

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Logic Circuits

Semester: Spring

Year : 2021
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) "Logical computation is either based on digital system or analog system", today which one is better and why. 5
b) Perform the conversion as indicated (any two). 5
 - i. $(73)_8 = ()_{\text{Excess-3}}$
 - ii. $(196)_{10} = ()_{2421}$
 - iii. $(CAB)_{16} = ()_2$
- c) Use 2's complement to subtract the following: 5
 - i. $(10101)_2 - (10111)_2$
 - ii. $(457)_{10} - (876)_{10}$
 - iii. $(378)_{\text{BCD}} - (256)_{\text{BCD}}$
2. a) Simplify the following Boolean functions to a minimum number of literals. 8
 - a. $(x' + y)(x + y')$
 - b. $x'y'z + x'y + xyz'$
 - c. $(x + y)'(x' + y')'$
 - d. $x(wz' + wz) + xy$
- b) A Boolean function is given by $F(A,B,C,D) = \sum(1,2,7,9,10,13,14)$ and don't care condition $d(A,B,C,D) = \sum(0,3,6,11)$. Implement it using NAND gate only. 7
3. a) Design a combinational circuit that converts a decimal digit from BCD to Excess 3 code. 8
b) Derive a PLA program table and circuit to implement the functions 7
 $F1(A,B,C) = \sum(1,3,5,7)$

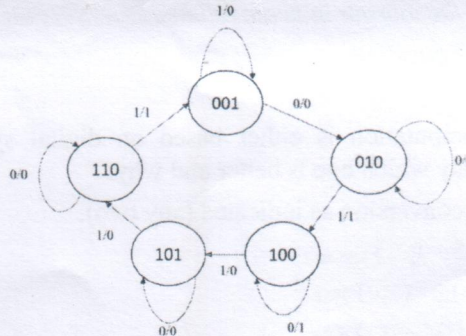
$$F_2(A,B,C) = \sum(0,2,4,6)$$

4. a) Implement the Boolean function $F(A,B,C, D) = \sum(0,1,3,4,7,11, 15)$ using: (i) 8x1 MUX, (ii) 16x1 MUX 8
- b) Implement the full adder circuit using 3x8 decoder. 7

OR

What is register? Explain the different type of shift register in brief.

5. a) Design a sequential circuit corresponding to the given state diagram. 8



- b) Explain operation of RS Flip-flop with its logic diagram, truth table, excitation table. 7

OR

Design a MOD-8 asynchronous up counter by using J-K Flip Flop.

6. a) Differentiate between synchronous and Ripple Counter. Design a 2-bit synchronous UP counter by using J.K flip-flop. 7
- b) Design an binary adder/subtractor circuit with one selection variable S and two inputs A and B. For $S = 0$, the circuit need to perform addition i.e. $(A+B)$ and for $S = 1$, the circuit must perform subtraction i.e. $(A - B)$ by taking 2's complement of B. 8

7. Write short notes on: (Any two) 2x5

- Read only memory (ROM)
- Output hazard races
- Ring counter