

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 compliment [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 type of shift register. [10]  
**B** Explain Full Adder circuit using PLA having three inputs, 8 product terms and two outputs. [10]

**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 triggered JK flip flop. [10]

**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]

\*\*\*\*\*