JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

MTech-I Semester (SE)

COURSE CODE (CREDITS): 25M1WCE131(3) MAX. MARKS: 15

COURSE NAME: Modelling Simulation and Computer Application

COURSE INSTRUCTOR: Dr. Tanmay Gupta MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed

Q.No	Question	CO	Marks
Q1	An 80 cm piece of wire is cut into two pieces. One piece is bent into an equilateral triangle and the other will be bent into a rectangle with one side 4 times the length of the other side. Determine where, if anywhere, the wire should be cut to maximize the area enclosed by the two figures.	1	3
Q2	a) Explain with an example use of Modelling and Simulation in Civil Engineering. (b) Write any 4 advantages and 4 disadvantages of application on Modelling and Simulation	1	4
Q3	In open channel hydraulics, the alternate subcritical flow depth y (in meters) for a rectangular channel with a specific energy $E = 2.5$ m and a unit discharge parameter $\frac{q^2}{2g} = 0.20\ \text{m}^3$ is defined by the cubic specific energy polynomial equation: $f(y) = y^3 - 2.5y^2 + 0.20 = 0$ Calculate the alternate flow depth y using the Newton-Raphson Method, starting with an initial estimate of $y_0 = 2.4$ m. Continue iterations until the absolute error $\lvert y_{n+1} - y_n \rvert$ drops below the standard civil engineering tolerance of $\varepsilon_{tol} = 10^{-4}$ m (0.0001 m).	2	4
Q4	A precast plant produces Beams (x_1) and Columns (x_2) with profits of ₹300 and ₹200 per unit, respectively. Resource consumption and daily capacities are: • Concrete: 2 tons/beam and 1 ton/column (max 18 tons) • Steel: 2 tons/beam and 3 tons/column (max 42 tons) • Curing Area: 3 m^2/beam and 1 m^2/column (max 24 m^2) Formulate the LPP and determine the profit-maximizing daily production using the Simplex Method.	2	4

MID TERM EXAMINATION AUG-2026