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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2019/2020 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(BUSINESS ADMINISTRATION)

Date: 10th April, 2019
Time: 11.00am – 1.00pm

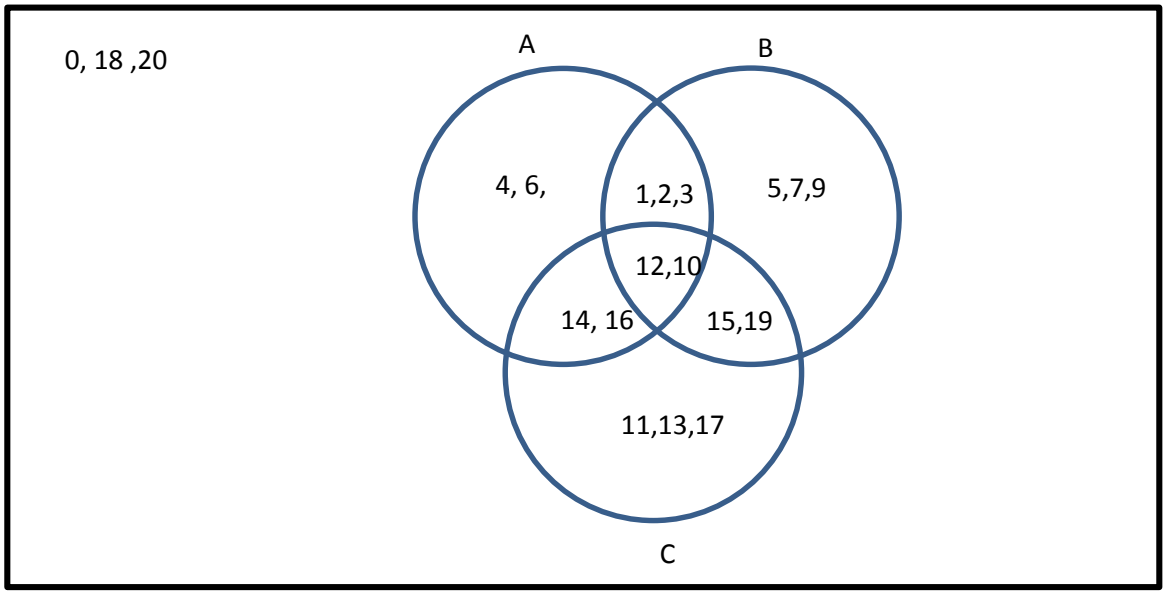
KBA 106 - BUSINESS MATHEMATICS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Consider the following Venn diagram;



Find;

i. $(A \cup B)^c \cap C^c$ (3 Marks)

ii. $(A - C) - (B - C)$ (2 Marks)

b) Differentiate the function $y=(3x-1)(2x+5)$ (3 Marks)

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

d) If Ksh.7500 is invested for 4 years at compound interest, at what rate will the money amount to Ksh.9116.30 if compounded annually? (3 Marks)

e) Solve the following quadratic equation using factorization method. (4 Marks)

$$3x^2-12x+9=0$$

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^TB (4 Marks)

f) Solve the following using elimination method (3 Marks)

$$x+3y=4$$
$$2x+5y=7$$

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)

QUESTION TWO (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? (2 Marks)

b) The cost of production per day for some widget is given by $C(x)=2500-10x-0.01x^2+0.0002x^3$ What is the marginal cost when $x=300$ and $x=200$ (2 Marks)

c) Use quotient rule to differentiate the following (5 Marks)

$$y=\frac{4\sqrt{x}}{x^2-2}$$

d) Integrate the following functions

i. $\int_1^2 \frac{2w^5 - w + 3}{w^2}\, dw$ (3 Marks)

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

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

QUESTION THREE (20 MARKS)

a) A customer deposited sh. 43,000 in a savings account that yields 2% p.a. compounded semi-annually.

i. How long will it take to amount to Ksh.47, 500? (4 Marks

ii. What is the compound interest? (2 Marks)

b) A market researcher investigating consumers' preference for three brands of beverages namely: coffee, tea and cocoa, in Githurai gathered the following information: From a sample of 800 consumers, 230 took coffee, 245 took tea and 325 took cocoa, 100 took tea and cocoa, 80 took coffee and tea, 70 took coffee and cocoa, 110 took coffee only, 185 took cocoa only.

Required:

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

ii) The number of customers who took tea only. (2 marks)

iii) The number of customers who took all the three drinks. (2 marks)

iv) The number of customers who at most two drinks. (2 marks)

v) The number of customers who took none of the beverages. (2 marks)

QUESTION FOUR (20 MARKS)

a) Let x, y and z denote the cost of having round, square and triangular bottom respectively, in a certain packing company in Kariobangi. Determine the cost of each shape given the following;

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

(12 Marks)

b) Use the method of completing squares to solve the quadratic equation below

$$4x^2 - 12x + 14 = 0$$ (4 Marks)

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

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

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

QUESTION FIVE (20 MARKS)

a) State any four properties of logarithm (4 Marks)

b) Solve the following simultaneous equations using the indicated method

i. $2x-3y=12$
$5x+3y=9$ [substitution] (5 Marks)

ii. $x+y=3$
$2x-y=4$ [graphically] (5 Marks)

c) For producing a certain product, if total costs can be represented by $C(X)=1600+1500x$ and the total revenues by $R(X)=1600x-x^2$, find the break-even points and maximum possible profit. (6 Marks)