

2022

3rd Semester Examination

PHYSICS (Honours)

Paper : C 7-T

[Digital Systems and Applications]

[CBCS]

Full Marks : 40

Time : Two Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers

in their own words as far as practicable.

Answer any *five* of the following : $2 \times 5 = 10$

1. Add $(-12)_{10}$ and $(-14)_{10}$ using the 1s complement method.
2. Find the value of base r if $(121)_r = (144)_8$.
3. Subtract hexadecimal number $(C5A)_{16}$ from $(B3D)_{16}$ using 15s complement method.
4. Show that $B\bar{C} + AB + AC = AC + B\bar{C}$.
5. Write down the excitation table of JK flip flop.
6. How many decade counters are required to convert a clock of 10 MHz to 100Hz.

P.T.O.

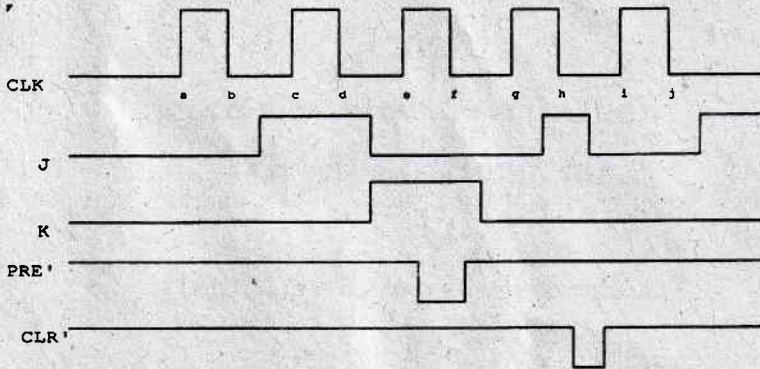
7. What are the differences between RAM and ROM ?
8. Write down two limitations of 1C.

Answer any *four* of the following : $5 \times 4 = 20$

9. (a) Implement the following expression using NAND logic $B\bar{C} + A + D$.
(b) Design Ex-OR gate using 4 NAND gate only. 5
10. Minimize the following expression using K-Map :

$$F(A,B,C,D) = \prod M(0,2,4,6,8,10,12,15) \prod d(9,14)$$
 d represents don't care. 5
11. A binary ripple counter is required to count up to $(16,383)_{10}$. How many FFs are required ? If the clock frequency is 8.192 MHz, what is the frequency at the output of the MSB ? Determine the required number of flip flops for MOD-72 and MOD-148 counters. 5
12. A certain memory has capacity of 8KX16. How many data input and data output lines does it have ? How many address lines does it have ? What is the capacity in bytes ? 5
13. The input signals shown in figure below are applied to a positive edge triggered J-K flip flop with active low preset (PRE') and clear (CLR'). Draw the output waveform. 5

(3)



14. Subtract 1010 from 1101 using parallel adder IC 7483 (pin diagram not necessary). 5

Answer any *one* of the following : $10 \times 1 = 10$

15. Write down the truth table of Half subtractor and determine the output expressions in SOP form the truth table. Design it using NAND gate only. Design 4:1 Multiplexer. How can you design 5:32 line decoder by cascading two 4:16 line decoder IC74154.

$2+1+2+3+2$

16. Explain the details operation of astable multivibrator using IC555 timer. Derive the expression of frequency of generated wave. Determine its duty cycle. How can you modify the circuit for 50% duty cycle ? $4+3+2+1$
