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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2016/2017 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

Date: December…
Time: 9.00am –

KBA 106 - BUSINESS MATHEMATICS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Solve the following quadratic equations;

$\frac{5x}{6} - \frac{2x-1}{3} = \frac{4}{15}$ (4 Marks)

b) Find the solution of the following simultaneous equations;

$$3x - 4(y-2) = 2$$
$$2x + 3(y-3) = 4$$

(4 Marks)

c) Given the sets $U = (1, 2\ 3, \ldots 9,)\ A = (1, 3, 5, 7), B = (2, 3, 5, 6\ 8)$ and $C = (3, 4, 8,)$ find;

i. $A \Delta B$

(3 Marks)

ii. $(A \cap B)^C) \cup C$

(3 Marks)

iii. $(B \cap C) - A$

(2 Marks)

d) Determine whether the function below is continuous;

$$f(x) = \frac{1}{x^2 - 1} \ at \ the \ point \ x = 1$$

(3 Marks)

e) Find the limits of the functions below;

$\lim_{x \to 2} \frac{x-2}{x^2+4x-12}$

(3 Marks)

f) Give the functions $f(x) = 6x + 4, g(x) = x^2 - 1$ find;

i. F inverse

(3 Marks)

ii. $(f - g)(2)$

(2 Marks)

iii. $(f \circ g)(-1)$

(3 Marks)

QUESTION TWO (20 MARKS)

a) Find the derivates for the functions indicated below;

i. $y = x^3 + 4x^2 - 5$

(2 Marks)

ii. $y = \frac{x^4 - 3x}{x^2}$

(4 Marks)

iii. $y = (3x^2 - x)^2$

(3 Marks)

b) A company's total profit ($000) over a particular period is given by the function $17x^2 - 12x - 5x^3$ where x is the number of items produced (in hundreds). It is known that the maximum production possible for the period is 300 items;

i) Find the production level that maximizes profit.

(5 Marks)

ii) Maximum profit

(2 Marks)

c) What sum of money will amount to Ksh. 21,600 in 4 years kept in an account that gives 2% p.a simple interest?

(4 Marks)

QUESTION THREE (20 MARKS)

a) Use the substitution method to solve the simultaneous equation;

$$x^2 + xy + 2y^2 = 16$$
$$x - y = -4$$

(7 Marks)

b) The width of a rectangle is 16 feet less than 3 times the length. If the area is 35 square feet, formulate a quadratic equation to find the dimensions of the rectangle.

(4 Marks)

c) A small business needs $50,000 for a new venture in 6 years time. It intends to save the amount through an account that gives 3.2% compounded semi-quarterly with payments made at the end of each quarter for 6 years. Find the;

i) Amount of the periodic payment in order to meet the target.

(6 Marks)

ii) Interest earned.

(3 Marks)

QUESTION FOUR (20 MARKS)

a) Distinguish the following terms as used in set theory and give example.

i) Finite and infinite set

ii) Singular and null sets

(2 Marks)

b) Use two sets to prove the De Morgans I and II law.

(4 Marks)

c) Define the terms power set thus find the $P(A)$ where $A = \{1, 2, 3\}$

(4 Marks)

d) In a survey of 200 people in a town on travel means, it was found that 100 used car, 70 buses, 140 Trains, 40 used cars and buses, 30 buses and trains, 60 used cars and trains and 20 used all the three means.

i) Represent the information in a Venn diagram

(3 Marks)

How many people;

ii) Did not use these mode of transport

(2 Marks)

iii) Used only one mode

(1 Marks)

iv) Used buses and trains if and only if they did not use cars

(2 Marks)

v) Used trains but not cars or buses

(2 Marks)

QUESTION FIVE (20 MARKS)

a) The weekly cost to produce x widgets is given by $C(x) = 75{,}000 + 100x - 0.03x^2 + 0.000004x^3$ such that $0 \leq x \leq 10000$ and the demand functionfor the widgets is given by $p(x) = 200 - 0.005x$. find;

i) The revenue function and the profit function

(3 Marks)

ii) The marginal revenue and profit when 2500 widgets are sold.

(4 Marks)

iii) The marginal revenue and profit when 7500 widgets are sold.

(4 Marks)

iv) Give an interpretation on the results obtained in (i) and (ii).

(3 Marks)

b) How long will it take for a sum of money to double in value if it is kept in an account that gives 4% p.a interest compounded semi-annually.

(6 Marks)