Engineering Mechanics

Assignment-2

Last date of submission:15-02-2016

1. A uniform bar AB of length 3r remains in equilibrium on a hemispherical bowl of radius r as shown in fig:1. Determine the angle made by bar with the horizontal corresponding to equilibrium. Take weight of bar 100 N.
2. Determine magnitude and direction of smallest force P required to start the roller over the step as shown in fig;2
3. Two rollers A and B or weight 100 N and 200 N respectively are connected by a flexible string AB. The rollers rest on two mutually perpendicular planes CD and CE as shown in fig;3. (a) Find the tension in the string and the angle Θ that it makes with the horizontal when the system is in equilibrium. Also find the reactions under the rollers.
4. A light string ABCDE whose extremity A is fixed, has weights W_1 and W_2 attached to it at B and C. It passes round a small smooth peg at D carrying a weight of 300N and the free end E as shown in fig:4. Find weights W_1 and W_2 and pressure on peg D.
5. Two forces P and Q are applied to the corners A and B of a square plate. Find forces P , Q and angle α if resultant of two forces has a magnitude of 140 N, passing through O and making an angle of 30° with positive x axis. Refer fig:5
6. Determine magnitude and direction of minimum force P so that resultant of system is passing through point D. Refer fig:6
7. A prismatic bar AB of length l and weight 3 KN is hinged to a wall and supported by a cable BC. Find hinge reaction and tension in cable BC. Refer fig:7
8. A rigid bar AB with small rollers of weights 50 N and 100 N is supported inside a circular ring as shown in fig:8. If α+β = 90°, neglecting friction and weight of bar. Find angle Θ that bar makes with horizontal in equilibrium position, also find angles α , β, reactions at A and B and compressive force in bar AB.
9. A 10 Kg ring is supported by a smooth surface at E and a wire AB. A body of mass 3 Kg is fixed at D as shown in fig:9. What is the tension in the wire AB. Also find angle α. The point A is directly above point O.
10. Figure:10 shows a smooth cylinder of radius 25 cm. Supporting a rod AB 80 cm long, weighing 120 N. The end A of the rod is hinged to a horizontal surface AD. The cylinder is also attached to the hinge by a string of length 25 cm. Find the tension in the string for the equilibrium of the system.
11. A rigid bar AB is supported in a vertical plane by a hinge at the end A and by horizontal string attached to the bar as shown in fig:11. The end B of the bar carries a load W. Find the tensile force in the string neglecting the weight of the bar.
12. A square block of 30 cm side and weighing 40 N is hinged at A and simply supported at B on rollers. It is pulled by a string attached at the top left hand corner inclined at 30° to the horizontal. Find the pull applied to the string so that the block just get lifted from the rollers. Refer fig:12
13. A slender rod of length l is lodged between peg C and vertical smooth wall. It supports a load P at end A. Neglecting weight and friction, find angle Θ for equilibrium of bar. Refer fig:13

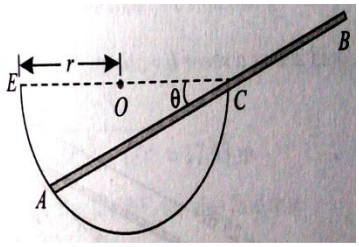

fig:1

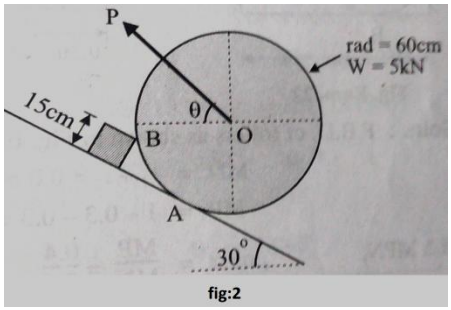

fig:2

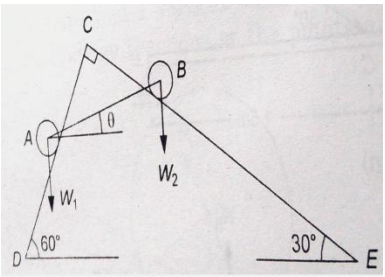

fig:3

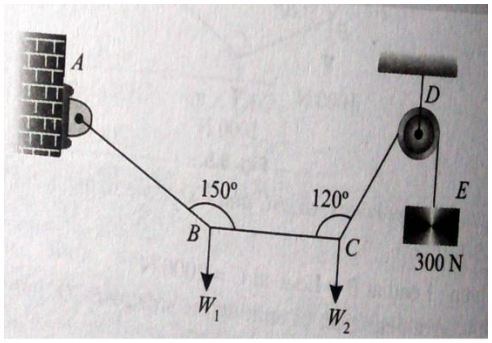

fig:4

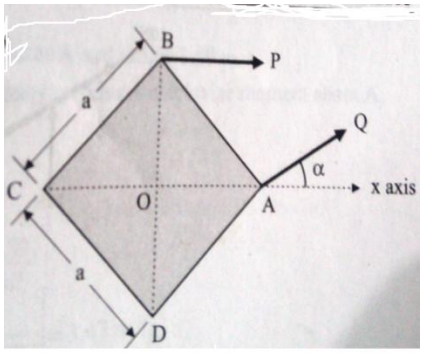

fig:5

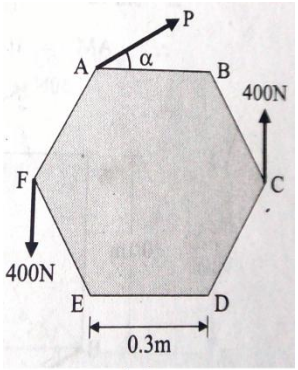

fig:6

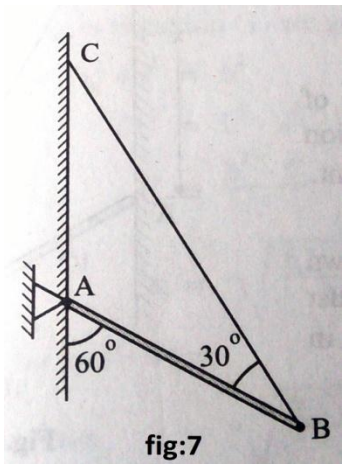

fig:7

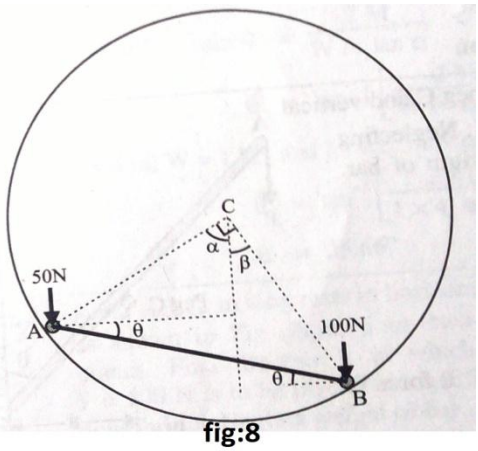

fig:8

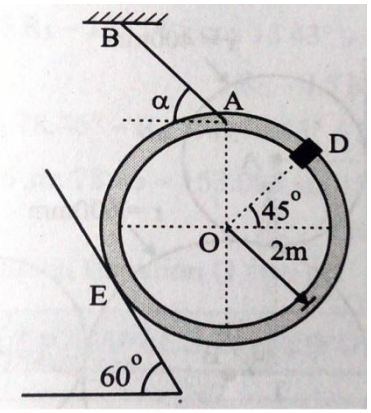

fig:9

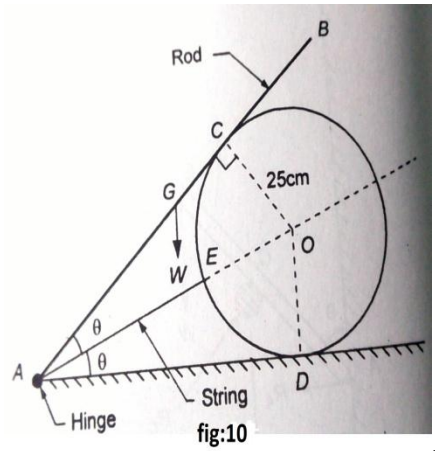

fig:10

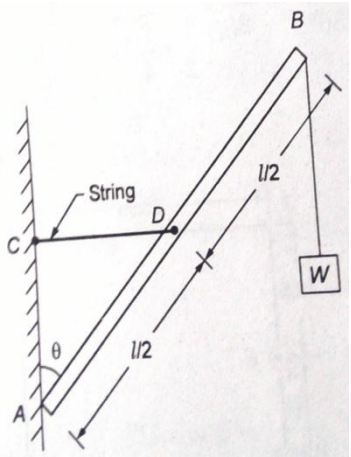

fig:11

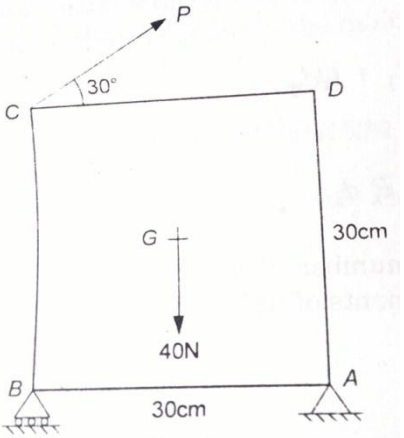

fig:12

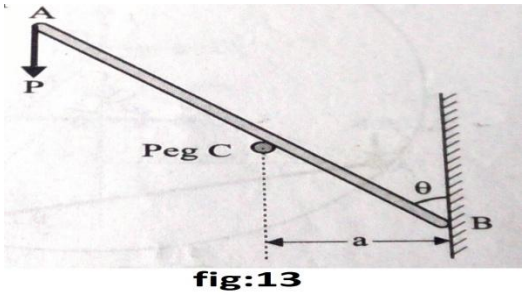

fig:13