

Time: 3 Hours

Max. Marks: 80

- N.B.: (1) Question No. 1 is compulsory.
 (2) Solve any **three questions** from the **remaining five**
 (3) Figures to the right indicate full marks
 (4) Assume suitable data if necessary and mention the same in answer sheet.

Q. 1. Solve any four Questions out of five

- A** a) Perform the following operation using 2's complement [5]
 i) $(35)_{10} - (45)_{10}$
 ii) $(45)_{10} - (35)_{10}$
 Comment on results of (i) and (ii)
B If $F(A,B,C) = \sum m(1,3,4,5,6) + d(0,2)$ with its truth table and express F in [5]
 SOP and POS form
C Convert D flip flop to T flip flop. [5]
D Explain Static RAM [5]
E Design Full Adder using VHDL [5]

Q. 2. Solve the following

- A** Prove that NAND and NOR gates are Universal gates [10]
B Convert the following into BCD and OCTAL code [10]
 i) $(7AB)_{16}$ ii) $(125)_{10}$

Q.3. Solve any Two Questions out of Three

- A** Draw and explain a neat circuit diagram of BCD adder [10]
B Design a 3 – bit synchronous counter using J-K FLIP-FLOPs [10]
C Realize the following functions of four variables using 8:1 multiplexer [10]
 $F = \sum m(0, 1, 2, 3, 7, 9, 10, 11, 13, 14, 15)$

Q. 4. Solve the following

- A** What are shift registers? How are they classified? Explain working of SISO [10]
 type of shift register.
B Explain Full Adder circuit using PLA having three inputs, 8 product terms [10]
 and two outputs.

Q. 5. Solve the following

- A** Draw and explain 4- bit Johnson counter [10]
B Draw and explain 3 bit asynchronous binary counter using positive edge [10]
 triggered JK flip flop.

Q. 6. Solve the following

- A** Compare TTL and CMOS logic families [05]
B Convert the following equation in its Canonical form [05]
 $Y = AB(C + \bar{C}) + A\bar{C}(B + \bar{B}) + BC(A + \bar{A})$
C Simplify the following expression using Boolean algebra [05]
 $Y(A, B, C) = \sum m(0, 1, 2, 3, 4, 5, 6, 7)$
D Compare Moore and Mealy Machine with neat Diagram [05]
