UNIVERSITY OF SWAZILAND

FACULTY OF COMMERCE

DEPARTMENT OF BUSINESS ADMINISTRATION

FINAL EXAMINATION PAPER; FULL TIME STUDENTS

MAY 2016

TITLE OF PAPER : MANAGEMENT SCIENCE11

COURSE CODE : BA 310 FULL TIME STUDENTS

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 WHICH ARE COMPULSORY TWO [2] 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

QUESTION1.1

4HIM, a security company has a contract with UNISWA which is subject to renewal without going to tender provided there are no issues raised by UNISWA. 4HIM wishes to maximise efficiency at the different security points at Kwaluseni campus UNISWA staff houses. There are four security points and four security personnel identified for the required services to reap maximum benefits. The table below shows efficiency levels that can be achieved if any of the security personnel is assigned to guard some point. You are requested to assist the Chief Security Officer with the said assignments. Please advise him on the most appropriate assignments that are likely to yield the highest efficiency to 4HIM so it can stand a better chance of having its contract being renewed next year. If you look at Security Guard 3 in the table there will be 80 % efficiency when she or he is assigned to security point A, 100% to security point B, 90 % to security point C and 80% to security point D. An important assignment principle is that you give one assignment to one person at a time. What will be your recommendation in this instance? [20]

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

QUESTION 1.2.

Solve the following transportation problem using supply sources and destinations requirements information provided in the following tables.

SUPPLY SOURCE	1	2	3	
CAPACITY	100	200	150	
DEMAND POINT	A	B	C	D
REQUIREMENTS	80	90	120	160

Shipping costs from Source to Demand points are as follows:

FROM/TO	A	B	C	D
1	E4	E7	E7	E1
2	E12	E3	E8	E8
3	E8	E10	E16	E5

a. Determine the optimal transportation cost using the North West Corner Point method [10]

b. Will there be any benefits deriving from using the Vogel's Approximation Method (VAM) than the North West Corner Point method? [10]

QUESTION 1.3.

Car wash has become big business in Swaziland and John actually opened an outlet recently at Matsapha. Now he wants to determine efficiency levels at the centre. The centre is able to clean cars at an average of 3 units per hour or about 1 unit every 20 minutes. Customers who need carwash service arrive at the centre at an average of 2 per hour. If all the conditions of the single channel queuing model are met, calculate values of the following operating characteristics.

i. The average number of cars in the system(number in line plus number being served) [2]

ii. Average time the customer spends in the system(time spent in line and time spent being served) [2]

iii. Average number of cars in the queue [2]

iv. Average time a customer spends waiting in the queue [2]

v. The utilisation factor for the system(probability that the service facility is busy) [1]

vi. The per cent idle time(probability that there is no one in the system) [1]

[TOTAL MARKS 50]

Section B. Choose 2 questions of your choice from this section. Each question carries 25 marks.

QUESTION 2.1.

The Owner of butchery will soon be adding new types of products and this forces her to lease new type of machines for a monthly rental of E60, 000. 00. Variable costs would be E20 per kg of beef, and meat would retail for E70 per kg.

i. How many kilograms must be sold in order to break even? **[2]**

ii. What would the profit (loss) be if 1000 kg are made and sold in a month? **[2]**

iii. How many kilograms must be sold to realise a profit of E 40,000.00? **[2]**

iv. If 20,000 kilograms can be sold, and the profit target is E50, 000.00, what price should be charged per kilo? **[2]**

v. Why is BEP a weak model **[2]**

QUESTION 2.2.

The Faculty of Commerce at the University of Swaziland introduced a new course in Project Management which became so popular with all Faculties, such that the University Book Shop's book sales drastically went up. The Book shop management are aware of the advantages of keeping adequate stocks so that stocks do not run dry, however management is also worried about the costs of overstocking the prescribed book in case they hold too many copies in stock which will not be bought.

Analysis of sales for the Project Management text for the past 50 weeks reveals the following:

Sales per Week	Frequency
40	6
50	5
60	9
70	12
80	8
90	7
100	3

a. The Book Shop has negotiated with the supplier to have the book printed locally so that it can be ordered at short notice. If the Book Shop maintains a constant supply of 80 books in any given week, how many times will the bookshop fail to meet demand in a 20 week simulation? Please use random numbers from the 9th column of the attached table beginning with the random digits 99. **[10]**

b. What is the average number of book sales per week over the 20 week period, including stock outs? **[5]**

[TOTAL 25 MARKS]

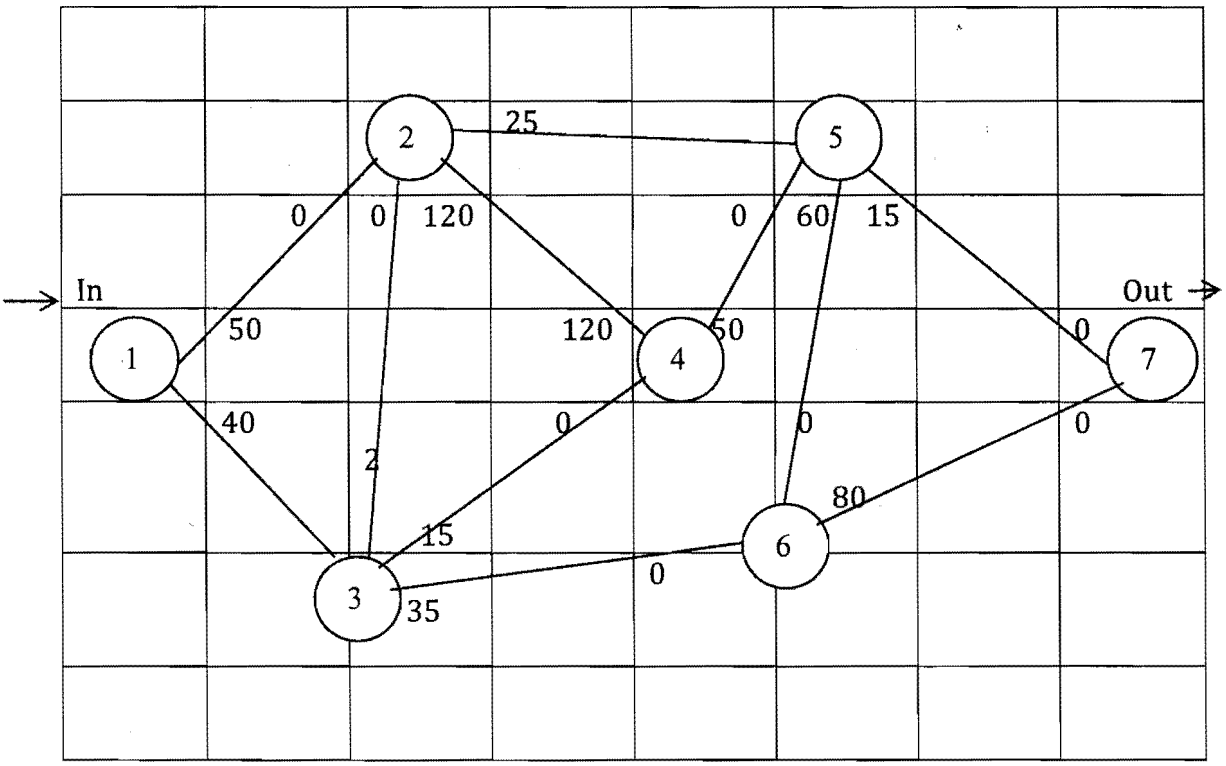
QUESTION 3.1.

The Swaziland tourism market is famous about its Mandenga cultural village in Ezulwini. The unique village which is in the midst of hilly forests has limited capacity

because it takes about 20 visitors at a time. As a result of this authorities must restrict the flow of tourists through the village. Daily capacity, especially during public holidays is very limited, and tourists demand exceeds the present limit.

Given flow patterns and capacitated tranches shown in the network table below what is the maximum number of tourists to go through the village without causing any problems. **[15]**

During the August 2016 SADC conference to be hosted in Swaziland Government directed that 100 people per hour will be reasonable. What advise will you give to Government? **[3]**



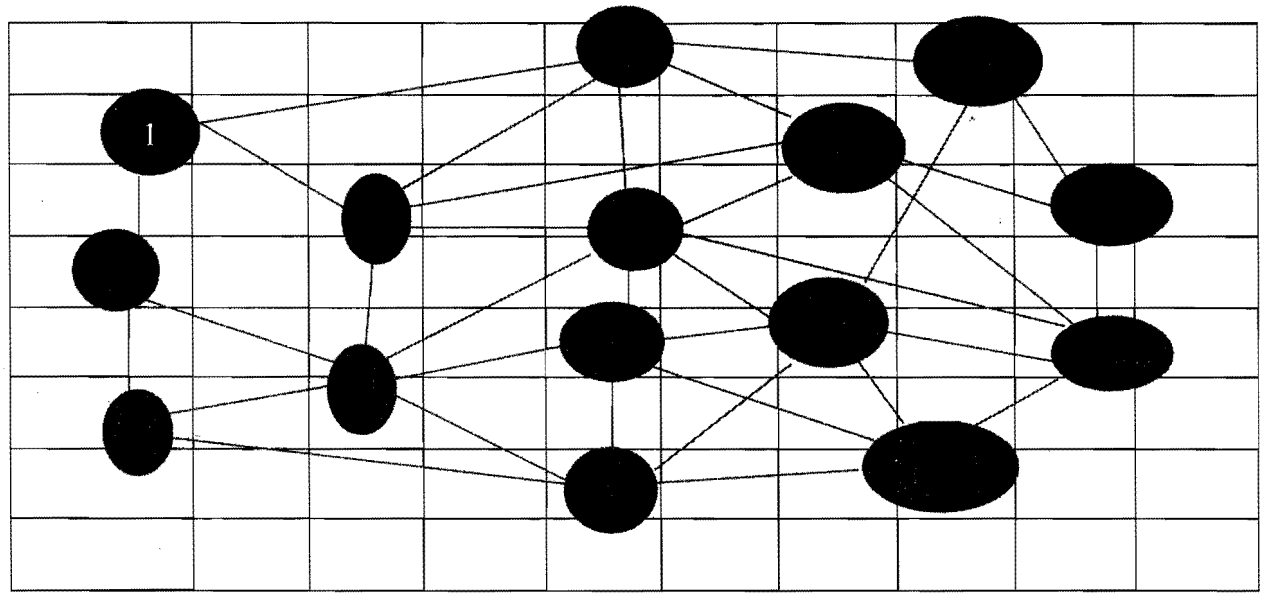
QUESTION 3.2.

Briefly explain three psychological effects of waiting lines and how the effects can be controlled? **[7]**

[TOTAL 25MARKS]

QUESTION 4.

The Matsapha Municipality purchased land for a new state park, and park planners identified the ideal locations for lodge, cabins, picnic groves, boat dock, and scenic points of interest. The locations are represented by the nodes of the following network. The arcs of the networks represent possible road connections in the park. Distances between locations are shown separately in the table below the network. If the park designers want to minimise the total road kilometres that must be constructed in the park and still permit access to all facilities(nodes), which road connections should be constructed? **[20]**



From	1	1	1	2	2	3	3	4	4	4	4	5	5	6	6	6	7	7	7	8	8	8	9	9
To	2	5	6	3	4	4	9	5	7	8	9	6	7	7	11	12	8	10	11	9	10	13	10	13
Distance	8	6	2	1	4	9	3	3	4	6	2	5	11	3	8	12	1	2	4	5	3	4	3	6

From	10	10	10	11	11	12	13	14
To	12	13	14	14	15	15	14	15
Distance	6	7	5	6	7	3	4	2

QUESTION 4.2

Why is the shortest route technique a weaker technique than the maximum flow and minimum flow techniques? **[5]**

[TOTAL 25 MARKS]

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: The Free Press, 1955), p. 7, with permission of the RAND Corporation.