



*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**UNIVERSITY EXAMINATIONS**

**2021/2022 ACADEMIC YEAR**

**(SPECIAL/SUPPLEMENTARY)**

**DIPLOMA IN BUSINESS IN INFORMATION TECHNOLOGY**

**COURSE CODE: DBT 076**

**COURSE TITLE: QUANTITATIVE METHODS IN BUSINESS**

**DATE: 2<sup>ND</sup> AUGUST 2022**

**TIME: 8-10AM**

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***INSTRUCTIONS TO CANDIDATES***

- Attempt question **ONE** and **ANY TWO** questions in section B

MMUST observes ZERO tolerance to examination cheating

### QUESTION ONE

(28 MARKS)

- a) Describe the four components of time series analysis (4 marks)
- b) Find the limit:  $\lim_{x \rightarrow 1} \frac{x^2 - 4x + 3}{x^2 - 1}$  (4 marks)
- c) Find the area of a curve  $y = 5 - 2x^2$  from  $x=0$  to  $x=1$  (4 marks)
- d) Evaluate  $\int x \sin(x^2) dx$  (4marks)
- e) Name and describe the various types of costs (8 marks)

- f) Calculate the Economic Order Quantity of the number of orders to be placed in a year.

Quarterly consumption of materials	4000 units	
Cost of placing one order	100	
Cost per unit	80	
Storage and carrying cost	8% of inventory.	(4 marks)

### QUESTION TWO

(16 MARKS)

- a) Suppose that you have the following payoff matrix

Action	Event				
	E1	E2	E3	E4	E5
A1	-100	160	40	200	0
A2	60	80	80	40	100
A3	20	60	60	20	80
A4	-20	-100	-140	-40	400

Select the optimal action by applying maximin, maximax, Hurwicz( $\alpha=0.3$ ), Minimax regret and the laplace criteria. Compare your choice under each criteria. (10Marks)

- b) A marketing manager has to determine in which two regions a new product should be introduced. The level of sales can be characterized as either high, average or low. He estimates the probabilities associated with each of these outcome is 0.25, 0.50 and 0.25 respectively.

The payoff of the matrix has been constructed as follows:

Action	Event		
	High	Average	Bad
South East(A1)	Rs. 40,000	Rs.30,000	Rs.20,000
North east(A2)	Rs.70,000	Rs. 20,000	Nil

Using the EMV as a criterion, in which of the two regions should the product be introduced? (6 marks)

**QUESTION THREE****(16 MARKS)**

- a) State the reason why inventory control is carried out? **(4 marks)**
- b) A square sheet of metal has an area of  $100m^2$ . An open rectangular tank is to be made by cutting equal squares from the Conner and bending the sides up. Find the height of the tank for which the volume will be maximum. **(8 marks)**
- c) Find the area enclosed by the curve  $y = x^2 - 10x + 9$  the x axis and the lines  $x=4$  and  $x=10$ . **(4 marks)**

**QUESTION FOUR****(16 MARKS)**

- a) Evaluate  $\lim_{x \rightarrow 0} \frac{\sqrt{t^2+9}-3}{t}$  **(4 marks)**
- b) Differentiate  $y = x^2 \sin x$  **(4 marks)**
- c) Show that point (2,4) lies in the curve  $x^3 + y^3 - 9xy = 0$ . Then find the tangent and normal curve **(8 marks)**

**QUESTION FIVE****(16 MARKS)**

- a) Differentiate

**(4 marks)**

$$f(x) = \frac{\sec x}{1 + \tan x}$$

- b) Suppose that two batteries are randomly chosen without replacement from the following group of 12 batteries.

3 new

4 used(working)

5 defective

Let X denote the number of new batteries chosen.

Let Y denote the number of used batteries chosen.

Find  $F_{XY}(x, y)$  i.e{Joint Probability Distribution}

**(6 marks)**

- c) Define the following terms:

i) Sample space

**(2 marks)**

ii) Conditional probability

**(2 marks)**

iii) Joint probability

**(2 marks)**