

THARAKA



UNIVERSITY

COLLEGE

(A Constituent College of Chuka University)

UNIVERSITY EXAMINATIONS

CHUKA & THARAKA CAMPUS

EXAMINATION FOR THE AWARD OF
DIPLOMA IN COMPUTER SCIENCE

COSC 0170: MATHEMATICS FOR COMPUTING I

STREAMS:

TIME: 2 HOURS

DAY/DATE: TUESDAY 14/04/2020

11.30 AM – 1.30 PM

INSTRUCTIONS:

Answer Question One and any other Two Questions

QUESTION ONE (20 MARKS)

(a) State the properties of real numbers in the equations below.

(i) $a(b + c) = ab + ac$

(ii) $(a + b) + c = a + (b + c)$

(iii) $a(b + c) = a(b + c)$

[3 marks]

(b) Given that

$$U = \{0,2,4,6,8,10,12\}$$

$$C = \{4,8\}$$

$$D = \{0,2,10\}$$

$$E = \{10,2,0,12\}$$

Find the following using Venn diagram.

(i) $D \cap E$

(ii) $C \cap D \cap E$

(c) Differentiate between inductive and deductive reasoning giving an example in each.

[4 marks]

- (d) Find the slope m , x-intercept a and y-intercept b of the given line $5x+2y+2=0$ [5 marks]
- (e) Find the centre and radius of the circle given by $x^2 + y^2 + 10x - 12y + 12 = 0$ [4 marks]
- (f) Solve $6x^2 + 2x - 8 = 0$ using factorization method. [4 marks]
- (g) Solve for n in $n \cap C_2 = 28$ [5 marks]

QUESTION TWO (20 MARKS)

- (a) Define the following terms
- (i) Set
 - (ii) Subset
 - (iii) Empty set
 - (iv) Universal set
- (b) Safaricom (Kenya ltd) surveyed 400 of its customers to determine the way they learned about the new jibambe tariff. The survey shows that 180 learned about the tariff from radio, 190 from television, 190 from newspapers, 80 from radio and television, 90 from radio and newspapers, 50 from television and newspapers and 30 from all three forms of media.
- (i) Draw a Venn diagram to represent this information. [10 marks]
 - (a) Using your Venn diagram (together with the inclusion –exclusion principle where need be): determine
 - (ii) The number of customers who learned of the tariff from at least two of the three media.
 - (iii) The number of customers who learned of the tariff from exactly one of the three media.
 - (iv) The number of customers who did not learn of the tariff from any of the three media.
- (c) Differentiate from first principle $f(x) = \frac{1}{x}$ and determine the value of the gradient of the curve at $x = 2$. [6 marks]

QUESTION THREE (20 MARKS)

- (a) In how many ways can a class of 20 children be split into two groups of 8 and 12 respectively if there are two twins in the class who must not be separated. [6 marks]
- (b) Differentiate the following using the methods indicated
- (i) $y = 3x^2(x^2 + 1)$ (Product rule) [3 marks]

- (ii) $y = \frac{x^2+4x}{2x-1}$ (Quotient rule) [3 marks]
 (iii) $y = (2x^4 - 7)^6$ (Chain rule) [3 marks]
 (c) Given that $f(x) = 3x + 1, g(x) = x - 2$. Determine
 (i) $(f \circ g)^{-1}(x)$ [3 marks]
 (ii) $(g \circ f)(x)$ [2 marks]

QUESTION FOUR (20 MARKS)

- (a) $f(x) = x^3 + ax^2 + bx - 3$. When $f(x)$ is divided by $x-1$ and $x+1$, the remainders are 1 and -9 respectively. Find the values of a and b . [5 marks]
 (b) The coordinates of the end points of the diameter of a circle are $A(-3,8)$ and $B(1,4)$ find.
 (i) The centre of the circle
 (ii) Radius
 (iii) Equations of the circle [10 marks]
 (c) Solve $-2x + 3 < 5, 4x - 7 < 9$, and graph the solution [5 marks]

QUESTION FIVE (20 MARKS)

- (a) Solve the equation below using the completing square method
 $7x^2 + 9x + 2 = 0$
 (b) Find the point of intersection of the given pair of lines
 $5x + y - 2 = 0$
 $2x - 2y + 1 = 0$
 (c) How many committees of five people can be chosen from 20 men and 12 women
 (i) If exactly three men must be on each committee?
 (ii) If atleast four women must be on each committee? [6 marks]
 (d) Let set $A = \{1,2,3,4\}, B = \{3,4,5,6,7\}$, and $U = \{x|x \in N, x \leq 10\}$
 Find:
 (i) A^c
 (ii) $A \setminus B$
 (iii) $A \cap B$
 (iv) $A \cup B$ [4 marks]
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