

Prelim Paper

Time: 3 Hrs.]

Digital Circuit Design

[Marks : 80

- N.B.:**
- (1) Question number 1 is compulsory.
 - (2) Attempt any three questions out of remaining five.
 - (3) Each question carries 20 marks and sub-question carry equal marks.
 - (4) Assume suitable data if required.

1. Solve following : [20]
 - (a) Explain characteristics of logic families.
 - (b) State and Prove Demorgan Theorem.
 - (c) Convert JK flip flop to T flip flop.
 - (d) Convert the following numbers as mentioned against them:
 - (I) $(101011)_2$ convert to decimal number.
 - (II) Convert $(129.625)_{10}$ Hexadecimal form.
 - (III) Write $(-20)_{10}$ in Two's complement form.
2. (a) Minimize the following expression using Quine McCluskey technique : [10]
 $F(A,B,C,D) = \sum(0,1,2,3,5,7,9,11)$
(b) Draw four bit Ring counter and explain its operation. [10]
3. (a) Explain the Johnson's Counter. Design for initial state 0110. From initial state explain and draw all possible states. [10]
(b) Implement the following function using only one 4:1 multiplexer and gates : [10]
 $Y = F(A,B,C,D) = \sum m(2, 3, 5, 7, 10, 11, 12, 13)$
4. (a) Design a 2 bit comparator and implement using logic gates. [10]
(b) Draw circuit diagram of 2 input TTL NAND gate and explain its operation. [10]
5. (a) Design BCD Adder using the integrated circuit 4 bit binary adders. [10]
(b) Design lockout free mod 10 up synchronous counter using JKMS flip flops. [10]
6. Write short notes on following : [20]
 - (a) Hazards
 - (b) Hamming Code
 - (c) Encoder and Decoder
 - (d) Compare TTL and CMOS logic families

