711302**Date: 07-01-2015****Subject Name: Traffic Engineering****Time: 02:30 pm - 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) Explain the physical characteristics of driver affecting the traffic flow. **07**
 (b) Define: Space Mean Speed, Space head way, Gap, Rate of flow, Density, AWT, DDHV. **07**

- Q.2** (a) The driver of vehicle travelling at 70kmph requires 9m less to stop after applying the brakes up a grade than when travelling down the same grade. If the coefficient of friction is 0.38, calculate: (i) % of the gradient, (ii) braking distance on the downgrade. **07**
 (b) Explain with graphs speed-flow-density relationship for the highway traffic. Using Greenshield's linear speed-density function, derive the equations for maximum flow condition. **07**

OR

- (b) Explain with flow-density graph formation of shock-wave in traffic flow. **07**
- Q.3** (a) What are the purposes of conducting Spot Speed study surveys? Enlist various methods of Spot Speed study survey and describe any one of them with sketch. **05**
 (b) From the following data of spot-speed study, draw graphs for frequency (%) vs- Speed range and Cumulative frequency (%) - vs- Speed. Also, calculate: Modal speed, Median speed, TMS, SMS, speed to be used in geometric design, speed for traffic regulation, standard deviation and coefficient of variation. **09**

Speed range (kmph)	1-10.9	11-20.9	21-30.9	31-40.9	41-50.9	51-60.9	61-70.9	71-80.9	81-90.9
No. of vehicles	1	4	10	16	22	18	12	5	2

OR

- Q.3** (a) What are the applications of Travel time and Delay studies? Enlist different methods of conducting Travel time and Delay studies and describe any one of them. **07**
 (b) A test car was used on a North-South road of 3.4 km and following data for the moving car was collected. Calculate traffic volume, average travel time and SMS on both directions. **07**

North bound trip no.	Travel time (min)	No. of veh. met against of stream	No. of veh. overtaking test car	No. of veh. overtaken by test car
1	8.2	227	6	2
2	8.4	260	8	3
3	8.9	305	10	4
4	9.1	324	12	5
South bound trip no.	Travel time (min)	No. of veh. met against of stream	No. of veh. overtaking test car	No. of veh. overtaken by test car
1	7.6	259	3	2
2	7.7	237	5	6
3	7.9	276	7	4
4	8.1	317	9	3

Q.4 (a) Define 'Capacity' and 'Level of service' of a roadway. As per HCM, describe basic conditions for basic freeway segment and steps involved for its operational analysis. **07**

(b) The speed-density relationship of traffic on a section of a freeway lane was estimated to be $v_x = 18.2 \ln (220/k)$ as per Greenberg's model. (a) Find flow, speed and density at Maximum flow, (b) Find jam density. **07**

OR

Q.4 (a) What is 'Weaving'? Describe with sketches different types of weaving areas on freeway as per HCM. **05**

(b) On the right angled crossing of four arm signalized intersection, design 4 phase signal cycle for the given data using Webster's method and IRC recommendations. Assume, amber = 3 sec/phase, lost time = 2 sec/phase, saturation flow rate = $525W$ [W = Width of approach (m)], pcu value for the left and right turning vehicles are 25% and 75% more respectively. All left (L), straight (S) and right (R) turning vehicles on an approach are allowed to depart simultaneously during a green interval. Road AB crosses road CD at right angle. **09**

Approach	A			B			C			D		
Width(m)	10			9			9			8		
Turning	L	S	R	L	S	R	L	S	R	L	S	R
Volume (pcu/hr)	400	800	250	180	600	100	100	375	45	75	300	25

Q.5 (a) Discuss in brief: (i) Pedestrian flow-speed-density measurement, (ii) TSM techniques. **07**

(b) Write short note on: (i) Parking accumulation and duration study, (ii) Collision diagram for accident study. **07**

OR

Q.5 (a) Briefly discuss: (i) Noise pollution by traffic and its mitigation techniques, (ii) Home interview survey. **07**

(b) Explain briefly with sketches: (i) Warning signs, (ii) Rotary Intersection. **07**
