

UNIVERSITY OF SWAZILAND
FACULTY OF COMMERCE
DEPARTMENT OF BUSINESS ADMINISTRATION
SUPPLEMENTARY EXAMINATION PAPER; FULL TIME STUDENTS
JULY 2016

TITLE OF PAPER : **MANAGEMENT SCIENCE11**
COURSE CODE : **BA 310**
TIME ALLOCATED : **THREE [3] HOURS**
TOTAL MARKS : **100 MARKS**

INSTRUCTIONS

1. TOTAL NUMBER OF QUESTIONS IN THIS PAPER IS 4
2. THE PAPER CONSISTS OF SECTION A AND SECTION B
3. ANSWER THE QUESTION IN SECTION A WHICH IS COMPULSORY AND ANY THREE [3] QUESTIONS IN SECTION B.
4. THE MARKS ALLOCATED FOR A QUESTION/PART OF A QUESTION ARE INDICATED AT THE END OF EACH QUESTION/PART OF QUESTION.
5. NOTE: MAXIMUM MARKS WILL BE AWARDED FOR QUALITY, LAYOUT, ACCURACY, AND GOOD PRESENTATION OF WORK.

THIS PAPER MUST NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

SECTION A : ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION1.

- a. An Accounting firm in Mbabane has four (4) Accountants whom it wishes to move to different locations. The matrix below shows the cost to move each of these Accountants to each of the locations. Determine which Accountant should be moved to each of the four locations.

Accountant	Office location			
	Manzini	Siteki	Lubombo	Hlathikulu
Adiel	E3,000	E 5,000	E 4,500	E 5,500
Brenton	8,000	5,000	7,000	4,600
Cathy	6,000	3,000	4,200	5,100
David	4,400	7,500	6,100	6,900

[20 Marks]

- b. Don Yale, President of Hard rock concrete company has plants in three locations and is currently working on three major construction projects, located at different sites. The shipping cost per truck load of concrete, plant capacities, and project requirements are provided in the following table.

From \ To	Project A	Project B	Project C	Plant capacities
Plant 1.	\$10	\$4	\$11	70
Plant 2.	\$12	\$5	\$8	50
Plant 3.	\$9	\$7	\$6	30
Project requirements	40	50	60	150

- Use the North West Corner solution to establish the initial feasible solution for the transportation problem and also compute the total cost.(10)
- Find the closed path to each empty cell and determine the improvement index for each unused cell.(10)
- What conclusion will you make if you find that all improvement indices are greater than or equal to zero? (5).
- What will be the initial feasible total transportation cost if you used the lowest cell method?(5)

[30 Marks]

Section B. Choose 2 questions of your choice from this section. Each question carries equal marks (25).

QUESTION 2.

a).

The Harry-Mxolisi porcelain company is about to launch a new luxury tableware range. The selling price for the set will be \$90.00. To make the range the company has invested \$319,000.00 in new equipment and variable cost will be \$35.00 per set. What number of sets must they sell to break even and what profit will they make if they sell 6000 units (15)

b).

The Matsapha savings and loan bank has one drive –up teller window in operation. Cars arrive at the window in a Poisson fashion at the rate of 15 customers per hour. It takes the teller an average of 2 minutes to serve each customer. Service is on a first come first serve basis (FCFS) and times are exponentially distributed. Management is interested in the operating characteristics of the current system. Calculate; the proportion when the server is busy(p), Probability of an empty system (P_0), Expected number of cars in the system(L), Expected number of cars in the queue (L_q), Expected time in the system for each car(W) and Expected time each car is waiting to be serve (W_q) (10)

[25 Marks]

QUESTION 3.

Mazibuko Enterprises presently has two factories at Siteki and at Luyengo, and three warehouses at Manzini, Mbabane, and Big Bend. Siboniso the company's new General Manager has proposed a new warehouse at Hlathikhulu to increase factory capacity. Sandra the Board Chairperson wants to know what the company's monthly shipping cost will be with the new factory located at Hlathikhulu. The monthly capacities of the old and new factories, the monthly warehouse requirements, and the transportation costs per unit from each factory to each warehouse are:

Monthly Factory Capacity

Factory	Monthly Capacity
Siteki	4,000
Luyengo	10,000
Hlathikhulu	6,000
TOTAL	20,000

Monthly Warehouse Requirements.

Warehouse	Monthly Demand
Manzini	3,000
Mbabane	9,000
Big Bend	8,000
TOTAL	20,000

Transport Costs.

From	To		
	Manzini	Mbabane	Big Bend
1. Siteki	E31	E21	E42
2. Luyengo	E20	E21	E30
3. Hlathikhulu	E23	E20	E15

- i. Draw the Transportation tableau.(6 marks)
- ii. Use the minimum cost method and the stepping stone method, if need be, to obtain the optimal solution.(10 marks).
- iii. How many units should be shipped from each factory to each warehouse after the new factory has been built? (5 marks).
- iv. What is the total monthly transportation cost for the company?(4 marks)

[Total 25 Marks]

QUESTION 4.

- i. Central Construction Company moves materials between three plants and three projects. Project A requires 140 truckloads each week, project B requires 200, and project C requires 80. Plant W can supply 120 loads, plant X can supply 160, and plant Y can supply 140. Using the cost information given in the following table, compute the optimal transportation cost using the stepping stone method. (13)

Cost information.

From	To project A	To project B	To project C.
Plant W	\$ 5	\$ 4	\$ 9
Plant X	4	3	5
Plant Y	7	4	2

- ii. A vehicle repairs workshop is capable of installing anti hijack sets at an average rate of 3 per hour or about 1 hour 20 minutes. Customers needing the same service arrive at the shop at the average of 2 per hour. If all conditions of a single channel model are met ,calculate
- a. Average number of customers in the system (L)
 - b. The average time a customer spends in the system(W)
 - c. Average number of customers in the queue(Lq)
 - d. Average waiting time the customer spends waiting in the queue(Wq)
 - e. The probability that the service facility is being used(p)
 - f. Percentage idle time(P0)

(12)

[Total 25 Marks]

END OF EXAMINATION: GOOD LUCK!!!!