

Roll No.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

End-Semester Examination May, 2022

Branch : EEE

Semester : 4th

Title of the Course : Digital Electronics & Logic
Design

Course Code : CSB 254

Time: 3 Hours

Maximum Marks: 50

Note: Q1 is compulsory.

Section-A

- A1. All questions are compulsory. (1x10=10)
- (a) A square wave with a period of 10 μ s drives a T flip-flop. What will be the period of the output signal?
 - (b) What are the values respectively of R1 and R2 in the expression $(235)_{10} = (565)_{10} = (865)_{10}$?
 - (c) What is Hexadecimal output of AND operation of $(79)_{10}$ and $(-56)_{10}$?
 - (d) What are the minimum number of flip-flops needed to build a MOD-12 counter.
 - (e) BCD input 1000 is fed to a 7-segment display through a BCD to 7 segment decoder/driver. The segments which will lit up are
 - (f) Define latch.
 - (g) D flip-flop can be configured from which Flip-Flop.
 - (h) What is meant by parity bit?
 - (i) What are the maximum possible number of states required in a ripple counter with 5 flip-flops.
 - (j) Define memory.

Section-B

Attempt any 4 questions.

(4x5=20)

- B1. Draw the excitation table and characteristics equation for the J-K flip flop. Also, discuss the procedure to get the characteristics equation.
- B2. Design a 4-bit parallel adder cum subtractor circuit and explain its working with the help of an example.
- B3. Convert the S-R flip-flop into flip-flop.
- B4. Obtain all the prime implicants for the following four variable functions.
 $F = \sum m(0,1,2,3,6,7,13,14) + d(8,9,10,12)$
- B5. What is ripple counter? How it works? Explain with logic diagram.

Section-C

Attempt all questions.

(2x10=20)

C1(a). Implement the following Boolean expression with exclusive-OR and AND gate.

$$F = AB'CD' + A'BC'D' + AB'C'D + A'BC'D$$

C1(b). Design a combinational circuit with three inputs and one output using following condition-
The output is 1 when the binary value of the input is less than 3. The output is 0 otherwise.

C2(a). Design a 4-bit Bi-directional shift register. Explain its working with the help of an example.

C2(b). Design a decade counter using a flip-flop and also, explain its working.

