

PAN AFRICA CHRISTIAN UNIVERSITY

CERTIFICATE IN INFORMATION AND COMMUNICATION TECHNOLOGY

END-OF-SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY

COURSE CODE: CICT0114

COURSE TITLE: ELEMENTARY MATHEMATICS

EXAM DATE: XXXXX XXXXX/APRIL, 2023

TIME: XXXXX

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other Three questions in Section **B**.
- Write only your **student number** on the answer booklet provided.

SECTION A
(Answer ALL questions in this section)

Question 1:

Solve for x and y .

[3 Marks]

$$3x + 3y = 24$$

$$2x + y = 13$$

First multiply the bottom equation by 3. Now the y is preceded by a 3 in each equation.

$$3x + 3y = 24 \quad 3x + 3y = 24$$

$$3(2x) + 3(y) = 3(13) \quad 6x + 3y = 39$$

The equations can be subtracted, eliminating the y terms.

$$3x + 3y = 24$$

$$-6x + (-3y) = -39$$

$$-3x = -15$$

$$\frac{-3x}{-3} = \frac{-15}{-3}$$

$$x = 5$$

Insert $x = 5$ in one of the original equations to solve for y .

$$2x + y = 13$$

$$2(5) + y = 13$$

$$10 + y = 13$$

$$-10 \quad -10$$

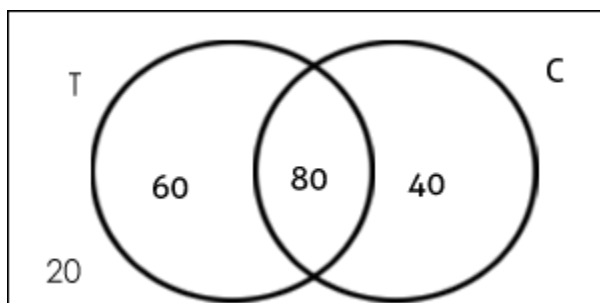
$$y = 3$$

- i. Express $\frac{1}{\sqrt{32}}$ as a power of 2 [1 Mark]
- ii. Write $50 \times 49 \times 48 \times 47 \times 46$ in factorial form. [2 Marks]
- a) Three coins are tossed, find the probability that two heads are obtained. [2 Marks]
- c) Evaluate $\frac{20!}{3!8!}$ [2 Marks]

SECTION B
(Answer any THREE (3) questions in this section)

Question 2:

- a) In a college, 200 students are randomly selected. 140 like tea, 120 like coffee and 80 like both tea and coffee.
- Draw a Venn diagram to represent the information above [5 Marks]
 - How many students like only tea? [1 Mark]
 - How many students like only coffee? [1 Mark]
 - How many students like neither tea nor coffee? [1 Mark]
 - How many students like only one of tea or coffee? [1 Mark]
 - How many students like at least one of the beverages? [1 Mark]



Question 3:

- a) Evaluate the following: [4 Marks]

i. ${}^{15}C_7$

ii. ${}^{10}C_4 =$

- b) A box contains 3 red balls, 5 yellow balls, and 2 blue balls. If a ball is picked at random from the box, what is the probability that a ball picked is a yellow ball?

[2 Marks]

- c) How to shade the union, intersection and complement of two sets? **[4 Marks]**

1. $A \cup B'$

2. $A' \cap B'$

Question 4:

a) Given two matrices: $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 0 \\ -6 & 7 \end{bmatrix}$

Find:

i. $2A + 3B$

[3 Marks]

ii. AB

[3 Marks]

- b) Calculate the determinant of the matrix A below.

[4 Marks]

$$\begin{bmatrix} 3 & 2 & -1 \\ 2 & 4 & 3 \\ 4 & 2 & 2 \end{bmatrix}$$

Question 5:

- a) Let $U = \{a, b, c, d, e, f, g, h, i, j\}$ be the universal set, and let $A = \{a, b, c, d, e, f, g\}$, $B = \{b, d, f, i, j\}$, $C = \{a, c, f, j\}$.

Calculate:

i. $A \cap B = \{b, d, f\}$ **[2 Marks]**

ii. $(A \cup C)' \cap B$ **[3 Marks]**

iii. $(A \cap C)' =$ **[2 Marks]**

b) Prove that $(A' \cup C') = (A \cap C)'$: **[3 Marks]**

$$A = \{5, 6, 7\} \quad B = \{1, 2, 3, 4, 5, 6\} \quad C = \{6, 7, 8, 9, 10\}$$

Question 6:

a) Construct the truth table of $(p \wedge q) \vee (\neg p \wedge \neg q)$ **[5 Marks]**

b) Prove that the proposition $(p \rightarrow q) \wedge (p \rightarrow r) \equiv p \rightarrow (q \wedge r)$ is a Logical Equivalence. **[5 Marks]**

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