UNIVERSITY OF SWAZILAND

INSTITUTE OF DISTANCE EDUCATION

BACHELOR OF COMMERCE DEGREE

MAIN EXAMINATION

COURSE TITLE : **MANAGEMENT SCIENCE II**

COURSE CODE : **IDE BA310/407**

DEGREE : **BACHELOR OF COMMERCE**

EXAM PERIOD : **MAY / JUNE 2019**

INSTRUCTIONS

1. **This paper has five (5) questions**
2. **Answer any four (4) questions**

EXTRA REQUIREMENTS

1. **Students are allowed to use a calculator.**

In assessing your work, consideration will be given to the accuracy of language, quality of expression and layout/presentation of your final answer.

BA 310/407 Management Science Examination

Attempt Any Four (4) Questions)

Question 1 (25 Marks)

The WSS Company sells desktop computers to IT companies in Matsapha and ships them from three distribution warehouses located in three (3) different areas. The company is able to supply the following numbers of desktop computers to IT companies by the beginning of the year:

Distribution Warehouse	Supply
Warehouse 1	150
Warehouse 2	200
Warehouse 2	50
Total	400

IT companies have ordered desktop computers that must be delivered and installed by the beginning of the year

IT Company	Demand Desktop Computors
IT Connection (ITC)	100
Bytes (BYT)	80
Computronics (CMP)	220
Total	400

The shipping costs per desktop computer from each distributor to each company are as follows:

From			
	ITC	BYT	CMP
Warehouse 1	7	5	9
Warehouse 2	10	12	10
Warehouse 2	6	3	14

With cost minimization as a criterion, WSS Company wants to determine how many desktop computers should be shipped from each warehouse to each IT company.

Task: Establish an initial feasible solution:

a. The Northwest corner rule (5 Marks)
b. Least Cost Method (5 Marks)
c. Vogel's Approximation Model (5 Marks)

Task: Test for optimal solution using

d. Stepping stone method (5 Marks)
e. Modified Distribution method (MODM) (5 Marks)

Question 2 (25 Marks)

There are 3 jobs *A*, *B*, and *C* and three machines *X*, *Y*, and *Z*. All the jobs can be processed on all machines. The time required for processing job on a machine is given below in the form of matrix. Make allocation to minimize the total processing time.

	Machines (Hours)		
	X	Y	Z
A	11	14	6
B	8	10	11
c	9	12	7

Question 3 (25 Marks)

The following costs are incurred per show at Sebastian's Dinner Theater:

- Facilities cost E500
- Staff (actors who double as servers) 1000
- Kitchen staff 200
- Stage crew 300
- Food cost (per ticket) 10

- Ticket Price is E30

Task: Calculate breakeven number of tickets. (5 Marks)

1. What are the fixed costs? (4 Marks)
2. What are the variable costs? (4 Marks)
3. What is the revenue? (4 Marks)
4. What is the Unit Contribution Margin for Sebastian's Dinner Theater? (4 Marks)
5. What is the Contribution Margin stated as a Percentage of sales (4 Marks)

Question 4 (25 Marks)

A new shopping mall is considering setting up an information desk manned by one employee. Based upon information obtained from similar information desks, it is believed that people will arrive at the desk at a rate of 20 per hour. It takes an average of 2 minutes to answer a question. It is assumed that the arrivals follow a Poisson distribution and answer times are exponentially distributed.

(a) Find the probability that the employee is idle. (4 Marks)

(b) Find the proportion of the time that the employee is busy. (4 Marks)

(c) Find the average number of people receiving and waiting to receive some information. (4 Marks)

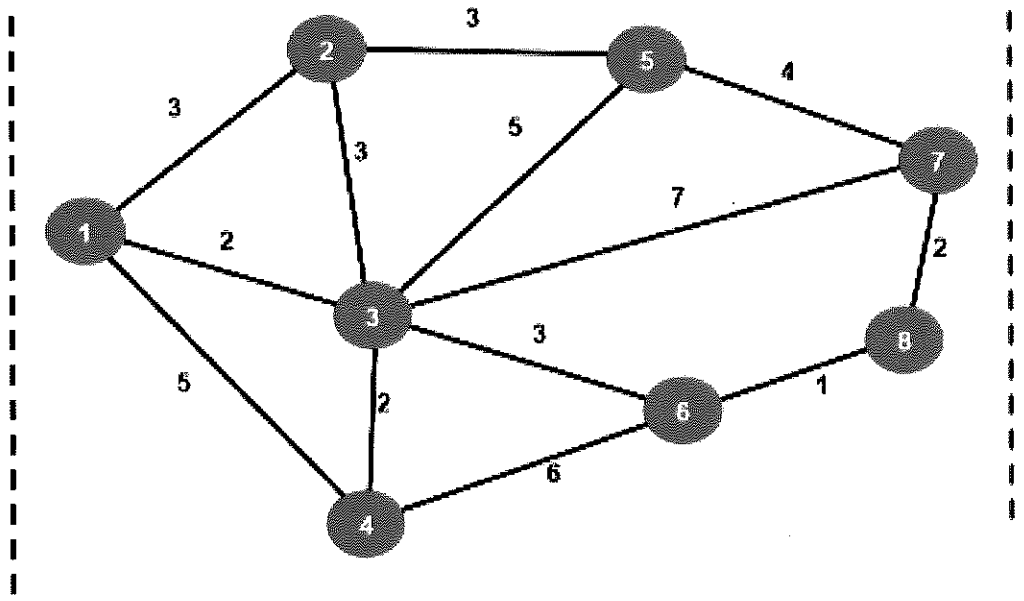
(d) Find the average number of people waiting in line to get some information. (4 Marks)

(e) Find the average time a person seeking information spends in the system. (4 Marks)

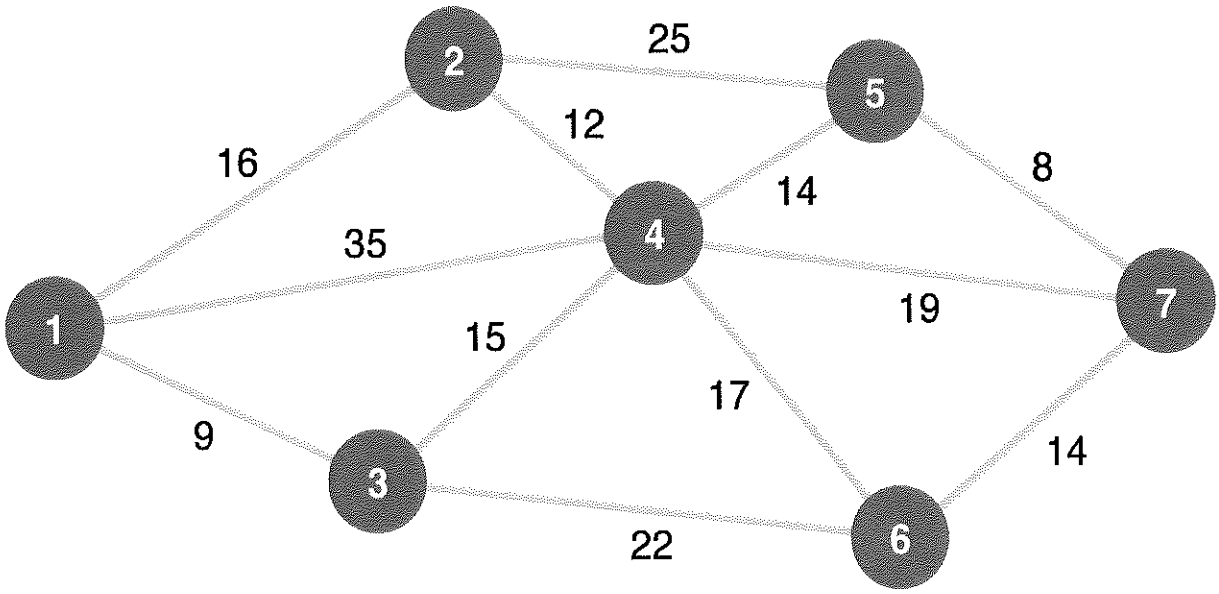
(f) Find the expected time a person spends just waiting in line to have a question answered (time in the queue). (5 Marks)

Question 5 (25 Marks)

a) The Lauderdale Construction Company is developing a housing project. It wants to determine the least expensive way to install water and power lines to each house. There are eight houses in the project and the distance between them is shown in the table below:
a). Find the shortest path through the network using the shortest-route technique (8 Marks)



b). Problem: Connect all nodes in a network so that the total of the branch lengths are minimized. (7 Marks)



C). Maximize the amount of flow of items from an origin (Omaha) to a destination (St Louis) (10 Marks)