

Nov – Dec 2024

B. Tech Program: **Electronics and Telecommunications** Scheme: IIB

*Carry on* Regular Examination: **TY** Semester: **V**

Course Code: **EXC502-IIB** Course Name: **Digital VLSI Design**

Date of Exam: *25/05/25*

Duration: **02.5 Hours**

Max. Marks: **60**

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

	Marks	CO	BT
Q 1 Solve any <b>two</b> questions out of three: (05 marks each)	10		
a) Write lambda design rules for area and spacing in mask layout.		CO1	R
b) Explain the problem of CMOS latch up in a CMOS inverter.		CO2	U
c) Design NOR based ROM to store the following data: 1101, 1001, 0101, 0010		CO4	Ap
Q 2 Solve any <b>two</b> questions out of three: (05 marks each)	10		
Realize following expressions using transmission gate design style. i. AND gate ii. 4:1 Mux		CO3	Ap
b) Draw a block diagram of 4-bit Ripple Carry Adder. If the delay of a block is 2 ns, calculate the total delay.		CO5	Ap
c) Differentiate between HLSM and FSM.		CO6	Ap
Q.3 Solve any <b>two</b> questions out of three. (10 marks each)	20		
a) For an nMOS, i. What are the different types of capacitances? Show all the capacitance components with a proper diagram. <b>(05 Marks)</b> ii. Write an expression for the capacitance values of an nMOS transistor given the following parameters: channel length $L$ , channel width $W$ , channel overlap length $L_D$ , diffusion depth $x_j$ and oxide capacitance per unit area $C_{ox}$ . <b>(05 Marks)</b>		CO1	U
Draw and explain CMOS SRAM cell. Explain Read 1 and Write 0 operation.		CO4	U
c) Design a soda dispenser machine using RTL design technique.		CO6	C
Q.4 Solve any <b>two</b> questions out of three. (10 marks each)	20		
a) Derive expressions for $V_{IH}$ and $V_{OH}$ in CMOS Inverter.		CO2	U
b) Realize the following expression using static CMOS design style. Also draw the stick diagram following the Euler's path. $Y = \overline{(AB + CD)}$		CO3	Ap
c) Explain the principle of operation of Carry Select Adder. Demonstrate the addition of the following numbers using the same principle, $(1001\ 0010\ 1001\ 1110)_2$ and $(0011\ 0101\ 1000\ 0011)_2$ .		CO5	Ap

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