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**3E1203****3E1203****B.Tech. III-Sem. (Main/Back) Examination, January/February - 2024****Artificial Intelligence and Data Science****3AID3-04 Digital Electronics****AID, CAI, CS,IT,CCS, CDS,CIT,CSD,CSR****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates:**

*Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No.205)*

**PART - A****(Answer should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. List the different types of flip flops. (2)
2. Define reflective codes. (2)
3. State De Morgan's theorem. (2)
4. Convert  $(10101101)_B \rightarrow ( )_G$  (2)
5. Explain race around condition in JK flip flop. (2)
6. Illustrate Excitation table of SR flip flop. (2)
7. Explain don't care condition. (2)
8. Show the classification of digital logic families. (2)
9. Solve  $(0100\ 1000.01111001)_{10} \times S-3 = ( )_{10}$  (2)
10. Calculate the value of x.  $(23)_x + (12)_x = (101)_x$ . (2)

## PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.

(5×4=20)

1. What is multiplexer? Design 4:1 MUX using 2:1 MUX. (4)
2. Interpret the function  $f = A+BC$  in canonical POS form (Product of Sum form). (4)
3. Design full adder circuit using half adders. (4)
4. Construct CMOS NAND and CMOS NOR gate for two inputs. (4)
5. Show that
  - i)  $AB + A'C + BC = AB + A'C$  (2)
  - ii)  $AB+A'C = (A+C) (A'+B)$  (2)
6. Consider two binary numbers  $X = 1010100$  and  $Y = 1000011$ , perform the subtraction using 2's complement.
  - i)  $X-Y$  (2)
  - ii)  $Y-X$  (2)
7. What are decoders? Implement the following boolean function using 3 to 8 decoder  
 $f(A,B,C) = \sum_m (2,4,5,7)$  <https://www.rtuonline.com> (4)

## PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions.

(3×10=30)

1. Simplify the following boolean function using quine McCluskey method and verify the result using k-map also.  $F(A,B,C,D) = \sum_m (1,2,3,7,8,9,10,11,14,15)$  (10)
2. Design a 3-bit synchronous counter using JK flip flops. (10)

3. Explain the following terms:

- i) Noise Margin (2)
- ii) Propagation Delay (2)
- iii) Fan - In (2)
- iv) Fan-out (2)
- v) Power Dissipation (2)

4. Design a 4-bit binary to gray code converter and realize it using logic gates. (10)

5. Explain the working of 4-bit serial in parallel -out shift register along with the waveform. (10)

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