B.E. Third Semester (Computer Engineering) (C.B.S.)

Digital Electronics

P. Pages : 2 **NKT/KS/17/7248**

Time : Three Hours Max. Marks : 80

* 0 2 8 5 *

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Answer **six** questions.

1. a) Convert the following. **10**

i) $(AB2 \cdot CD)_H = (\quad)_D$

ii) $(257 \cdot 43)_{10} = (\quad)_2$

iii) $(475)_8 = (\quad)_8$

iv) $(101101 \cdot 101)_2 = (\quad)_D$

v) $(2A1C)_H = (\quad)_8$

b) Differentiate between analog and digital system. **4**

OR

2. a) State and prove De-Morgan's Theorem. **4**

b) Explain Universal Gates. **4**

c) Prove that **6**

i) $AB + ABC + A\overline{B} = A$

ii) $(AB + C)(AB + D) = AB + CD$

3. a) Explain Priority encoder. **4**

b) Design 4 : 1 multiplexer using logic gates. **6**

c) Define SS1, MS1 and VLS1. **3**

OR

4. a) Realize 5×32 decoder using 3×8 and 2×4 decoders. **7**

b) Implement the following function using 8 : 1 MUX. **6**

$F(A, B, C, D) = \Sigma m(0, 1, 5, 8, 11, 12, 14)$

5. Find the minimal expression using k-map for the following.

i) $F(A,B,C,D) = \Sigma m(0,1,2,4,7,9,11,12,14)$ **5**

ii) $F(P,Q,R,S) = \pi M(1,3,4,5,8,10,11)$ **5**

iii) $F(A,B,C) = \Sigma m(0,1,2,5) + \Sigma d(3,7)$ **4**

OR

6. a) Minimize the logic expression using k-map **6**
$y = \bar{A}\bar{B}CD + \bar{A}BC\bar{D} + \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}\bar{D} + A\bar{C} + \bar{B}$
and implement using logic gates.

b) Reduce the following function using k-map technique and implement using NAND gates. **8**
$F(A,B,C,D) = \bar{A}\bar{B}D + AB\bar{C}\bar{D} + \bar{A}BD + ABC\bar{D}$

7. a) What is J-K Flip-flop? Give the truth table of J-K flip flop? Explain the working of J-K flip-flop. **6**

b) What do you mean by positive edge triggering and negative edge triggering of flip-flop. **3**

c) Draw and explain flip-flop as basic memory cell. **4**

OR

8. a) Convert the following. **8**
i) S-R to J-K flip flop
ii) T to D flip flop

b) Write short note on semiconductor memory. **5**

9. a) Draw and explain 3 bit ripple counter with waveform. **7**

b) Differentiate between synchronous and asynchronous counter. **6**

OR

10. a) Design a synchronous lock free counter using D-flip flop that passes through following states. **7**

$$S_0 \to S_2 \to S_3 \to S_5 \to S_6$$

b) Write short note on shift register and explain any one type of shift register. **6**

11. a) Explain the function of full adder? Also Implement the full adder using two half adders and one OR gate. **7**

b) Explain BCD Adder Circuit. **6**

OR

12. a) Write short note on ALU and its Design. **7**

b) Explain the Monostable multivibrator. **6**

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