TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Chaitra

Exam.	Regular/Back		
Level	BE	Full Marks	80
Programme	BEI	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

Subject: - Digital Logic *(EX 401)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. Write down the advantages and disadvantages of digital signals over analog signals. [4
2. Convert the following: [1.5×4
   a) $(53.125)_{10} = (?)_2$
   b) $(615)_8 = (?)_{BCD}$
   c) $(10011)_{Gray} = (?)_8$
   d) $(11001001)_{excess-3} = (?)_8$
3. State and prove De Morgan's theorem. Design X-NOR gate using anyone of universal gate. [4+2]
4. Simplify the following expressions using K-map and also draw the logical circuit.
   $Y(A, B, C, D) = \Sigma (0, 2, 3, 4, 7, 8, 10, 13)$ and
   $d = \Sigma (5, 6, 12)$ [4+2]
5. Construct the 3-bit magnitude comparator circuit. [5]
6. Implement the following function using 8×1 MUX.
   $F (A, B, C, D) = \Sigma (0, 2, 3, 6, 7, 8, 12, 13, 15)$ [5]
7. Construct Full Adder using half Adder. [4]
8. Explain operation of S-R flip-flop with its logical diagram characteristics table, characteristics equation excitation table and timing diagram. [8]
9. Convert J-K flip flop to S-R flip flop. [6]
10. Explain the working principle of 4-bit parallel in serial out shift register with its timing diagram. [6]
11. Construct an Asynchronous Decade counter. [5]
12. Design a sequential machine that detects 101 from input stream X by making Y is 1. Using J-K flip-flop. [10]
13. What is ROM? Implement given functions $F_1 (A,B, C) = \Sigma (2, 3, 5, 6)$ and $F_2 (A, B, C) = \Sigma (0, 1, 5)$ using ROM. [1+4]
14. Draw the circuit diagram of frequency counter. [4]

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