UNIVERSITY OF SWAZILAND

FACULTY OF COMMERCE

DEPARMENT OF BUSINESS ADMINISTRATION

FINAL EXAMINATION PAPER; IDE STUDENTS

MAY 2013.

TITLE OF PAPER : MANAGEMENT SCIENCE

COURSE CODE : BA 412

TIME ALLOCATED : THREE [3] HOURS

TOTAL MARKS : 100 MARKS

INSTRUCTIONS

1. TOTAL NUMBER OF QUESTIONS IN THIS PAPER IS 5
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.

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.

a. Matsapha Manufacturing Company presently has factories in Siteki and Luyengo, and has got three warehouses at Manzini, Mbabane and Big Bend. A new factory at Hlathikulu is being proposed to increase factory capacity. Dludlu, the company's Board Chairman wants to know what the company's monthly shipping costs will be with the new factory located at Hlathikulu. The monthly capacities of the old and new factories, the monthly warehouse requirements, and the transportation costs per unit from each factory to each warehouse are shown below;

Monthly factory Capacity (000)		**Monthly warehouse requirements(000 tons)**	
Siteki	400	Manzini	300
Luyengo	1000	Mbabane	900
Hlathikulu	600	Big Bend	800
Total	**2000**	**Total**	**2000**

Transportation Cost Table

Factories	**Warehouses**		
	Manzini	Mbabane	Big Bend
Siteki	E31	E21	E42
Luyengo	E 20	E21	E 30
Hlathikulu	E 23	E 20	E15

i. Use both the Lowest Cost Cell method and the North West Corner method to determine the initial monthly transportation cost when the new factory is located at Hlathikulu. **(12 marks)**

ii. Apply the Stepping stone method to improve the transportation cost under the North West corner method and indicate how many units must be shipped from each factory to each warehouse after the new factory has been built and what the optimal cost is? **(16 marks)**

[Total Marks 28]

b. To complete the construction of UNISWA transport workshop, the project Director has laid out the major steps and seven activities involved. The activities have been labelled A to G in the following table, which also shows their estimated completion times (in weeks) and immediate predecessors. (See table of activities below for details);

Project activities

Activity	**a**	**m**	**b**	**Immediate Predecessors**
A	1	2	3	----
B	2	3	4	----
C	4	5	6	A
D	8	9	10	B
E	2	5	8	C,D
F	4	5	6	B
G	1	2	3	E

i. Draw diagram of all the transport workshop project activities **(6 marks)**

ii. Calculate the expected time and variance for each activity **(8 marks)**

iii. Which activities fall along the critical path for the entire transport workshop project? **(6 marks)**

iv. Determine the project's expected completion time **(2 marks)**.

[Total Marks 22]

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

QUESTION 2.

UNISWA Maintenance unit employs five joiners. Each joiner has different abilities and skills and takes different amounts of time to do each job. At present there are five jobs to be allocated. The time taken for each job by each person is given below;

Time per job (hours)

	Job 1.	Job 2.	Job 3.	Job 4.	Job 5.
M1	25	16	15	14	13
M2	25	17	18	23	15
M3	30	15	20	19	14
M4	27	20	22	25	12
M5	29	19	17	32	10

The jobs have to be assigned one job to one joiner. How should this be done in order to minimize the total man time needed to finish all of the jobs? **(15marks).**

b. Assuming UNISWA Maintenance Department can employ an additional part time joiner who can do the same jobs in times shown in a table below; how would this affect the assignment of the jobs to minimize total time? **(10 marks).**

Time per job (hours)

	Job 1.	Job 2.	Job 3.	Job 4.	Job 5.
M6	28	16	19	16	15

[Total Marks 25]

QUESTION 3.

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.

i. What is the annual demand for the chemical? **(1 mark).**

ii. What is the economic production lot size? **(2 marks)**

iii. What is the maximum inventory the company can handle? **(2 marks)**

iv. Calculate the company's minimum total cost? **(3 marks)**

v. What is the approximate length of each production run? **(2 marks)**

vi. What is the cycle time? **(2 marks)**

vii. How much could the company save annually if the set up cost could be reduced to E25.00? **(3marks).**

[15 Marks]

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 marks).**

[Total Marks 25]

QUESTION 4.

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 a E5 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? **(10 marks).**

b. The Director of Research and Development (R&D) department of a South African Chemical manufacturing company believes that the company's annual profits depend on the company's R&D budget. The new Chief Executive Officer does not agree with this and has asked for evidence. The table below shows the data for 6 months. Use the regression equation to predict annual profit from the amount budgeted for R& D. Assuming the R&D budget for 2012 is R8 million how much profit does the company approximately expect to earn in profit during the year? **(15 marks)**

Year	**Research and Development Expenses (E-millions)**	**Annual profit (E-millions)**
2006	2	20
2007	3	25
2008	5	34
2009	4	30
2010	11	40
2011	5	31

[Total Marks 25]

END OF EXAMINATION: GOOD LUCK!!!!