End Semester Examination, 2021

Semester - III

Physics

PAPER - C7T

Full Marks : 40

Time : 2 Hours

Gr - A

Answer any <u>five (5)</u> questions :- **5x2=10**

1.a) Draw the circuit diagram of the Boolean expression $y = AB + \overline{A}\,\overline{B}$ using only NAND gates. 2

b) Simplify the expression —

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

ii) $A + \overline{A}B$ 2

c) Explain De' Morgan's theorem. 2

d) What do you mean by PROM and EPROM ?

e) What is edge triggering ?

f) Convert decimal to binary $(-19)_{10} = (?)_2$ 2

g) Subtract $(1011)_2$ from $(11001)_2$ using 2's compliment method. 2

h) Distinguish between combinational and sequential logic circuits. 2

Gr - B

Answer any <u>four (4)</u> questions :- **4x5=20**

2.a) Write down the Boolean function corresponding to the following standard POS notation.

$f(A,B,C) = \Pi M(0,1,2,5)$ 3+2

b) Design a half adder using NAND gate only with truth table.

3.a) What is an integrated circuit ?

b) Discuss the relative advantages and disadvantages of IC's over discrete assembly.

c) What is Wafer ? 1+3+1

4.a) Two digital signals A=101101 and B=110101 applied to a two-input AND gate, sketch the input and output signals and give the equivalent binary number of the output.

b) Convert E3B to its octal equivalent. 3+2

5.a) What is meant by race-around condition ? How it is removed in JK-MS flip-flop ?

b) What is VLSI ? (2+2)=1

6.a) What is an SR flip-flop ? Give its logic symbol, truth table and circuit realization using any universal gates. 4

b) Why 'NOT' gate is called inverter ? 1

7. Draw circuit diagram of a positive diode logic AND gate. Explain its operation. 2+3

Gr - C

Answer any <u>one</u> questions :- **1x10=10**

8.a) Draw a master-slave JK flip-flop system using universal gate. Explain its operation.

b) What are the function of 'preset' and 'clear' inputs ?

c) Minimize the following output functions using K-map — (2+3)+1+4

$$f(x_1, x_2, x_3, x_4) = \sum m(1,3,5,7-9,12,13) + d(14,15)$$

9.a) Represent $(2^n - 1)$ in binary and hexadecimal.

b) Implement on NAND gate using NOR only.

c) Define positive and negative logic systems.

d) Give the circuit diagram of a 1 line to 4 line de-multi-plexer using basic gates and explain. 3+2+2+3