

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,2022

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:

- a) Convert the following: **[6 Marks]**
- i. 1001.1101_2 to decimal equivalent
 - ii. 17.5625_{10} to binary number
 - iii. $E94B_{16}$ to octal equivalent
- b) Three coins are tossed, find the probability that two heads are obtained. **[2 Marks]**
- c) Determine the power set of $B = \{x, y, z\}$. **[2 Marks]**

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

Question 2:

Professor asked 42 students when they had studied for his class the previous week.

Their responses were as follows;

- 9 had studied on Friday
- 18 had studied on Saturday
- 30 had studied on Monday
- 3 had studied on both Friday and Saturday
- 10 had studied on both Saturday and Monday
- 6 had studied on both Friday and Monday
- 2 had studied on Friday, Saturday and Monday

- a) Represent the above information using a Venn diagram. **[4 Marks]**
- b) Calculate the number of students who:
- i. Did all of their studying on one day. **[2**

Marks]

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- ii. Studied on Monday but not on either Friday or Saturday. [2

Marks]

- iii. Did not study at all for this class last week. [2

Marks]

Question 3:

- 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 4:

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

Find:

i. $3A + 4B$ [3 Marks]

ii. AB [3 Marks]

- b) Calculate the determinant of the matrix A below. [4 Marks]

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

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. $A \cap B$ [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 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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