Total No. of printed pages = 6

END SEMESTER EXAMINATION - 2019

Semester : 4th

Subject Code : Et - 403

DIGITAL ELECTRONICS

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. All questions of PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks with suitable words : 1×10=10

   (a) $(3AC)_H$ = (———)$_2$.

   (b) A + BC = (A+B) (———).

   (c) The result of EX-OR of two equal binary numbers is ———.

[Turn over

(d) A single input NAND gate is equivalent to a ——— gate.

(e) A flip-flop can store a ——— bit.

(f) The outputs of a binary adder are SUM and ———.

(g) A digital counter is used to count ———.

(h) ——— is a read / write semiconductor memory.

(i) NAND and ——— gates are often referred to a universal gate.

(j) The flip-flop is the fundamental block of ——— logic circuits.

2. Write true or false : 10

(a) An encoder converts decimal numbers to binary and other codes.

(b) A logic circuit with four inputs can have 8 possible input combinations.

(c) Another name for digital circuits is logic circuits.

(d) A NOR gate is equivalent to bubbled AND gate.

(e) In signed binary numbers MSB is the sign bit.

(f) A latch is constructed using two cross-coupled AND or NOR gates.

(g) J-K flip-flop is called universal flip-flop.

(h) A Full adder can be implemented with half adders and NOT gate.

(i) Each combination of the variables in a truth table is called Minterm.

(j) In R-2R ladder DAC four input resistor values are required.

3. Specify the correct answer : 1×5=5

(a) Minimum number of flip-flops needed to construct a BCD decade counter is

(i) 4 (ii) 3

(iii) 10 (iv) 5

(b) The maximum number of variables that can be used in the minimization of K-map.

(i) 4 (ii) 6

(iii) 8 (iv) 10

(c) A data selector is also called a

(i) Demultiplexer (ii) Multiplexer

(iii) Decoder (iv) Encoder

(d) If A is a logic variable, then according to Boolean algebra

(i) $1.A = 1$

(ii) $A.A = A+A$

(iii) $A + \overline{A} = 1$

(iv) $A + \overline{A} = 0$

(e) "The output is '0' for like inputs and '1' for unlike inputs." This statement is representative of which 2 input logic gate ?

(i) NAND (ii) EX-NOR

(iii) EX-OR (iv) OR.

PART – B

Marks – 45

4. Convert the following :

(a) 0.6875 decimal to binary 2

(b) 10101 binary to decimal 2

(c) $(206.104)_8$ to decimal 2

(d) 21A hexadecimal to binary 2

(e) 101011 binary to octal. 1

5. (a) Subtract 10110 from 11001 using 1's complement. 2

(b) Subtract 11001 from 11011 using 2's complement. 2

(c) Multiply $(101.01)_2 \times (10)_2$. 2

(d) Divide $(1110101)_2$ by $(1001)_2$. 2

(e) Convert $(126)_{10}$ to excess –3 code. 1

6. (a) Prove the following using Boolean algebra :

(i) $A + BC = (A+B)(A+C)$ 2

(ii) $A + \overline{A}B = A + B$ 2

(b) Implement OR and NOT function using NAND gates only. 3

(c) State De Morgan's theorem. 2

7. Define a decoder. Draw a BCD to decimal decoder. Show how to convert the system into demultiplexer. Name two demultiplexer IC's. 1+4+2+2=9

8. (a) Draw a 4 bit serial-in-serial-out shift register. Draw the waveform of the shift register for serial input data 1011. 3+3=6

   (b) Differentiate between static and dynamic RAM. 3

9. (a) Draw the logic diagram of 3 bit simultaneous analog to digital converter and explain briefly the operation. 2+3=5

   (b) Compare MOS circuit with TTL circuit. 4

10. Write short notes on any *three* : 3×3=9

    (a) 8 : 1 multiplexer

    (b) Master slave JK flip-flop

    (c) Parity checker/generator

    (d) Hard disk.