JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Supplementary Examination- 2026

BTech-3rd Semester (CE)

COURSE CODE(CREDITS):25B11CE311 MAX. MARKS: 75

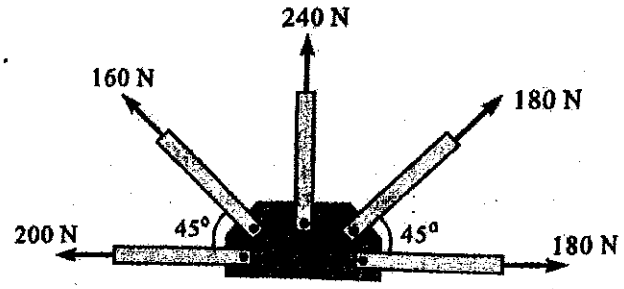
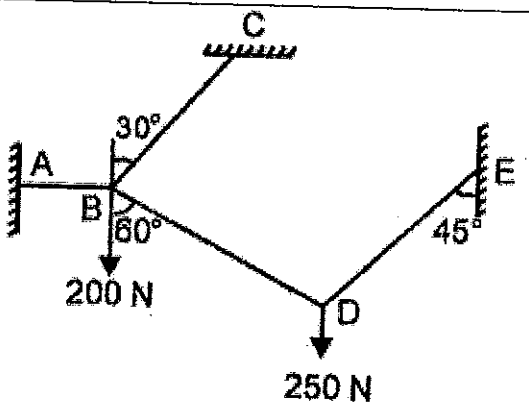
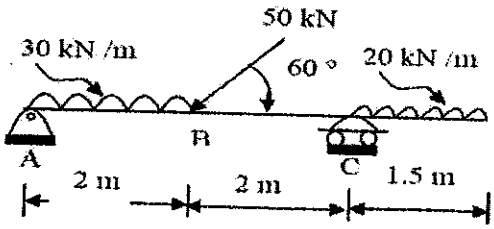
COURSE NAME: ENGINEERING MECHANICS

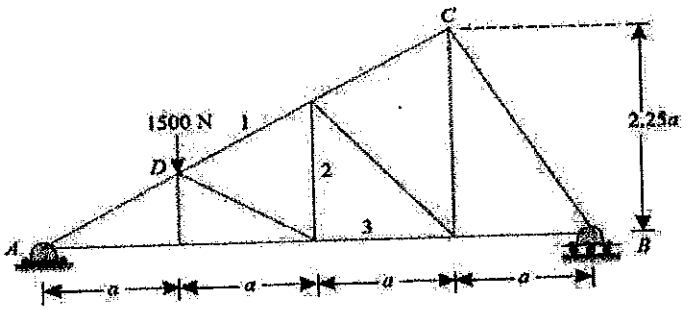
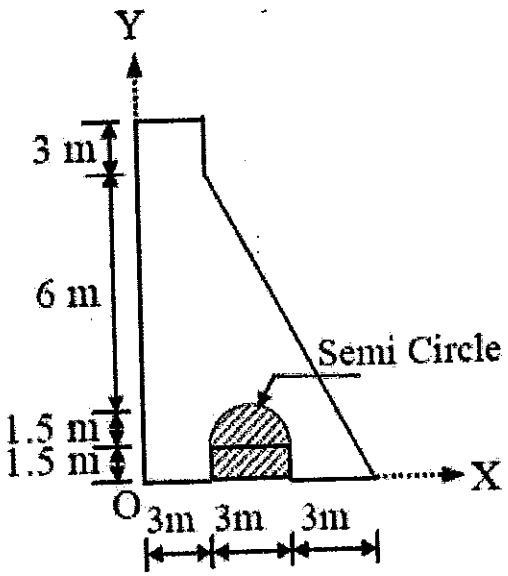
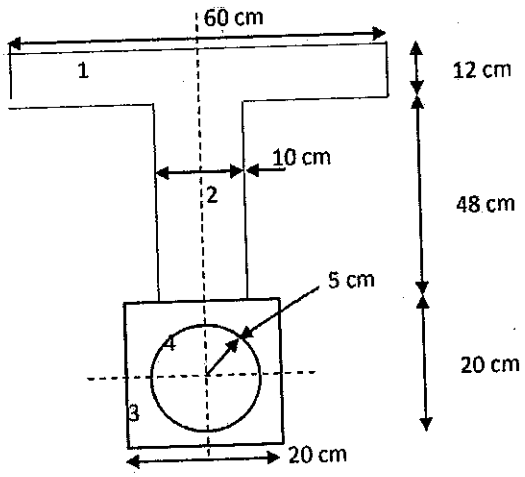
COURSE INSTRUCTORS: DR SAURAV MAX. TIME: 2 Hours

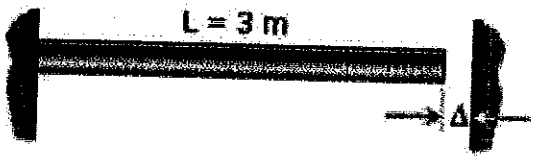
Note: *(a) All questions are compulsory.*

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

(c) Use of Non Programable calculator is allowed

Q.No	Question	CO	Marks
Q1	A gusset plate of roof truss is subjected to forces as shown in Fig.1. Determine the magnitude of the resultant force and its orientation measured counter clockwise from the positive x-axis  Fig. 1	1	5
Q2	a) State and prove Lami's theorem b) A system of connected flexible cable shown in Fig. 2 is supporting two vertical forces 200 N and 250 N at points B and D. Determine the forces in various segments of the cable  Fig. 2	2	6+7
Q3	Find out the support reactions for the beam as shown in Fig. 3  Fig. 3	2	7

Q4	A plane truss is loaded & supported as shown in Fig.4. Determine the nature and magnitude of the forces in the members' 1,2 and 3.  Fig. 4	2	10
Q5	Determine co-ordinates of centroid with respect to 'O' of the section as shown in Fig. 5  Fig.5	4	10
Q6	Determine moment of inertia of a section shown in Fig. 6 about horizontal centroid axis.  Fig. 6	4	10

Q7	A bronze bar 3 m long with a cross-sectional area of 320 mm^2 is placed between two rigid walls as shown in Fig. 7. At a temperature of -20°C, the gap $\Delta = 2.5$ mm. Find the temperature at which the compressive stress in the bar will be 35 MPa. Use $\alpha = 18.0 \times 10^{-6}$ /°C and E = 80 GPa.  Fig. 7	4	8
Q8	Derive an equation for moment of inertia of the following sections: a) A rectangular section (B × D) about its centroidal axis parallel to its width. b) A triangular section of base B and height H about its base.	3	12