

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS.

EXAMINATION FOR THE AWARD OF DEGREE DIPLOMA IN COMPUTER SCIENCE

COSC 0170: MATHEMATICS FOR COMPUTING I

STREAMS: DIP (COMPUTER SCIENCE)

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 10/04/2019

11.30 A.M - 1.30 P.M.

INSTRUCTIONS

- Answer Question ONE and any other TWO Questions
- Do not write on the question paper

QUESTION ONE: [30 MARKS]

(a) Classify each of the following numbers.

[5 Marks]

(i)  $-1$

(ii)  $0$

(iii)  $-3.\dot{3}\dot{3}\dot{3}$

(iv)  $\sqrt{-4}$

(v)  $\frac{1}{2}$

(b) State the properties of real numbers in the equations below:

(i)  $72 = 72 + 0$

[1 Mark]

(ii)  $7 + 6 = 8(7 + 6)$   
 $8i$

[1 Mark]

(iii) If  $5(1+2) = 5(3)$ , then  $5(3) = 5(1+2)$

[1 Mark]

(iv) If  $a(4) = a(2+2)$  and  $a(2+2) = 29+29$ , then  $a(4) = 29 + 29$ .

[1 Mark]

(v)  $C(b) = b(c)$

[1 Mark]

(c) Solve  $3x^2 - 1/x - 4 = 0$  Using factorization method. [4 Marks]

(d) How many arrangements are there in the letters of the word MISSISSIPPI? [3 Marks]

(e) Given  $f(x) = 4x^2 - 5$   
 $g(x) = -x - 3$ ,

Find (i)  $f \circ g(2)$

(ii)  $g \circ f(2)$

(iii)  $g \circ g(x)$

(iv)  $f \circ f(x)$

[8 Marks]

(f) Given the equation of a circle  $\frac{1}{2}y^2 - 5y = 6x - \frac{1}{2}x^2 - 1$ , find its radius and the centre coordinates. [5 Marks]

**QUESTION TWO: [20 MARKS]**

(a) Given  $z_1 = 3 - 6i$

$z_2 = 4i + 17$

Find: (i)  $z_1 z_2$  [2 Marks]

(ii)  $\frac{z_2}{z_1}$  [2

Marks]

(iii)  $\dot{z}_2 + i z_1 \vee i$  [2 Marks]

(iv)  $|z_2| + i \dot{z}_1 \vee i$  [2 Marks]

(v)  $\frac{z_2}{z_2}$  [2

Marks]

(b) Draw the graphs of the following quadratic functions ;

(i)  $Y = x^2 + 2x + 3$  for  $-4 \leq x \leq 3$  [3 Marks]

(ii)  $Y = 6 + x - x^2$  for  $-3 \leq x \leq 3$  [3 Marks]

(c) Solve  $2x^2 - 8x = -16$  using completing square method. [4 Marks]

**QUESTION THREE: [20 MARKS]**

(a) Represent the following in a Venn diagram and use it to solve the following;

$$A = \{5, 8, 15\}$$

$$B = \{5, 10, 12\}$$

$$C = \{5, 8, 10, 20\}$$

Find (i)  $B \cap C$  [2

Marks]

(ii)  $(A \cup B \cup C)^c$  [2 Marks]

(iii)  $(A \cup C) \cap B$  [2 Marks]

(iv)  $A^c \cup B^c$  [2

Marks]

(v)  $\in$  [2

Marks]

(b) With examples, differentiate between Assaultive laws and Distributive law as used in set theory. [3 Marks]

(c) Show that  $P \Leftrightarrow Q = (P \rightarrow Q) \wedge (Q \rightarrow P)$  and show the equivalents column. [7 Marks]

**QUESTION FOUR: [20 MARKS]**

(a) Find  $\frac{dy}{dx}$  of the following equations;

(i)  $y = (x-1)(x^3 - 2x + 1)$  [2 Marks]

(ii)  $y = x\sqrt{x}$  [2 Marks]

(iii)  $5/x^3$

[2 Marks]

(iv)  $x^{-2}+2/x^2$

[2 Marks]

(b) Expand the equation  $(-3m-2n)^4$

[5 Marks]

(c) Find the centre coordinates and the radius of the circle that passes through (9, -7), (-3, -1) and (6, 2) [7 Marks]

**QUESTION FIVE: [20 MARKS]**

(a) Find the equation of the line passing through the points A=(-1, 6), B=(3, -9) and its length.

[7 Marks]

(b) How many arrangements are there in the letter of the word MATHEMATICS

[3 Marks]

(c) Find the quotient and the remainder of the equation  $4x^4 + 2x^3 - 7x^2 + x - 3$  divided by  $x-2$ .

[5 Marks]

(d) By the help of a Truth Table, show that negation of  $\sim PV \sim Q = \sim (P \wedge Q)$

[5 Marks]

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