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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2026

B.Tech-VI Semester (ECE)

COURSE CODE (CREDITS): 18B11EC612 (4) MAX. MARKS: 25

COURSE NAME: VLSI TECHNOLOGY

COURSE INSTRUCTORS: Dr. Shruti Jain MAX. TIME: 1 Hour 30 Minutes

Note: *(a) All questions are compulsory. Use of calculator is allowed.*
(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

Q.No	Question	CO	Marks
Q1	i. Draw the VTC curve for resistive load *n*-MOS inverter. ii. Transition width is expressed as _____ iii. For calculating V_{IL}, the driver current is in _____region. iv. For nMOS saturated Enhancement load inverter *if* v_i = 3V and v_0= 0.1V, then driver current is in _____. v. A fast circuit dissipates more power. Justify.	2	5
Q2	Evaluate source capacitance (C_S considering both oxide and junction capacitance) for *n*-channel MOS transistor with abrupt junction having parameters: substrate doping density =10^{16}/cm^3, polysilicon gate doping density=2×10^{20}/cm^3, C_{j0}=2.942 × 10^{-4}F/m^2, *gate* oxide thickness = 50nm, length of drain = 9μm, width = 4μm, length of channel=1.5μm, drain to bulk voltage=1.5V, gate to source voltage=2V, drain to source voltage=2V, threshold voltage=0.8V, electron mobility=650 cm^2/V-s.	3	5
Q3	i. A resistive load nMOS inverter has the following parameters: R = 1 kΩ, $\mu_n C_{ox}$ = 22 μA/V^2, V_{TO} = 1V, V_{DD} = 4.0V. Determine W/L ratio such that V_{OL} = 1V. ii. For resistive load nMOS inverter determine the V_{OH} when biased at V_{DD} = 2.5V, k'=1μA/V^2, V_{t0D}= 0.5V, $(W/L)_D$ =10, R = 2KΩ.	4	3 + 2
Q4	Sita wants to work on linear E-MOS inverter. Determine the *high input voltage* when inverter is biased at V_{DD} = 4V, V_{GG} = 5V, k`= 45μA/V^2, V_{t0D} = V_{t0L} = 0.8V, $(W/L)_D$ =10, $(W/L)_L$= 2, V_{out} = 0.2V.	4	5
Q5	Design the depletion load inverter such that maximum power dissipation is 350μW. The inverter is biased at 5V with output voltage 0.192V, threshold voltages V_{TOD} = 1V, V_{TOL} = -3V, K_n` = 25μA/V^2.	4	5