TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
**Examination Control Division**
**2076 Chaitra**

| Exam. | Regular | | |
|---|---|---|---|
| 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 **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Write the basic difference between analysis and digital signals with examples. [3]
2. Perform the following code conversions. [1.5×4]

   (i) $(430.25)_8=(?)_{16}$
   (ii) $(39.75)_{10}=(?)_8$
   (iii) $(17)_{10}=(?)_{gray}$
   (iv) $(17)_{excess\text{-}3}=(?)_{BCD}$



3. a) State and prove De-Morgan's laws. [2]
   b) Realize 3 inputs XOR gates using NAND gates only. [3]
4. Define minterms and maxterms. Simplify the following using k-map and implement the result using NOR gates only. [2+4+2]

   $F(A,B,C,D) = \Sigma m\,(0,1,2,5,8,14) + d(4,10,13)$
5. Implement 1:16 demultiplexer using 1:2 demultiplexer. [4]
6. What is hazard? Explain types of hazards with hazard cover techniques used in K-map simplification. [1+4]
7. Define excess-3 code with examp. Design a binary to excess-3 code converter circuit using basic gates. [2+5]
8. Differentiate between combinational and sequential circuit. Explain working principle of master slave JK flip-flop. [2+4]
9. Define shift registers with its application. Explain the working principle of 4 bit Ring counter with its timing diagram. [2+5]
10. Design a 3 bit synchronous up counter where the bit combination of each states are in gray system. (Use T-flip-flop in your design.) [8]
11. Using melay circuit with J-K flip-flops design a synchronous sequence detector that produces output Z=1 when it detects the serial input X=010. [10]
12. Differentiate between RAM and ROM. Implement $F1=\Sigma(1,2,4,6)$ and $F2=\Sigma m(0,2,3)$ using PROM. [2+4]
13. What are the applications of digital devices? Explain frequency counter. [1+4]

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