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D/3rd/DECE303

2024

SUBJECT NAME : Digital Electronics

Full Marks : 100

Time : Three hours

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

Answer any five questions.

- Q.1 a) Use Boolean algebraic techniques to simplify 2X5=10
i) $a+abc$ ii) $a'+ab$ iii) $a+b+ab+1$ iv) $xy+(xy)'$ v) $(x+y)(x+y)'$
- b) Prove that $(a+b)'=a'.b'$ 4
- c) Use basic gates to realize 3X2=6
i) $Y=ab(c+d)'$ ii) $ab'+cd$
- Q.2 a) Use k-map method to simplify the following 5+6=11
i) $f(x,y,z)=\sum m(0,2,3,5)$
ii) $f(w,x,y,z)=\sum m(0,1,3,7,9,10,15)$
- b) Use only NAND gate to realize 3+2+4=9
i) $Y=a+b$ ii) $Y=ab$ iii) $Y=ab+c$
- Q.3 a) Design following combinational circuits 5+4+5+6=20
i) 2to 4 Decoder
ii) Half subtractor
iii) 1:4 De-Multiplexer
iv) Full Adder

Q.4 a) Write down the truth table/Function table of the following circuits 3X4=12

i) S-R latch ii) J-K latch iii) 4 to 2 Encoder iv) 4:1 Multiplexer

b) Define max term and minterm 2+2=4

c) Convert $f(x,y,z)=xy+yz$ into canonical SOP form 4

Q.5 a) Draw logic diagram of the following circuits 3X3=9

i) S-R latch ii) D-latch iii) S_R latch with enable

b) Use Boolean algebraic techniques to simplify 3+3+2+3=11

i) $(x'+y)' + (x'y)' + xyz$ ii) $(x+y+z)(x+y'+z)$ iii) $x.x.x+x+x'+1$ iv) $abc+(abc)'$

Q.6 Describe general method of designing any combinational circuit. 20