

2056
M. Tech. (Microelectronics)
Second Semester
MIC-209: Digital Integration Circuits Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Answer the following:-

- a) What does "LS" signify in the IC 74LS00?
- b) Distinguish between transmission time and propagation delay.
- c) Define fan-in and fan-out.
- d) What are the different types of tri-state buffers?
- e) Differentiate between a latch and a flip-flop. (5×2)

UNIT - I

II. Explain and design high-speed adders. Where are these adders used and why? (10)

III. a) Why is a Multiplexer (MUX) referred to as a *universal circuit*? Explain.

b) Design a 4:1 MUX using 2:1 MUXs. (2×5)

IV. What are asynchronous inputs? Explain and illustrate a simple synchronizer with logic and timing diagrams. (10)

UNIT - II

V. What are the two basic types of finite state machines (FSMs)? Explain the steps involved in designing an FSM. (10)

VI. Design a barrel shifter with 16 data inputs, 16 data outputs, and 4 control inputs. (10)

VII. a) What are the three types of sequential circuits?

b) Design the data unit and control unit state machine for dividing an 8-bit unsigned number using the *shift and-subtract algorithm*. (2×5)

x-x-x