

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 $F(A, B, C) = \sum m(1,5,6)$ 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