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.

7. What are the differences between RAM and ROM ?

8. Write down two limitations of 1C.

Answer any *four* of the following :   5×4=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 :

$F(A,B,C,D) - \Pi M(0,2,4,6,8,10,12,15) \Pi d(9,14)$

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 (GLR'). Draw the output waveform.   5
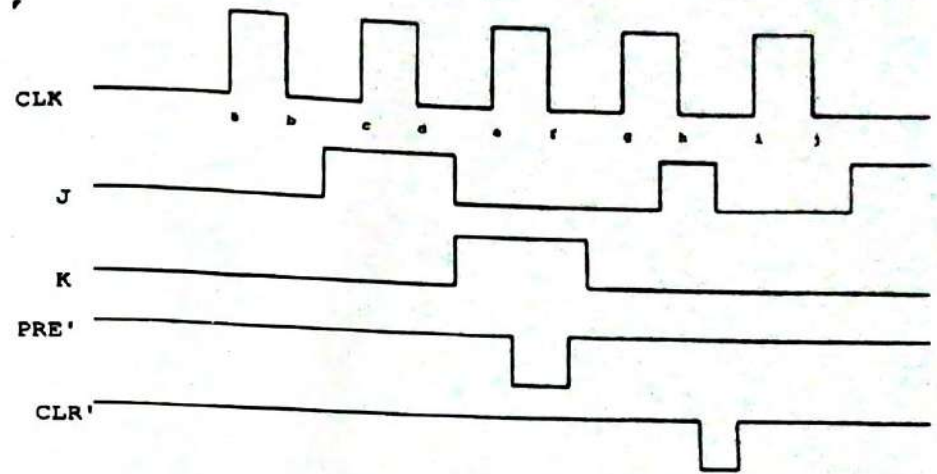
14. Subtract 1010 from 1101 using parallel adder IC 7483 (pin diagram not necessary).   5

Answer any *one* of the following :   10×1=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

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