

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.SC., DEGREE END SEMESTER ONLINE EXAMINATION NOV 2021

ELECTRONICS I

CODE: 19PH/MC/EL33
CLASS: II B.Sc. Physics

MAX.MARKS: 100
TIME: 3 HRS

SECTION A

Answer ALL the questions

(34 MARKS)

Choose the correct answer

(8x1=8)

1. In 1's complement subtraction of binary numbers, if there is no end around carry the answer should be
 - a) recomplemented
 - b) made negative
 - c) carry is disregarded
 - d) recomplemented and made negative
2. Which of the following flip flops is used as latch
 - a) JK flip flop
 - b) D flip flop
 - c) RS flip flop
 - d) T flip flop
3. Component that cannot be fabricated in an IC is _____
 - a) resistor
 - b) inductor
 - c) capacitor
 - d) transistor
4. Large and complicated circuits are formed by
 - a) Hybrid IC
 - b) Thick film IC
 - c) monolithic IC
 - d) thin film IC
5. Digital design often starts by constructing a _____ with desired output.
 - a) K-Map
 - b) truth table
 - c) logic gate
 - d) both a & c
6. To display the digit 7 in a seven segment display indicator
 - a) A,B, C must be lighted
 - b) A,B must be off
 - c) F,B,C must be on
 - d) All segments must be lighted
7. The digital circuits can be made by the repeated use of
 - a) OR gates
 - b) NOT gates
 - c) NAND gates
 - d) EX-OR gates
8. When the light increases, the reverse current in a photo diode
 - a) Increases
 - b) decreases
 - c) is unaffected
 - d) becomes zero

Fill in the blanks

(5x1=5)

9. $A(A+B)=$ _____
10. If Q_3 and Q_0 drive the NAND gate the modulus of the counter is _____.
11. Min term corresponding to 13 in a 4 variable K-Map is _____.
12. The forbidden state present in S R flip flop is defined in _____ flip flop.
13. Dark resistance of a photodiode is given by the relation _____.

Answer briefly

(7x3=21)

14. How can you realize a D latch from a JK Flip-flop?
15. Differentiate between analog and digital signals?
16. Implement a logic circuit for the expression $Y = \overline{A}BC \overline{(A + D)}$.
17. How does LED differ from an ordinary diode? Give any two applications of LED.
18. Design a monolithic IC with transistor and a diode on a single substrate.
19. Explain the term rolling and redundant group in K map.
20. What is an IC? Why are ICs more dependable than the discrete circuits?

SECTION B

Answer any FOUR questions

(4x9=36)

1. What are the methods used to solve a Boolean expression? Simplify using K-map and realize the logic circuit using NAND gates. $Y=F(A,B,C,D)=\Sigma(1,5,10,11,14,15) + \Sigma_d(0,2,4,6,7)$.
2. a) How many half adders and full adders are required to perform the binary addition $101+10$? Indicate how the half adders and full adders are to be connected and also show the result of the addition.
b) Simplify the following Boolean expression
$$F(A, B, C, D) = A B C + A B D + \overline{A} B \overline{C} + C D + B \overline{D}.$$
3. Illustrate the working of J K flip flop. Discuss on the race around condition.
4. Explain the fabrication of capacitor and resistor in a monolithic IC.
5. (a) Explain the term dark current. Determine the value of dark current using the following values $V_r = 12 \text{ V}$, $R_r = 220 \text{ K ohms}$.
(b) What value of series resistor is required to limit the current through the LED to 15 mA, with a forward voltage drop of 1.8 V when connected to a 12 V supply.

SECTION C

Answer any ONE question

(1x30=30)

6. a) What are the difference between counters and registers? With necessary diagram, truth table and waveform, explain the function of UP counter. (15)
b) What is a photo diode? How does a photodiode operate? Discuss its characteristics and applications.(15)
7. a) What is a full adder? How is a full adder built using two half adders? Explain the working with a suitable example.(15)
b) What is a monolithic IC? Explain the different stages of fabrication of monolithic IC. What are the limitations of IC?(15)