

PAN AFRICA CHRISTIAN UNIVERSITY

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY

COURSE CODE: DICT0114

COURSE TITLE: FOUNDATION MATHEMATICS

EXAM DATE: MONDAY, XXXX, DECEMBER, 2022

TIME: 8:00AM -11:00AM

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.

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SECTION A
(Answer ALL questions in this section)

Question 1:

a) Convert the following:

[4 Marks]

i. 1010110101_2 to hexadecimal equivalent

ii. $B5C_{16}$ to octal number

b) Given the matrices below;

$$A = \begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 0 & -4 \\ 3 & -2 & 6 \end{bmatrix}.$$

Find $A+B$

[2 Marks]

c) Given the following sets.

$$A = \{5, 6\} \quad B = \{x, y, z\}$$

Find the:

i. Cartesian of set $A \times B$

[1 Mark]

ii. Powerset of set B

[2 Marks]

d) Determine the number of all the rearrangements in the letters, **MISSISSIPPI**, using permutation.

[1 Mark]

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

Question 2:

a) Consider the following universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$,

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

Find the following:

i. $C - A$

ii. $A \cup B$

iii. $(A \cap B)'$

iv. $(A \cup B) \cap C$

v. $A \cap (B \cap C)$

[10]

Marks]

Question 3:

a) A pair of dice is tossed. Find the number of elements in each of the following event:

i. Two numbers are equal

[2 Marks]

ii. Sum is 10 or more

[2 Marks]

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

[6 Marks]

Question 4:

Wananchi Agency Limited deals with the distribution of three types of newspapers namely: Neno, Imani and Upendo. The company recently conducted a market survey to determine the newspaper preferences of 100 households in a certain town. The following results were obtained from the survey.

48 Households read Neno newspaper

18 Households read Imani newspaper

26 Households read Upendo newspaper

8 Households read Neno and Upendo newspapers

8 Households read Neno and Imani newspapers

3 Households read Upendo and Imani newspapers

3 Households read the three newspapers

- a) Represent the above information using a venn diagram. **[4 Marks]**
- b) Find the number of households that:
- i. Read only one of the newspaper. **[2 Marks]**
 - ii. Read Upendo newspaper and the Imani newspaper but did not read the Neno newspaper. **[2 Marks]**
 - iii. Read none of the newspapers. **[2 Marks]**

Question 5:

- a) Evaluate the following: **[4 Marks]**
- i. 6P_3
 - ii. ${}^{10}C_6$

- b) Find x, y, z and t ;

$$\text{where } 3 \begin{bmatrix} x & y \\ z & t \end{bmatrix} = \begin{bmatrix} x & 6 \\ -1 & 2t \end{bmatrix} + \begin{bmatrix} 4 & x+y \\ z+t & 3 \end{bmatrix}.$$

[6 Marks]

Question 6:

- a) Given the following arithmetic sequence 2, 7, 12, 17... Calculate the:
- i. 10^{th} term **[2 Marks]**
 - ii. sum of first 12 terms of the arithmetic sequence **[3 Marks]**
- b) Compute the determinant of the 3×3 matrix below. **[5 Marks]**

$$B = \begin{bmatrix} 4 & -1 & -2 \\ 0 & 2 & -3 \\ 5 & 2 & 1 \end{bmatrix};$$

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