

**Closed Books and Notes Exam & Assume Reasonably Any Missing Data & Total Mark = 100 Pts.**

↳ **First Part (Transport planning) (50 Points)**

**Q1: (a) Define the following terms using sketches if appropriate: (15 pts)**

Desire line & Cordon line & Land use type & Gross residential density & C.B.D &  
 Inter-zonal trip & Home interview & Zoning system & Trip purpose & Non-Home -trip  
 & Employment & Trip purposes & Regression method & Evaluation

**Q1: (b) Show what meant by using neat sketches: (10 pts)**

Trip Types with respect to cordon line – Network Description

Idealized road networks – Flow band diagram- Isochrone curves.

**Q2: (a)** There is a city consists of 4 zones, the generation method is carried out and the future trip production and attraction are obtained and the growth factors for both generation and attraction are calculated and listed in the Future O/D Matrix given below. Using Furness method, determine the final trip interchange for the four zones. Use the future production and attraction growth factors. (Only three iterations are required) **(15 points)**

D \ O	1	2	3	4	Pr-G.F
1	0	500	400	650	3.0
2	550	0	250	300	1.5
3	650	350	0	450	2.0
4	450	300	350	0	1.5
Att.G.F	2.0	2.0	2.5	2.0	

**Q2: (b) Using the bionomial mode choice model, solve the following question (10 pts)**

A user with annual income of 5000 Pounds is choosing between two modes, a taxi and a public bus for a specific journey of distance 5 miles, If the utility function of the model choice is on the following form:  $U_m = km - 0.05 t_m - 0.38 (X_m/d) - 50 (C_m/y)$

Where:  $t_m$  = in vehicle time (minutes),  $X_m$  = out vehicle time (minutes),  $d$  = distance (miles),  $C_m$  = Cost in piasters,  $y$  = annual income,  $km$  = mode specific constant

Taxi:  $t = 10$  min.,  $X = 5$  min,  $C = 200$  Piasters,  $k_t = 0.0$

Public Bus:  $t = 18$  min.,  $X = 8$  min,  $C = 75$  Piasters,  $k_b = -0.15$

It is required to obtain how many people use taxi and public bus from a 1000 people?

↳ **Second Part ( Traffic Engineering) (50 Points)**

**Question (1): (25 Points)**

**1. Complete The Following: (5 Points)**

Function of the shoulder is:

a. \_\_\_\_\_ b. \_\_\_\_\_ c. \_\_\_\_\_, Standard width= \_\_\_\_\_

Types of medians are: a. \_\_\_\_\_ b. \_\_\_\_\_

**2. Define The Following Terms Stating Their Units In Metric System: (5 Points)**

$$L = \frac{AS^2}{200(\sqrt{h_1} + \sqrt{h_2})^2}$$

L= \_\_\_\_\_

S= \_\_\_\_\_ A= \_\_\_\_\_

h<sub>1</sub>= \_\_\_\_\_ h<sub>2</sub>= \_\_\_\_\_

**3. Draw neatly a sketch of a typical cross-section of a divided highway in rural areas showing all elements. (3 Points)**

4. An observer in a moved car has collected data for traffic stream volume and speed calculations for a section of road with length of 1.5 km as given in the following table. Calculate the average flow and the average overall speed for each direction and for the whole section.

**(12 Points)**

Run No.	Direction		Time (mins)		Vehicles met with in the opposite direction	No. of vehicles overtook test car	No. of vehicles overtaken by test car
			Running	Delays			
1	North	South	2.5	0	42	1	0
2			2.2	0.4	45	2	0
3			1.9	0.5	47	2	1
1	South	North	2.2	0.3	34	2	0
2			1.8	0.8	38	2	1
3			2.1	0.6	41	0	0

**Question (2): (25 Points)**

1. Draw a sketch showing the conflict points for 4-legs intersection and count the conflicts for either merging, diverging and crossing, since movements are permitted in through and right-turn only.

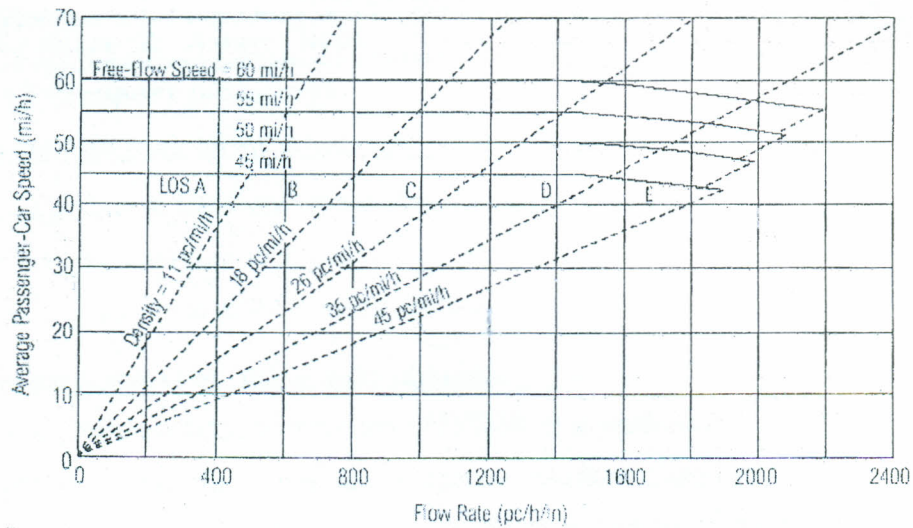
**(3 Points)**

2. An undivided 2 mile - multilane segment is required to be designed. It has a service flow rate of 1500 pc/hr/ln, a 4-lanes with 3.6 m for each lane, 0.9 m lateral clearance on both sides, and average 6 access points/km on each direction. If the 85<sup>th</sup> percentile speed is 94.8 km/hr, what is LOS?

**(10 Points)**

3. Four-phase traffic signals control an intersection with cycle time of 120 seconds. Saturation flows on all approaches are identical but the maximum traffic flows on two of the phases are twice that in the remaining two phases. Determine the actual green time for each phase of this intersection; the yellow time and total lost time are 3 and 3 seconds, respectively for each phase and draw the phase diagrams.

**(12 Points)**



Note:  
 Maximum densities for LOS E occur at a  $v/w$  ratio of 1.0. They are 40, 41, 43, and 45 pc/mi/h at FFS of 60, 55, 50, and 45 mi/h, respectively. Capacity varies by FFS. Capacity is 2,200, 2,100, 2,000, and 1,900 pc/h/n at FFS of 60, 55, 50, and 45 mi/h, respectively.

### Speed-flow curves with LOS criteria for multi-lane highways

Lane Width (m)	Reduction in FFS (km/hr)
3.6	0.0
3.5	1.0
3.4	2.1
3.3	3.1
3.2	5.6
3.1	8.1
3.0	10.6

Median Type	Reduction in FFS (km/hr)
Undivided highways	2.6
Divided highways	0.0

Four-Lane Highways		Six-Lane Highways	
Total Lateral	Reduction in FFS	Total Lateral	Reduction in FFS
Clearance, m	(km/hr)	Clearance, m	(km/hr)
3.6	0.0	3.6	0.0
3.0	0.6	3.0	0.6
2.4	1.5	2.4	1.5
1.8	2.1	1.8	2.1
1.2	3.0	1.2	2.7
0.6	5.8	0.6	4.5
0.0	8.7	0.0	6.3

Access Points/Kilometer	Reduction in FFS (km/hr)
0	0.0
6	2.5
12	5.0
18	7.5
≥ 24	10.0

Good Luck  
 Associate Prof. Sayed Shwaly  
 Dr. Alaa Gabr