B.E. (Civil Engineering) Semester Seventh (C.B.S.)
Elective - I : Advanced Traffic Engineering

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Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data whenever necessary.
4. Illustrate your answers whenever necessary with the help of neat sketches.
5. Use of non programmable calculator is permitted.
6. Use of statistical tables e.g. normal density function, Chi – squared function etc. is permitted.

1. a) Explain in detail road user characteristic. **6**

b) The following data represent volume in PCU of average six runs in a moving observer study. Analyse the data for : **8**
i) Directional flow
ii) Directional running speed
iii) Directional journey speed
DATA : Length of section = 0.9 km.

Run Direction	Travel Time (sec.)	Vehicles met from opp. Direction	Number of vehicles in same direction		Stopped time (sec.)
			Over taking	Over taken	
E	164	72	6	4	8.4
W	155	94	9	11	10.2

OR

2. a) What are different types of traffic volume studies which are conducted for planning the transportation facilities. **6**

b) Analyse the following spot speed data and estimate. **8**
i) Medium speed
ii) Lower and upper speed
iii) Design speed

Speed Group (kmph)	Frequency
20 – 24.9	03
25 – 29.9	06
30 – 34.9	11
35 – 39.9	15
40 – 44.9	36
45 – 49.9	38
50 – 54.9	24
55 – 59.9	8
60 – 64.9	2
65 – 69.9	1

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3. a) At an uncontrolled T junction past experience indicates that the probability of a vehicle arriving on a side road during 10 second interval and turning right into the main road is $\frac{1}{4}$. Find the probability that in a period of 1 minute there will be 0, 1, 2, 3, 4, 5 or 6 vehicles arriving and turning right. **6**

b) On a motor way, the number of vehicles arriving from one direction in successive 10 seconds interval was counted and recorded in table. **7**

Vehicles arriving in 10 sec. interval	Frequency
0	10
1	25
2	32
3	20
4	9
5	4
6	2
7 or more	0

Find out the mean rate of arrival and with the help of Poissonian distribution compare the observed frequency with theoretical frequency.

OR

4. The following information was obtained from a transportation survey of a town **13**

Traffic Zone Number	Population in the Zone (in Thousands)	Total trips generated (in Hundreds)
1	24	10
2	26	11
3	29	15
4	31	16
5	21	12
6	30	11
7	19	10
8	24	14

Develop a linear regression modal for estimating trips generated from a Zone. If the population in a particular zone increases to 50000, predict the expected trip generation from that zone.

5. Design a rotary intersection for the following data of two highways situated in urban area. The highways intersect at right angles and have a carriage way width of 15 m. Make suitable assumption. **13**

Approach	Left turning (PCU)	Straight ahead (PCU)	Right turning (PCU)
N	402	536	406
E	410	620	360
S	440	410	510
W	510	320	410

OR

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| 6. | a) | Draw neat sketches of various types of grade separated intersection showing on it all the traffic movements. | 7 |
| | b) | Draw neat sketches of various types of at grade road junction. | 6 |

| 7. | a) | Enlist various types of traffic signs and write in general principles of traffic signing. | 6 |
| | b) | A toll booth at the entrance to a bridge can handle 120 veh/hr. The vehicle arrival is 90 veh/hr with a Poissonion arrival pattern. Service time is exponentially distributed. Determine | 8 |

       i)   Average number of vehicles in the systems.
      ii)   The length of queue.
     iii) Average time spent by the vehicle in the system.
     iv) The average time spent by the vehicle in the queue.

OR

| 8. | a) | What is signal co-ordination. Explain in brief various types of co-ordination system used. | 6 |
| | b) | The average normal flow of traffic on cross roads A and B during design period are 380 and 240 PCU/hour respectively and the saturation flow values on these roads are estimated as 1200 and 1000 PCU/hour. The all red time required for pedestrian crossing is 12 sec. Design the two phase traffic signal by Webster's method. | 8 |

| 9. | a) | Explain Collision diagram with neat sketch. | 6 |
| | b) | It is observed that on an average a vehicle driver drives 5000 km during the course of year. The probability of having an accident is 80 per 200 million vehicle kilometers. What is the probability of a driver having at least two accidents during his driving career extending to 20 yrs. | 7 |

OR

| 10. | a) | Write a short note on 3E's of traffic management. | 6 |
| | b) | The accident records for three consecutive years at an uncontrolled junction indicates following number of accidents. | 7 |

          Year   No. of accidents
          2010   4
          2011   6
          2012   8

Calculate the probability of 5 accidents occurring per year at the site.

| 11. | a) | State various problems due to Urban traffic and explain how there can be tackled in metro cities. | 6 |
| | b) | What are the various types of parking facilities designed for traffic needs? Compare on street parking with off street parking. | 7 |

OR

| 12. | a) | Estimate the total parking demand in the commercial area having following floor area composition : | 7 |

       i)   Offices   - 5000 m^2

      ii)   Shops   - 3580 m^2

     iii) Restaurants   -   350 seats
     iv) Cinema Hall   -   700 seats
      v) Two Star Hotel   -   56 rooms

| | b) | What is man transportation? Explain the merits and demerits of it indicating various modes of transportation used in metropolises of India. | 6 |

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