B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEMESTER - 2018
Traffic Engineering & Planning

Time 3 hours   Full marks 100

Use separate answer-scripts for each part

Part I

(This part carries 60 Marks)

1. Provide to the point answers to each of the following questions: 6*5=30
   a. Define aggregate linear travel demand function and generalized cost. What are the effects of short term and long term changes in factors other than perceived costs on travel demand for a specific kind of trip?
   b. Explain the steps of integrated land use-transport model by Ira Lowry?
   c. Provide a brief detail of the disaggregate multinomial logit model for modal split.
   d. How do we define and divide a study area for traffic survey?
   e. Why capacity restrained traffic assignment model is preferred to all-or-nothing model?
   f. Why gravity models are preferred to growth factor models for trip distribution?

2. Define accessibility, Hansen's accessibility model and development potential. A 3-zone city has the following characteristics: 10

Zones	Existing Population	Holding Capacity (Acres)	To j From i	Travel time matrix (Minutes) Zones		
				1	2	3
1	2000	100	1	2	6	8
2	1000	200	2	6	3	5
3	3000	300	3	8	5	4

An exponent of 2 can be assumed based on work done with other cities of the same size. If the population of this city is expected to rise to 8000 persons in next twenty years, how will the population be distributed by zone, assuming that total employment in each zone is proportional to the total existing population in that zone, using Hansen's model.

3. The bus service from Esplanade (Kolkata) to Asansol is currently served by express buses and AC buses. 2000 passengers per day use the express buses and 700 use AC service. Travel times (min) and fares (Rs.) are as follows: 10

	Travel time	Fare
Express buses	3hours and 15 minutes	Rs. 100
AC buses	2 hours and 30 minutes	Rs. 320

The linear arc-time and arc-price elasticities of demand are as follows:

	Express bus		AC Bus	
	Time	Fare	Time	Fare
Express bus	-0.03	-0.04	+0.02	+0.05
AC Bus	+0.05	+0.02	-0.07	-0.20

If the fare of the AC buses is raised to Rs 330, what would be the effect on ridership?

4. Use two iterations of Average Growth Factor method to predict the future trip distribution matrix from the following traffic survey information: 10

Trip ends for Different Zones		A	B	C	D
Produced trips	Present	75	45	90	40
	Future	150	85	135	120
Attracted trips	Present	60	50	75	65
	Future	90	150	150	100

Present Trip Distribution Matrix				
O \ D	A	B	C	D
A	20	20	20	15
B	10	10	15	10
C	20	15	25	30
D	10	5	15	10

B. CIVIL ENGINEERING 4ᵀᴴ YEAR 2ᴺᴰ SEMESTER EXAMINATION 2018

TRAFFIC PLANNING AND MANAGEMENT (ELECTIVE – III)

Time: 3 Hours   Full Marks: 100

Part II   40 marks

Use Separate Answer scripts for each Part

Answer ALL Questions

Answer brief & to the point. Assume standard value for any parameter, if required

1.   6+6+8
   a. Solve the flow-capacity model and draw neatly the corresponding diagram for a 6-lane 2-way divided highway with mean free speed of 80KmpH and average car length of 5.0m.
   b. Draw also the changes in the same diagram if 1-lane is closed for vehicular traffic in each way.
   c. Using the model obtained, solve the bottleneck problem that will be created in an average flow of 10,000 vehicles per hour each way by determining the velocity of traffic in the partially closed section and at the approach to it and the corresponding shockwave velocity.

2.   5+8+(1+2+4)
   a. Using a standard queuing model for a highway service point, where average service time is 30secs, determine the following for an average arrival flow of 100 veh/hr –
      i. The average time spent by a vehicle in the system
      ii. The average time spent by a vehicle in the queue
      iii. The probability of an idle system
      iv. The probability of no queue in the system
      v. The probability of having more than 15 vehicles in the system
   b. State the assumptions involved in the model used in solving Qn. 2(a)
   c. Write Schull's equation explaining all the terms involved.
      Using the same and considering flow gets retarded for headway less than 6 secs, find the probability of having headway of more than 8secs from the following headway observation noted in secs. –
      9.8; 3.6; 4.9; 13.5; 5.0; 10.8; 1.6; 5.3; 7.2; 18.1; 5.4; 6.8; 1.2; 12.1; 2.4; 5.0; 2.9; 7.6; 9.9; and 7.1