JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech- III Semester (CE)

COURSE CODE (CREDITS): 25B11CE311 (4) MAX. MARKS: 25

COURSE NAME: ENGINEERING MECHANICS

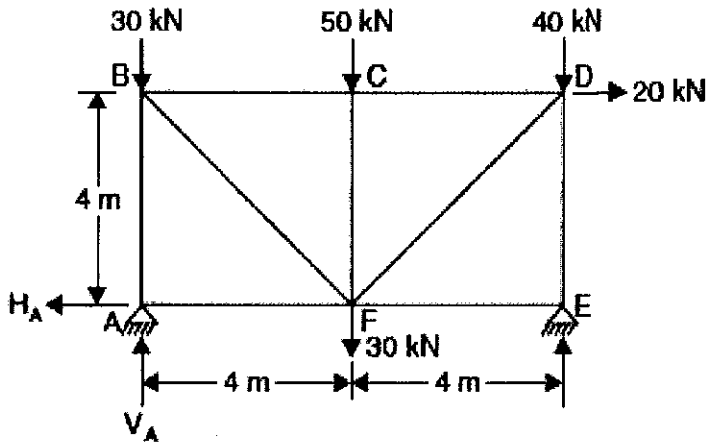
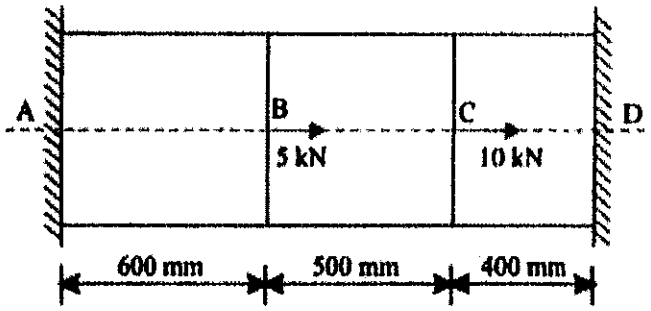
COURSE INSTRUCTORS: DR SAURAV MAX. TIME: 1 Hour 30 Min

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

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

(c)Use of Non Programmable Scientific Calculator is allowed

Q.No	Question	CO	Marks
Q1	A circular rod of length L tapers uniformly from diameter d_1 at one end to d_2 at the other. The rod is subjected to an axial load P and has a modulus of elasticity E. **a)** Apply the concept of deformation under axial loading to derive an expression for the total change in length of the uniformly tapering rod. **b)** For a bar tapering from (d + a) to (d – a) over a length L, compare the actual extension with that calculated by assuming a uniform cross-section of average diameter d, and hence determine the percentage error.	4	5+2
Q2	A hollow steel tube is required to carry an axial compressive load of 160 kN. The yield stress for the steel is 250 N/mm², and a factor of safety of 1.75 is to be applied in the design. Three classes of tubes, each with an external diameter of 101.6 mm, are available: **Class** / **Thickness (mm)**: Light 3.65; Medium 4.05; Heavy 4.85 **a)** Apply the concept of axial stress and factor of safety to calculate the safe load-carrying capacity of each tube section. **b)** Analyze and compare the results obtained for the light, medium, and heavy tubes to identify which section provides adequate strength under the given loading conditions.	4	5

Q3	Determine the forces in the members of truss shown in Fig. 1 and tabulate the results.  **Fig. 1**	2	6
Q4.	A straight uniform bar AD is clamped at both ends and loaded as shown in the Fig. 2. Initially the bar is stress free. Determine the stresses in all the three parts (AB, BC, CD) of the bar if the cross-sectional area of the bar is 1000 mm^2.  **Fig. 2**	4	4
Q5.	Draw the stress- strain curve of mild steel in a tension test and show the salient points on the curve. Explain why stress increases after plastic stage in strain hardening region.	4	3