

BBM 351



OFFICE OF THE DEPUTY PRINCIPAL

ACADEMICS, RESEARCH AND STUDENTS' AFFAIRS

UNIVERSITY EXAMINATIONS

2019 /2020 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER REGULAR EXAMINATION

FOR THE BACHELOR OF BUSINESS MANAGEMENT

COURSE CODE: BBM 351

COURSE TITLE: OPERATIONS RESEARCH

DATE: 4/11/2020

TIME: 3 HOURS

INSTRUCTION TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF 5 PRINTED PAGES

PLEASE TURN OVER

REGULAR-MAIN EXAMINATION
BBM 351: OPERATIONS RESEARCH

STREAM: BBM

DURATION: 3HRS

INSTRUCTIONS:-

- Answer Question **ONE** and any other **TWO** questions.
- Question **ONE** carries **30 Marks**

QUESTION ONE

- a) Briefly trace the history of operation research and highlight the major developments especially after World War II. [5 marks]
- b) Briefly describe the steps involved in simplex algorithm. [6 marks]
- c) "Operations researchers normally start with a simple model and subsequently develop it into elaborate one to reflect the reality of the problem". Do you agree with this statement? Explain [3 marks]
- d) Managers, as decision makers can purchase computer software to solve specific Operations Research (OR) formulations and as such it is not important for them to learn the OR techniques. Comment on this statement [5 marks]
- e) Explain the assumption made in solving LP problems. [2 marks]
- f) Bright Bakery keeps stock of a popular brand of cake. Previous experience indicates the daily demand as given here:

Daily Demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.30	0.32	0.02

Consider the following sequence of random numbers:

Random Number: 48,78,19,51,56,77,15,14,68,09.

Using this sequence, simulate the demand for the next 10 days. Find out the stock situation, if the owner of the bakery decides to make 30 cakes per day. Also estimate the daily demand for the cake on the basis of simulated data. [5 marks]

- h) State any four assumptions of game theory. [4 marks]

QUESTION TWO

- a) Briefly outline the steps involved in the process of simulation. [10 marks]
- b) A toy manufacturer is considering a project of manufacturing a dancing doll with three different design options. The doll will be sold at Sh. 10. The first design, A will have a fixed cost of

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Sh.100,000 and a variable cost of Sh.5 per unit of variable cost. The second design, B will have a fixed cost of Sh.160,000 and a variable cost of Sh. 4 per unit while the third design, C will have a fixed cost of Sh. 300,000 and a variable cost of Sh. 3 per unit. One of the following demand events can occur with the probabilities:

	Demand(units)	Probability
Light demand	25,000	0.10
Moderate demand	100,000	0.70
Heavy demand	150,000	0.20

- i. Calculate the conditional profit in relation to various action-outcome combinations and events and tabulate.[4 marks]
- ii. Calculate the optimal Expected Monetary Value (EMV). [4 marks]
- iii. Calculate Expected Value of Perfect Information (EVPI).[2 marks]

QUESTION THREE

- a) Distinguish between slack and auxiliary variables [2 marks]
- b) State and explain areas where linear programming can be used to aid a manager in decision making. [5 marks]
- c) Outline FOUR requirements of linear programming. [2 marks]
- d) A company can produce three products A, B and C. The products use a machine which has 660 hours capacity in the next period and 1230 labour hours. Each unit of the products A,B and C uses 3, 12 and 6 hours respectively of the machines capacity and 6, 6 and 3 hours respectively for the labour hours. There are only 990 units available in the period of a special component which is used in the production of the three products. Product A uses 6 units, while product B and C uses 9 units each. For each period, the company must produce at least 10 units of product C. In order to maximize profits, how many products of each kind should be produced if the contribution margin are Ksh 5, Ksh 3 and Ksh 4 respectively for products A, B and C? [11 marks]

QUESTION FOUR

A wholesale company has three warehouses from which suppliers are drawn for four retail customers. The company deals in a single product, the suppliers of which at each warehouse are:-

Warehouse Supply (Tons)

1 20

2 28

3 17

Customer Demand (Tons)

A 15

B 19

C 13

D 18

The following table gives the transportation costs per ton shipment from each warehouse to each customer (in KShs);

WAREHOUSE	CUSTOMER			
	A	B	C	D
1	30	60	80	50
2	60	10	20	50
3	70	80	30	90

Required;

- Develop a linear programming problem (Do not solve) [5 marks]
- Obtain an initial feasible solution using: North west corner rule, Least cost cell method and Vogels approximation method and comment on the solutions [10 marks]
- Determine the optimal distribution to minimize the cost of transportation [5 marks]

QUESTION FIVE

- State the assumptions made in solving transportation problems. [5 marks]
- Hallo Baby Ltd has a network of branches all over Kenya. The branches are used to service, repair and install equipments for their clients. Currently the Eldoret branch has four clients who require installation of equipment. Each client requires service of one engineer. There are four engineers who are not engaged at the moment and can be assigned any of the tasks. However, these engineers have travel from different locations and the Eldoret branch has to meet their travel and substance allowances. The allowances vary from one engineer to another and according to the client the engineer has been assigned to work for. The table below shows the costs (in thousand shilling) associated with each engineer.

Clients	E	F	G	H
Engineer				
A	17	11	8	26
B	4	26	13	28
C	18	15	38	19
D	24	10	19	26

Required;

- The assignments to be made in order to minimize the total cost of the engineer. [7 marks]
- The minimum cost of using the engineers. [2 marks]

- c) Explain the difference between
- i. Assignment and transportation problem. [4 marks]
 - ii. Binding and nonbinding constraints [2 marks]

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