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UNIVERSITY OF SWAZILAND

FACULTY OF COMMERCE

DEPARMENT OF BUSINESS ADMINISTRATION

SUPPLEMENTARY EXAMINATION PAPER; F/T STUDENTS

JULY 2014

TITLE OF PAPER : MANAGEMENT SCIENCE 11

COURSE CODE : BA 310

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 THE QUESTIONS IN SECTION A AND ANY THREE [3] QUESTIONS IN SECTION B.
4. THE MARKS ALLOCATED FOR A QUESTION/PART OF A QUESTION ARE INDICATED AT THE END OF EACH QUESTION/PART OF 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.

QUESTION 1.

1.1. A security company wishes to maximize efficiency at the different security points at a local hospital. There are four security points and four security personnel. The table below shows efficiency levels that can be achieved if any of the security personnel is assigned to guard some point. You are required to advise head of security on assignments that are likely to yield highest efficiency for the company.

	SECURITY POINTS			
SECURITY GUARD	A	B	C	D
1	20	60	50	55
2	60	30	80	75
3	80	100	90	80
4	65	80	75	70

(18 marks)

1.2. The management of a company is considering the introduction of a new product. The fixed cost to begin production of the new product is E30, 000.The variable cost for the product is expected to be between E16 and E24 with the most likely value of E20 per unit. The product will sell for E50 per unit. Demand for the product is expected to range from 300 to 2,100 units, with 1200 units the most likely demand.

a. Develop the profit model for this product.(5)
b. Provide base case, worst case, and best case analysis.(12)

(17marks)

1.3

1.3. The North -South highway passing through Matsapha can accommodate vehicle capacities shown in the network diagram below. Use the network analysis (maximal flow) technique to determine if the highway system can accommodate a North- South flow of 15,000 cars per hour.Note that numbers in the above network represent cars in thousands.

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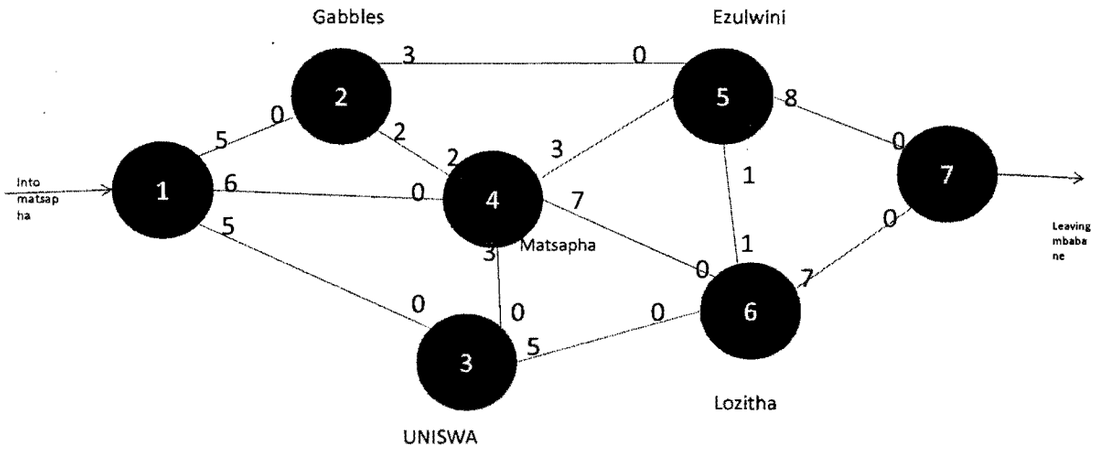


(15 marks)

[Total 50 Marks]

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

QUESTION 2.

A Swaziland company that distribute very popular industrial raw materials has establish plants at Manzini, Matsapha and Malkerns as follows;

SWAZI Plant	**3 moths capacity (units)**
Manzini	5,000
Matsapha	6,000
Malkerns	2,500

The product is distributed through four distribution outlets at 1, 2, 3, and 4 whose forecast demand are as follows;

Distribution center	**Demand forecast (3months)**
1	6,000
2	4,000
3	2,000
4	1,500

The individual unit transportation rates between the different places cited above are as follows;

Origin	**Destination**			
	1.	**2.**	**3.**	**4**
Manzini	E3	E2	E7	E6
Matsapha	7	5	2	3
Malkerns	2	5	4	5

Use the North West Corner method and the Stepping stone method to establish the optimum transportation cost and the number of units that must be shipped from the different plants to the different distribution centers.

[Total 25 Marks]

QUESTION 3.

Study the following activities needed by a company that is developing a new product and then address the project questions

ID	Activity Description	Predecessor	Optimistic Time (a)	Most probable Time (m)	Pessimistic Time (b)
A	R& D product design	---	4	5	12
B	Plan Marketing Research	-----	1	1.5	5
C	Routing	A	2	3	4
D	Build proto type model	A	3	4	11
E	Prepare Marketing brochure	A	2	3	4
F	Cost estimates	C	1.5	2	2.5
G	Preliminary product tests	D	1.5	3	4.5
H	Marketing survey	B, E	2.5	3.5	7.5
I	Pricing & forecast report	H	1.5	2	2.5
J	Final Report	F, G, I	1	2	3

a. Calculate the expected duration each activity (10 marks)

b. Draw a network diagram for the 10 activities (6 marks)

c. Show the different paths in this project network (4 marks)

d. Which activities fall on the critical path? (2 marks)

e. What is the project completion time? (3 marks)

[Total 25 marks]

QUESTION 4.

4.1.Swaziland Furniture Industries manufactures school furniture at three locations at Mustapha, Piggs'Pick and Mbabane. The company distributes the furniture through regional warehouses located in Manzini, Shisweleni and Sabatini. An estimate of the monthly production capacity at each factory and an estimate of items that are needed each month at each of the three warehouses are shown below. Production costs are estimated to be identical at all the three factories but shipping costs from each factory to each warehouse are given and these are assumed to be constant regardless of volumes shipped.

Warehouse Requirements		**Factory Capacities**	
Manzini	300	Matsapha	100
Shisweleni	200	Piggs'Peak	300
Sabatini	200	Mbabane	300

Transportation costs per item

	Manzini	**Shisweleni**	**Sabatini**
Matsapha	E5	E4	E3
Piggs'Peak	E8	E4	E3
Mbabane	E9	E7	E5

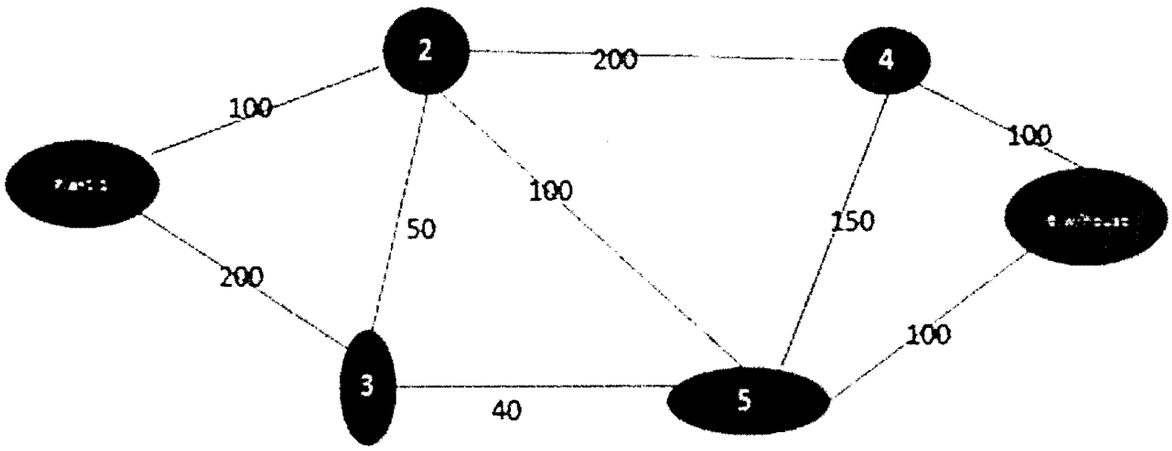
a. Establish a transportation tableau for SFI using the above information **(5 marks)**

b. Use VOGEL's approximation method to calculate the optimal transportation cost **(10 marks).**

4.2. Dlamini drives from his factory based at Plant 1 to the warehouse every day. Figure on arrows represents distance between the different routes that Dlamini can use. Establish the shortest route that Dlamini must use to travel from plant to warehouse to save fuel.

(10 marks)

Dlamini-from plant to warehouse.



[Total 25 Marks]

END OF EXAMINATION: GOOD LUCK!!!!!

TABLE 15.5

Table of Random Numbers

52	06	50	88	53	30	10	47	99	37	66	91	35	32	00	84	57	07
37	63	28	02	74	35	24	03	29	60	74	85	90	73	59	55	17	60
82	57	68	28	05	94	03	11	27	79	90	87	92	41	09	25	36	77
69	02	36	49	71	99	32	10	75	21	95	90	94	38	97	71	72	49
98	94	90	36	06	78	23	67	89	85	29	21	25	73	69	34	85	76
96	52	62	87	49	56	59	23	78	71	72	90	57	01	98	57	31	95
33	69	27	21	11	60	95	89	68	48	17	89	34	09	93	50	44	51
50	33	50	95	13	44	34	62	64	39	55	29	30	64	49	44	30	16
88	32	18	50	62	57	34	56	62	31	15	40	90	34	51	95	26	14
90	30	36	24	69	82	51	74	30	35	36	85	01	55	92	64	09	85
50	48	61	18	85	23	08	54	17	12	80	69	24	84	92	16	49	59
27	88	21	62	69	64	48	31	12	73	02	68	00	16	16	46	13	85
45	14	46	32	13	49	66	62	74	41	86	98	92	98	84	54	33	40
81	02	01	78	82	74	97	37	45	31	94	99	42	49	27	64	89	42
66	83	14	74	27	76	03	33	11	97	59	81	72	00	64	61	13	52
74	05	81	82	93	09	96	33	52	78	13	06	28	30	94	23	37	39
30	34	87	01	74	11	46	82	59	94	25	34	32	23	17	01	58	73
59	55	72	33	62	13	74	68	22	44	42	09	32	46	71	79	45	89
67	09	80	98	99	25	77	50	03	32	36	63	65	75	94	19	95	88
60	77	46	63	71	69	44	22	03	85	14	48	69	13	30	50	33	24
60	08	19	29	36	72	30	27	50	64	85	72	75	29	87	05	75	01
80	45	86	99	02	34	87	08	86	84	49	76	24	08	01	86	29	11
53	84	49	63	26	65	72	84	85	63	26	02	75	26	92	62	40	67
69	84	12	94	51	36	17	02	15	29	16	52	56	43	26	22	08	62
37	77	13	10	02	18	31	19	32	85	31	94	81	43	31	58	33	51

Source: Excerpted from *A Million Random Digits with 100,000 Normal Deviates* (New York: Free Press, 1955) p. 7, with permission of the Rand Corporation.