COURSE CODE (CREDITS): 25B11MA312 (2) MAX. MARKS: 15

COURSE NAME: NUMERICAL TECHNIQUES

COURSE INSTRUCTORS: RKB*

MAX. TIME: 1 Hour

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

Q.No	Question	CO	Marks
Q1	Suppose that we are using a computer with a fixed word length of 4 digits. Evaluate the error due to chopping in representing the number 86.45315.	CO-1	2
Q2	If the true value of an observation is 1565 and the approximated value is 1520, then find the percentage relative error.	CO-1	2
Q3	If for a transistor, the node-voltage equation reduces to a polynomial like $x^3 - x - 4 = 0$ after non-dimensionalization. Solve the polynomial using Newton-Raphson method correct to 3 decimal places to find the node voltage (normalized) at the DC operating point needed before analyzing small-signal behavior or designing bias networks.	CO-2	4
Q4	Suppose we have a **gate delay** measured at different input transition times The measured gate delays at three input slews are given: Input Slew (ns): 0.1, 0.3, 0.5 Delay (ns): 0.25, 0.40, 0.65 Using Lagrange Interpolation, estimate the interpolated delay at input slew 0.20.	CO-2	4
Q5	Suppose the following data represents the measured NMOS saturation current (Id) versus gate voltage (Vgs) data: Vgs: 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0 Id: 0.05, 0.40, 1.10, 2.10, 3.45, 5.10, 7.05 Using the method of least square, fit a linear order equation to interpolate the value of saturation current at the gate voltage 1.5.	CO-2	3

Q4 table:

Input Slew (ns)	0.1	0.3	0.5
Delay (ns)	0.25	0.40	0.65

Q5 table:

Vgs	0.8	1.0	1.2	1.4	1.6	1.8	2.0
Id	0.05	0.40	1.10	2.10	3.45	5.10	7.05

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