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B. Tech

PECE 8413

Eighth Semester Examination – 2008

TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING

Full Marks – 70

Time : 3 Hours

Answer Question No. ***1*** *which is compulsory and any* ***five*** *from the rest.*

The figures in the right-hand margin indicate marks.

Statistical tables and charts may be used if required.

Suitable data may be assumed if needed.

1. Answer the following questions : 2×10

(a) What are the basic possibilities for solution to the traffic engineering problem ?

(b) What are the effects of music on the driving performance of drivers ?

(c) Define Median speed. Modal speed and 85^{th}, 98^{th} and 15^{th} percentile speeds.

(d) State the difference between test car method and floating car method.

(e) The free speed and jam density on a highway are found to be 120 kmph and 80 vehicles / Km respectively. What is the maximum flow expected on a highway and at what speed will it occur ?

(f) Differentiate between on-street parking and off-street parking.

(g) Enumerate the main functions of a traffic island.

(h) Calculate the basic capacity of a traffic lane having a speed of 60 kmph, assuming average length of vehicles and reaction time as 6m and 2 seconds respectively.

(i) State the principle of a rotary intersection.

(j) What do you understand by E-L-T system approach to transportation planning ?

2. (a) Describe briefly the main functions of traffic Engineering. 5

(b) State briefly how human behaviour affects traffic engineering. 5

3. (a) A driver traveling at 60 kmph behind another vehicle decides to overtake it and presses the accelerator. The accelerating behaviour of the car is described by the following equation :

$dV/dt = 1.2 - 0.02\ V$

where V and t are speed in m/sec and time in seconds respectively.

Determine :

(i) Maximum speed of the vehicle

(ii) Maximum rate of acceleration

(iii) Rate at which the vehicle is accelerating after 4 seconds

(iv) Time needed for the vehicle to reach a speed of 100 kmph. 5

(b) Which types of vehicle constitute the slow moving traffic in India and what are their characteristics to be considered by a traffic engineer ? 5

4. (a) How are the travel time and delay data presented ? 5

(b) Explain with neat sketches the typical speed-volume-density relationships. 5

5. (a) Explain how space inventory is made in case of a parking study. 5

(b) Explain the restrictions on turning movements of vehicles on highways. 5

6. (a) Explain with the help of a neat sketch, different levels of service for uninterrupted flow on rural highways. 5

(b) The traffic flow at an intersection of two highways having carriageway width of

15m each, intersecting at right angle is given below. Assuming suitable data, design a rotary intersection (no constraint of land).

Appr-oach	Left Turning			Straight Ahead			Right Turning		
	Car / jeep	Bus truck	Motor Cycle	Car / jeep	Bus truck	Motor Cycle	Car / jeep	Bus / truck	Motor Cycle
N	250	125	300	300	300	400	200	135	250
E	200	150	250	240	120	320	240	120	350
S	260	180	320	200	130	220	160	150	160
W	200	140	360	210	160	300	250	170	320

5

7. (a) Discuss briefly the principal steps of UTP morphology. 5

(b) Trips between the traffic zones of a proposed new town are assumed to be proportional to the trips produced by the zone of origin and trips attracted by the zone of destination and inversely proportional to the square of the travel time between zones. Details of the three traffic zones are given below :

(A) Trips generated		
Zone	Trips produced	Trips attracted
A	4000	3000
B	2500	2000
C	6000	5000

(B) Future trips and travel time

Origin Zone	Destination zone		
	A	B	C
A			x (15)
B	y (12)		
C	240 (12)	Z (18)	

Figures in bracket show travel times in minutes.

Determine correct values of x,y and z in the above table, assuming same constant of proportionality for all zones. 5

8. (a) Write one method of forecast of travel demand. 5

(b) The table below shows the design year total person trips between four zones. The modal split analysis shows 60/40 for private car vs. public transport, as an overall split. The peak period car occupancy is 1.8 persons per car and 50 persons per bus.

Develop the trip matrixes for the two modes, i.e. cars and buses and total vehicular trips.

If the goods vehicles constitute extra 20% of the person vehicle trips, calculate the total vehicle trip. 5

O \ D	A	B	C	D
A	–	2000	600	3000
B	500	–	800	1000
C	700	1800	–	2100
D	400	500	900	–