

D-180297**B. Tech. EXAMINATION, 2018**

Semester V (CBS)

ELECTRONIC LOGIC CIRCUIT DESIGN

EC-503

Time : 3 Hours

Maximum Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting *one* question from each Sections A, B, C and D. Section E is compulsory.

Section A

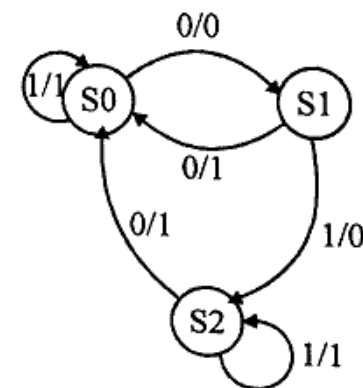
- (a) Explain state diagrams with an example.
(b) Draw the logic diagram for a binary up-counter using four JK flip-flops and draw the truth table and the output waveforms.

- (a) Design a shift register counter to generate a sequence length of 8 having self-start feature.
(b) Design a mod-10 (Decade) synchronous counter using JK flip-flops. 12

Section B

- A sequential network has one input X and two outputs S and V. X represents a four-bit binary number N, which is input least significant bit first. S represents a four-bit binary number equal to $N + 2$, which is output least significant bit first. At the time the fourth input is sampled, $V = 1$, in $N + 2$ is too large to be represented by four bits; otherwise $V = 0$.
Derive a Mealy state graph and table with a minimum number of states.

- Design a circuit that implements the state diagram : 12



Section C

5. (a) Design a JK flip-flop asynchronous sequential circuit that has two inputs and single output. The circuit is required to give an output equal to 1 if and only if the same input variable changes two or more times consecutively.
- (b) Describe cycles in asynchronous sequential circuits.
6. (a) Realize the following function using PLA :
- $$f_1(A, B, C) = \sum(0, 2, 4, 5)$$
- $$f_2(A, B, C) = \sum(1, 5, 6, 7)$$
- (b) Derive the PLA program table for a combinational circuit that squares a 3-bit number. Minimize the number of product terms. 12

Section D

7. Design and explain in detail a hazard free asynchronous sequential circuits. 12
8. What are conditions for serial and parallel decomposition in sequential circuits ? How serial decomposition affect the functioning of sequential circuit. 12

Section E

9. Answer the following : 1×12=12
- (a) Distinguish Mealy and Moore machines.
- (b) What is state table ?
- (c) What is mean of Modulo Counter ?
- (d) Limitation of finite state machines.
- (e) A scynrhonous counter has four flip-flops and the propagation delay of each is 20 ns. What is its maximum counting speed ?
- (f) Construct a logic diagram of a clocked D flip-flop using AND and NOR gates.
- (g) Describe cycles in asynchronous sequential circuits.
- (h) Explain the difference between stable and unstable states in asynchronous circuits.
- (i) Discuss limitations of FSM with suitable example.
- (j) Briefly describe the FPGA.
- (k) What is the significance of Hazards ?
- (l) Parallel decomposition.