



TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Business and Social Studies

DEPARTMENT OF BUSINESS STUDIES

UNIVERSITY EXAMINATIONS FOR DEGREE IN
BACHELOR OF BUSINESS ADMINISTRATION
BACHELOR OF COMMERCE

BMS 4307: OPERATIONAL RESEARCH I

SPECIAL/SUPPLEMENTARY EXAMINATIONS

SERIES: FEBRUARY 2015

TIME: 2 HOURS

INSTRUCTIONS:

- Answer Question **ONE (Compulsory)** and any other **TWO** questions.
- Do not write on the question paper

This paper consists of Three printed pages

QUESTION 1 (Compulsory)

- a) Discuss the origin and development of operation research. **(4 marks)**
- b) Explain the steps involved in a simulation study. **(4 marks)**
- c) A cement firm has two processing plants A and B with supply capacity of 100 tones and 110 tones a day respectively. The company has three warehouses R; S,T. The warehouses need 80, 120 and 60 tones of cement every day respectively to meet their distribution requirements. The transportation costs for each warehouse are given below

From	To	Cost/Tone
A	R	1
A	S	2
A	T	3

B	R	4
B	S	1
B	T	5

Required:

- i) Find the initial feasible solution using north west corner under its costs. **(8 marks)**
- ii) Find the optimal solution using the stepping stone method. **(14 marks)**

QUESTION 2

A firm uses three machines M1, M2 and M3 in manufacturing two products A and B. Each unit of product A requires 8, 4 and 8 tones in machines M1, M2 and M3 while each unit of product B requires 4, 12 and 8 hours in machines M1, M2 and M3 respectively. The machine hours available on the three machines are 320, 480 respectively. The profit contribution are Ksh.12 and 18 per unit for product A and B respectively.

Required:

- a) Formulate problem as a linear programming model. **(4 marks)**
- b) Find the dual of a) above. **(3 marks)**
- c) Find the optimal solution and contribution of a) above using simplex method. **(13 marks)**

QUESTION 3

- a) Explain **THREE** objectives and **THREE** benefits of inventory control. **(6 marks)**
- b) The demand for an item in a certain firm is 18,000 units per year and the firm can produce at the rate of 3,000 units per month. The cost of one set up Kshs. 500 and the holding cost of 1 unit per month is Ksh. 15.

Required:

- i) The optimum manufacturing quantity. (2 marks)
- ii) The maximum inventory. (2 marks)
- iii) The time between orders. (2 marks)
- iv) The number of orders per year. (2 marks)
- v) The time of manufacturing. (2 marks)
- vi) The optimum annual cost if the cost of item per unit is Kshs. 2. (4 marks)

QUESTION 4

- a) Discuss customer service discipline in a given queuing environment. **(5 marks)**
- b) A supermarket operates for 8 am to 8 pm and customers are served at a single counter. These customers.... At a rate of 30 customers per day. The cashier at the service point takes an average of t minutes to serve one customer.

Required:

- i) The average number of customers in the queue. **(3 marks)**
- ii) The average queue. **(3 marks)**
- iii) The average queue length. **(3 marks)**
- iv) The average time a customer waits before being served. **(3 marks)**
- v) The probability that a customer will spend less than 15 minutes in the queue. **(3 marks)**

QUESTION 5

- a) Explain **THREE** significance of PERT to a Manager and **THREE** limitations of this technique. **(6 marks)**
- b) A firm is in negotiation with its union on wage increment. Both groups must decide and agree on an overall strategies that will be agreeable to both parties. Below is a table showing strategies from both sides. A plus sign (+) means a wage increment while a minus sign means wage reduction.

		Union Strategies			
		M1	M2	M3	M4
Company Strategies	C1	+0.28	+0.27	+0.35	-0.02
	C2	+0.20	+0.16	+0.08	+0.08
	C3	+0.14	+0.12	+0.15	+0.12
	C4	+0.30	+0.14	+0.19	0.00

- c) Use graphical method to find the value of the game given below;

$$\text{Player } A = \begin{pmatrix} -2 & 4 \\ 8 & 3 \\ 9 & 6 \\ 1 & 6 \end{pmatrix}$$

(6 marks)