

17320

21819

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) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. a) Attempt any SIX of the following: **12****
- (i) Convert the following binary number to gray code.
 - 1) 1101101
 - 2) 101110
 - (ii) List any two applications of multiplexer.
 - (iii) State the different triggering methods in digital circuit.
 - (iv) List any two applications of shift registers.
 - (v) Identify following ICs.
 - 1) IC 0800
 - 2) IC 0809
 - (vi) Compare volatile memory and non- volatile memory (any two - points)

P.T.O.

- (vii) State any four Boolean laws.
- (viii) Draw the logic symbol and truth table for two input EX-OR gate.

b) **Attempt any TWO of the following:** **6**

- (i) Solve the following subtraction using 9's and 10's complement method.

$$(84)_{10} - (23)_{10}$$

- (ii) Minimize the following using K-map.

$$1) F(A, B, C) = \pi M(0, 1, 2, 3, 7)$$

$$2) F(A, B, C, D) = \Sigma m(1, 2, 3, 5, 7, 9, 12)$$

- (iii) Implement the following function using 16:1 multiplexer.

$$Y = \Sigma m(1, 2, 5, 6, 8, 12)$$

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

- a) Convert the following numbers in binary and add them.
 $(174)_8 + (253)_8$
- b) Why NAND gate is called universal gate? Implement basic gates using NAND gate only.
- c) Convert the following expressions into their standard forms
- (i) $Y = A + BC + ABC$
- (ii) $Y = (A + B)(A + C)$
- d) Draw the circuit diagram of master-slave J-K flip-flop with the help of NAND gates.
- e) Design 3 bit asynchronous up-counter, write its truth table and draw its output waveforms.
- f) State and define any four specifications of DAC.

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

- a) Add $(248)_{10}$ and $(568)_{10}$ in BCD
- b) Compare CMOS, TTL and ECL logic families. (any four points)
- c) Design 16:1 multiplexer using 4:1 multiplexer.

- d) Write the use of preset and clear terminal in a flip-flop.
 e) State advantages and disadvantages of single slope ADC. (any two points each)
 f) Compare EPROM and EEPROM with any four points.

4. Attempt any FOUR of the following: 16

- a) State and prove De'morgan's theorems.
 b) Realize the following function using demultiplexer.
 (i) $F_1 = \Sigma m (0, 1, 2, 5, 7, 9, 11, 15)$
 (ii) $F_2 = \Sigma m (3, 4, 6, 10)$
 c) Explain the working of 4 bit ring counter with a neat diagram.
 d) Convert J-K flip into 'D' and 'T' flip-flop. Write their truth tables.
 e) With the help of block diagram. Describe the working of successive approximation ADC.
 f) Compare static RAM with Dynamic RAM, (any four points)

5. Attempt any FOUR of the following: 16

- a) Draw the circuit diagram of CMOS NOT gate and explain its working.
 b) Draw and explain circuit diagram of 1 : 4 demultiplexer using logic gates.
 c) In the Fig. No. 1 the control signals S_1, S_0 changes from 00 to 11. Write the truth table for outputs Q_A and \overline{Q}_A
 Figure No. 1.

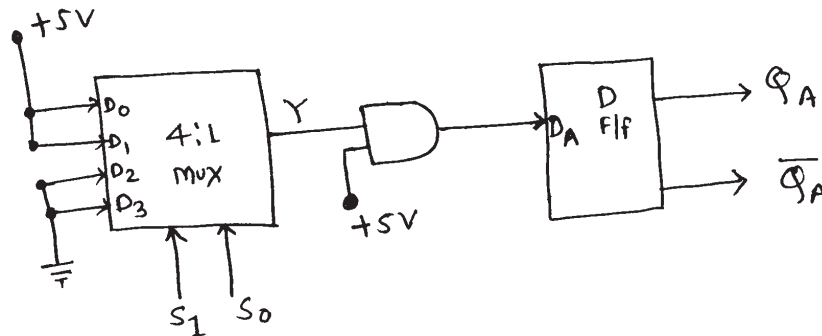


Fig. No. 1

- d) Draw 4 bit SISO shift register using D-flip-flop. Explain its working in brief with waveforms.
- e) Calculate the analog output for 5 bit weighted resistor type DAC for inputs
- (i) 10110
- (ii) 10001
- Assume reference voltage = 10V
- f) State any four advantages of semiconductor memories.

6. Attempt any FOUR of the following:

16

- a) Solve the following subtraction using 1's and 2's complement method $(10110)_2 - (10011)_2$
- b) Simplify the following expressions using Boolean laws.
- (i) $Y = \overline{A} \overline{B} C + B\overline{C} + \overline{A}BC + ABC$
- (ii) $Y = \overline{\overline{D}(C + D)}$
- c) Realize full adder circuit using K-map
- d) Define priority encoder. Draw the block diagram of 8:3 priority encoder. Write its truth table.
- e) Draw the block diagram of IC 7490 and specify its working as decade counter.
- f) Draw the circuit diagram of 3-bit binary weighted resistor type DAC. Derive the expression for its output voltage.
-