STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2019-2020 and thereafter)

SUBJECT CODE :19PH/MC/EL33

B.Sc. DEGREE EXAMINATION NOVEMBER 2022
BRANCH III - PHYSICS
THIRD SEMESTER

COURSE : MAJOR – CORE
PAPER : ELECTRONICS I
TIME : 3 HOURS **MAX. MARKS :100**

SECTION – A

ANSWER ALL QUESTIONS: **25 MARKS**

I. CHOOSE THE CORRECT ANSWER: **(10 X 1 = 10)**

1. A 32-bit binary number is called as
   a. Nibble b. Byte c. Word d. Double word
2. Two's complement of 1010_2 is
   a. 0101_2 b. 0110_2 c. 0111_2 d. 0100_2
3. The complement of A + BC, by DeMorgan's theorem is
   a. $\overline{A}\,(\overline{B} + \overline{C})$ b. $\overline{A} + (\overline{B} + \overline{C})$ c. $\overline{A}\,(\overline{BC})$ d. $\overline{A} + (\overline{BC})$
4. The number of cells, representing minterms in a four variable Karnaugh map is
   a. Four b. Eight c. Twelve d. Sixteen
5. The flip-flop, that can be converted into any other flip-flop is
   a. RS flip-flop b. Clocked RS flip-flop c. D flip-flop d. J-K flip-flop
6. One of the most important and useful sequential logic circuit is
   a. Flip-flop b. Registers c. Counters d. Binary adders
7. In the fabrication process of integrated circuits, the process for pattern definition by applying a thin uniform layer of viscous liquid on the wafer surface is called as
   a. Etching b. Deposition c. Lithography d. Diffusion
8. _____ cannot be fabricated on an IC.
   a. Transistors b. Inductors c. Diodes d. Resistors
9. Which of the following is not a characteristic of LED?
   a. Fast action b. High Warm-up time c. Low operational voltage d. Long life
10. Most seven segment displays are driven with an encoder that converts a binary encoded nibble into a
    a. Binary number b. Numeric number c. Octal number d. Hexadecimal number

II. FILL IN THE BLANKS: **(5 X 1 = 5)**

11. Any octal digit can be represented by a group of _____ sequence.
12. A full adder can be converted into a full subtractor with the addition of _____
13. In a J-K master slave flip-flop, for J=1 and K=1, the condition for the output changes state only once for each clock pulse is called as _____
14. The most commonly used ICs are _____
15. A photo-diode is normally _____ biased.

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III. ANSWER BRIEFLY: **(5 X 2 = 10)**

16. What is an analog signal? Give an example.
17. Differentiate between SOP and POS.
18. Write the difference between D latch and D flip-flop?
19. What is the scale of integration of a digital IC?
20. What is a multicolour LED?

SECTION – B

ANSWER ANY FIVE QUESTIONS: **(5 x 6 = 30)**

21. a. Convert the binary number $(111101.11101)_2$ into its decimal equivalent.
    b. $(125)_{10} = (x)_8 = (y)_{16} = (z)_2$. Find x, y, z.
22. a. Perform binary multiplication for the decimal number $(13_{10} X 11_{10})$
    b. Subtract $(18)_{10}$ from $(12)_{10}$ by 2's complement method.
23. a. Using Boolean algebra, show that $\overline{A}B + \overline{B}C + \overline{C}A = A\overline{B} + B\overline{C} + C\overline{A}$
    b. Use DeMorgan's theorem to find the complement $A\overline{B} + \overline{C\,D}$ and simplify.
24. Simply using Karnaugh map: a. $Y = F(A, B, C) = \Sigma (1, 3, 4, 5, 6, 7)$
    b. $Y = F(A, B, C) = \Sigma (0, 2, 4, 6, 7)$
25. What is a flip-flop? Explain the working of clocked R-S flip-flop using NAND gates.
26. a. Write the differences between analog and digital signals.
    b. Discuss the binary arithmetic operations with an example.
27. Discuss the working and applications of LED.

SECTION – C

ANSWER ANY THREE QUESTIONS: **(3 x 15 = 45)**

28. a. Differentiate between a register and counter
    b. Discuss in detail about Decade Counter
29. a. State and prove DeMorgan's theorem.
    b. What is a full subtractor? How is a full subtractor built using two half subtractors?
30. a. Construct J-K master-slave flip-flop and show that, the racing in J-K flip-flop is solved in J-K master-slave flip-flop.
    b. Explain the working of a shift right shift register using J-K flip-flops.
31. a. With a neat sketch, describe the steps involved in the fabrication of monolithic ICs.
    b. Enumerate the advantages and disadvantages of integrated circuits.
32. Discuss the operation, characteristics and applications of a photo-diode in detail.

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