



MOI UNIVERSITY

OFFICE OF THE DEPUTY VICE CHANCELLOR
(ACADEMICS, RESEARCH & EXTENSION)

UNIVERSITY EXAMINATIONS 2022/2023 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATION

COMMON COURSE

COURSE CODE: HRD 101 / *BBM 113*

COURSE TITLE: QUANTITATIVE SKILLS I

DATE: 2ND DECEMBER 2022 TIME: 9.00 A.M – 12.00 NOON

INSTRUCTION TO CANDIDATES

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HRD 101: QUANTITATIVE SKILLS 1

INSTRUCTION: Answer Question ONE and any other THREE Questions

QUESTION ONE (28 Marks)

a) Without using a calculator,

i. find the value of x if;

$$2 + \log_2 6 - \log_2 x = \log_2 8 + 1$$

(2 marks)

ii. simplify, $\log_{243} 3 \div \log_{256} 4$

(2 marks)

b) Using relevant examples explain

i. One main difference between natural logarithms and common logarithms (2 marks)

ii. One importance of using logarithms in business. (1 mark)

c) The following data represents quantities in kilograms and number of constructing metal pipes manufactured by a company.

Quantity (in Kg)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of pipes	3	2	8	-	27	15	6	1

Given that the Arithmetic mean is $43\frac{12}{71}$, Calculate;

i. The missing number of pipes

(3 marks)

ii. The Quartile deviation

(2 marks)

iii. The Coefficient of Quartile deviation

(2 marks)

d) Using examples differentiate between a population and a sample as used in Data collection.

(2 marks)

e) List down ALL the subsets that belong to set $A = \{2, 5, 9, 7\}$

(2 marks)

f) Given that the matrix $A = \begin{bmatrix} -2x & 9 \\ -x & -3x \end{bmatrix}$ is Singular, find the values of x . (2 marks)

g) Giving examples, distinguish between Seasonal movement from Cyclic movement of time series movements;

(1 mark)

h) Consider the following matrices;

$$A = \begin{bmatrix} -2 & 3 \\ 1 & 5 \end{bmatrix}$$

$$B = \begin{bmatrix} 2 & 3 & 0 \\ -1 & 1 & 2 \\ 4 & 0 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} -1 & 1 & 2 \\ 2 & 1 & 0 \end{bmatrix} \quad D = \begin{bmatrix} -2 & 3 \\ 1 & -1 \end{bmatrix}$$

Compute the following, if possible;

(i) $C' B$

(2 marks)

(ii) $2A - D'$

(1 mark)

i) Consider the following data from Excel Enterprise sales over a number of years.

Year	2014	2016	2017	2018	2019	2020	2021
Sales (thousand units)	104	107	116	112	110	118	114

- (i) Fit a trend line by the method of semi-averages (3 marks)
(ii) Use your graph to estimate the sales in the year 2022 (1 mark)

QUESTION TWO (24 Marks)

- a) Explain Two importance of set theory in business. (2 marks)
b) An entrepreneur researcher investigating customer taste for different brands of fruit drinks namely: Cool drink, Tasty drink and Mild drink, in a well populated town gathered the following information:

From a sample of 2150 customers, 1002 bought Cool drink, 1400 bought Tasty drink and 1025 bought Mild drink, 390 bought all the varieties, 560 bought Cool and Tasty drinks, 620 purchased Tasty drink only, 309 purchased Cool drink only.

Required:

Using μ for Universal set; C for those who purchased Cool drink, T for those who purchased Tasty drink and M for those who purchased Mild drink;

- i.) Represent the given information in set notation (2 marks)
ii.) Present the information in a Venn Diagram. (3 marks)
Find,
iii.) The number of customers who purchased Cool and Mild drinks only. (2 marks)
iv.) The number of customers who purchased Tasty and Mild drinks only. (2 marks)
v.) The number of customers who purchased Mild drink only. (2 marks)
vi.) The number of customers who purchased none of the fruit drinks (2 marks)

- c) Consider the following sets;

$$A = \{x \mid -2 \leq x \leq 14\}$$

A is a universal set

$$B = \{x \mid 1 \leq x \leq 10\}$$

$$C = \{-2, -1, 0, 6, 7, 12\}$$

$$D = \{ \}$$

Find the following;

- (i) $B \cup D \cap C$ (2 marks)
(ii) $B' \cup C'$ (2 marks)
(iii) $C' \cup D$ (2 marks)
(iv) $C \cap B$ (1 mark)
- d) If P, Q and R are three subsets of a Universal set U, illustrate the following using Venn diagrams.
- j) $P^c \cap Q \cap R$ (1 mark)
k) $P \cup Q \cup R^c$ (1 mark)

QUESTION THREE (24 Marks)

- (a) Explain Four reasons why the analysis of Time Series is of great significance to an owner of a business? (4 marks)

(b) Giving reasons, indicate which element of Time series you would associate with the following;

- A high demand for warm clothing during the months of April, June and July in the Rift valley regions of Kenya. (2 marks)
- Lorries carrying maize grain to the Kenyan cereals board once a year during the month of December in Uasin Gishu County, Kenya (2 marks)
- Unexpected fire burning up clothes stalls in a market in Nairobi, Kenya (2 marks)

(c) The table below shows the production of tea in a factory.

YEAR	2014	2015	2016	2017	2018	2019	2020
PRODUCTION('000 tons)	80	90	92	83	94	99	92

- (i) By using the method of least squares, fit a straight line trend to these figures (8 marks)
- (ii) Plot these figures on a graph and show the trend line. (4 marks)
- (iii) From your graph predict the production in the years 2013 & 2021. (2 mark)

QUESTION FOUR (24 Marks)

- a) Mr. Halli Mzuri is an entrepreneur dealing in agri-business. He buys cows and goats from other small scale farmers, rears them to a certain standard size and sells them to other traders. On a certain day, he had two customers Anna and Haroni buying from him. Anna bought 10 cows and 30 goats at a total of Ksh. 1, 500,000. Haroni bought 15 cows and 25 goats at a total of Ksh. 2,050,000. If Mr. Halli Mzuri made a profit of 20% from the sale of a cow and a profit of 25% from the sale of a goat;

Required; Calculate

- i. How much Halli Mzuri sold a cow and a goat, respectively. (4 marks)
- ii. The small scale farmers average selling price of a cow and that of a goat respectively. (2 marks)

b) Find the value of X in the equation $2X^2 + 11X - 21 = 0$ (2 marks)

c) Consider a matrix $A = \begin{pmatrix} 5 & 4 & 2 \\ 4 & 2 & 1 \\ 3 & 0 & 2 \end{pmatrix}$

Giving a reason, categorize the given matrix A as singular or non-singular. Show your working (3 marks)

(c) Solve the following systems of equation using any specified matrix method. (10 marks)

$$4x_1 + x_2 - x_3 = 17$$

$$3x_1 + x_3 = 16$$

$$-x_1 + 3x_2 + 2x_3 = -9$$

(d) Given the following two matrices A and B;

$$A = \begin{pmatrix} 3 & 2 \\ -5 & -2 \end{pmatrix} \text{ and } B = \begin{pmatrix} -1 & 4 \\ 1 & -3 \end{pmatrix}$$

Determine

(i) $A^{-1}B$

(2 marks)

(ii) B⁻¹A

(2 marks)

QUESTION FIVE (24 Marks)

- a) Distinguish between qualitative and quantitative data giving appropriate examples. (2 marks)
- b) Describe **Two** Merits of using the Median as a measure of Central tendency? (2 marks)
- c) The following data represents the mass of some items manufactured in an enterprise.

87	89	55	75	97	130	51	73	75	91
68	125	61	99	65	82	88	122	66	77
83	84	119	95	94	94	62	85	69	91
81	64	92	105	99	91	52	74	74	83
87	65	94	67	118	106	61	96	88	107

Required;

- a) Prepare a frequency table with each class interval of 10 Kg and the first class interval as 50-60 exclusive form. (4 marks)
- b) Calculate;
- (i) The mean mass (3 marks)
- (ii) The median mass (3 marks)
- (iii) The mode value (2 marks)
- (iv) The value of Coefficient of Quartile Deviation (3 marks)
- (v) The value of Standard deviation (3 marks)
- (vi) The coefficient of variation (2 marks)

QUESTION SIX (24 marks)

- i) Explain **Three** importance of using a Z-chart for presenting business data over a period of one year. (3 marks)
- ii) The following are figures of sales of two firms A and B for the years 2014 to 2021.

YEAR	SALES FIRM A ('000 Units)	SALES FIRM B ('000 Units)
2014	100	1000
2015	200	2000
2016	350	3500
2017	400	4000
2018	500	5000
2019	650	6500
2020	700	7000
2021	850	8500

- a) Use the Semi-logarithmic method to represent this information graphically. Use the same axes. (7 marks)
- b) Comment on the growth rate of the sales of the two firms A and B (2 marks)

iii) In the following table, the number of projects situated in two areas P and Q are listed according to the amount of profits earned by them.

Profits earned in (Ksh '000)	No. of Projects	
	Area P	Area Q
6	6	2
25	11	38
60	13	52
84	14	28
105	15	38
150	17	26
170	10	12
400	14	4

Required;

- a) Draw in the same diagram their Lorenz curves
- b) Interpret the curves drawn in iii) a).

(10 marks)

(2 marks)

-----**END**-----