Course No. CE F211   **Course Title: Mechanics of Solids**
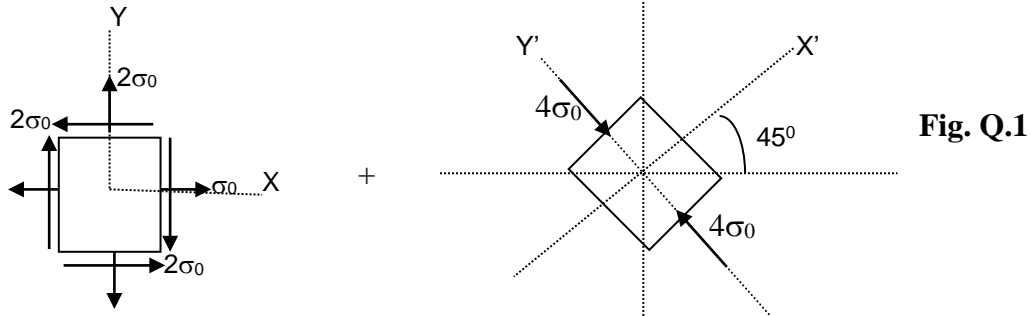**Date: 31ˢᵗ October. 2022**   **Max. Marks: 60**   **Duration: 90 Mins.**

Q.1). Draw the Mohr's circle for resultant state of stress shown in Fig Q.1 also find the principal stresses and its orientation.   [7+5+3]

Fig. Q.1

Q.2 A 600-N box is held in place on the smooth bed of the dump truck by the rope AB (FigQ.2).

a) Draw the free body diagram of the system.   [4]
b) If $\alpha = 25°$, what is the tension in the rope?   [4]
c) If the rope will safely support a tension of 400 N, what is the maximum allowable value of α?   [5]
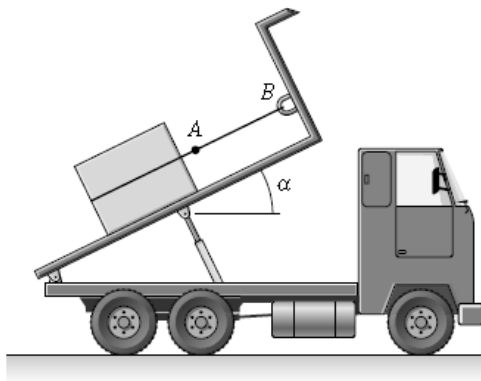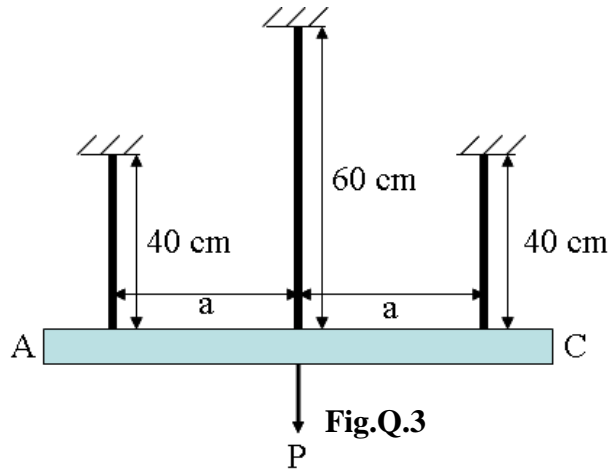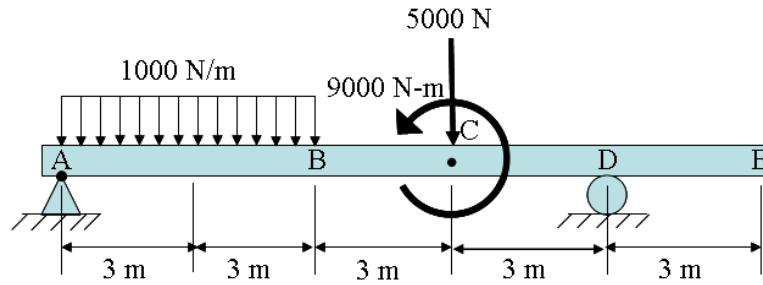

FigQ.2

Fig.Q.3

Q.3 A rigid bar (Fig Q.3) AC is supported by three rods in the same vertical plane and equidistant. The outer rods are of Brass and of length 40 cm and dia. 2 cm. The central rod is of steel of 60 cm length and of 2.5 cm diameter. Calculate the forces in the bars due to an applied load P, if the bar AC remains horizontal after the load has been applied. Take $E_s/E_b = 2$. $E_s = 2 \times 10^5$ N/mm²   [12]

Q.4 For the beam given in **FigQ.4**

a) Calculate support reactions. [3]
b) Determine Shear Force values at points A, B, C, D & E. [6]
c) Determine the Bending Moment values at points A, B, C, D & E. [6]
d) Draw Shear Force and Bending Moment Diagram indicating values at salient points.[5]

FigQ.4