

UNIVERSITY OF SWAZILAND

FACULTY OF COMMERCE

DEPARTMENT OF BUSINESS ADMINISTRATION

FINAL EXAMINATION PAPER, FULL TIME STUDENTS

NOVEMBER 2013.

TITLE OF PAPER : MANAGEMENT SCIENCE 1

COURSE CODE : BA 302

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 QUESTION IN SECTION A AND ANY TWO [2] QUESTIONS IN SECTION B.
4. THE MARKS ALLOCATED FOR A QUESTION OR PART OF A QUESTION ARE INDICATED AT THE END OF EACH QUESTION OR PART OF THE QUESTION.
5. NOTE: MAXIMUM MARKS WILL BE AWARDED FOR QUALITY, LAYOUT, ACCURACY, AND GOOD PRESENTATION OF WORK.
6. THIS PAPER MUST NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

SECTION A : ANSWER ALL QUESTIONS IN THIS SECTION [50 MARKS].

QUESTION 1.

1.1.

Solve the following problem given these constraints and this objective function:

$$\text{Maximize profit} = 30x_1 + 40x_2$$

$$\text{Subject to: } 4x_1 + 2x_2 \leq 16$$

$$2x_1 - x_2 \geq 2$$

$$x_2 \leq 2$$

$$x_1, x_2 \geq 0$$

- a. Graph the feasible region (6 marks)
- b. Evaluate the objective function at each corner point (8 marks)
- c. Identify the optimal solution (1 mark)

(Hint- An algebraic solution is not necessary in this instance but to improve your accuracy you can use the graph paper)

[Total 15 Marks]

1.2.

The New Product Development Director of a Matsapha chemical and pharmaceuticals manufacturing company believes that the firm's annual profits depend on the amount spent on research and development (R & D). The new Chief Executive Officer (CEO) does not agree and he has asked for evidence. R& D expenditure and profit data for the past six years was obtained for use and it was as follows:

Year	Amount spent on R&D (E millions)	Annual Profit (E millions)
2012	2	20
2011	3	25
2010	5	34
2009	4	30
2008	11	40
2007	5	31

Use the regression equation to advise the new CEO how much profit he will likely earn if he approves the 2014 R & D, proposed budget of E 8 million that was presented for his approval

[Total 15 marks]

1.3.

The forecast annual demand of particular product sold at Lomahasha retail store is 600 units, the cost is E 60 per unit. The cost of ordering and receiving delivery is E15 on each occasion. Stockholding costs are 20% per annum of stock value.

- Calculate the optimum order quantity if there is to be instantaneous delivery of an order.
(4 marks)
- If the store offers a quantity discount of 10% when orders of equal or in excess of 150 units are placed, will you accept the discount offer, and what will be the cost implications?(6 marks)

[Total 10 Marks]

1.4

Illustrate and explain what is meant by a production system that is under control.

[Total 10 marks]

SECTION B: CHOOSE TWO (2) QUESTIONS OF YOUR CHOICE FROM THIS SECTION. EACH QUESTION CARRIES 25 MARKS.

QUESTION 2.

2.1.

A decision table with monetary pay offs and associated probabilities is given below.

Decision alternative	STATE OF NATURE		
	Good marketing	Average audit	Bad Market
Small factory	290 000	180 000	- 170 000
Medium size factory	320 000	200 000	- 240 000
Large factory	490 000	540 000	- 360 000
No factory	0	0	0
Probabilities	0.3	0.6	0.1

Assuming there are no probabilities, what decisions would you make under, Maximax criterion, Maximin criterion, Laplace, Minimax regret criterion and Criterion of realism with a 0.8 coefficient of realism and assuming the probabilities are now brought into place what decision will you make under the Expected value decision criterion? (15 marks)

2.2.

The Dean of UNISWA Graduate School of Management must plan the school's course offerings for the fall semester. Student demands make it necessary to offer at least 30 undergraduate and 20 graduate courses in the term. Faculty contracts also dictate that at least 60 courses be offered in total. Each undergraduate course taught costs the college an average of E2, 500 in Faculty wages, and each graduate course costs E3, 000. How many undergraduate and graduate courses should be taught in the fall so that the total Faculty salaries are kept to a minimum? (10 marks)

[Total 25 Marks]

QUESTION 3.

3.1.

A toy manufacturer uses 48,000 rubber wheels per year for its popular dump truck series. The firm makes its own wheels, which it can produce at a rate of 800 per day. The toy trucks are assembled uniformly over the entire year. Carrying cost is \$ 1 per wheel a year. Set up cost for a production run of wheels is \$ 45. The firm operates 240 days per year. Determine the, Overall run size, Minimum total annual cost for carrying and set up, Cycle time for the optimal run size, and Run time. (13 marks)

3.2.

Shisweleni Enterprises is considering opening a food outlet in Hlangano town. The company is evaluating 3 sites; Downtown, The mall, and out at the busy Traffic circle. Shisweleni calculated the value of successful stores at these locations with the Mall being R300, 000, Downtown being R250 000 and the busy Traffic circle being R400 000. Shisweleni also knows that losses if unsuccessful would be R100, 000at either Downtown or The mall, and R200, 000 at the Traffic circle. The company figures its chances to be 50% Downtown, 75% at the Traffic circle and 60% at The mall. A friend has also suggested that ShisweleniEnterprise could choose not to open the restaurant. Draw a decision tree to represent the above situation and select the best option for Shisweleni. (12 marks)

[Total 25 Marks]

QUESTION 4.

Carefully study the following table;

Period	Actual	Period	Actual
1	180	5	190
2	168	6	205
3	159	7	180
4	175	8	18

Forecast quantities uplifted in period 9 using the following methods:

4.1.

Naive forecasting, assuming a stable environment. (2 marks)

4.2.

Three (3) months moving average from year 4 up to 9 (4 marks)

4.3.

Weighted moving average that assumes weights of 0.5 the most recent upload, 0.3 second most recent, and 0.2 the third most recent. (4 marks)

4.4.

Exponential smoothing method with a smoothing factor of .10 and assuming period 1, forecast of 175 (5 marks)

4.5.

Using MAD & MSE, which forecasting method is better than the other, between three months moving average and exponential smoothing? (10 marks)

[Total 25 Marks]

END OF QUESTION PAPER; GOOD LUCK!!!!!!!!!!!!!!