JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Make-up Examination-Nov-2025

MTech-I Semester (Structural Engineering)

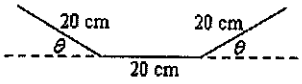
COURSE CODE (CREDITS): 25M1WCE131 (3) MAX. MARKS: 25

COURSE NAME: MODELLING, SIMULATION AND COMPUTER APPLICATIONS

COURSE INSTRUCTORS: Dr. Tanmay Gupta MAX. TIME: 1 Hour 30 Minutes

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

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems, Use of Scientific Calculator is allowed.

Q.No	Question	CO	Marks
Q1	A trough for holding water is formed by taking a piece of sheet metal 60 cm wide and folding the 20 cm on either end up as shown below. Determine the angle that will maximize the amount of water that the trough can hold. 	2	4
Q2	A numerical model is often considered an approximation of reality. Discuss the process of model validation and verification in the context of civil engineering simulations. Why are both steps essential, and what could be the consequences of neglecting either in structural or geotechnical analysis?	1	4
Q.3	Discuss the advantages and disadvantages of modelling and simulation in civil engineering applications. In your answer, highlight situations where simulation provides clear benefits, and cases where it may not be the most suitable approach.	1	4
Q.4	Solve the following LPP Using Two Phase method: Minimize $Z = 2x_1 - 4x_2 + 3x_3$ Subjected to $5x_1 - 6x_2 + 2x_3 \geq 5$ $-x_1 + 3x_2 + 5x_3 \geq 8$ $2x_1 + 5x_2 - 4x_3 \leq 9$ $x_1, x_2, x_3 \geq 0$	2	5
Q.5	Find the root of the equation $2x - 5 = 3\sin(x)$ by Newton – Raphson method correct to 3 decimals.	2	4
Q.6	Using regression analysis fit a parabola $y = ax^2 + bx + c$ to the following data:	3	4

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

(43)