PAN AFRICA CHRISTIAN UNIVERSITY

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: **COMPUTING AND INFORMATION TECHNOLOGY**

COURSE CODE: **BSIT102**

COURSE TITLE: **DISCRETE MATHEMATICS**

CAMPUS: **ROYSAMBU**

EXAM DATE: **WEDNESDAY, XXXX,APRIL,2026**

TIME: **2:00PM -4:00PM**

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 One (15 marks) Compulsory

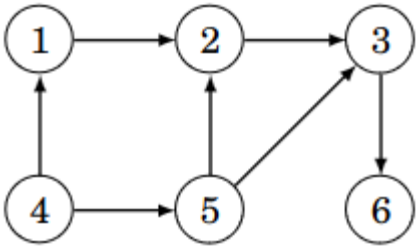
a) Compute the following**:** **[4 Marks]**

i. $1011_2 \times 1010_2$

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ii. $1110110_2 - 1010111_2$

b) Given the following directed graph.



Compute the indegree and outdegree of following vertices **[5 Marks]**

Vertex	Indegree	Outdegree
1		
2		
3		
5		
6		

c) Let $A = \{1,2,3,4\}$ and $B = \{a,b,c,d\}$. Find

i. $|P(B)|$, where $P(B)$ is the power set of B. **[3 Marks]**

ii. $A \times B$ **[3 Marks]**

SECTION B

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

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Question Two (15 Marks)

a) Given that A = { x, y, z }, compute $\mathcal{P}(A)$. **[3 Marks]**

b) In a survey involving 60 people, 25 like milk, 26 tea and 26 coffee, 9 like both milk and tea, 11 like milk and coffee, 8 like coffee and tea and 8 like none of the three drinks.

i. Draw a Venn diagram representing the information above. **[5 Marks]**

ii. Find the number of people who like any of the three drinks [**3 Marks]**

iii. Find the number of people who like coffee only, tea only and milk only **[4 Marks]**

Question Three (15 Marks)

a) Convert the following:

i. 11101_2 to decimal equivalent **[2 Marks]**

ii. 9.5625_{10} to binary number **[2 Marks]**

iii. $7B3_{16}$ to octal equivalent **[3 Marks]**

b) Perform the following

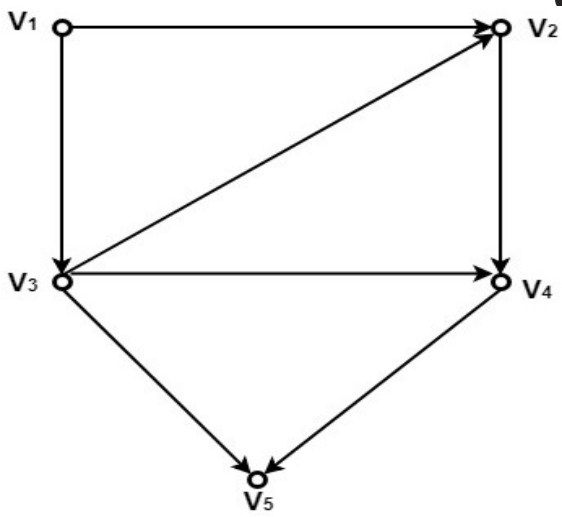
i. $(110101)_2 - (100010)_2$ **[4 Marks]**

ii. $(-1101)_2 + (-1110)_2$ **[4 Marks]**

Question Four (15 Marks)

a) Consider the directed graph shown below.

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Determine its adjacency List L_A. **[7 Marks]**

b) Graph G is represented by the following adjacency matrix;

$$\begin{bmatrix} 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Draw the graph G (use a, b, c, d, and e as the vertices). **[8 Marks]**

Question Five (15 Marks)

a) Simplify the following expression using Karnaugh Map:

i. Z= A'B'C + ABC' + A'BC' + AB'C **[7 Marks]**

ii. Z= A'B'C + AB'C + A'BC' + AB'C' + ABC **[8 Marks]**

Question Six (15 Marks)

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a) Let $A = \{4,2,6,1\}$, $B = \{a,2,c,5,4\}$, and U={1,2,3,4,5,6} Evaluate

i. $B - A$ **[2 Marks]**

ii. $A \cap B$ **[2 Marks]**

iii. $|A \cup B|$ **[2 Marks]**

iv. $(A \cap B)^c$ **[2 Marks]**

b) Prove that the proposition (p ∧ ¬ q) v (¬ p ∧ q) is a tautology. **[7 Marks]**

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