End Semester Examination, 2022

Semester - III

Physics

PAPER - CC-7T

Full Marks : 40

Time : 2 Hours

The Figures in the right hand margin indicate marks. Candidates are required to give their answers in their own words as far as practicable.

Group - A

1. *Answer any <u>five</u> questions :* ***5x2=10***

a) Represent $(2^{11}-1)$ in binary and hexa-decimal. 2

b) Subtract by 2's compliment method

i) 1101 from 1110

ii) 1001 from 1101. 1+1=2

c) What do you know by duty cycle of a clock ? 2

d) Proof the following using Boolean algebraic theorems.

$\overline{AB} + \overline{A} + AB = 1$ 2

e) What is RAM and ROM ? 2

f) What is the function of time-base circuit in CRO ?

g) What is race around condition in JK flip-flop ?

h) How phase difference between two voltages can be measured using CRO ?

(Turn Over)

Group - B

Answer any four questions : ***4x5=20***

2. a) What is multiplexer ? Draw a logic block diagram of a 4 :1 multiplexer. 1+1

   b) Explain the operaton of basic sequeritial circuit (S-R latch) 3

3. a) Give difference between racing and toggling. 2

   b) Write down the Boolean function corresponding to the following standard POS notation : 3

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

4. a) Explain performance of a 4-bit subtractor using 4 bit adder (use full adder) 3

   b) Show how to implement an AND gate with OR and NOT gates. 2

5. a) Classify counters. How many flip flops do you need to count numbers (0-31) 1+1

   b) Convert D3B to its octal equivalent. 1

   c) Distinguish between ripple counter and synchronous counter. 2

6. Design an astable multivibrator using 555 timer for a frequency of 1 KH_z and a duty cycle of 70%. 5

7. a) What is the deflection sensitivity in CRO ?

   b) The period of the time-base of CRO is 1ms. Find the number of waveforms obtained on the screen if the frequency of the vertical input voltage is $1KH_z$. 2+3

Group - C

Answer any one questions : ***1x10=10***

8. a) What is a Karnaugh map ? What you mean by don't care cells ? 1+1

   b) Simplify the Boolean function 4

   $$f(W,X,Y,Z) = \sum m(1,2,4,7,13) + d(9,11,14)$$

   c) Draw a negetive edge triggered J-K flip flop system using universal gate. Explain its operation. 1+3

9. a) Draw a ligic diagram of a BCD-encoder and explain its operation. 5

   b) Obtain the Boolean expression for the output Y in the logic circuit of that figure. Simplify the expression and show that the circuit is equivalent to an AND gate with inputs A and B. 5