PG/IIS/ELC/203/25

M.Sc. 2nd Semester Examination, 2025

ELECTRONICS

(*Digital System Design*)

PAPER — ELC-203

Full Marks : 50

Time : 2 hours

Answer any **four** questions each from Group-A and Group-B and **two** questions from Group-C

The figures in the right hand margin indicate marks

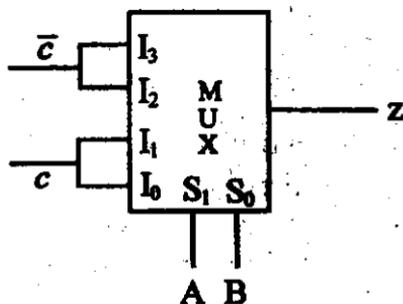*Candidates are required to give their answers in their own words as far as practicable*

GROUP — A

Answer any **four** questions : 2×4

1. Implement NAND gate using diode and transistor only. Write its truth table. $1 + 1$

2. Implement XOR gate using NOR gates only.

3. Write advantages of ECL logic families.

4. The MUX shown below is a 4×1 MUX, what is the output of the MUX ?

5. Implement $y = \overline{A(B+C)}$ using CMOS logic.

6. Write two differences between combinational circuit and sequential circuit.   1 + 1

GROUP – B

Answer any **four** questions :   4 × 4

7. Convert JK flip flop to T flip flop.

8. Simplify the following Boolean expression using k map.

$$f = \sum m(0,1,2,3,5,7,8,9,10,12,13)$$

9. Write different types of shift registers with suitable diagram. $1 + 1 + 1 + 1$

10. Design 2-bit magnitude comparator circuit. Explain its operation with truth table.
                                      $1 + (2 + 1)$

11. Implement $f = \sum m(0,3,5,8,9,10)$ using 4:1 MUX.

12. Design 4-bit binary to Gray code converter circuit.

GROUP – C

Answer any two questions : 8×2

13. Differentiate between asynchronous and synchronous counter. Design MOD 6 synchronous counter. Write two applications of a counter. $2 + 4 + 2$

14. What is race around condition ? How it can be avoided ? Write different states of a ring counter using suitable circuit diagram. $2 + 3 + 2 + 1$

15. (*i*) An 8-bit D/A converter has output voltage range of 0V to 255V. Find the resolution of the system.

(*ii*) Differentiate between weighted resister D/A converter and R-2R ladder type D/A converter.

(*iii*) Write the operation of successive approximation type A/D converter using suitable block diagram. $2 + 2 + 4$

(*Continued*)

16. Explain Mealy and Moore machines with
suitable examples.   4 + 4

[Internal Assessment — 10 Marks]

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