C151

MPHY-509

Digital Electronics

M.Sc. Physics (MSCPHY-20)

2nd Semester Examination, 2022 (June)

Time : 2 Hours]   **Max. Marks : 40**

Note :   This paper is of Forty (40) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A
(Long Answer Type Questions)

Note :   Section 'A' contains Five (05) long answer type questions of Ten (10) marks each. Learners are required to answer any Two (02) questions only.

$(2\times10=20)$

1.   What is a multivibrator? Draw the circuit of astable multivibrator and explain its operation in detail.

2. What do you mean by Flip flop? How is a RS Flip-flop converted into JK Flip-flop? Give its truth table and explain how it is obtained.

3. State and prove De-Morgan's theorem. Discuss the working of half adder and full adder with truth table in detail.

4. What is a Multiplexer? Write down the applications of Multiplexer? Discuss 4 : 1 Multiplexer in detail.

5. Explain Sum-of-Products and Product-of-Sums. Show the logic circuit for $Y = AB' + AB$. Simplify this Boolean equation and the corresponding circuit.

SECTION–B
(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Five (05) marks each. Learners are required to answer any Four (04) questions only. (4×5=20)

1. Write a Short note on various number systems used in digital electronics.

2. Compare asynchronous and synchronous counter. Design a Mod-10 asynchronous counter using T Flip-Flop.

3. With the help of a neat diagram explain the working of R-2R ladder network type digital to analog converter (DAC).

4. Discuss Postulates and theorem of Boolean algebra.

5. What are the differences between Combinational circuits and Sequential circuits?

6. Realize X-OR operation using :

(a) Only NAND gates.

(b) Only NOR gates.

7. What do you mean by shift register? Explain the Serial-In-Serial-Out shift register.

8. Find the decimal equivalent of :

(a) 10101.

(b) 101.1110.

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