UNIVERSITY OF SWAZILAND

FACULTY OF COMMERCE

DEPARMENT OF BUSINESS ADMINISTRATION

FINAL EXAMINATION PAPER: FULL TIME & IDE STUDENTS

DECEMBER 2015

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 QUESTIONS 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.

1

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

QUESTION 1.

1.1.

Explain the steps of the decision making process in Management Science/ Operations Research. **(10 marks).**

1.2.

Solve the following minimisation problem using the corner point solution

Minimise $E2X1 + E3X2$

Subject to the following constraints

i. $1X1 + 1X2 \geq 350$ (production constraint)

ii. $1X1 \geq 125$ (special customer constraint)

iii. $2X1 + 1X2 \leq 600$ (processing time constraint)

iv. $X1, X2 \geq 0$ (Non-negativity constraint)

(18 marks)

1.3

Explain the advantages and disadvantages of any four qualitative forecasting techniques you know **(12 marks)**

1.4

What is expected value of perfect information (EVPI)? Study the following table, calculate EVPI for the scenario and interpret the results.

(10 marks)

ALTERNATIVE	STATE OF NATURE		
	Good Market Market	Fair Market	Poor Market
Stock market	$1,400	$800	0
Bank-Certificate of Deposit	$900	$900	$900
Probability	0.4	0.4	0.2

[TOTAL 50 MARKS]

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

QUESTION 2.

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

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

3

You are required to answer the following questions based on the table presented above.

2.1

Use a scatter graph to show if there is any trend in the statistics you were given. What will be the sales figure for 2015? **NB. Do not try to solve the trend line equation in this instance.** **(4 Marks)**

2.2.

What is the difference between trend analysis and regression analysis?

(3 marks).

2.3.

Determine forecasts for 2015 using 4 period moving average and exponential smoothing methods, using exponential smoothing factor of 0.5

(8 marks)

2.4

If you use Mean Absolute Deviation (MAD) and Mean Squared Error (MSE) forecasting accuracy test techniques which approach would you select between 4 period 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 a is 0.7?

    v.   What will be the mini-max regret decision?

(15 marks)

3.2

Doctors operating the Men's Clinic in Matsapha use 816 cases of liquid ICU hand wash when scrubbing up for operations. The ordering cost is E12, carrying cost is 20% or 0.20 times the average inventory. A new price has been received from a South African 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 Answer the questions that follow using information in the table below:

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. Develop a regression model that could be used to predict the final average mark in the course based on the test mark

(8 marks)

ii. Predict the final average mark for a student who has a score of 73 on the test

(3 Marks)

iii. What is a dependent variable and how is it different from a predictor?

(2 marks)

4.2

Mary is considering opening a grocery store in Manzini town. She is evaluating 3 sites: The Hub Centre, Bunu Mall and River stone. Mary calculated the value of successful stores at these locations with Bunu Mall being E300, 000, The Hub Centre being E250, 000 and River stone being E400, 000. Mary also knows that the losses if unsuccessful would be E100, 000 at either The Hub Centre or Bunu Mall and E200, 000 at River stone. Mary figures her chances to be 50% The Hub Centre, 75% at River stone 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]

END OF QUESTION PAPER: GOOD LUCK !!!!!!!!