

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/AUGUST,2024

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.

SECTION A
(Answer ALL questions in this section)

Question 1:

a) Convert the following:

[4 Marks]

i. 1011110101_2 to hexadecimal equivalent

ii. 79_{10} to binary number

b) Let $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 0 \\ -6 & 7 \end{bmatrix}$

Calculate: $3A + 4B$

[2 Marks]

c) Given the set $A = \{x, y, z\}$. Find $P(A)$

[2 Marks]

d) In ICT department, there are 112 students. If 43 take Programming, 57 take Mathematics, and 38 take neither. Compute the number of students who take both Programming and Mathematics.

[2 Marks]

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

Question 2:

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. $A \cap B$

[2 Marks]

ii. $(A \cup C)^c \cap B$

[3 Marks]

iii. $(A/C)^c$

[2 Marks]

b) Find the Cartesian product of the following sets:

[3 Marks]

$$A = \{1, 3, 5, 7\} \quad B = \{a, b, c\}$$

Question 3:

a) Convert the following:

[4 Marks]

i. 1001.1101_2 to decimal equivalent

ii. $E94B_{16}$ to octal equivalent

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. 7P_3

ii. ${}^{10}C_2$

- b) There are 6 oranges, 5 apples and 8 mangoes in a basket. Peter picked 3 oranges, 2 apples and 4 mangoes from the basket. Compute the number of choices peter has in selection of fruits.

[2 Marks]

- c) Determine the number of all the rearrangements in the following letters using permutation:

i. MISSISSIPPI

[2 Marks]

ii. BENZENE

[2 Marks]

Question 6:

- 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 9 or more

[2 Marks]

iii. 4 appears on at least one die

[2 Marks]

- b) Find the determinant of the 3×3 matrix below.

[4 Marks]

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

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