

## 16117

3 Hours / 100 Marks	Seat No.					
		-				

**Instructions**: (1) **All** questions are **compulsory**.

- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the **right** indicate **full** marks.
- (4) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any six of the following:

12

- a) i) Define w.r.t. digital IC's
  - 1) Noise Immunity
  - 2) Propagation delay.
  - ii) State advantages of digital systems (any 4).
  - iii) State any 4 Boolean laws.
  - iv) Draw symbol and truth table of NoR gate.
  - v) Convert the following:  $(AB8C)_{16} = ( )_2$

- vii) Draw the functional block diagram of ALU 74181.
- viii) Define the following w.r.t. to DAC.
  - 1) Resolution
  - 2) Conversion time
- b) Attempt any two of following.

8

- i) Subtract using 2's complement method
  - 1)  $(10110)_2 (10001)_2$
  - 2)  $(1101)_2 (11010)_2$



Marks

- ii) State and prove Demorgan's theorems.
- iii) Convert the following:

1) 
$$(498.25)_{16} = ( )_{10}$$

2) 
$$(10110101)_2 = ( )_{16}$$

3) 
$$(B689D)_{16} = ( )_8$$

4) 
$$(110110111)_2 = ( )_{10}$$

2. Attempt any four of the following:

16

- a) Derive AMD gate and OR gate using NOR gates only.
- b) Simplify the following Boolean expressions using Boolean laws:

i) 
$$\overline{(A\overline{B} + \overline{A} \overline{B})(AB + \overline{A}B)}$$

ii) 
$$\overline{A}B + ABD + A\overline{B}C\overline{D} + BC$$

c) Perform the following binary operations.

i) 
$$101101 \times 110$$

d) Minimize the following Boolean expression using K-map.

$$Y = \Sigma m (1, 3, 5, 7, 8, 10, 14)$$

Draw the logical diagram using basic gates.

- e) Design a half adder circuit using k-map.
- f) Draw block diagram of digital comparator IC 7485 and explain with the help of truth table.
- 3. Attempt any four of the following:

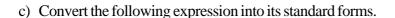
16

a) Implement the logical expression using basic gates.

$$Y = \overline{A}B + \overline{A} \overline{B} + \overline{AC}$$

b) Design 1:16 demultiplexer using only 1:4 demultiplexers.





i) 
$$Y = \overline{A}BC + AC + \overline{B}$$

ii) 
$$Y = (B + \overline{C}) \bullet (A + D) \bullet (\overline{B} + \overline{D})$$

- d) Draw logic diagram of 8:1 multiplexer. Write it's truth table.
- e) Explain different triggering methods.
- f) Explain Master-Slave JK flip-flop with neat diagram.

## **4.** Attempt **any four** of the following:

**16** 

Marks

a) Draw the logical diagram of MOD -11 counter and describe its operation with truth table.

[3]

- b) State any four specifications of ADC.
- c) Describe the function of preset and clear terminals in JK flipflop. Write truth table of it.
- d) Draw the neat diagram of clocked SR flip flop using NAND gates. Write truth table.
- e) Differentiate between RAM and ROM (any four points).
- f) Draw the circuit diagram of weighted resister type D to A converter. Describe its working.

## **5.** Attempt any four of the following:

16

a) Perform the following BCD arithmetic.

i) 
$$(78)_{BCD} + (59)_{BCD}$$

ii) 
$$(86)_{BCD} - (36)_{BCD}$$

- b) Draw the logic diagram of D. flipflop using NAND gates. Write its truth table.
- c) Reduce the following expression using k-map and implement it using NAND gates.  $Y = \prod M(1, 3, 5, 7, 8, 10, 14)$
- d) Design 4-bit asynchronous up counter and describe its operation.
- e) Draw the block diagram of BCD to 7-segment decoder. Write its truth table.
- f) Draw the block diagram of SISO shift register and describe its operation.

6.

		$\mathbf{M}_{i}$	arks
Atte	emp	tany two of the following:	16
a)	i)	State any two applications of counters.	2
	ii)	Design full adder circuit using K-map. Implement using logic gates.	6
b)	i)	Differentiate combinational and sequential logic circuits (2 pts).	2
	ii)	State the applications of shift registers.	2
	iii)	Draw the block diagram of 4-bit PIPO shift register and explain its working with timing diagram.	4
c)	i)	Describe specifications of DAC.	4
	ii)	Describe the working of successive approximation type A to D converter with neat diagram	ı. <b>4</b>