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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech I Year II Semester Supplementary Examinations May-2022**

**ENGINEERING MECHANICS**

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

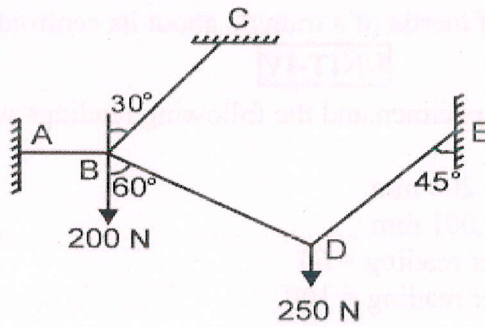
(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a The resultant of two forces when they act at right angles is 10N, whereas when they act at an angle of 60° the resultant is  $\sqrt{148}$ . Determine the magnitude of the two forces. L1 4M
- b State and prove Varignon's theorem. L3 4M
- c Classify different system of forces with suitable examples. L4 4M

**OR**

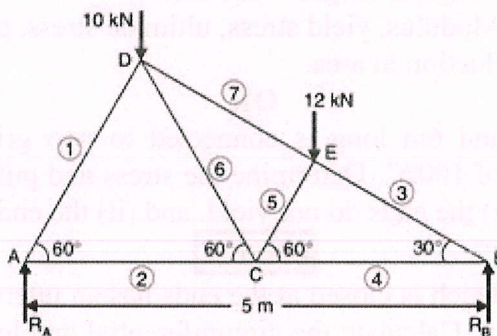
- 2 A system of connected flexible cable shown in Fig is supporting two vertical forces 200 N and 250 N at points B and D. Determine the forces in various segments of the cable.



L4 12M

**UNIT-II**

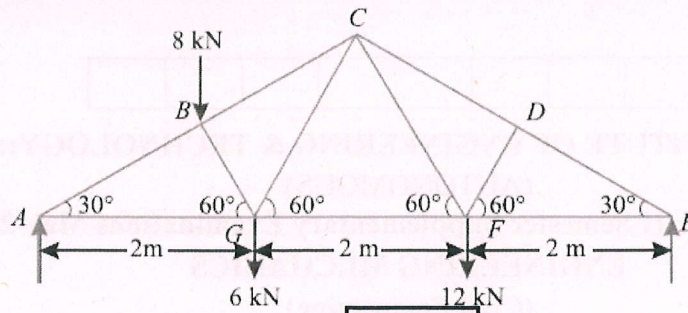
- 3 A truss of span 5m is loaded as shown in Fig. Find the reactions and forces in the members of the truss.



L4 12M

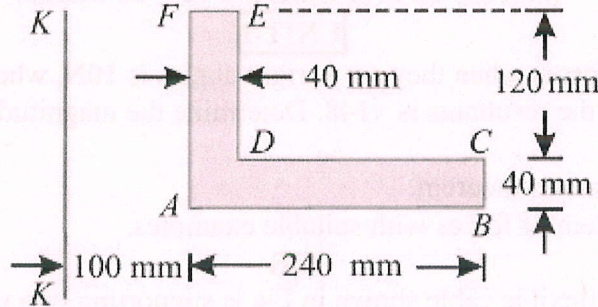
**OR**

- 4 An inclined truss is loaded as shown in Fig. Determine the nature and magnitude of the forces in the members BC, GC and GF of the truss. L4 12M



**UNIT-III**

5 Figure shows an area ABCDEF. Compute the moment of inertia of the above area about axis K-K.



L3 12M

OR

6 a Define parallel axis theorem. L2 2M  
 b How will you find the moment of inertia of a triangle about its centroidal axis? L3 10M

**UNIT-IV**

7 A tension test was conducted on a specimen and the following readings were recorded.  
 (a) Diameter = 25 mm  
 (b) Gauge length of extensometer = 200 mm  
 (c) Least count of extensometer = 0.001 mm  
 (d) At a load of 30 kN, extensometer reading = 60  
 (e) At a load of 50 kN, extensometer reading = 100  
 (f) Yield load = 160 kN L4 12M  
 (g) Maximum load = 205 kN  
 (h) Diameter neck = 17 mm  
 Final extension over 125 mm original length = 150 mm.  
 Also determine the Young's Modulus, yield stress, ultimate stress, percentage elongation and percentage reduction in area.

OR

8 A steel rod 5cm diameter and 6m long is connected to two grips and the rod is maintained at a temperature of 100°C. Determine the stress and pull exerted when the temperature falls to 20°C if (i) the ends do not yield, and (ii) the ends yield by 0.15cm. L4 12M

**UNIT-V**

9 A cylindrical shell 3m long which is closed at the ends has an internal diameter of 1m and a wall thickness of 15mm. Calculate the circumferential and longitudinal stresses induced and also change in the dimensions of the shell if it is subjected to an internal pressure of 1.5 MPa. Take  $E = 200 \text{ GN/m}^2$  and  $\mu = 0.3$ . L3 12M

OR

10 An aluminum wire is stretched taut across the diameter of a steel cylindrical pressure vessel. The diameter of the vessel is 2000mm and thickness 10mm. If the vessel is pressurized to 1 MPa and at the same time the temperature drops by 50°C. What stress would develop in the wire? Take  $\mu = 0.3$ ;  $E_{Al} = 70 \text{ GPa}$ ;  $E_s = 200 \text{ GPa}$ ;  $\alpha_l = 23.4 \times 10^{-6} / ^\circ\text{C}$ ;  $\alpha_s = 11.7 \times 10^{-6} / ^\circ\text{C}$  L3 12M

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