

TITLE OF PAPER : MANAGEMENT SCIENCE11

COURSE CODE : BA 310/BA407

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/PART OF A QUESTION ARE INDICATED AT THE END OF EACH QUESTION/PART OF A QUESTION.
5. THIS PAPER MUST NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

proposed to increase factory capacity. Ditudu, the company's 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 costs 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 Vogel's approximation method to determine the initial monthly transportation cost when the new factory is located at Hlathikulu. (10 marks)
- ii. Apply the Stepping stone method to improve the transportation costs under the above two scenarios and say which of the two is a better method (20 marks)

Hot water heater sales per week	Number of weeks this number was sold
4	6
5	5
6	9
7	12
8	8
9	7
10	3
Total	50

- a. If Mabhensane maintains a constant supply of 8 hot water bottles in any given week, how many times will he be out of stock during a 20 week simulation? Use random numbers from the seventh column of the attached table, beginning with the random digit 10
(12 marks).
- b. What is the number of average sales per week, including stock outs over the 20 week period?
(4 marks)
- c. Using the expectation (non -simulation) method what is the expected number of sales per week? How does the answer you get here compare with the answer you get in (b) above?
(4 marks)

[TOTAL 50 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

2.a. 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? **(15 marks).**

2.b. Assuming UNISWA Maintenance Department can employ an additional part time joiner who can do the same jobs in times shown in the following table; 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 25 MARKS]

average rate of 3 per hour, or about 1 every 20 minutes. Customers needing this service arrive at the shop at an average of 2 per hour. The shop owner studied Management Science and Operations Management at UNISWA in which she learnt about the Queuing Theory. She therefore feels that all the conditions for a single channel model are satisfied in the above example. Can you now assist her to calculate the values of the operating characteristics of the Queuing model listed below?

- i. Average number of customers in the system (L)
- ii. The average time a customer spends in the system(W)
- iii. Average number of customers in the queue(Lq)
- iv. Average waiting time the customer spends waiting in the queue(Wq)
- v. The probability that the service facility is being used(p)
- vi. Percentage idle time (P0) (13 marks).

QUESTION 3(b).

Explain the significance of Psychology of waiting lines

(12 marks)

[TOTAL 25 MARKS]

QUESTION 4(a).

The owner of an old fashioned restaurant that specialised in Chinese food, Biggy Ndlovu contemplates adding traditional Swazi food which has become popular these days. The required expansion means Biggy has to rent additional space that will cost E6, 000 per month. Variable costs will be E2 per plate and traditional food would retail for E7.00 per plate.

- i. How many pies must be sold in order to break even?
- ii. What would the profit (loss) be if 1,000 plates of traditional food are sold in a month?

50	48	61	18	85	23	08	54	17	12	80	69	24	64	92	10	47	57
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	38	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.

Use the North West Corner Method to determine the optimum transportation cost for a company that has to move stocks from supply sources 1 (120 tonnes), and supply sources 2 and 3, (80 tonnes) each. The stocks are being moved to destinations A, B, and C with restricted requirements of 150 tonnes, 70 tonnes, and 60 tonnes respectively **(12 marks)**

Transportation rates are as per the table below;

From\To	A	B	C
1	E8	E5	E6
2	15	10	12
3	3	9	10

[TOTAL 25 MARKS]

END OF EXAMINATION: GOOD LUCK!!!!