

## (REVISED COURSE)

(3 Hours)

[ Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.  
 (2) Attempt any **four** questions out of remaining **six** questions.  
 (3) Assume **suitable** additional data if **required**.

1. (a) Prove with an example AND-OR configuration is equivalent to a NAND-NAND configuration. 5
- (b) Give the Truth-Table and waveforms for positive edge triggered S-R flip-flop. Consider your own i/p data. 5
- (c) Perform the following operations without converting to any other base— 5
  - (i)  $(58)_{16} + (22)_{16}$
  - (ii)  $(84)_{16} - (2A)_{16}$
- (d) Give the PLA program table for the following— 5
 
$$F_1 = AB' + AC$$

$$F_2 = AC + BC$$
2. (a) Minimize the following **four** variable logic function using K-map— 10
  - (i)  $f(A, B, C, D) = \Sigma m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$
  - (ii)  $f(A, B, C, D) = \Pi M(4, 6, 10, 12, 13, 15)$
- (b) A combinational circuit has four inputs and one output. The output is equal to 1 when (1) all the inputs are equal to 1 or (2) none of the inputs are equal to 1 or (3) an odd number of inputs are equal to 1 : 10
  - (i) Obtain the truth table
  - (ii) Find the simplified output function in SOP form
  - (iii) Find the simplified output function in POS form
  - (iv) Draw the two logic diagrams using universal gates.
3. (a) Explain one-digit BCD subtractor. 10
- (b) Determine the prime-implicants of the function. 10
 
$$F(w, x, y, z) = \Sigma(1, 4, 6, 7, 8, 9, 10, 11, 15)$$
4. (a) Explain Master-Slave J-K F/F. 10
- (b) Convert— 10
  - (i) D f/f into J-K f/f
  - (ii) T f/f into D f/f.
5. (a) Explain bidirectional shift register. 10
- (b) Design 3-bit binary synchronous counter. 10  
 Also state the applications of counter.
6. (a) Explain in brief CAD system. 10
- (b) Write in short about ENTITY declarations and operators in VHDL. 10
7. Write short notes on any **two** :- 20
  - (a) Error detecting and correcting codes.
  - (b) ALU
  - (c) FPGA
  - (d) Applications of flip-flops and registers.