



**PAC INSTITUTE OF TECHNOLOGY AND SOCIAL STUDIES
END OF TERM 2 2024 ASSESSMENT**

FORMATIVE ASSESSMENT

Qualification Code : 061306T4CSC

Qualification : COMPUTER SCIENTIST LEVEL 6

Unit Code : ICT/OS/CS/CR/03/6/A

Unit of Competency : MATHEMATICS FOR COMPUTER SCIENCE

TIME 3 HOURS

INSTRUCTIONS TO CANDIDATE:

- 1. Read all the instructions carefully before attempting the question*
- 2. This paper consists of two sections, A and B*
- 3. You are allowed 2 Hours to Answer the questions*
- 4. Marks for each question are indicated in brackets*
- 5. Write your responses in the Separate Answer booklet provided*
- 6. Do not write anything in this question paper*

SECTION A [40 MARKS]
Answer all questions on these sections

1. Explain the following terms as used in Mathematics for Computer Science

- i. Set (2 Marks)
- ii. Universal set (2 Marks)
- iii. Empty set (2 Marks)
- iv. Probability (2 Marks)

2. Given that set $A = \{ 1, 2, \{2\} \}$, state whether the following statements are true or false.
(4 Marks)

- i. $\{1\} \in A$;
- ii. $\{2\} \in A$

3. Describe each of the following logic gates:

- i. NAND (4 Marks)
- ii. NOR (4 Marks)
- iii. EXOR (4 Marks)

4. Given the following sets of matrix;

$$A = \{1, 2, 3, 4, 5\}, B = \{1, 2, 4, 8\}, C = \{1, 2, 3, 5, 7\}, D = \{2, 4, 6, 8\}$$

Determine;

- i. $(A \cap B) \cap C$ (4 Marks)
- ii. $(A \cup B) - (C \cap D)$ (4 Marks)

5. Given two sets $P = \{19, 38, 57, 76, 95\}$ $Q = \{7, 19, 57, 75, 94\}$

Find

- i. $P - Q$ (4 Marks)
- ii. $Q - P$ (4 Marks)

SECTION B [60 MARKS]
Answer any three questions on this section

6. Given two matrices: $X = \begin{bmatrix} 3 & 2 \\ 2 & 5 \end{bmatrix}$ and $Y = \begin{bmatrix} 3 & 2 \\ 4 & -1 \end{bmatrix}$
- a) Show that $(X \times Y) \times (X \times Y)^{-1} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (8 Marks)
- b) Use matrix method to solve the following system of simultaneous equations: (6 Marks)
- $$4x - 3y = 18$$
- $$2y - x = 1$$
- c) Using factorization method, $9x^2 + 6x + 1 = 0$ (6 Marks)
7. In a group of 40 students 22 are taking Algebra, 18 are taking Biology, 14 are taking Chemistry, 7 both Algebra and Chemistry, 9 both Algebra and Biology, 5 Biology and Chemistry, 2 all the three courses.
- a) Draw a venn diagram to represent the above information (10 marks)
- b) Find the total number of students taking the three Courses? (6 marks)
- c) How many students are not taking any of these courses? (4 marks)
8. Given sets $U = \{11, 12, 13, 14, 15, 16, 17, 18\}$, $B = \{11, 12, 13, 14, 15\}$ and $A = \{11, 12, 13\}$;
- a) Outline three characteristics of a set (4 marks)
- b) Determine each of the following operations
- i. $A \cap B$; (4 Marks)
- ii. $A^c \cap B$; (4 Marks)
- c) Solve $5x - 6 = 3x - 8$. (4 marks)
- d) Use the following data to calculate their mean (4 marks)
- 9.
- a. There are two basic laws of probability, that is Addition Rule and Multiplication Rule, use these rules to perform the following calculations;
- i. The probability of throwing a 3 or a 6 with a single throw of a dice (4 marks)
- ii. The probability of throwing a 3 and a 6 with two throws of a dice. (4 marks)
- b. There are 7 black, 5 red and 4 green balls in a bag. Four balls are drawn without replacement. Find the probability that;
- i. There will be three red balls balls selected (4 marks)
- ii. Two black balls and a red ball is selected (4 marks)
- iii. Two green balls selected (4 marks)

