



**SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
(AUTONOMOUS)**

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QUESTION BANK (DESCRIPTIVE)

Subject with Code : Digital Electronics (20EC448)

Course & Branch: B.Tech - EEE

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

UNIT -I

BINARY SYSTEMS

1. Explain about Logic gates. with symbols and truth tables. [L1] [CO1] [12M]
2. Perform the following
 - a) Subtraction by using 1's complement for the given $10101 - 11011$. [L3] [CO1] [6M]
 - b) Subtraction by using 2's complement for the given $111001 - 1010$. [L3], [CO1] [6M]
3. a) Convert the following numbers to Decimal and then to Octal. (i) $(423416)_{10}$ [L1] [CO1] [6M]
 (ii) $(10010011)_2$.
- b) Convert the following to Decimal and then to Hexadecimal. (i) $(1234)_8$ (ii) $(11001111)_2$ [L1] [CO1] [6M]
4. Simplify the following Boolean expression:
 - (a) $F = (A+B)(A'+C)(B+C)$. [L3] [CO1] [6M]
 - (b) $F = XY+XYZ+XYZ'+X'YZ$ [L3] [CO1] [6M]
5. Explain Different Types of binary codes and give there examples [L3] [CO1] [12M]
6. Convert the following to Decimal and then to Octal. [L1] [CO1] [12M]
 - (a) 1234_{16}
 - (b) $12EF_{16}$
 - (c) 10110011_2
 - (d) 10001111_2
 - (e) 352_{10}
7. Express the function $Y=A+B'C$ in (i) Canonical SOP form (ii) Canonical POS form [L3] [CO1] [12M]
- 8 a) Simplify the following Boolean functions to minimum number of literals [L3] [CO1] [6M]
 - (i) $xyz + x'y + xyz'$.
 - (ii) $xz + x'yz$.
- b) Simplify the following Boolean functions to minimum number of literals: [L3] [CO1] [6M]

$$F = ABC + ABC' + A'B$$
9. A receiver with even parity hamming code is received the data as 1110110. Determine the correct code. [L3] [CO1] [12M]
10. What is Grey code? What are the rules to construct gray code? Develop the 4 bit gray code for The decimal 0 to 15. [L1] [CO1] [12M]

UNIT -II**GATE-LEVELMINIMIZATION**

1. Minimize the following Boolean function using K-Map. [L2] [CO2] [12M]
 $F(A, B, C, D) = \Sigma m(0, 2, 4, 6, 8, 10, 12, 14)$.
2. Minimize the given Boolean function $F(A,B,C,D) = \Sigma m(2,3,5,7,8,10,12,13)$ using tabulation method. [L2] [CO2] [12M]
3. Simplify the following Boolean expressions using K-map and Implement the same using Logic gates. F(W,X,Y,Z)= XZ+W'XY'+WXY+W'YZ+WY'Z [L3] [CO2][12M]
4. Simplify the following Boolean expressions using K-map. [L3] [CO2][12M]
 $F(A, B, C, D) = \Sigma m(5,6,7,12,13) + \Sigma d(4,9,14,15)$
5. a) Simplify the following expression using the K-map for the 3-variable. [L3] [CO2] [6M]
 $Y = AB'C + A'BC + A'B'C + A'B'C' + AB'C'$
b) Simplify the following Boolean expressions using K-map.
 $F(A, B, C, D) = \Sigma m(1,3,7,11,15) + \Sigma d(0,2,5)$ [L3] [CO2] [6M]
6. Minimize the given Boolean function $F(A,B,C,D) = \Sigma m(0,2,3,6,7,8,10,12,13)$ using tabulation method. [L2] [CO2] [12M]
7. What are the universal gates? Implement logic gates by using NAND and NOR gates. [L2] [CO2] [12M]
8. Simplify the following Boolean expressions using K-map. [L3] [CO2] [12M]
 $F(A, B, C, D) = \pi M(0,2,3,8,9,12,13,15)$
9. Simplify the following Boolean expressions using K-map. [L3] [CO2] [12M]
 $F(A, B, C, D,E) = \Sigma m(0,2,4,6,9,11,13,15,17,21,25,27,29,31)$
10. Simplify the following Boolean expressions using K-map. [L3] [CO2] [12M]
 $F(A, B, C, D,E) = \Sigma m(0,5,6,8,9,10,11,16,20,24,25,26,27,29,31)$

UNIT -III
COMBINATIONAL LOGIC

- 1 Design 32:1 Mux using two 16:1 Muxs and one 2:1 Mux. [L3] [CO3] [12M]
- 2 What is combinational logic circuit? Give the analysis procedure for combinational logic circuit. [L2] [CO3] [12M]
3. Design & implement Half Adder and Full Adder with truth table. [L3] [CO3] [12M]
4. Design & implement Half Subtractor and Full Subtractor with truth table. [L3] [CO3] [12M]
- 5.What is magnitude comparator? Design 2-bit comparator by using logic gates. [L1] [CO3][12M]
- 6.What is parallel adder? Design and explain 4 bit parallel adder by using full adder. [L3] [CO4] [12M]
- 7.What is Decoder? Design the circuit for 3to 8 decoder with truth table. [L1] [CO4] [12M]
8. What is Encoder? Design the circuit for Octal to Binary encoder with truth table. [L1] [CO4][12M]
9. Design 32 to1 multiplexer using 8 to 1 multiplexers and 2to4 Decoder. [L1] [CO4][12M]
- 10.What is Demultiplexer? Desingn1:8 Demultiplexer using 1:4 Demultiplexers. [L1] [CO4][12M]

UNIT-IV
SYNCHRONOUS SEQUENTIAL LOGIC

1. a) Draw the logic diagram for D Flip Flop by using SR Flip Flop Explain the operation with truth table. [L1] [CO5][7M]
- b) Write the differences between combinational and sequential circuits. [L2] [CO5][5M]
2. a) Explain working of Master Slave Flip flop with neat diagram. [L1] [CO5][6M]
- b)Draw the logic diagram T Flip Flop by using JK Flip Flop and draw the timing diagram. [L1] [CO5][6M]
3. Draw the circuit of JK flip flop using NAND gates and explain its operation. [L3][CO5][12M]
4. What is SR latch? Explain the operation for different cases By using Truth table. [L1] [CO5] [12M]
5. What is Register Explain i) Parallel in Parallel out Register [L3] [CO5] [12M]
 ii) Series in Parallel out Register
6. Design and implement 3-bit ripple counter using J-K flip flop. Draw the state diagram, logic diagram and timing diagram for the same. [L3] [CO5] [12M]
7. With a neat sketch explain 4 bit Johnson counter using D FF. [L3] [CO5] [12M]
8. Implement 4-bit ring counter using suitable shift register. Briefly describe its operation. [L3] [CO5] [12M]
9. a) Explain about level and Edge triggering . [L1] [CO5] [6M]
b)Explain the operation of series in series out register. [L1] [CO5] [6M]
10. Design MOD-10 Asynchronous counter by using T-Flip flop [L3] [CO5] [12M]

UNIT -V
FINITE STATE MACHINES AND PROGRAMMABLE LOGIC DEVICES

1. Explain about Mealy and Moore Models of sequential machines. [L3] [CO6][12M]
2. Implement the following Boolean function using PAL. [L3] [CO6][12M]
 - (i) $W(A,B,C,D) = \Sigma m(0,2,6,7,8,9,12,13)$ (ii) $X(A,B,C,D) = \Sigma m(0,2,6,7,8,9,12,13,14)$
 - (iii) $Y(A,B,C,D) = \Sigma m(2,3,8,9,10,12,13)$ (iv) $Z(A,B,C,D) = \Sigma m(1,3,4,6,9,12,14)$
3. What is design procedure for FSM? Give the advantages of FSM. [L3] [CO6][12M]

4. Implement PLA circuit for the following functions $F1(A,B,C) = \Sigma m(3,5,6,7)$,
 $F2(A,B,C) = \Sigma m(0,2,4,7)$. [L3] [CO6] [12M]
5. Given the 8-bit data word 01011011, generate the 12-bit composite word for the hamming code
that corrects and detects single errors. [L1] [CO6] [12M]

6. Explain the following related to sequential circuits.
 - a) State diagram.
 - b) State table.
 - c) State assignment.
[L2] [CO6] [12M]
7. What is ROM organization? Explain about Different types of ROM. [L3] [CO6] [12M]

8. Compare three combinational circuits: PLA, PAL and PROM. [L3] [CO6] [12M]
- 9.a) What is FSM? Give the applications of FSM. [L3] [CO5] [6M]
 - b) Explain about Memory decoding. [L3] [CO6] [6M]
- 10.What is RAM organization? Explain about Different types of RAM. [L3] [CO6] [12M]

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