Total No. of printed pages = 5

CAI-303/DC/3rd Sem/2018/M

DIGITAL CIRCUITS

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

PART – A

(Compulsory)

Marks – 25

1. (i) Covert the following : 4

(a) $(15)_{10}$ = $(\ldots\ldots)_2$

(b) $(A10)_{16}$ = $(\ldots\ldots)_2$

(c) $(1001)_2$ = $(\ldots\ldots)_{10}$

(d) $(11F)_{16}$ = $(\ldots\ldots)_{10}$

[Turn over

(ii) Answer the following questions : 1×10=10

(a) Obtain the 2's compliment of 100100.

(b) Represent the decimal number 12 in BCD code .

(c) Number of control inputs needed to implement 16:1 multiplexer is ———.

(d) Write down 2 bit gray code sequence .

(e) 1101 X 101 = ———.

(f) Number of outputs present in 1:8 Demultiplexer is ———.

(g) A+ABC = ———.

(h) Find out the min term, if the variables a,b,c, is talking values 0,1,0.

(i) Subtracted value of 10110 - 01101 is _____.

(j) Find out the max term, if the variables a, b, c, is talking values 0,1,1.

(iii) Write down whether the following statements are true/false : 1×11=11

(a) D-latch is a combinational circuit.

(b) x+y = y+x is aan example of commutative law.

(c) Multiplexer is a data selector circuit.

(d) Half Adder can be used to add 2 bits.

(e) 3 bit register can count upto 16.

(f) Asyncronous circuit uses external clk to ena be all the circuit.

(g) If two inputs of a xor gate is 1 then the output is 0.

(h) $x + x' = 0$.

(i) ASCII code is an example of alphanumeric code.

(j) $(x'y'x')' = xyz$.

(k) $(x+x'y')(x+x'y) = x$.

PART – B

Answer any *three* questions.

1. (i) Simplify using Boolean algebric method : $2 \times 2 = 4$

(a) $abc' + ab'c' + a'b'c + ab'c + a'bc$

(b) $(x+y'+z')' + (x'y'z)' + xy$

(ii) Simplify using K-map method : 5+6=11

a) $f(w,x,y,z) = \sum m(2,4,5,6,9,10,11,12,13)$

(b) $f(a,b,c,d) = \sum m(0,1,2,3,4,5,6,12,13) + d(7,8)$

2. (i) Use basic gates to implement Y= ab'(c+d) +ab (c'+d) 3

(ii) Use NAND gate only to implement Y = ab + cd 4

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

(iv) Why NAND, NOR gates are called universal gate. 2

(v) Write down distributive, commutative, associative law of boolean algebra. 3

3. (i) Design a Full Adder. 6

(ii) Write down truth table of a 2 to 4 Decoder. 2

(iii) Write down funtion table of a 4:1 Multiplexer. 2

(iv) Distinguish between combinational and sequential circuits. 3

(v) Use Nor gate only to implement Y= a+b. 2

4. (i) Explain the operation of S-R latch with circuit diagram, truth table. 5

(ii) Draw the logic diagram of a J-K latch. 2

(iii) Explain the operation of a master slave flip-flop with logic diagram, truth table. 6

(iv) Draw the logic diagram of a D latch. 2

5. (i) Describe the function of a 3 bit Counter with block diagram, timing diagram. 10

(iii) Design a 1:8 De-Multiplexer. 5

6. (i) Use 1's Complement method to subtract 1110 – 1001. 2

(ii) Describe the functions of a 3 bit Register with block diagram, timing diagram. 10

(iv) What do you mean by binary coding. Explain with example. 3