17320

11819

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) 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) Represent the decimal no. 27 in binary form using -

(1) BCD code

(2) Gray code

(ii) Draw the logic diagram of half subtractor and write its truth table.

(iii) Draw the symbol of Ex-OR gate along with truth table.

(iv) What is meant by modulas of a counter?

(v) Define the following specifications of DAC.

(1) Resolution

(2) Linearity

(vi) Compare EPROM and flash memory. (any two points)

(vii) Draw the logical diagram of bit memory cell using NAND gates only.

(viii) List the types of ADC's and DAC's.

P.T.O.

Marks

b) **Attempt any TWO of the following:** **8**

(i) Perform the binary subtraction using 1's and 2's compliment method.

$(52)_{10} - (65)_{10}$

(ii) Define priority encoder. Draw the truth table of decimal to BCD encoder.

(iii) Write the difference between combinational and sequential logic circuit.

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

a) Perform the following BCD operation

(i) $(37)_{10} + (65)_{10}$

(ii) $(46)_{10} - (73)_{10}$ [use 10's compliment method]

b) Draw and explain the circuit diagram of 1:4 demultiplexer using logic gates.

c) Why NOR gate is called as Universal gate? Implement basic gates using NOR gate.

d) Explain full adder with its truth table, K-map specification and logic diagram.

e) Explain the working of 4 bit ring counter with a neat diagram.

f) Compare between R-2R ladder DAC and weighted resistor DAC. (any four points)

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

a) Convert the following:

(i) $(5C7)_{16} = (\ ?\ )_{10}$

(ii) $(1011.110)_2 = (\ ?\ )_{10}$

(iii) $(43)_8 = (\ ?\ )_{10}$

(iv) $(6AC)_{16} = (\ ?\ )_2$

b) Simplify the following equations with Boolean Law.

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

(ii) $y = A\overline{B}C + \overline{A}BC + ABC$

Marks

c) Minimize the following expression using K-map.

(i) $f(A,B,C) = \Sigma m(0,1,3,4,5,7)$

(ii) $f(A,B,C,D) = \pi M(0,2,7,8,9,10,13)$

d) Identify the following circuit as combinational circuit OR sequential circuit.

(i) 3 bit ring counter

(ii) Full Adder

(iii) Clocked J-K FF

(iv) 4:1 Mux

e) Describe the working of single slope ADC with block diagram.

f) State different types of ROM and explain any one in detail.

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

a) Convert the following numbers into binary and add them.

$(173)_8 + (741)_8$

b) Compare Totem pole and Open Collector outputs. (any four points)

c) Describe the working of BCD to 7 segment decoder with truth table and circuit diagram.

d) Draw 3 bit asynchronous up counter with truth table and timing diagram.

e) Describe the working of Dual Slope ADC.

f) Compare Volatile and Non-volatile Memory. (any four points)

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

a) State and prove first and second De-morgan's theorem.

b) Compare TTL and CMOS logic families on the basis of size, power consumption, speed, and fan out.

c) Design 32:1 multiplexer using 16:1 multiplexer and one 2:1 multiplexer.

Marks

d) Draw logic diagram of 4 bit SISO shift register and its output waveform.

e) What is race-around condition in J-K Flip Flop? How is it avoided using MS JK - Flip Flop?

f) Explain R-2R ladder network method of D\A conversion with neat circuit diagram.

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

a) Realize the following Boolean expression using Basic gates.

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

(ii) $y = AB + AC$

b) Draw the block diagram of ALU IC 74181 and also write its operation.

c) Realize the following function using De-multiplexer.

(i) $F_1 = \Sigma m\ (0,1,3,7,11,13,15)$

(ii) $F_2 = \Sigma m\ (2,4,8,10,12)$

d) How IC 7490 can be used as a decade counter, explain with neat block diagram.

e) Calculate the analog output of a 4 bit DAC if the digital input is 1101. Assume $V_{FS} = 5V$.

f) Compare static RAM and Dynamic RAM (any four points).