Time: 3 Hours **Marks: 80**

N.B. (1) Question No. 1 is compulsory
(2)Assume suitable data if necessary
(3)Attempt any three questions from remaining questions

1

(a) Convert $(47.3)_7$ to BCD, Excess-3 and gray code. (3)
(b) Perform $(2F9)_H - (1AD)_H$ without converting to any other base. (3)
(c) Subtract $(64)_{10} - (31)_{10}$ using 2's complement. (4)
(d) Explain race around condition. (4)
(e) Prove OR-AND configuration is equivalent to NOR-NOR configuration. (4)
(f) Obtain hamming code for data 1101. (2)

2 (a) Simplify following function using Quine McCluskey method and realize circuit using basic gates. (10)
$F(A,B,C,D) = \sum m(0,1,3,5,7,9,11,15) + d(2,14)$
(b) Design 1-bit magnitude comparator. (10)

3 (a) Compare different logic families with respect to fan in, fan out, speed, propogation delay and power dissipation. (5)
(b) Simplify $Y = \overline{A}\,\overline{B}\,\overline{C} + A\,\overline{B}\,\overline{C} + A\,\overline{B}\,C$ (5)
(c) Implement the following using only one 8:1 Mux and few gates. (10)
$F(A,B,C,D) = \sum m(0, 1, 5, 7, 9, 10, 15)$

4 (a) Convert D flip-flop to JK flip-flop and JK flip-flop to D flip-flop. (10)
(b) Design a full adder using only NAND gates. (10)

5 (a) Design mod -6 asynchronous UP counter. (10)
(b) Write short note on VHDL . (10)

6 (a) Explain Astable and Bistable multivibrators. (10)
(b) Explain 4-bit bidirectional shift register. (10)