



COMSATS University Islamabad

Terminal Examination

BCS-2B (Sp-2023)

Digital logic Design –EEE 241

FA22-BCS-076

20th June 2023

Marks: 75

Instructions:

- Attempt all first 5 questions!
- Attempt any one out of the last two questions: Q6 or Q7

Q1. (CLO1-C2-PLO1)

The state of a 12-bit register is 0101_0110_0100_0100.

[10]

Make a conversion table for decimal to BCD and show the corresponding decimal number?

Q2. (CLO3-C4-PLO2))

[10]

Using continuous assignments, write a Verilog description of the circuit specified by the following Boolean functions:

$$\text{Out 1} = (C+B)(A'+D)B$$

$$\text{Out 2} = (CB' + ABC + C'B)(A+D')$$

Q3. (CLO3-C4-PLO2)

[10]

Simplify the following Boolean function F , together with the don't-care conditions " d ", and then express the simplified function in sum-of-min terms form:

$$F(A, B, C, D) = \sum (0, 3, 5, 7, 11, 12)$$

$$d(A, B, C, D) = \sum (1, 2, 4, 6, 12)$$

Q4. (CLO4- C5-PLO3)

[10]

Make a Binary multiplier circuit for the following values:

($K = 0101$, $J = 101$) Show the corresponding diagram and perform all the calculations

Q5. (CLO4- C5-PLO3)

[10]

Draw a 4-bit Adder-Subtractor diagram with overflow detection and explain it briefly.

int x = 5

int y = 2

cout < x = 0101 5

OA = 156

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int x = 5

int *y = 8x

cout < y = (address)

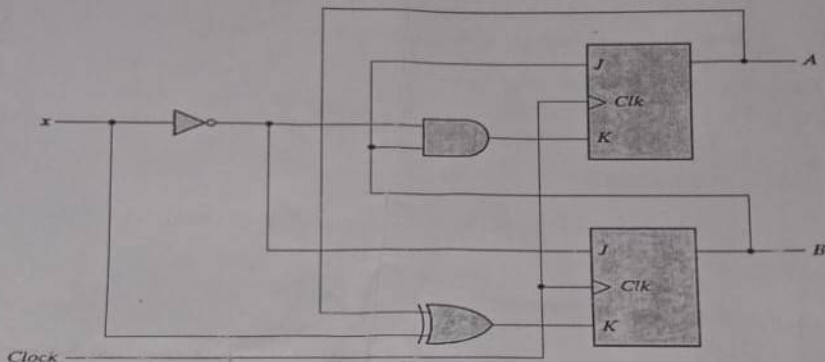
int *y = 6

cout < x = (6)

Q6. (CLO4-C5-PLO3)

Analyze the JK Flip Flop using first (substitution method) or the second (Flip Flop input method) for the following sequential circuit:

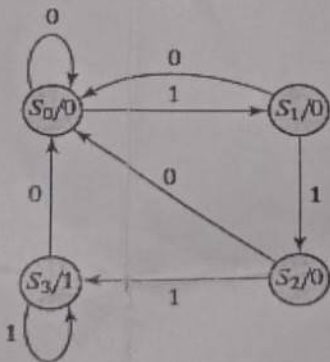
- The Solution should include: what type of state machine it is? input equations, State equations, JK general characteristic equation and table for the reference, State table for first type (using substitution) or second type (Flip Flop inputs), State diagram, Function of the machine.



Q7. (CLO4-C5-PLO3)

[25]

Design a sequence detector using D-Flip Flop that detects three or more consecutive 1's in a string of bits coming through an input line (serial-bit-stream), the corresponding State-diagram is as under:



int $x = 5$
int $y = x$
cout << y
5