Building and Construction Engineering Department **Faculty of Engineering** **Mansoura University**	**Transportation Planning and Traffic Engineering Final Exam**	**Course Code: NPWE5** **28 December 2017** **Time Allowed: 2 hours**

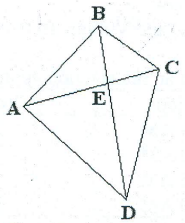
***Please try all questions.** ***This is a closed book closed notes exam.**
***Any missing data may be reasonably assumed.** ***Total exam grade: 50 points.**
**** The exam in 1 page (2 faces)*** **** Please be organized.***

Q1. (5 points) In your answer sheet only state (√) or (X):

1) An arterial road is a low capacity urban/rural road.
2) Surveys on trip making habits show that the trip generation rate decrease with the increase of car ownership and income levels.
3) The FFS can be easily achieved under level of service "E".
4) The cordon line divides the study area into different zones for data collection.
5) Synthetic methods for trip distribution are simpler compared to the growth factor methods.
6) Spacing is defined as the distance between end of the front vehicle and front of the back vehicle.
7) The trip production equations depend only on employment and income.
8) A regression model with coefficient of determination of 0.1 is a good model.
9) Zoning is established mainly based on the land use.
10) Minimum path tree can represent the shortest time on the network between the OD pairs.

Q2. (20 points):

1) **(2 pts)** State the main function of the desired line diagram and show an example with a neat sketch.
2) **(5 pts)** Construct the incident matrix for the network shown in the following figure based on the existence or non-existence of a direct link between zone centroids. Then determine the most and least accessible nodes.



3) **(6 pts)** Roads have a major function of moving people and goods from one place to another safely and efficiently. However, accessibility is also an important function. Discuss this in light of the different highway functional classifications. Use appropriate figures to support your answer.

4) **(7 pts)** The utility function of the model choice is as follows:

$$U_m = a_m - 0.05\,X_1 - 0.02\,X_2 - 0.015\,X_3 - 0.005\,X_4$$

If the future number of trips between zones is 1000 trip /person/ day. Considering two users choosing between two modes, passenger car (A) and a public bus (B). Also, considering the following situation:

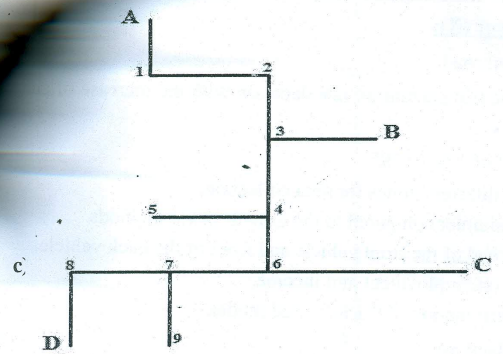
Variable	X_1	X_2	X_3	X_4	a_m
Passenger car	8	4	25	200	-0.15
Public bus	12	16	45	50	-0.53

Determine the modal split ratios and number of future trips in PCUS for using passengers' cars and buses, knowing that (Occupancy rates for passenger car and public bus are 2 & 40 respectively, Also, one Public bus = 5 PCU.

Q3. (15 points):

a) **(2 pts)** State the two objectives of the O/D surveys.

b) **(13 pts)** Assign the (O/D) matrix given to the network shown in the Figure below. **Use the All-Or-Nothing Technique** (assume average running speed of 30 Km/hr). Assume that **DHV = 0.15 ADT** and the lane capacity is 100 PCU/hr./lane. The future interchanges between zones represented as PCUs as resulted from the model split process and after applying the occupancy rate of all available modes of transportation in the city. It is required to find out the number of lanes for each link.



Scale 1:100000

O\D	A	B	C	D
A		200	150	250
B	200		400	100
C	150	400		150
D	250	100	150	

Q4. (10 points):

a) (5 pts) Write briefly about the following items (using sketches if possible) :

I. Interrupted flow and uninterrupted flow
II. Relationships among Speed, Density, and Volume (rate of flow) on uninterrupted flow.

b) (5 pts) The following counts were taken on an intersection approach during the morning peak hour.

Time Period	Volume
6:00 – 6:15 AM	170
6:15 – 6:30 AM	185
6:30 – 6:45 AM	195
6:45 – 7:00 AM	190

Determine : the hourly volume, the peak rate of flow within the hour, and the peak hour factor.

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Best wishes **Examiner: Dr. Sherif El-Badawy**