

UNIVERSITY OF ESWATINI  
FACULTY OF COMMERCE  
DEPARTMENT OF BUSINESS ADMINISTRATION  
FINAL EXAMINATION PAPER; FULL TIME& IDE STUDENTS  
JANUARY 2019.

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TITLE OF PAPER : MANAGEMENT SCIENCE 1

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 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. CREDIT WILL BE AWARDED FOR QUALITY, LAYOUT, ACCURACY, AND EXPLANATIONS FOR STEPS USED TO SOLVE PROBLEMS

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.

Explain with the assistance of an illustration what it meant by ‘a production system being out of control’ **(12 marks)**

1.2.

Benele Lungile Simiso is considering investing some money that she inherited. The following payoff table gives the profits that would be realised during the next year for three investment alternatives Benele is considering.

<u>Decision Alternative</u>	<u>State of Nature</u>	
	<u>Good Economy</u>	<u>Poor Economy</u>
Stock Market	80,000	- 20,000
Bonds	30,000	20,000
CD	23,000	- 23,000
Probability	0.5	0.5

- i. What decision would maximise expected profit? **(3 marks)**
- ii. What decision would you make using the mini-max regret criterion **(3 marks)**
- iii. What decision will be made using the criterion of realism ( $\alpha = 0.7$ ) **(3 marks)**
- iv. What is the maximum amount that should be paid for a perfect forecast of the economy? **(4 marks)**

1.3.

Room registrations at Esibayeni Lodge have been recorded for the past 9 years. Management would like to determine the mathematical trend of guest registration in order to project future occupancy. The estimate would help the hotel to determine whether future expansion will be needed. Given the following time series data. Room registrations are in thousands.

<b>Year</b>	1	2	3	4	5	6	7	8	9
<b>Registrations</b>	17	16	16	21	20	20	23	25	24

- i. Calculate MAD and MSE using the three year moving average forecast (10 marks)
- ii. Calculate MAD and MSE using exponential smoothing forecast with an exponential smoothing factor of 0.4 and a forecast of 17 bookings for year 1 (10 marks)
- iii. Which of the two forecasts must be selected and why? (5 marks)

[TOTAL MARKS 50]

**SECTION B: ANSWER TWO QUESTIONS OF YOUR CHOICE FROM THIS SECTION. EACH QUESTION CARRIES 25 MARKS.**

**QUESTION 2.**

The following table contains figures on a monthly volume and unit costs for a random sample of 16 items from a list of 2000 inventory items at Mbabane Government Hospital. Assume 60% of the items are class A category, 30% B category and the balance C category.

Item	Unit cost	Usage	Item	Unit cost	Usage
K34	E100	200	F99	200	60
K35	250	600	D45	100	550
K36	360	150	D48	120	90
M10	160	25	D52	150	110
M20	200	80	D57	400	120
Z45	800	200	N08	300	40
F14	200	300	P05	160	500
F95	300	800	P09	100	30

- a. Explain the Pareto analysis principle [10 marks]
- b. Develop an A-B-C- classification for the items [10 marks]
- c. After reviewing your classification scheme, suppose that the Hospital Administrator decides to place item P05 into the A category. What would be some possible explanations for this decision? [5 marks]

**QUESTION 3.**

The Bambani Farmers Association in Mbuluzi is considering buying two different brands of chick feed and blending them to provide good, low-cost diet for its birds. Each feed contains in varying proportions, some or all of the three nutritional ingredients essential for fattening chicks. Each kilogram of brand 1 purchased for example, contains 5 grams of ingredient A, 4

grams of ingredient B, and 0.5 grams of ingredient C. Each kilogram of brand 2 contains 10 grams of ingredient A, 3 grams of ingredient B, but no ingredient C.

The brand 1 feed cost the Association 2 Emalangenì a kilogram, while brand 2 costs 3 Emalangenì per kilogram.

Use the linear programming corner point solution to determine the lowest diet that meets the minimum monthly intake requirement for each nutritional ingredient when the minimum monthly ingredients requirements are: Ingredient A (90 grams), Ingredient B (48 grams), and Ingredient C (1 ½ grams).

**[TOTAL 25 MARKS]**

#### **QUESTION 4.**

Michael has always been proud of his personal investment strategies and has done very well over the past several years. Over the past several months however, Michael has become very concerned about the stock market as a good investment. In some cases it could have been better for Michael to have his money in the bank than in the market. During the next year, Michael must decide whether to invest \$10 000 in the stock market or certificate of deposit (CD) at an interest rate of 9 %. If the market is good, Michael believes that he could get a 14% return on his money. With a fair market, he expects to get an 8 % return. If the market is bad, he will most likely get no return at all - in other words the return would be 0%. Michael estimates that the probability of a good market is 0.4, the probability of a fair market is 0.4, the probability of a bad market is 0.2, and he wishes to maximise his long term average return.

a. Develop a decision table for this problem and advise what the best decision is?  
**[10 marks]**

b. If you hire a consultant he will give you additional information that can improve the quality of your decision, but of course you need to pay the consultant. How much will you be willing to pay the consultant in the above case?  
**[10 marks]**

c. Would you make the same advice as in (a) above when the probabilities for good market and bad market are 0.2 and 0.4 respectively?  
**[5 marks]**