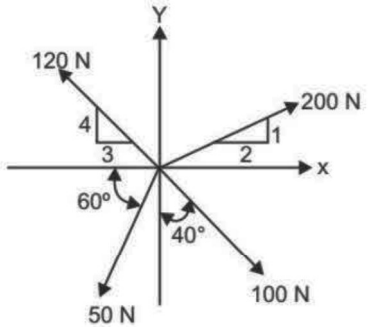
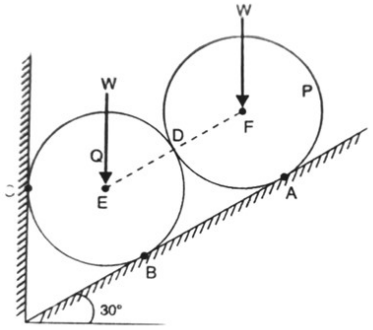
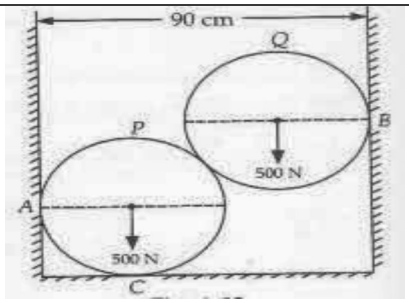
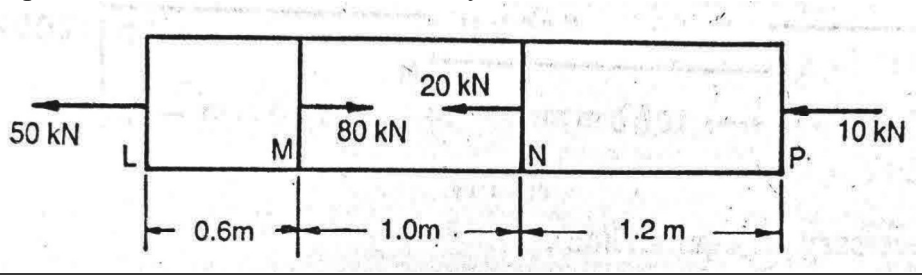
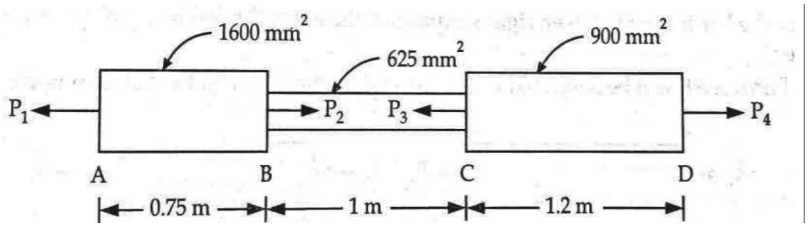
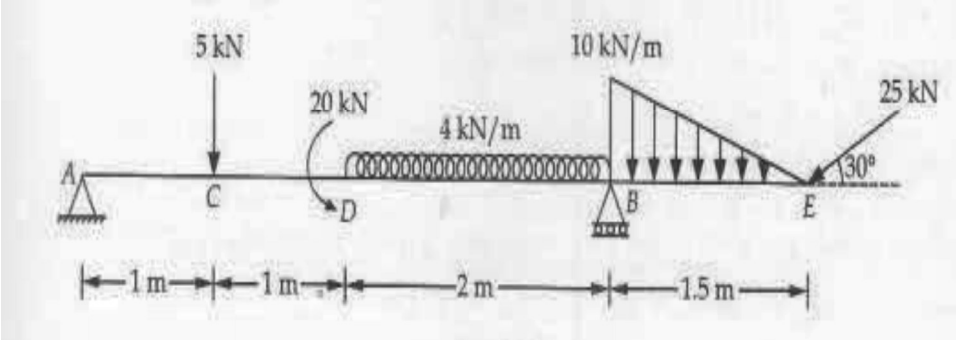
ABES ENGINEERING COLLEGE, GHAZIABAD

Department of Mechanical Engineering

Fundamentals of Mechanical Engineering (BME 101/201)

Question Bank Unit-I (Introduction to Mechanics)

Q.NO.	Short Answer type questions
1	Explain principle of transmissibility of force system.
2	Explain Varignon's theorem.
3	What are various types of loads, beams and supports?
4	What is a statically determinate beam? Give some examples too.
5	Define Engineering stress and True stress.
6	How shearing stress is different from normal stress?
7	State and explain Hooke's law and poisson's ratio.
8	Discuss about superposition theorem.
9	What are elastic constants? Give their name.
10	Write formulae for relationship among elastic constants
Q.NO.	**Short Answer type questions**
1	A system of four forces acting on a body is as shown in figure. Determine the magnitude resultant and its inclination with positive X-axis. 
2	Two identical rollers P and Q, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in figure. Draw FBD of both sphere assuming all surfaces to be smooth. Also, find the reactions at points A, B, C and D. 
3	Two forces equal to P and 2 P respectively act on a particle. When the first force is increased by 120 N and the second force is doubled, the direction of the resultant remains the same. Determine the value of force P.
4	Two smooth spheres P and Q each of radius 25 cm and weighing 500 N, rest in a horizontal channel having vertical walls. if the distance between the walls is 90 cm, make calculations for the reactions on all the points of contact.

	
5	Draw and explain stress and strain curve for ductile material. Also, explain the difference between true stress and engineering stress.
6	Illustrate the various important points on stress strain diagram for mild steel. Also, explain the significance of different regions on the same.
7	A brass bar having cross sectional area of 1000 mm^2 is subjected to axial forces as shown in the figure. Find the total elongation of the bar and stress in individual components. Take Modulus of elasticity of Brass = 100 GPa 
8	A member ABCD is subjected to point loads P_1, P_2, P_3 and P_4 as shown in figure given below:  Calculate the force P_3 necessary for equilibrium if P_1 = 120 kN, P_2=220 kN and P_4=160 kN. Determine change in length of the member. Take modulus of elasticity 200 GN/m^2.
9	A beam has been loaded and supported as shown in figure given below. Determine the reactions at the support points A and B. 
10	Derive the relationship among E (Young's modulus), K (Bulk modulus) and μ (Poisson's ratio).
11	A square bar 50 mm x 50 mm is subjected to a compressive load of 500 KN. The contraction over 200 mm length is 0.5 mm and increase in thickness is 0.04 mm. Calculate the value of the four elastic constants of the material.
12	At an axial load of 22 kN, a 45-mm-wide by 15-mm thick polyimide polymer bar elongates 3.0 mm while the bar width contracts 0.25 mm. The bar is 200 mm long. At

	the 22-kN load, the stress in the polymer bar is less than its proportional limit. Determine, 1. The modulus of elasticity. 2. Poisson's ratio. 3. The change in the bar thickness
13	A steel bar of square cross-section 35 mm x 35 mm, 500 mm long stretches 0.2 mm under a pull of 100 kN. The same bar in single shear test under a force of 122.5 kN shows a distortion of original right-angle corners by 0.00125 radian. Determine the values of the four elastic constants of the material.