Total No. of printed pages = 4

19/3rd Sem/DECE303

2021

DIGITAL ELECTRONICS

Full Marks –100

Time – Three hours

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

Answer any *five* questions.

1. (a) Convert the following : 1×4=4

   (i) Binary 1001 into decimal

   (ii) Decimal 31 into binary

   (iii) F01 into binary

   (iv) Binary 110001 into Hexadecimal.

   (b) Simplify the following using Boolean algebraic techniques : 1×5+2×3=11

   (i) a+ab

   (ii) a+a'b

   (iii) a+abc

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(iv) (a+b)(a+b')

(v) a'+a'+ a'+ a'

(vi) (x'+y') '+(x'. y')'

(vii) (x x'+x+ x'+ x')'

(viii) xyz+xyz+ x'y'z'+xy'z'.

(c) Prove that x+yz = (x+y)(x+z). 5

2. (a) Use kmap method to simplify below Boolean equations. 2+3+5×2=15

(i) $f(x,y) = \sum m(0,1,2)$

(ii) $f(x,y,z) = \sum m(0,1,4,5)$

(iii) $f(w,x,y,z) = \sum m(0,1,4,5,8,9)$

(iv) $f(w,x,y,z) = \sum m(0,2,4,6,8,10,11,15)$

(b) Use basic gates to realize
$Y = xy + (xy)'z + x'y'z\ (x+y)'$ 5

3. (a) Design the following : 4+6=10

(i) Half Adder

(ii) Full Adder

(b) Use NAND gate only to realize 3+3=6

(i) Y=A+B

(ii) Y=AB

4. (a) Find out minterm for following : 1×3=3

(i) x = 0 y = 1 z = 0

(ii) w = 0 x = 0 y = 1 z = 1

(iii) x = 0 y = 1

(b) Find out maxterm for following : 1×3=3

(i) x = 1 y = 1 z = 0

(ii) w = 1 x = 0 y = 1 z = 1

(iii) x = 1 y = 1

(c) Convert the following : 2×2=4

(i) xyz+xy'z+xy into canonical SOP form.

(ii) (x+y)(x+y+z) into canonical POS form.

(d) Design a Full Subtractor. 10

5. (a) Draw the logic diagram and explain it's truth table of the following latches. 2×(2+3)=10

(i) S-R latch

(ii) J-K latch.

(b) Use two input basic gates to realize the following boolean functions : 2×2+3×2=10

(i) Y=abcd (ii) Y= a+b'+c+d

(iii) Y=a+bcd' (iv) ab+b'(a+cd)

6. (a) Design a 2 to 4 Decoder. 5

(b) Draw the symbol and truth table of a XNOR gate. 2

(c) Design 4:1 Multiplexer and 1:4 De-multiplexer. 5×2=10

(d) Prove that (a+b+c)'=a'.b'.c'. 3