

UNIVERSITY OF SWAZILAND

FACULTY OF COMMERCE

DEPARTMENT OF BUSINESS ADMINISTRATION

SUPPLEMENTARY EXAMINATION PAPER; FULL TIME & IDE STUDENTS

JULY 2015

TITLE OF PAPER : MANAGEMENT SCIENCE I
COURSE CODE : BA 302/BA406
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 ALL QUESTIONS IN SECTION A AND ANY TWO [2] 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 A QUESTION.
5. NOTE: MAXIMUM MARKS WILL BE AWARDED FOR QUALITY, ACCURACY, LAYOUT, 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. TOTAL MARKS FOR SECTION A IS 50 MARKS.

QUESTION 1.

1(a).

A shop sells 500 packets of soap powder per year. Demand is spread evenly over the year. The packets are purchased for E2.00 each. It costs the proprietor E10.00 to place an order. The supplier's lead time is 12 working days (assuming a six days week). The holding costs are estimated to be 20% per annum of the average stock value.

You have just received additional information that the supplier is offering the following discounts;

Quantity offered	Discount %	Cost per packet
0-199	0	E2.00
200-499	2	1.96
500 and over	4	1.92

Answer the following questions clearly showing all the workings.

- How many soap packets should the shop owner order under the three categories?(3)
- Should the shop owner accept one of the discounts being offered? (12)
- What will be the overall total cost to the shop owner for purchasing 500 packets (2)

1(b).

Solve the following Linear programming (maximization) using the corner method. (17)

$$\text{Max } P: = 200X_1 + 500X_2$$

$$\text{St: } X_2 \leq 40$$

$$1.2X_1 + 4 X_2 \leq 240$$

$$0.5 X_1 + X_2 \leq 81$$

$$X_1; X_2 \geq 0$$

1(c).

Suppose the director of planning at the Manzini town council' Sanitation division is interested in the relationship between the age of a garbage truck and the annual repair expense he should expect to incur. In order to determine this relationship, the director has accumulated information concerning four of the trucks the city currently owns. (see table below):

Truck Number.	Age of truck in years(x)	Repair expense during last year in (00,000)(E)/year
101	5	7
102	3	7
103	3	6
104	1	4

a). Calculate the regression line using information in the table and determine the estimated next budget if the city has to use a truck that is four years old (16)

[Total 50 Marks]

SECTION B: ANSWER ANY 2 QUESTIONS OF YOUR CHOICE FROM THIS SECTION.

QUESTION 2.

2(a).

A chemical firm produces sodium bisulphate in 100 kg bags. Demand for the product is 20 tonnes per day. The capacity for producing the product is 50 tonnes per day. Set up cost is E100.00 and storage and handling cost are \$5.00 per tonne per year. The firm operates 200 days per year. NB. 1 tonne is equivalent to 2000 kg. How much could the company save annually if the set up cost is reduced to E25.00? (15)

2(b).

Explain reasons given by companies for carrying inventory? (10)

[Total 25 Marks]

QUESTION 3 (a).

Matsapha furniture manufacturers produce tables and chairs. The production process for each is similar in that both require a certain number of hours of carpentry work and a certain number of labour hours in the painting and varnishing department. Each table takes 4 hours of carpentry and 2 hours in the painting and varnishing shop. Each chair requires 3 hours in carpentry and 1 hour in the painting and varnishing shop. During the current production period, 240 hours of carpentry time are available and 100 hours in painting and varnishing time are available. Each table sold yields a profit of E7, each chair produced is sold for aE5 profit.

Determine the best possible combination of tables and chairs to manufacture in order to reach the maximum profit. What profit do you expect to make? (15marks)

QUESTION 3(b).

Matsapha Garage has developed a new device which should make the internal combustion engine more efficient. The chief mechanic is faced with three alternatives in regard to this device. The garage can proceed to manufacture and make the device itself; in this case the garage would make a profit of E2. for each device sold. As a second choice, the garage can sell the patent outright to another company for E1, million. In the third case, the garage can sell the patent for E.3 million and receive a royalty of E1. per device sold. Which is the optimal choice using the expectation principle if there is a .50 probability that the sales of the device will be .2million units, a .40 probability of sales of .8 million units, and if there is .10 probability of 1.4 million units being sold. Set up the decision matrix before applying the expectation principle. 10)

[Total 25 Marks]

QUESTION 4.

Bill Holiday is not sure what he should do. He can build a quadplex (a building with four apartments), build a duplex, gather additional information or simply do nothing.

If he gathers additional information, the results could be either favourable or unfavourable, but it would cost him E3000.00 to gather the information. Bill believes that there is a 50-50 chance that the information will be favourable. If the rental market is favourable, Bill will earn E15, 000., with the quadplex or E5; 000., with the duplex. Bill does not have the financial resources to do both. With an unfavourable rental market, however, Bill could lose E20, 000. with the quadplex or E10, 000., with the duplex. Without gathering additional information, Bill estimates that the probability of a favourable rental market is 0.7. A favourable report from the study would increase the probability of a favourable rental market