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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
FOR THE DIPLOMA IN HUMAN RESOURCE MANAGEMENT
DHR 021: BUSINESS MATHEMATICS

Date: 16TH AUGUST 2023

Time: 8:30AM-10:30AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Solve the following inequality;

$$\frac{1}{2}(3+4x) \leq 6\left(\frac{1}{3} - \frac{1}{2}x\right) - \frac{1}{4}(2+10x) \quad (2 \text{ Marks})$$

b) Differentiate the following function using product rule $y = \sqrt[3]{x^2}(2x - x^2)$ (3 Marks)

c) Simplify the following $\log_2\left(\frac{8}{7}\right) - \log_2\left(\frac{3}{14}\right) + \log_2\left(\frac{3}{2}\right)$ (4 Marks)

d) With the help of Venn diagrams state and prove De-Morgan's law (HINT: draw four Venn diagrams). (6 Marks)

e) If Ksh.7500 is invested for 4 years at compound interest, at what rate will the money amount to Ksh.9116.30? (4 Marks)

f) Solve the following by elimination method;

$$\begin{aligned} 20x + 30y &= 60 \\ 4y - 3x &= 15 \end{aligned} \quad (4 \text{ Marks})$$

g) Integrate the following functions;

i) $\int x^5 + 4x^3 + x^2 + 6 dx$ (2 Marks)

ii) $\int_2^4 4y^2 + y^{-2} + 1 dy$ (2 Marks)

h) Evaluate the following limit $\lim_{x \rightarrow 2} \frac{3x+4}{5x+7}$ (3 Marks)

QUESTION TWO (20 MARKS)

a) Express the following functions as either one-to-one, one-to-many or many-to-one mapping;

i) $y = \sqrt{x^2 + x - 2} \quad 2 \leq x \leq 7$

ii) $y = x^2 \quad -3 \leq x \leq 3$

iii) $y = -x \quad -2 \leq x \leq 3$

(6 Marks)

b) Solve $\frac{2Z}{Z+3} = \frac{3}{Z-10} + 2$ (5 Marks)

c) Given the following sets;

$P = \{x : x \text{ is the first four odd numbers}\}$ $R = \{x : x \text{ is the first three even numbers}\}$, $D = \{1, 3, 5, 2\}$,
 $G = \{2, 1, 1, 2\}$. Show that;

$$i) \quad P \cup (R \cap D) = (P \cup D) \cap (P \cup R) \quad (5 \text{ Marks})$$

$$ii) \quad ((P \cap D \cap G)^c)^c = P \cap G \cap D \quad (4 \text{ Marks})$$

QUESTION THREE (20 MARKS)

a) It is estimated that x months from now, the population of a certain community will be

$$P(x) = x^2 + 20x + 8,000$$

i) At what rate will the population be changing with respect to time 15 months from now? (2 Marks)

ii) By how much will the population actually change during the 16th month? (1 Mark)

b) Use quotient rule to differentiate the following;

$$y = \frac{5x^2 + 2x + 9}{7x^2 + 3x + 8}$$

(6 Marks)

c) Integrate the following functions;

$$i) \quad \int_1^2 \frac{2x^5 - x + 3}{x^2} dx \quad (4 \text{ Marks})$$

$$ii) \quad \int 3\sqrt[4]{x^3} + \frac{7}{x^5} + \frac{1}{6\sqrt{x}} dx \quad (3 \text{ Marks})$$

$$iii) \quad \int (\sqrt[3]{x} + x)(4 - x^2) dx \quad (4 \text{ Marks})$$

QUESTION FOUR (20 MARKS)

a) Solve the following by substitution method

$$x + 2y = 8$$

$$1 + y = 2x \quad (4 \text{ Marks})$$

b) Solve the following simultaneous equations graphically

$$y = 2x + 1$$

$$2y + x + 7 = 0 \quad (6 \text{ Marks})$$

c) State any five properties of logarithm. (10 Marks)

QUESTION FIVE (20 MARKS)

a) Christine has 21 coins whose total is Sh.87. There are twice as many ten shillings' coins as there are five shillings' coins. The rest are one shilling coins. Find the number of coins of each denomination. (6 Marks)

b) After how long will Sh.50,000 amount to Sh.75,000 under SI at the rate of 10% half year? (4 Marks)

c) Solve the following using factorization $x^2 - 4 = 0$. (3 Marks)

d) Solve $5x^3 - 5x^2 - 10x = 0$. (3 Marks)

e) Using method of completing squares, solve $x^2 + 4x - 7 = 0$. (4 Marks)

