POKHARA UNIVERSITY

Level: Bachelor   Semester:Fall   Year   : 2020
Programme:BE   Full Marks: 100
Course: Logic Circuits   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) Define digital system. Why do you prefer Digital systems against its analog counterpart? Explain.   5

   b) Perform the following subtraction using (r-1)'s complement: 5
      i. $(111001)_2 - (11011)_2$
      ii. $(2321)_{10} - (8301)_{10}$

   c) What is weighted and non-weighted code? Why Gray code is called reflected code?   5

2. a) Discuss the significance of NAND& NOR gate in Logic circuit. Prove that NAND and NOR gates are the Universal gate.   7

   b) For the given logic expression: 8
   F(A,B,C,D)=A'B+BD+A'D'+B'D'
      i) Make a truthtable
      ii) Simplify it using K map
      iii) Realize the simplified expression using NOR gate (2 inputs) only.

3. a) Use K-map scheme to obtain the minimized SOP expression for the given function $f(A, B, C, D) = \sum m(1, 5, 8, 12) + d(3, 7, 10, 11, 14, 15)$ and implement the result using NOR gates only.   8

   b) What are parity bits? Design 3-bit parity generator and 4-bit parity checker circuit for even parity.   7

4. a) Design a combinational circuit using PLD device as ROM which is used to find square of 3 bit numbers.   8

   b) Design and implement full adder circuit using decoder.   7

5. a) What are the significance of a flip-flop? Explain J-K flip-flop along with its logic diagram, truth table and excitation table.   7

b) Design synchronous sequential circuit for the given state diagram using T flip-flop.   8
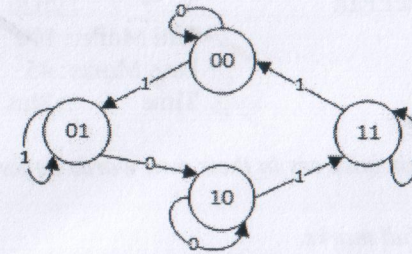
6. a) Design and implement Mod-5 counter using JK flip flop.   8

   b) Design an arithmetic circuit implementing given functions. Where A and B are 4-bit binary input lines.   7

S_1	S_0	C_{in}	Output (F)
0	0	0	A
0	0	1	A+1
0	1	0	A+B
0	1	1	A+B+1
1	0	0	$A+\bar{B}$
1	0	1	A-B
1	1	0	A-1
1	1	1	$\bar{A}$

7. Write short notes on: (**Any two**)   2×5
   a) Jhonson Counter
   b) Tristate Logic
   c) 4-Bit Nibble Adder