3RD SEM./ AE & I E/ AI & ML./ CS&E/ EE(I & C) / ETC & COMM./ E&TC / IT/ MECHATRONICS. /2023(W) NEW

Th-3 Digital Electronics

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

   a. Convert the decimal number $(78.4)_{10}$ to binary and octal number system.

   b. Find the 1's and 2's complement of $(10010011.0101)_2$.

   c. State Demorgan's Theorem.

   d. Draw the logic circuit of Half Subtractor and write its truth table.

   e. If F (A, B, C) = Σm (1,5,6) then write its SOP.

   f. Write the excitation table of JK -flop flop.

   g. List different types of shift registers.

   h. A clock pulse of 10KHz is applied to a decade counter. Find the frequency of output wave form (assuming output is taken at the MSB).

   i. Define resolution of a DAC.

   j. Define Propagation Delay with reference to logic families.

2. Answer **Any Six** Questions 6 x 5

   a. Design a 4-bit binary to gray convertor.

   b. Implement all the logic gates (NOT,OR,AND,NOR,XOR,XNOR) using NAND gate.

   c. With neat logic diagram explain the function of 4: 1 Multiplexer.

   d. With neat logic diagram and truth table explain the working of full adder.

   e. Differentiate between combinational and sequential logic circuits.(any 5)

   f. Describe the working of a 5-bit Ring Counter.

   g Draw CMOS logic circuit of two input (a) NAND gate 2.5
   (b) NOR gate 2.5

3 a) Minimize the following Boolean function using K-map 7
   $F(A,B,C,D)=\sum m(0,1,2,4,5,6,8,11,12)+d(9,13)$
   b) Implement the minimized expression obtained above with NAND gates only. 3

4 Design a 3-bit magnitude comparator circuit whose outputs are A>B, A=B, A<B, where A and B are two 3-bit numbers. 10

5 Convert a T flip flop to (a) D flip flop 5
   (b) JK flip flop 5

6 a) Design 4-bit asynchronous up counter and explain its working. 6
   b) Draw the output wave forms of each flip-flop 4

7 Explain the working of a counter type analog to digital convertor (ADC). 10