

**J-21-0046**

**B. Tech. EXAMINATION, 2021**

Semester V (CBCS)

ELECTRONIC LOGIC CIRCUIT DESIGN

EC-503

*Time : 2 Hours*

*Maximum Marks : 60*

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*The candidates shall limit their answers precisely within 20 pages only (A4 size sheets/assignment sheets), no extra sheet allowed. The candidates should write only on one side of the page and the back side of the page should remain blank. Only blue ball pen is admissible.*

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**Note :** Attempt *Four* questions in all, selecting *one* question from any of the Sections A, B, C and D.  
Q. No. **9** is compulsory.

**Section A**

1. Design a BCD Counter with J-K flip-flop which counts the following 0, 4, 2, 1, 6 sequence and repeat, using natural binary coding. **15**

2. What is the function of shift register ? With the help of simple diagram, explain its working. **15**

### Section B

3. Draw the state diagram of BCD ripple counter, develop its logic diagram and explain its operation. **15**

4. A sequential circuit is defined by the following Boolean functions with input X, present states P0, P1 and P2 next states N0, N1 and N2.

$$N2 = X(P1 \oplus P0) + \overline{X}(\overline{P1 \oplus P0})$$

$$N1 = P2$$

$$N0 = P1$$

$$Z = XP1P2$$

- (i) Derive the state table.  
 (ii) Derive the state diagram. **15**

### Section C

5. (a) Differentiate between PLA and PAL. Explain PAL in detail.  
 (b) What is programmable logic array ? How does programmable logic array differ from ROM ? **7½+7½**

6. (a) What are the steps for the design of asynchronous sequential circuit ?  
 (b) What are the different techniques used in state assignment ? **7½+7½**

### Section D

7. Explain with neat diagram the different hazards and the way to eliminate them. **15**  
 8. Find a circuit that has no static hazards and implements the Boolean function  $F(A, B, C, D) = \Sigma(0, 2, 6, 7, 8, 10, 12)$ . **15**

### (Compulsory Question)

9. (i) Why asynchronous counters are called ripple counter ?  
 (ii) What is a difference between binary and non-binary counter ?  
 (iii) What is the output frequency of a decade counter clocked from 50 kHz signal ?  
 (iv) What is fundamental mode sequential circuit ?  
 (v) What is the cause for essential hazards ?  
 (vi) What is state equivalence theorem ? **2½×6=15**