



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
CAMPUS: ROYSAMBU
EXAM DATE: XXXXX XXXXX/APRIL,2021
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: **[4 Marks]**

i) 11.11011_2 to decimal equivalent

ii) $AD3B_{16}$ to octal equivalent

b) Determine the power set of $A = \{a, b, c, d\}$. **[2 Marks]**

c) Determine the probability p of event that one or more heads appear in the toss of three fair coins. **[2 Marks]**

d)

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

Find AB . **[2 Marks]**

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

Question 2:

a) Find the Cartesian product of the following sets: **[2 Marks]**

$$A = \{2, 4, 6, 8\} \quad B = \{p, q, r\}$$

b) Let $U = \{1, 2, \dots, 9\}$ be the universal set, and let
 $A = \{1, 2, 3, 4, 5\}, \quad C = \{5, 6, 7, 8, 9\}, \quad E = \{2, 4, 6, 8\},$
 $B = \{4, 5, 6, 7\}, \quad D = \{1, 3, 5, 7, 9\}, \quad F = \{1, 5, 9\}.$
Find:

i) $(B \cap F) \cup (C \cap E)$ **[2 Marks]**

ii) D/E **[2 Marks]**

iii) $(A/C)^c$ **[2 Marks]**

iv) $(D \cup F)^c \cap A$

[2 Marks]

Question 3:

In a survey of 120 people, concerning their languages, it was found that:

65 speak English (E), 45 speak Kiswahili (K), 42 speak French (F), 20 speak both English and Kiswahili, 25 speak both English and French, 15 speak both Kiswahili and French, 8 speak all three languages.

Required

a) Fill in the correct number of people in each of the regions on the Venn diagram.

[4 Marks]

b) Find the number of people who:

i) Speak at least one of the three languages.

[2 Marks]

ii) Speak only one language.

[2 Marks]

iii) Do not speak any of the above language.

[2 Marks]

Question 4:

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]

iii) 5 appears on at least one die

[2 Marks]

b) Evaluate the following:

[4 Marks]

i) 7P_3

ii) ${}^{15}C_{10}$

Question 5:

a) Convert the following:

[6 Marks]

i) $94B_{16}$ to decimal equivalent

ii) 7.5625_{10} to binary number

iii) 1010100111_2 to octal equivalent

b) Prove that the statement $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ is a tautology.

[4 Marks]

Question 6:

a) Find the determinant of matrix B:

[5 Marks]

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

b) Find x, y, z, t , where $3 \begin{bmatrix} x & y \\ z & t \end{bmatrix} = \begin{bmatrix} x & 6 \\ -1 & 2t \end{bmatrix} + \begin{bmatrix} 4 & x+y \\ z+t & 3 \end{bmatrix}$

[5 Marks]

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