

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.

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 :

- All questions of PART - A are compulsory.
- Answer any five questions from PART - B.

PART - A

Marks - 25

- Fill in the blanks with suitable words : 1×10=10  
(a)  $(3AC)_H = ( \quad )_2$ .  
(b)  $A + BC = (A+B) ( \quad )$ .  
(c) The result of EX-OR of two equal binary numbers is  $\quad$ .

- (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.  $\uparrow$
- (b) A logic circuit with four inputs can have 8 possible input combinations.  $\uparrow$
- (c) Another name for digital circuits is logic circuits.  $\uparrow$
- (d) A NOR gate is equivalent to bubbled AND gate.  $F$

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- (e) In signed binary numbers MSB is the sign bit.  $\uparrow$
- (f) A latch is constructed using two cross-coupled AND or NOR gates.  $\uparrow$
- (g) J-K flip-flop is called universal flip-flop.  $\uparrow$
- (h) A Full adder can be implemented with half adders and NOT gate.  $\uparrow$
- (i) Each combination of the variables in a truth table is called Minterm.  $\uparrow$
- (j) In R-2R ladder DAC four input resistor values are required.  $\uparrow$

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

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[Turn over

- (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)  $A + \bar{A} = 1$
  - (iv)  $A + \bar{A} = 0$
- (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

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- (c) (206.104)<sub>10</sub> 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)  $A + \bar{A}B = A + B$  2
- (b) Implement OR and NOT function using NAND gates only. 3
- (c) State De Morgan's theorem. 2

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