B.E. Seventh Semester (Civil Engineering) (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 the various vehicular characteristics. How do they affect in design.   **6**

   b)   A passenger car weighing 2 t is required to accelerate at the rate of $3.1 \text{m}/\text{sec}^2$ from a speed of 15 KMPH on a gradient of $+ 1.00\%$ on a WBM road surface. Assuming that the frontal area of the car is 2.1m^2, calculate the engine H.P. needed for running speed of 35 KMPH. Take coefficient of rolling resistance (f) as 0.025 and coefficient of air resistance (Ca) as 0.39.   **8**

OR

2.   a)   Discuss the methods available for conducting 'spot speed' studies.   **6**

   b)   The following data represent volume in PCU of average of six runs in a moving observer study. Analyse the data for (i) Directional flow (ii) Directional running speed (iii) Directional journey speed.   **8**
Data : Length of section = 1.45km.

Run Direction	Travel Time (sec.)	Vehicles met from opp. direction	No. of vehicles		Stopped time (sec)
			Overtaking	Overtaken	
E	174	92	8	6	9.8
W	152	118	9	11	11.4

3.   a)   In analysing the employment structure of household in an urban area in connection with a trip generation study it has been found that there are 2000 household of 4 members in each. Find the probability that a particular household of this size has 0, 1, 2, 3 and 4 employed residents. The average number of employed person in a family is one.   **6**

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

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Vehicles arriving in 10 sec. interval	Frequency
0	12
1	28
2	30
3	22
4	8
5	4
6	2
7 & over	0

OR

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

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Traffic Zone Number	Population in the zone (thousands)	Total trips generated (in hundreds)
1	22	10
2	24	12
3	28	14
4	32	15
5	21	12
6	31	11
7	18	10
8	23	13

Develop a linear regression model for estimating trips generated from a zone. If the population in a particular zone increases to 45000, 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 assumptions.

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Approach	Left turning (PCU)	Straight ahead (PCU)	Right turning (PCU)
N	404	534	408
E	412	618	358
S	442	412	510
W	510	330	420

OR

6. a) Draw neat sketches of various types of grade separated intersection showing on it all the traffic movements.

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b) Define intersection, what are the basic principles followed in the design of road intersection.

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7. a) A typical signalized intersection can handle 500 veh/approach/hr. If the vehicle arrivals during the peak flow of 400 veh/approach/hr are random and service time exponential. Calculate :
   i) Expected number of vehicles in the system.
   ii) Average Queue Length.
   iii) Average time spent by the vehicle in the system.
   iv) Average time spent by the vehicle in the queue.
   v) Probability that there are no vehicle in the system. **8**

   b) Enlist the various types of traffic signs and write in detail about general principles of traffic signing. Explain with neat sketches. **6**

OR

8. a) Enlist the various types of traffic signals and mention the advantages and disadvantages of them. **6**

   b) The average normal flow of traffic on cross roads A and B during design period are 450 and 300 PCU/hour respectively and the saturation flow values on there roads are estimated as 1150 and 1050 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 condition diagram. **6**

   b) It is observed that on an average a vehicle driver drives 4500 km during a course of year. The probability of having an accident is 100 per 300 million vehicle kilometers. What is the probability of a driver having at least three accidents during his driving career extending to 25 years. **7**

OR

10. a) Write a detailed note on 3E's of traffic engineering. **6**

   b) It has been found that on an average 1 in 100 drivers in a bus company are involved in an accident every year. If there are 500 drivers in the company, what is the probability that there are exactly 5 drivers who are involved in an accident during a year. **7**

11. a) State various problems due to urban traffic and explain how there can be tackled in metro cities. **6**

   b) Estimate the total parking demand in the commercial area having following floor area composition. **7**
   i) Office - $5100 \, m^2$
   ii) Shops - $3660 \, m^2$
   iii) Restaurants - 360 seats
   iv) Cinema Hall - 760 seats
   v) Two star hotel - 52 rooms.

OR

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

   b) Explain what is parking space inventory and how the parking survey results are presented. **7**

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