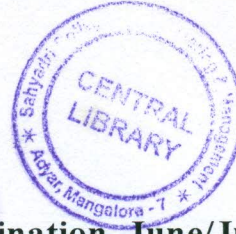10CV667

Sixth Semester B.E. Degree Examination, June/July 2016
Traffic Engineering

Time: 3 hrs.   Max. Marks:100

*Note: 1. **Answer any FIVE full questions, selecting**
atleast TWO questions from each part.
2. Use of Statistical tables permitted.
3. Use of Normal distribution function table is permitted.

PART – A

1 a. Define Traffic Engineering. Describe the functions of traffic engineering.   **(08 Marks)**
   b. Describe the Visual aspects of road users affecting highway design.   **(06 Marks)**
   c. A car weighing 1300 kg and travelling at a speed of 65 kmph on a level road of rolling resistance 0.025, is allowed to stop by suddenly switching off the engine and putting the gear in neutral. If coefficient of air resistance is 0.37 and frontal area is $1.65m^2$, find the deceleration caused. At what distance, will the car come to a halt?   **(06 Marks)**

2 a. Explain the various dynamic characteristics of vehicles considered in traffic engineering.   **(10 Marks)**
   b. Discuss the various tractive resistances a moving vehicle has to overcome with relevant equations.   **(10 Marks)**

3 a. The spot speed studies were carried out at a city road during certain period of time. Suggest
      1. Speed limit for regulation   2. Speed to check geometric design element
      3. Lower speed group causing congestion   4. Medium speed.   **(08 Marks)**

Speed Group (Kmph)	No. of vehicles	Speed Group (Kmph)	No. of vehicles
0-10	155	51-60	341
11-20	345	61-70	290
21-30	510	71-80	147
31-40	590	81-90	95
41-50	410	91-10	21

   b. What is 30th highest hourly volume? Explain its importance with a neat sketch.   **(06 Marks)**
   c. List the objectives and uses of (i) O and D studies   (ii) Parking studies.   **(06 Marks)**

4 a. Estimate the theoretical capacity of a lane, with one way traffic flow at a stream speed of 50 kmph. Assume average speed gap between the vehicles to follow a relationship $S_g = 0.278\ V_t$, with a reaction time of 0.75 seconds. Assume the average length of the vehicle travelling is 6m and hence evaluate capacity for a 2 lane system.   **(06 Marks)**
   b. Explain various forms of presenting O and D data.   **(06 Marks)**
   c. A vehicle of weight 30 tonnes skids through a distance equal to 50m, before colliding with another parked vehicle of weight 3 tonnes. After collision, both the vehicles skid through a distance equal to 16m, before stopping. Find the speeds of vehicles assuming f = 0.4
      i) After collision   ii) At collision   iii) Before collision.   **(08 Marks)**

PART – B

5 a. Describe the characteristics of the following with neat sketches : i) Green shield model ii) Parabolic flow density model. **(10 Marks)**

b. Assuming a linear speed density relationship, the mean free speed is observed to be 60 Kmph, near zero density. The corresponding jam density is 140 veh/km.
i)   Write down the speed – density and flow – density equations.
ii) Draw v-k , v-q, q-k diagrams indicating critical values.
iii) Compute the speed and the density corresponding to a flow of 1000 veh/hr. **(10 Marks)**

6 a. In a study of 363 observations of spot speed of vehicles, a researcher found the resulting mean to be 39.7 kmph with a standard deviation of 6.8 kmph. What would be a 95% confidence interval for the population mean speed? Assume that the observations are normally distributed. **(06 Marks)**

b. The data given below shows that the occupancy of Parking spaces in a parking lot consisting of 50 spaces. The count was taken with 15 minute intervals for 4 hours duration on 6 week days. Find whether the number of vacant spaces during any count follows a Poisson distribution. **(08 Marks)**

Occupancy of Parking spaces	50	49	48	47	46	45	44	43	42	41	≤ 40
Frequency	6	15	21	20	15	10	5	2	1	1	0

c. Explain the importance and basic approach to traffic forecasting. **(06 Marks)**

7 a. Describe the main functions and requirements of traffic control devices. **(06 Marks)**

b. With neat sketches, explain i) Phasing of traffic signals   ii) Regulatory and warning signs. **(06 Marks)**

c. A Simple four leg intersection needs a fixed time signal. The critical flow in N-S and E-W directions are 600 and 400 veh/hr, saturation flow is 1800 veh/hr and the lost time per phase is observed to be 1.2 seconds. Determine the cycle length and distribution of green. Give a neat sketch of timings. Use Webster's method. **(08 Marks)**

8 a. Mention the advantages and disadvantages of one way streets. **(08 Marks)**

b. Write a short note on signal coordination. **(06 Marks)**

c. Briefly explain Intelligent transport system and its use in Traffic Engineering. **(06 Marks)**

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