(c) Design T flip-flop using JK flip-flop with all the necessary steps. (CO4)

5. (a) Describe the operation of 3 bit Asynchronous up counter with truth table and logic diagram. (CO5)

(b) Explain the difference between the synchronous and asynchronous counter. Also mention their advantages and disadvantages. (CO5)

(c) Write short notes on the following : (CO5)

(i) Synchronous counter

(ii) Ring counter

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TBC–205/TBI–205

B. C. A./B. SC. (IT)

(SECOND SEMESTER)

END SEMESTER

EXAMINATION, June, 2023

DIGITAL ELECTRONICS

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any ***two*** sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Convert the following : (CO1)

(i) $(5C7)_{16} = (?)_{10}$

(ii) $(2598)_{10} = (?)_{16}$

(iii) $(10110)_2 = (?)_{10} = (?)_{16}$

(iv) $(1011001)_2 = (?)_8$

P. T. O.

(b) Explain Fixed Point Representation. Represent the number F = –3.75 in single precision format (IEEE 754 standard). (CO1)

(c) (i) Find r's and $(r-1)$'s complement of the following numbers :

(I) $(137)_{10}$

(II) $(1011)_2$

(ii) Convert the following Binary number into Gray code :

(I) (1111)

(II) (1101001)

2. (a) State and prove the following : (CO2)

(i) Distributive Theorem

(ii) De Moran's Theorem

(b) (i) Minimize the following expression using K-map :

$$f(P,Q,R,S) = \sum m(0,1,4,5,7,8,9,12,13,15)$$

(ii) Draw the symbol and write logic expression and truth table of the two input universal logic gates.

(c) Convert the following functions into canonical form : (CO2)

(i) AB + BC′ + A′B

(ii) (A + B′) (A′ + C′) (B′ + C′)

3. (a) Describe function of full subtractor circuit with its truth table, K-map simplification and logic diagram. (CO3)

(b) Explain 8 to 1 Multiplexer with block diagram, truth table, logic expression and logic diagram. (CO3)

(c) Explain a 3 to 8 Decoder with the help of AND gate and NOT gate. Implement 3 to 8 Decoder using two 2 to 4 Decoder. (CO3)

4. (a) Describe the operation of 4 bit SISO shift register with the help of block diagram, truth table and timing diagram. (CO4)

(b) Explain the following flip-flop with logic diagram and also write their truth table, characteristic table and characteristic equation : (CO4)

(i) SR flip-flop

(ii) D flip-flop