

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. NOTE: MAXIMUM MARKS 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.

QUESTION 1.

1.1.

Solve the following minimisation problem using the corner point solution

$$\begin{array}{llll} \text{Min} & E2X1 + E3X2 & & \\ \text{St} & 1X1 + 1X2 & \geq & 350 \quad (\text{production constraint}) \\ & 1X1 & \geq & 125 \quad (\text{special customer constraint}) \\ & 2X1 + 1X2 & \leq & 600 \quad (\text{processing time constraint}) \\ & X1, X2 & \geq & 0 \quad (\text{Non-negativity constraint}) \end{array}$$

(20 marks)

1.2

Explain advantages and disadvantages of four qualitative forecasting techniques you know

[16 marks]

1.3

What is EVPI? Why is it necessary to estimate the fees consultants will charge you?
Study the following table and calculate EVPI for the scenario

(14 marks)

SECTION B; ANSWER TWO QUESTIONS OF YOUR CHOICE FROM THIS SECTION.

QUESTION 2.

Annual sales of soccer balls at a Johannesburg based company were indicated as follows for the twelve years.

Year	2003	2004	2005	2006	2007	2008
Sales(000)	1850	1920	1800	1875	1960	2040
Year	2009	2010	2011	2012	2013	2014
Sales(000)	1980	2100	2070	2150	2210	2180

2.1

What is the difference between trend analysis and regression analysis?

(3 marks).

2.2.

Use a scatter graph to show if there is any trend in the statistics you were given.

Reading from your graph, what will be the sales figure for 2015?

(4 Marks)

If you use MAD and MSE forecasting accuracy test techniques which approach would you select between 4 periods moving average and exponential smoothing method. For the exponential smoothing method assume the forecast for period one is the same as actual sales for that period.

(10 marks)

[TOTAL MARKS 25]

QUESTION 3.

3.1

Matsapha Electronics specialises in manufacturing modern electronics components.

It also produces equipment that builds the components. Monero who is responsible for advising the Chief Executive Officer (CEO) of Matsapha Electronics on electronics manufacturing equipment has developed the following table concerning a proposed facility.

ALTERNATIVES	PROFIT(\$)		
	Strong market	Fair market	Poor market
Large facility	550,000	110,000	- 310,000
Medium size facility	300,000	129,000	- 100,000
Small facility	200,000	100,000	- 32,000
No facility	0	0	0

- i. What will be your maxi-maxi decision?
- ii. What will be your maxi-min decision?
- iii. What will be the Laplace decision?
- iv. What will be the Hurwicz decision assuming α is 0.7?

0.20 times the average inventory. A new price has been received from a supplier from a company that manufactures liquid ICU hand wash. The new price schedule indicates that any order quantity lower than 50 cases will cost E20 per case. The proposed price schedule is shown below:

DISCOUNT	RANGE	PRICE(E)
1	1 - 49	20
2	50 - 79	18
3	80 - 99	17
4	Above 100	16

How many cases of liquid ICU must the doctors order?

(10 Marks)

[TOTAL MARKS 25]

QUESTION 4.

4.1

Test Mark(X)	58	47	48	40	56	31	36	55	39
Final Average(Y)	92	77	83	72	83	63	63	94	75

- i. What is a dependent variable and how is it different from a predictor?
(2 marks)
- ii. Develop a regression model that could be used to predict the final average mark in the course based on the test mark
(8 marks)
- iii. Predict the final average mark for a student who has score 73 on the test
(3 Marks)

E100,000 at either Downtown or Bunu Mall and E200,000 at Riverstone. Mary figures her chances to be 50% Downtown, 75% at Riverstone and 60 at Bunu Mall. A friend has also suggested that Mary could choose to not open a grocery store. Use the decision tree method to recommend the best option for Mary. **(12 Marks)**

[TOTAL MARKS 25]