

Tribhuvan University  
Institute of Science and Technology  
2081

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Bachelor Level / First Year/ First Semester/ Science  
Computer Science and Information Technology (CSC 116)  
(Digital Logic)  
**(NEW COURSE)**

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

*Candidates are required to give their answers in their own words as far as practicable.*  
The figures in the margin indicate full marks.

**Section A**

Attempt any TWO questions.

(2×10=20)

1. Differentiate between synchronous and asynchronous counter. Design a 3-bit synchronous binary counter using T Flip Flop. Draw its timing diagram. (2+8)
2. Explain De-Morgan's Law. Simplify the Boolean function  $F(P,Q,R,S)=\Pi(0,1,4,5,11,14,15)$  and  $d(P,Q,R,S)=\Sigma(2,3,7,8,9,13)$  using K- Map in both SOP and POS form. (2+8)
3. Explain design procedure of combinational circuits. Design a combinational circuit with three inputs x, y, and z, and three outputs, A, B, and C. When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is one less than the input. (10)

**Section B**

Attempt any EIGHT questions.

(8×5=40)

4. Given  $A=46$  and  $B=35$  represent them in binary and perform  $A-B$  using 1's complement method. (5)
5. What is Multiplexer. Design 8 to 1 Multiplexer with low level Multiplexers. (1+4)
6. Write about D flip flop with necessary circuit, block diagram, characteristic table and equation. (5)
7. Simplify  $F(A, B, C, D) = \Pi(1,3,4,6,9,11,12,14)$  and realize the equation using NOR gates only. (5)
8. Mention different types of shift registers. Explain SIPO with timing diagram. (1+4)
9. What is decoder? Describe the 3 to 8 line decoder circuit. (1+4)
10. Explain state diagram, state table, state reduction and state assignment with suitable example. (5)
11. Design a 2 bit asynchronous binary counter using T Flip Flop. Draw its timing diagram (5)
12. Write short notes on: (2×2.5=5)
  - a) Encoder
  - b) Error detection codes