



PAC INSTITUTE OF TECHNOLOGY AND SOCIAL STUDIES

JANUARY – APRIL 2025 ASSESSMENT

FORMATIVE ASSESSMENT

Qualification / Course : COMPUTER SCIENCE LEVEL 6

Unit of Competency : MATHEMATICS FOR COMPUTER SCIENCE

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO THE CANDIDATE:

- 1. Read all the instructions carefully before attempting the questions.*
- 2. This paper consists of two sections, A & 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 on this question paper.*

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

1. Given two matrices A and B such that:

$$A = \begin{bmatrix} 5 & 7 \\ 4 & 6 \end{bmatrix}, \quad B = \begin{bmatrix} 6 & 4 \\ 5 & 3 \end{bmatrix}$$

Show that;

- i. $AB \neq BA$ (4 Marks)
 - ii. $\det(A) \times \det(B) = \det(AB)$ (4 Marks)
 - iii. $A^{-1}B^{-1} \neq (AB)^{-1}$ (4 Marks)
2. Given that set $A = \{1, 2, \{2\}\}$, state whether the following statements are true or false. (4 Marks)

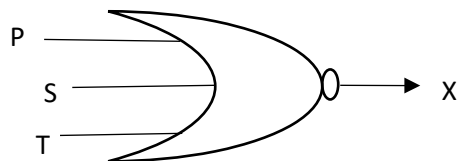
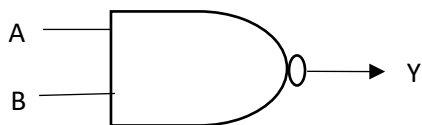
- i. $\{1\} \in A$;
 - ii. $\{2\} \in A$
3. Describe each of the following logic gates:
- i. NAND (4 Marks)
 - ii. NOR (4 Marks)
 - iii. EXOR (4 Marks)

4. Given the following sets of matrix;

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

Determine;

- i. $(A \cap B) \cap C$ (4 Marks)
- ii. $(A \cup B) - (C \cap D)$ (4 Marks)
- iii. Given the following logic gates;



5. Write the corresponding Boolean expression for each figure. (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. Given two matrices $A = \begin{bmatrix} 8 & 4 & 6 \\ 5 & 7 & 2 \\ 3 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 1 & 4 \\ 5 & 2 \end{bmatrix}$

a) Determine the following:

i. The matrix $A \times B$ (4 Marks)

ii. The inverse of A using co-factor method (10 Marks)

b) Using the completing square method, solve the quadratic equation $2x^2 + 9x - 5 = 0$ (6 Marks)

8. Given that matrix $Q = \begin{bmatrix} 2 & 8 & 2 \\ 1 & 2 & -2 \\ 3 & 4 & -6 \end{bmatrix}$, determine each of the following.

i. $3Q$; (4 Marks)

ii. $3Q^{-1}$ using the **co – factor** method (10 Marks)

iii. Using completing square method, solve the following quadratic equation. (6 Marks)
 $x^2 + 10x = 2$

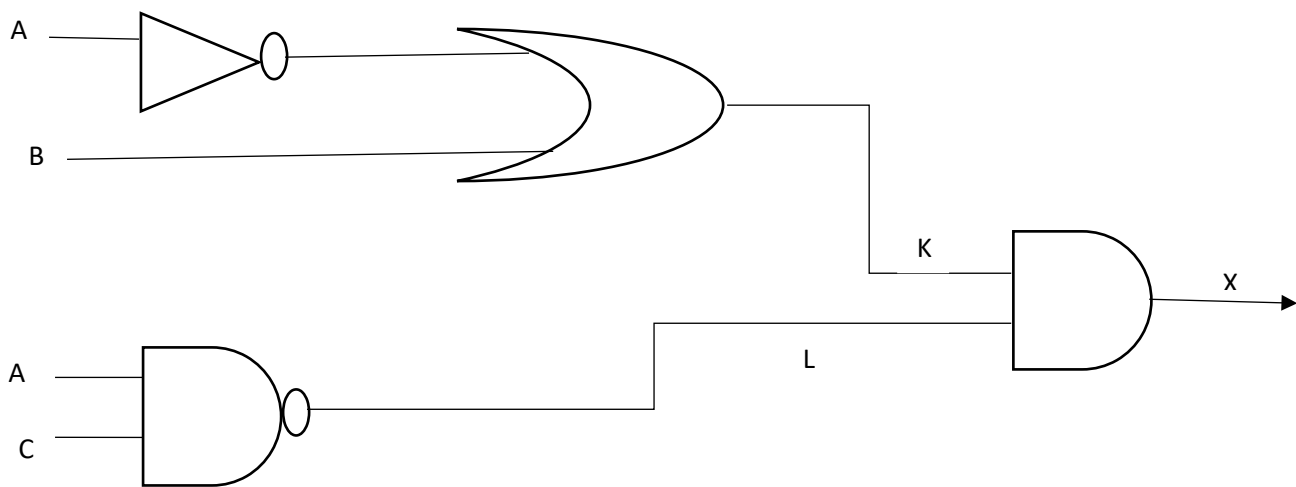
9. Given two matrices $A = \begin{bmatrix} 8 & 4 & 6 \\ 5 & 7 & 2 \\ 3 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 1 & 4 \\ 5 & 2 \end{bmatrix}$

a) Determine the following:

i. The matrix $A \times B$ (2 Marks)

ii. The inverse of A using co-factor method (7 Marks)

b) Figure below shows a circuit diagram; use it to answer the questions that follow.



i. Write a Boolean expression that represents the circuit above. (6 Marks)

ii. Given $A=1$, $B=0$, $C=1$, find the output X (5 Marks)

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