Q1:

Part (A)

F- is a Boolean Function shown in Fig(1)

(1) If $A=1, B=0$ What is the value of F1,F2,F3?

(2) Write down:
   (a) the Boolean expression of F1,F2,F3?
   (b) F1,F2,F3 - truth table.

Part (B)

Define and Explain the difference between each of the following pairs?

1- Multiplexer and De Multiplexer.
2- Encoder and Decoder .
3- Logic Circuit and Electronics Circuit .
4- Half Subtractor and Full Subtractor .
5- Bit and Byte.
6- 1’st Complement and 2’nd Complement
Q2:
Part (A)
Draw the Combinational CKT for the functions:

1- \( F_1 = \overline{AB} + \overline{A}B + AB \)
2- \( F_2 = \overline{AC} + B \overline{D} \)

Part (B)

in the Circuit below if logic 1 is (+5 volt) and Logic 0 is (0 volt):

(i) What is the basic gate performing this circuit
(ii) Write down the Truth table of this Ckt

Q3:
Part (A)
Perform the following operations:

1- \((C_3)_{16} + (F_5)_{16}\)
2- \((BCD)_{16} - (173)_{16}\)
3- \((-5)_{10} + (-9)_{10}\) (perform it in binary system)
4- \(11100111 - 00010011\)
5- \((100)_{2} * (110)_{2}\)
6- \((10100)_{2} / (100)_{2}\)

Part (B)

Draw the gate symbol, write the truth table and the boolean expression for the given gates:

1- OR 2- AND 3- NOT 4- BUFFER
5- XNOR 6- XOR 7- NOR 8- NAND

Q4:
Part (A)
1-find out the expression for the each K-map
2-by using truth table prove

\[(A+B) = (\overline{A}\overline{B})\]

**Part (B)**

1- Use only NAND gates to design a logic CKT of:

(i) \( F = A \cdot (B+C) \)

(ii) \( F = A \cdot B + C \cdot D + E \cdot F \)

2- Describe the implementation of \( F = A \cdot B \) using **only NOR gates**.

3 - Reconstruct the following Circuit by using only NAND gate

Good luck 🌷