JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS FOR MASTER OF BUSINESS ADMINISTARTION/ MASTER OF SCIENCE IN LOGISTICS

KISUMU/NAIROBI

MBA 805: QUANTITATIVE METHODS/MBM 5112

COURSE TITLE: QUANTITATIVE ANALYSIS

DATE: 22/12/2022   **SESSION: 9.00-12.00NOON**

INSTRUCTIONS:

Attempt Any 4 Questions

QUESTION ONE (15 MARKS)

A small scale industrialist produces four types of machine components A, B, C and D made of brass. The amount of steel and brass required for each component and the number of man weeks of labour required to manufacture and assemble one unit of each component are as follows:

	A	B	C	D	Availability
Steel	6	5	3	2	100kg
Brass	3	4	9	2	75kg
Man Weeks	1	2	1	2	20

The profit on each unit of A, B, C and D is Kshs. 60, 40, 70 and 50 respectively.

Required:
i. Formulate the linear programming problem (5 marks)
ii. Using simplex algorithm method, how many of each should be produced to optimize the profits. (10 marks)

QUESTION TWO (15 MARKS)

The
A Company has five salesmen and five sales territories. The sales territories are not equally rich in their sales potential nor do the salesmen have equal sales ability. The following table gives the expected sales in thousands per month for each salesman assigned to a given territory:

	Territory				
	1	2	3	4	5
Salesman					
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

Required:
How should the territories be assigned so as to maximize the sales? (15 marks)

QUESTION THREE (15 MARKS)

A) A Company produces a product which it sells for £25 per unit. Each unit costs the firm £18 in variable expenses, and fixed costs on an annual basis are £250,000. If x equals the number of units produced and sold during the year,

(i)   Formulate the total cost function (2 Marks)

(ii)   Formulate the profit function   (2 Marks)

(iii)   Determine the annual profit if 100,000 units are produced and sold.

(2Marks)

(iv)   What level of output is required in order to earn zero profit?

(2 Marks)

B) The demand for a certain product depends on the price. When the price is £10, £15 and £30, the demand is 3800, 1000, and 2800 units respectively.

(i)   Determine the equation for the demand function.   (5 Marks)

(ii)   What quantity will be demanded at a price of £25?   (2 Marks)

QUESTION FOUR (15 MARKS)

Assume the probability of producing a defective product in a production channel is equal to that of producing a non defective product. Suppose a Manufacturing firm planning to have four kind of products.

Required:

i.   Develop a probability distribution for the number of non defective products produced.   (3 marks)

ii.   The probability of getting at least two non defective products.

(4 marks)

iii. The expected number of non defective products produced in the Company   (4 marks)

iv.   The standard deviation for the number of non defective products.

(4 marks)

QUESTION FIVE (15 MARKS)

Consider the information in the table below:

Jobs	Predecessor	Normal		Crash	
		Time in Hours	Cost in Kshs	Time in Hours	Cost in Kshs
A	-	8	80	6	100
B	A	7	40	4	94
C	A	12	100	5	184
D	A	9	70	5	102
E	B,C,D	6	50	6	50
Total			340		530

A maintenance project has the above estimates of times in hours and cost in Kenya Shillings for the job. Assume that the jobs can be done either at normal or at fast pace but not at any other pace in between. Assuming a relationship between the job duration and job cost and with overhead cost of Kshs. 25 per hour,

Required:

What is the optimal cost and duration of the project? (15 marks)

QUESTION SIX (15 MARKS)

700 units of a product are to be moved from Plants P, Q and R where availability is 260, 70 and 370, respectively to three Companies A, B and C whose demand for the product is 300 units, 200 units and 200 units, respectively. The cost of moving one unit of the product from a Plant to a Company is given below:

To	A	B	C
From P	18	25	17
From Q	6	5	8
From R	9	10	14

Required:

Determine an allocation that would minimize the cost of transportation.

(15 marks)

QUESTION SEVEN (15 MARKS)

Assume that two products, Gleem and Sparkle, currently share the market with shares of 60% and 40% each respectively. Each week some brand switching takes place. Of those who bought Gleem the previous week, 70% buy it again, whilst 30% switch to Sparkle. Of those who bought Sparkle the previous week, 80% buy it again, whilst 20% switch to Gleem.

Determine the position:
  (i)   One week from now   (5 Marks)
  (ii)   Two weeks from now   (5 Marks)
  (iii) In the long run   (5 Marks)