17333

14115

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. a) **Attempt any <u>SIX</u> of the following:** **12**

(i) Compare the digital system with analog system on four points.

(ii) Define:

1) Propagation delay

2) Noise margin

(iii) Draw the symbol and truth table of:

1) EX-OR gate

2) NAND gate

(iv) State the meaning of universal gate. Name the universal gates.

(v) Write the binary addition rules.

Marks

(vi) Define Duality theorem and give example.

(vii) Draw the logic diagram of IC 7485.

(viii) Compare R-2R and weighted resistor DAC on four points.

b) **Attempt any <u>TWO</u> of the following:** **8**

(i) Convert the followings:

1) $(93)_{10} = (?)_2$

2) $(9B)_{16} = (?)_{10}$

(ii) Construct the AND and OR gate using NAND gate. Write necessary outputs of gates.

(iii) Perform the BCD arithmetic:

1) $(264)_{10} + (668)_{10}$

2) $(454)_{10} + (379)_{10}$

2. Attempt any <u>FOUR</u> of the following: **16**

a) State De-Morgan's theorems and prove for two inputs.

b) Reduce the following logic expression using Boolean laws and De-Morgan's theorems

$$Y = \overline{A \cdot (\overline{A \cdot B})} \cdot \overline{B \cdot (\overline{A \cdot B})}$$

c) Perform 2's complement subtraction:

$(59)_{10} - (62)_{10}$

Marks

d) For the given K-map in Figure No. 1, write minimized SOP expression and for the same draw NAND-NAND logic circuit.

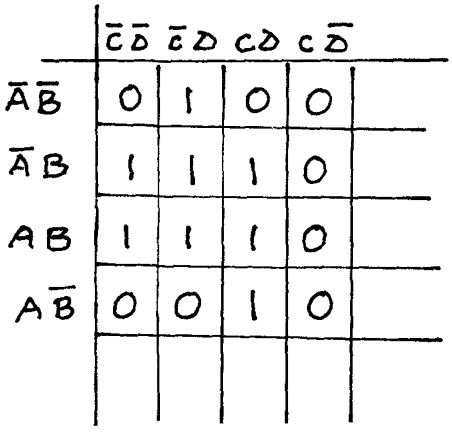

Fig. No. 1

e) Draw 8 : 1 multiplexer using basic logic gates.

f) Construct full adder using basic logic gates and K-Map technique.

3. Attempt any FOUR of the following: **16**

a) Reduce the given logic expression using Boolean laws and draw NAND logic circuit.

$$Y = A + \bar{A} \cdot B + A \cdot B$$

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

c) Draw the block diagram of BCD to seven segment decoder/ driver using IC 7447. Also draw it's truth table.

Marks

d) For the given K-Map in Figure No. 2, write the POS expression and draw NOR-NOR logic circuit for same.

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	1	1
$\bar{A}B$	0	0	0	1
AB	1	1	0	0
$A\bar{B}$	1	1	0	0

Fig. No. 2

e) Draw the symbol and truth table of followings:

(i) D-flip flop

(ii) R-S flip flop

f) Draw the circuit diagram of 4 bit asynchronous counter and explain with timing diagram.

4. Attempt any FOUR of the following: **16**

a) Draw 4 bit SISO shift register using D-flip flop and explain it's working with timing diagram.

b) Compare dual slope and successive approximation ADC on:

(i) Diagram

(ii) Working principle

c) Construct D-flip flop using R-S flip flop and explain it's working along with truth table.

d) Draw and explain the working of J-K flip flop with it's truth table.

e) Draw and explain working of static RAM cell.

f) With neat circuit diagram, explain the working of successive approximation ADC.

Marks

5. Attempt any <u>FOUR</u> of the following: **16**

a) Perform the binary arithmetic:

(i) $(11011.11)_2 + (11011.01)_2 = (\ ?\ )_2$

(ii) $(11101.1101)_2 - (101.011)_2 = (\ ?\ )_2$

b) Explain the techniques used in elimination of 'Race-around' condition.

c) Using Boolean laws, simplify the expression:

$Y = A\,(\overline{A}C)\,(\overline{A}B + \overline{C})$

d) Draw Master - slave J-K flip flop and explain it's working.

e) Describe the operation of decimal to BCD encoder IC 74147 with its truth table and pin diagram.

f) Define 'Modulus of counter'. Determine number of flip flops to be used in MOD-21 counter.

6. Attempt any <u>TWO</u> of the following: **16**

a) (i) Define and draw the logical symbol of multiplexer.

(ii) Find the reduced form of following function.

$f\,(A, B, C) = \Sigma m\,(2, 3, 4, 5, 6, 7)$

using K-map and draw logic circuit.

b) (i) List four applications flip flops.

(ii) Compare synchronous and asynchronous counter on any two points.

(iii) Convert JK-flip flop in to T-flip flop. Write it's truth table and explain.

c) (i) List any four specifications of DAC.

(ii) Draw neat block diagram of Ramp ADC and explain its working.