

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATIONS
RESIT/SPECIAL EXAMINATION**

EXAMINATION FOR THE AWARD OF DIPLOMA IN

COSC 0170: MATHEMATICS FOR COMPUTING 1

STREAMS:

TIME: 2 HOURS

DAY/DATE: TUESDAY 02/02/2021

11.30 A.M – 1.30 P.M.

INSTRUCTIONS:

- Answer all questions in section A and any other two in section B
- Do not write anything on the question paper
- Non-programmable electronic calculators may be used

SECTION A

QUESTION ONE (30 MARKS)

- a) Define the following terms as used in elementary mathematical logic
- i) Logical statement (1 marks)
 - ii) Truth table (1 marks)
 - iii) A simple statement (1 marks)
- b) State the properties of real numbers in the equations below (2 marks)
- i) $(5+9)+7=5+(9+7)$
 - ii) If $5(4+6)=5(10)$, then $5(10)=5(4+6)$
- c) Given $Z_1=3-4i$
 $Z_2=5i-2$
 $Z_3=-15i+6$

Find; $z_1 z_2$ (6 marks)
 $z_1 z_3$

$$\frac{z_1}{z_3}$$

d) Solve $2x^2-2x=-1$ using completing square method (2 marks)

e) Find the length of the line joining A and B in A(-1,6), B(3,-9) and its equation (2 marks)

f) Find the radius and the centre of the circle given by $2x^2+2y^2-28x+12y+114=0$ (3 marks)

g) How many arrangements are there in the letters of the given words CORDINATION, COMMITMENT (2 marks)

h) Given $f(x)=4x^2-5$
 $g(x)=-x-3$, find;

i) $fog(x)$ (2 marks)

ii) $fog(-2)$ (2 marks)

i) Given $U= (0, 3, 6, 9, 10, 12, 13)$
 $A= (0, 3, 10)$
 $B= (3, 10, 12)$
 Find using the Venn diagram, i) $A \cap B$, ii) $A \cup B$, iii) $A^c \cup B^c$ (6marks)

SECTION B

QUESTION TWO (20 MARKS)

a) Expand the following functions using appropriate method
 i) $(x+2y)^4$ (5 marks)
 ii) $(x-1/x)^6$ (5 marks)

b) Given $f(x)=2x^2+1$
 $g(x)=3x+4$,
 Find,
 i) $fog(2)$ (2 marks)
 ii) $gof(2)$ (2 marks)
 iii) $gog(x)$ (3 marks)
 iv) $fof(x)$ (3 marks)

QUESTION THREE (20 MARKS)

- a) Define the following terms as used in Number systems
- i. Real Numbers (2 marks)
 - ii. Integers (2 marks)
 - iii. Complex numbers (2 marks)
 - iv. Rational numbers (2 marks)
- b) Show that $P \Leftrightarrow Q = (P \rightarrow Q) \wedge (Q \rightarrow P)$ (6 marks)
- c) Proof by commutative law that $A \cap B = B \cap A$ (6 marks)

QUESTION FOUR (20 MARKS)

- a) Find $\frac{dy}{dx}$ of $(2x^3 - x^2 + 2)^5(x-2)^3$ (5 marks)
- b) Find the radius and the centre of a circle that passes through points P(2,1), Q(0,5) and R(-1,2) (10 marks)
- c) Given $A = \{5, 5, 8, 15\}$
 $B = \{5, 5, 10, 12\}$
 $C = \{5, 8, 10, 20\}$
 Find $B \cap C$, $(A \cup C) \cap B$, $(A \cup B \cup C)^c$ and $A^c \cap B^c$ with the help of a Venn diagram (5 marks)

QUESTION FIVE (20 MARKS)

- a) Find the quotient and the remainder of $(x^5 + 1) / (x - 1)$, (4 marks)
- b) Solve the following quadratic equations by any appropriate method.
- i) $P^2 + 4P + 3 = 0$ (4 marks)
 - ii) $3r^2 - 17r + 10 = 0$ (4 marks)
- c) A committee of 5 men and 4 women is to be formed from 8 men and 6 women. How many ways can this be done? (4 marks)
- d) Differentiate between a whole number and an integer giving relevant examples (4 marks)
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