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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2019/2020 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR SCIENCE
BUSINESS ADMINISTRATION

Date: 8th August, 2019
Time: 9.00am – 11.00am

KBA 106 - BUSINESS MATHEMATICS

INSTRUCTIONS:

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a)   With the use of Venn diagrams prove that $A\cup(B\cap C)=(A\cup B)\cap(A\cup C)$

(4 Marks)

b)   Differentiate the universal set from the null set   (2 Marks)

c)   A certain firm has costs given by $C(q)=420+3q+4q^2$ and revenue given by

$R(q)=100q-q^2$. Find the quantity that should be produced in order to maximize the

firm's profit.   (4 Marks)

d)   Determine the type of mapping the following functions have on the values of the domain.

   i) $y=\sqrt{x-2}$ $2\le x\le 7$ (2 Marks)

   ii) $y=x^2$ $-3\le x\le 3$ (2 Marks)

e)   Find $\dfrac{dy}{dt}$ using product rule given that $y=\left(t^3-6t\right)\left(2-4t^3\right)$ (5 Marks)

f)   Consider the following matrices;

$$A=\begin{bmatrix}2 & 4\\3 & 6\\1 & 8\end{bmatrix} \text{ and } B=\begin{bmatrix}5 & 4\\2 & 4\\9 & 1\end{bmatrix}$$

Compute $A^T B$ (4 Marks)

g) Solve for x given the following linear function $\dfrac{x-2}{3} = \dfrac{2x}{7} - 1$ (3 Marks)

h) Integrate the following functions

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

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

QUESTION TWO   (20 MARKS)

a)   With the use of relevant examples, briefly describe any five types of matrices

(10 Marks)

b)   Let x, y and z denote the cost of having round, square and triangular bottom respectively, in a certain packing company in Mwihoko. Determine the cost of each shape given the following using matrix method;   (10 Marks)

$$7x + 5y + 3z = 16$$
$$3x + 2z - 5y = -8$$
$$-7z + 5x + 3y = 0$$

QUESTION THREE (20 MARKS)

a) Using the appropriate method find the derivative of the following function

(5 Marks)

$$y = \frac{4x^2}{x^3 + 3}$$

b) Integrate the following functions

   i) $\int_1^2 \left(\sqrt{x} + 9\sqrt[3]{x^7} - \dfrac{2}{\sqrt[5]{x^2}}\right)dx$ (4 Marks)

   ii) $\int \sqrt[3]{x^2}\left(2x - x^2\right)dx$ (3 Marks)

c) The weekly cost of producing x items is given by
   $C(x) = 20{,}000 + 20x - 0.03x^2 + 0.000045x^3$ and the demand function for the items is given by $p(x) = 50 - 0.002x$. The number of items ranges between $0 \le x \le 5{,}000$.
   Determine the following given that 2000 items are produced assuming that the company sells exactly what they produce;
   i)   Marginal revenue   (3 Marks)
   ii)   Marginal profit   (5 Marks)

QUESTION FOUR (20 MARKS)

a) In a group of 60 students in KWUST, 8 play hand ball and football, 6 play volleyball and football, 5 play handball and volleyball, 2 play all the three games,25 play handball, 16 football and 22 play volleyball.

Required:

    i) Present the above information in a Venn diagram.   (6 Marks)

    ii) How many students play handball but not volleyball?   (2 Marks)

    iii) How many students play handball and volleyball but not football?   (2 Marks)

    iv) How many students play at most two games   (3 Marks)

b) Solve the following quadratic equations using the stated method;

    i) $3x^2 - 2x - 1 = 0$ [completing squares]   (4 Marks)

    ii) $3x^2 = 2x + 8$ [factorization]   (3 Marks)

QUESTION FIVE (20 MARKS)

a) State the properties of logarithm   (6 Marks)

b) Evaluate the following limit   (3 Marks)

$$\lim_{x \to 8} \frac{x^{2/3} + 3\sqrt{x}}{4 - \dfrac{16}{x}}$$

c) Solve the following simultaneous equations using the indicated method

    i) $\begin{aligned} 2x + y &= 12 \\ y - 3x &= 2 \end{aligned}$ [graphically]   (6 Marks)

    ii) $\begin{aligned} 4x + 2y &= 14 \\ 2y + 5x &= 16 \end{aligned}$ [substitution]   (5 Marks)