

(3 Hours)

80 Marks

- 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 a) Perform the following operation using 2's compliment [20]
 i) $(14)_{10} - (24)_{10}$
 ii) $(24)_{10} - (14)_{10}$
 Comment on results of (i) and (ii)
 b) If $F(A, B, C) = \sum m(0,3,5,7)$ with its truth table and express F in SOP and POS form
 c) Compare FPGA and CPLD.
 d) Explain Static RAM
- Q.2 a) Write VHDL code for 3 bit up counter. [10]
 b) Minimize the following expression using Quine McClusky Technique [10]
 $F(A, B, C, D) = \sum m(1,3,7,9,10,11,13,15)$
- Q.3 a) Design 3 bit Binary to Gray code Converter [10]
 b) Draw and explain a neat circuit diagram of BCD adder [10]
- Q.4 a) Draw and explain two input TTL NAND gate. [5]
 b) Compare combinational circuits and sequential circuits [5]
 c) Explain Full Adder circuit using PLA having three inputs, 8 product terms and two outputs. [10]
- Q.5 a) What is excitation table? Explain the excitation table of SR flip flop. [5]
 b). Convert D flip flop to T flip flop. [5]
 c) Draw and explain 3 bit asynchronous binary counter using positive edge triggered JK flip flop. Draw the waveforms. [10]
- Q.6 a) Implement following Boolean function using 8:1 multiplexer [6]
 $F(A, B, C, D) = \overline{A}B\overline{D} + A\overline{C}D + \overline{B}CD + \overline{A}\overline{C}D$
 b) State and prove Demorgan's theorem [4]
 c) What are shift registers? How are they classified? Explain working of any one type of shift register. [10]
