JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2023

B.Tech- 3rd Semester (CE)

COURSE CODE (CREDITS): **18B11CE315 (3)** MAX. MARKS: 35

COURSE NAME: **Engineering Mechanics**

COURSE INSTRUCTORS: Dr. Saurav MAX. TIME: 2 Hours

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

(b)Marks are indicated against each question in square brackets.

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

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Q1. Deduce the equation to find the centroid of triangular lamina of height h and base b about its base. **[5, CO3]**

Q2. Find the centroid of an I section from the bottom with following details **[5, CO3]**

Top Flange width = 100mm, Top flange thickness = 20mm, bottom flange width= 150mm

Bottom flange width = 30mm, overall depth = 150mm

Q3. In a tensile test on a specimen of mild steel, 16 mm diameter and gauge length 300 mm, the following results were recorded : **[5, CO4]**

Load (N)	5000	10000	15000	20000	25000	30000	35000	40000
Extension (mm)	0.040	0.080	0.121	0.161	0.201	0.242	0.282	0.322

Draw the stress-strain curve for this specimen data in the graph paper and hence determine the value of Young's modulus of elasticity. When the specimen was afterwards tested to destruction, the maximum load recorded was 65000 N, the diameter of the neck was 8.35 mm and the length between the gauge marks was 385.45 mm determine the ultimate tensile strength, percentage reduction of area and percentage elongation.

Q4. . A truss of 8 meters span is loaded as shown in Fig 1. Find the forces in the members CD, FD and FE of the truss. **[7, CO2]**

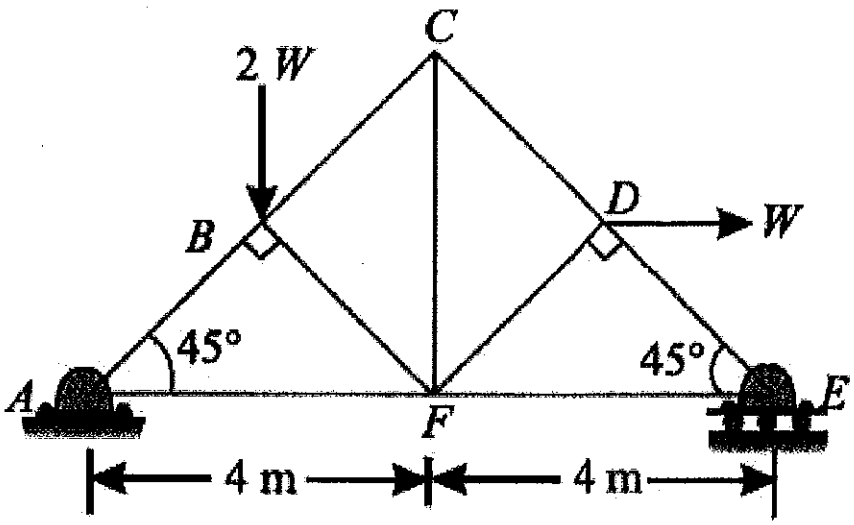

Fig. 1

Q5. Four forces equal to P, 2P, 3P and 4P are respectively acting along the four sides of square ABCD taken in order. Find the magnitude, direction and position of the resultant force. **[5, CO1]**

Q6. The cantilever is subjected to the given loading conditions as shown in Fig. 2. Determine the reactions developed **[5, CO1]**

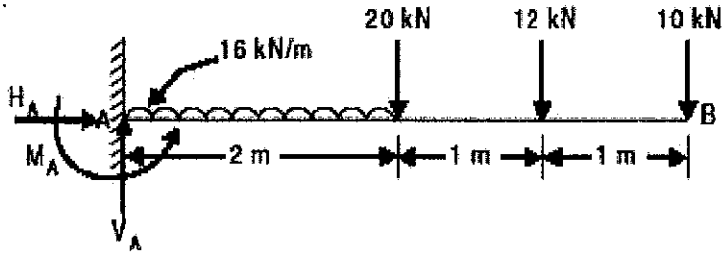

Fig. 2

Q7. A 0.5 m long steel bar is having diameter of 40 mm at one end and diameter gradually reduces from 40 mm to 20 mm at the other end. Determine the elongation of this bar when subjected to an axial tensile load of 200 kN. Given E = 200 GN/m^2. **[3, CO2]**