


SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR

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QUESTION BANK (DESCRIPTIVE)
Subject with Code: Digital Logic Design (20CS0503) **Course & Branch:** B.Tech –CSE,CSIT,CSM,CIC

Year &Sem: I-B.Tech& II-Sem

Regulation: R20

UNIT –I
BINARY SYSTEMS & BOOLEAN ALGEBRA

- 1 a)Convert the following numbers [L5][CO1] 6M
 i)(41.6875)₁₀to Hexadecimal number
 ii)(11001101.0101)₂to base-8 andbase-4
- b) Subtract (111001)₂ from (101011) using2'scomplement? [L5][CO1] 6M
- 2 a) Convert the following numbers [L5][CO1] 3M
 i) (AB)₁₆=()₂ ii) (1234)₈=()₁₆iii)(101110.01)₂=()₈
 b)Convert the following to binary and then to gray code (AB33)₁₆ [L5][CO1] 4M
 c) Perform the following Using BCD arithmetic (7129)₁₀ + (7711)₁₀ [L5][CO1] 5M
- 3 Explain the Binary codes with examples? [L2][CO1] 12M
- 4 Explain about complements with examples? [L2][CO1] 12M
- 5 Convert the following [L6][CO1] 12M
 a)(1AD)₁₆=()₁₀ b) (453)₈=()₁₀ c) (10110011)₂=()₁₀d) (5436)₁₀=()₁₆
- 6 Prove the following identities: [L5][CO1] 6M
 (i) $A'B'C' + A'B'C + A'B'C' + A'BC' = C'$.
 (ii) $AB + ABC + A'B + AB'C = B + AC$. [L5][CO1] 6M
- 7 Reduce the following Boolean Expressions to the indicated number of literals:
 a) $A'C' + ABC + AC' + AB$ to three literals. [L6][CO1] 4M
 b) $(X'Y' + Z)' + Z + XY + WZ$ to three literals. [L6][CO1] 4M
 c) $A'B(D' + C'D) + B(A + A'CD)$ to one literal. [L6][CO1] 4M
- 8 a)Simplify the Boolean expressions to minimum number of literals [L6][CO1] 6M
 i) $X' + XY + XZ' + XYZ'$
 ii) $(X+Y)(X+Y')$
 b) Obtain the Complement & Dual of Boolean Expression [L5][CO1] 6M
 i) $A+B+A'B'C$
 ii) $AB + A(B+C) + B'(B+D)$
- 9 a) Express the Boolean function $F=A+B'C$ as a sum of min terms. [L1][CO1] 6M
 b) Convert the given expression in standard POS form: [L6][CO1] 6M
 $Y=A(A+B+C)$
- 10 a) Convert the given expression in standard POS form: [L6][CO1] 6M
 $Y = (A + B)(B + C)(A + C)$.
 b) Convert the following numbers [L6][CO1] 6M
 i) (615)₁₀=()₁₆ii) (214)₁₀=()₈ iii) (0.8125)₁₀=()₂
 iv) (658.825)₁₀=()₈v) (54)₁₀=()₂

UNIT –II**GATE LEVEL MINIMIZATION**

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|----|---|-----------|-----|
| 1 | Simplify the following Boolean expression using K-MAP and implement using NAND gates.
$F(W,X,Y,Z)=XYZ+WXY+WYZ+WXZ$ | [L6][CO1] | 12M |
| 2 | Simplify the Boolean expression using K-MAP
$F(A,B,C,D)=\sum m(1,2,3,8,9,10,11,14)+d(7,15)$ | [L6][CO5] | 12M |
| 3 | Simplify the Boolean expression using K-map and implement using NAND gates
$F(A,B,C,D)=\sum m(0,2,3,8,10,11,12,14)$ | [L6][CO1] | 12M |
| 4 | Reduce the expression
$f(x,y,z,w)=\pi M(0,2,7,8,9,10,11,15)$.d (3,4) using K-Map? | [L6][CO5] | 12M |
| 5 | Simplify the Boolean expression using K-map?
$F(A,B,C,D,E)=\sum m(0,1,4,5,16,17,21,25,29)$ | [L6][CO1] | 12M |
| 6 | Simplify the following expressions, and implement them with two-level NAND gate circuits:
a) $AB' + ABD + ABD' + A'C'D' + A'BC'$
b) $BD + BCD' + AB'C'D'$ | [L6][CO5] | 12M |
| 7 | Explain NAND-NOR implementations? | [L2][CO1] | 12M |
| 8 | a) Design the circuit by Using NAND gates
$F= ABC'+DE+AB'D'$
b) Design the circuit by Using NOR gates
$F= (X+Y).(X'+Y'+Z')$ | [L6][CO5] | 6M |
| 9 | Simplify the Boolean expression using K-MAP
$F(A,B,C,D,E)=\sum m(0,2,4,6,9,11,13,15,17,21,25,27,29,31)$ | [L6][CO1] | 12M |
| 10 | Simplify the Boolean expression using K-MAP
$F(A,B,C,D)=\pi M(3,5,6,7,11,13,14,15)$.d(9,10,12) | [L6][CO5] | 12M |

UNIT –III**COMBINATIONAL LOGIC**

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|----|--|-------------------------|----------|
| 1 | Draw and explain the working of a Carry- Look ahead adder? | [L2][CO2] | 12M |
| 2 | a)Implement the following Boolean function using 8:1 multiplexer
$F(A, B, C, D) = A'BD' + ACD + A'C'D + B'CD$
b) Explain about parallel adder? | [L5][CO5] | 6M |
| 3 | a)Explain Design Procedure of combinational circuits?
b) Explain Full binary subtractor in detail? | [L2][CO2]
[L2][CO2] | 6M
6M |
| 4 | Design the combinational circuit binary to graycode? | [L5][CO2] | 12M |
| 5 | a) Explain about Binary Half Adder?
b) Design and draw a full adder circuit. | [L2] [CO2]
[L5][CO2] | 6M
6M |
| 6 | a)Implement the following Boolean function using 8:1 multiplexer
$F(A,B,C,D)=\Sigma M(0,1,2,5,7,8,9,14,15)$
b) Explain about Decimal Adder? | [L5][CO5]
[L2][CO2] | 6M
6M |
| 7 | a) Design a 4 bit adder-subtractor circuit and explain the operation in detail?
b) Explain the functionality of a Multiplexer? | [L5][CO2]
[L2][CO2] | 6M
6M |
| 8 | Implement BCD to 7-segment decoder for common anode using 4:16 decoder? | [L5][CO5] | 12M |
| 9 | a) Design a 4 bit binary parallel subtractor and the explain operation in detail?
b) Design the combinational circuit of Binary to Excess-3 code convertor? | [L5][CO2]
[L5] [CO2] | 6M
6M |
| 10 | a)What is combinational circuits and explain analysis and design procedure of combinational circuits .
b) Explain about Priority encoder? | [L1][CO2]
[L2][CO2] | 6M
6M |

UNIT –IV**SYNCHRONOUS SEQUENTIAL LOGIC**

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|----|--|------------|------------|
| 1 | a) Explain the Logic diagram of JK flip-flop? | [L2][CO2] | 6M |
| | b) Write difference between Combinational & Sequential circuits? | [L5] [CO4] | 6M |
| 2 | a) Explain the Logic diagram of SR flip-flop? | [L2] [CO2] | 6M |
| | b) Design and draw the 3 bit up-down synchronous counter? | [L5] [CO2] | 6M |
| 3 | a) Draw and explain the operation of D Flip-Flop? | [L2] [CO4] | 6M |
| | b) Explain about Shift Registers? | [L2] [CO4] | 6M |
| 4 | a) Draw and explain the operation of T Flip-Flop? | [L5] [CO2] | 6M |
| | b) Explain about Ring counter? | [L2] [CO4] | 6M |
| 5 | a) Explain about ripple counter? | [L2][CO2] | 6M |
| | b)What is state assignment? Explain with a suitable example? | [L1][CO4] | 6M |
| 6 | Explain the working of the following | [L2 ,L5] | 12M |
| | i)J-Kflip-flop | [CO2] | |
| | ii) S- Rflip-flop | | |
| | iii) Dflip-flop | | |
| 7 | Explain the design of a 4 bit binary counter with parallel load in detail? | [L2][CO4] | 12M |
| 8 | What is race-around condition? How its eteliminate does is a Master–slave J-K flip-flop? | [L1] [CO4] | 12M |
| 9 | a) Explain synchronous and ripple counters compare their merits and demerits? | [L2][CO2] | 6M |
| | b) Design a 4 bit binary synchronous counter with D-flipflop? | [L5] [CO2] | 6M |
| 10 | a) Write the truth table of clocked T- FlipFlop? | [L1][CO2] | 4M |
| | b) Write the differences between latches and flip flops? | [L1] [CO2] | 4M |
| | c) Write the differences between synchronous and asynchronous counters? | [L1][CO4] | 4M |

UNIT -V

MEMORY AND PROGRAMMABLE LOGIC

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|----|---|--------------|------------|
| 1 | Explain about Error correction & Detection Codes with examples? | [L2][CO6] | 12M |
| 2 | a) Write short notes on PLA | [L5] [CO6] | 4M |
| | b) Implement the following Boolean function using PLA:
$F1(A,B,C)=\sum m(3,5,6,7)$
$F2(A,B,C)=\sum m(0,2,4,7)$ | [L5][CO6] | 8M |
| 3 | Implement the following function using PLA
$A(x,y,z)=\sum m(1,2,4,6)$
$B(x,y,z)=\sum m(0,1,6,7)$
$C(x,y,z)=\sum m(2,6)$ | [L5][CO6] | 12M |
| 4 | Design a Combinational circuit using PAL by considering the following Boolean Functions given in sum of min terms:
$W(A,B,C,D)=\sum m(2,12,13)$
$X(A,B,C,D)=\sum m(7,8,9,10,11,12,13,14,15)$
$Y(A,B,C,D)=\sum m(0,2,3,4,5,6,7,8,10,11,15)$
$Z(A,B,C,D)=\sum m(1,2,8,12,13)$ | [L5][CO6] | 12M |
| 5 | What is memory decoding? Explain about the construction of 4 X 4 RAM? | [L1,L2][CO3] | 12M |
| 6 | Construct the PROM using the conversion from BCD code to Excess-3code? | [L3] [CO3] | 12M |
| 7 | Implement the following functions using PLA.
$A(x,y,z)=\sum m(1,2,4,6)$
$B(x,y,z)=\sum m(0,1,6,7)$
$C(x,y,z)=\sum m(2,6)$ | [L5][CO6] | 12M |
| 8 | Construct the PLA using the conversion from BCD code to Excess-3code? | [L3] [CO3] | 12M |
| 9 | a)Write difference between PROM ,PLA&PAL? | [L5][CO6] | 6M |
| | b) Implement the following Boolean expressions using ROM
$F1(A,B,C)=\sum m(0,2,4,7)$
$F2(A,B,C)=\sum m(1,3,5,7)$ | [L5][CO6] | 6M |
| 10 | a)What is ROM? List the different types of ROMs. | [L1] [CO6] | 6M |
| | b) Implement following Boolean functions using PLA
$F1(A,B,C)=\sum m(0,1,3,5)$ and $F2(A,B,C)=\sum m(0,3,5,7)$ | [L5][CO6] | 6M |