Tribhuvan University
Institute of Science and Technology
2074
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Bachelor Level / First Year/ First Semester/ Science
**Computer Science and Information Technology (CSc. 111)**
(Digital Logic)

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

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

Attempt any two questions: (2×10=20)

1. Implement the following function $F = \sum (0, 3, 5, 6, 7)$ using
   (a) Decoder
   (b) Multiplexer
   (c) PLA

2. Differentiate between PAL and PLA. Design a counter as shown in the state diagram below
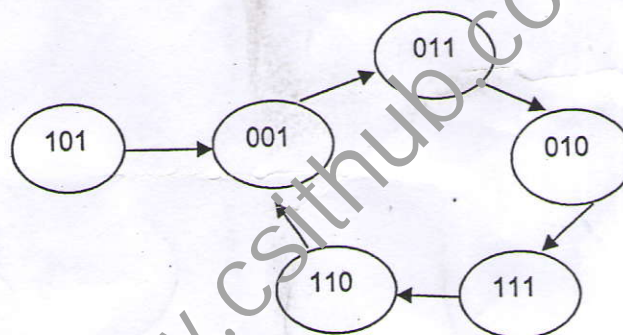
3. Draw a block diagram, truth table and logic circuit of 1*16 Demultiplexer and explain its working principle.

Attempt any eight questions: (8×5=40)

4. Perform the arithmetic operation (+42)+(-13) and (-42)-(-13) in binary using the signed -2's-complement representation for negative numbers.

5. Express the complement of the following function in sum of minterms.
   $F(A, B, C, D) = \sum(0, 2, 6, 11, 13, 14)$

6. Reduce the following function using k-map
   $F = wxy + yz + xy'z + x'y$

7. Design a combinational circuit with three inputs and six outputs. The output binary number should be the square of the input binary number.

8. Design a 5×32 decoder with four 3×8 decoder with enable and one 2×4 decoder. Use block diagrams only.

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9. Design and explain the Decimal adder with truth table and suitable diagram.

10. Explain shift register with parallel load. Highlight on its practical implications.

11. Explain master slave J-K flipflop.

12. Write short notes on (**any two**):
    (a) State diagram
    (b) De-Morgan's theorem
    (c) TTL

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