PROBLEM SET 4.3

4.21 Calculate the axial force S_i in each bar of the simple truss supported and loaded as shown in Fig. A. The triangle ACB is isosceles with 30° angles at A and B and $P = 5$ kN. (*Ans.* $S_1 = -3.34$ kN; $S_2 = -6.67$ kN; $S_3 = +5.77$ kN; $S_4 = +2.89$ kN; $S_5 = +5.77$ kN)

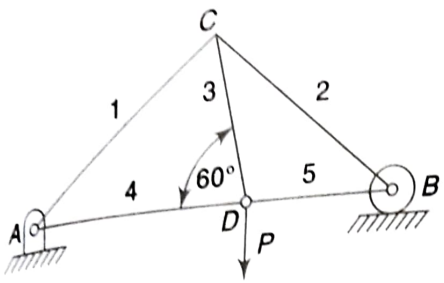

Fig. A

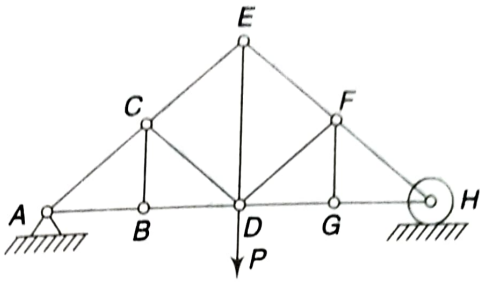

Fig. B

4.22 Prove that a tensile force equal to the applied load P is produced in the bar DE of the truss shown in Fig. B.

4.23 Determine the axial forces in the bars 1, 2, 3, 4 and 5 of the plane truss supported and loaded as shown in Fig. C.
(*Ans.* $S_1 = -P$; $S_2 = +P$; $S_3 = -0.5P$; $S_4 = +0.442P$; $S_5 = -0.333P$)

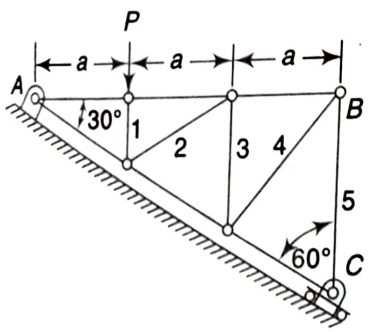

Fig. C

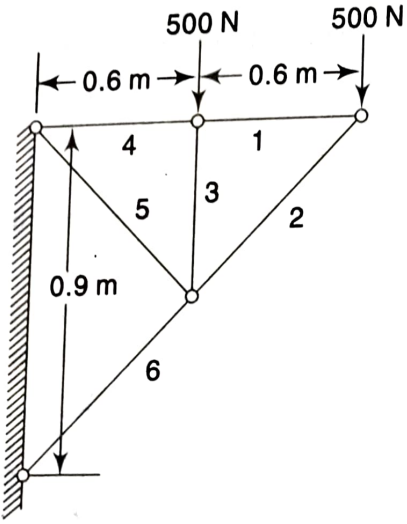

Fig. D

4.24 Determine the axial force in each bar of the plane truss loaded as shown in Fig. D. (*Ans.* $S_1 = +665$ N; $S_2 = -835$ N; $S_3 = -500$ N; $S_4 = +665$ N; $S_5 = +415$ N; $S_6 = -1250$ N)

4.25 Determine the force S in the bar CD of the simple truss supported and loaded as shown in Fig. E. The triangle ABC is equilateral.
(*Ans.* $S = -0.866P$)

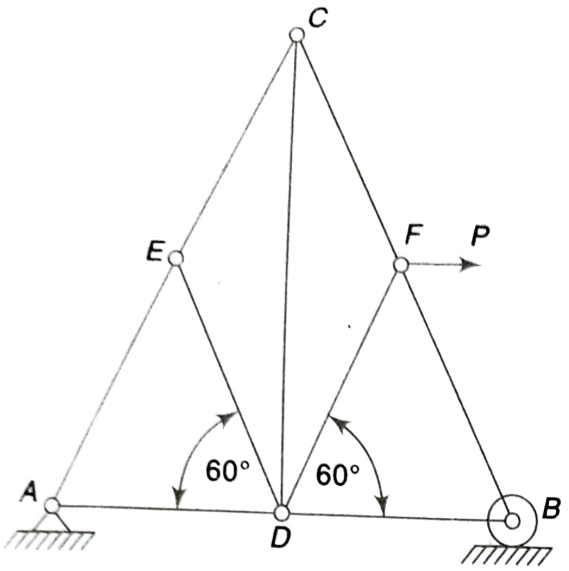

Fig. E

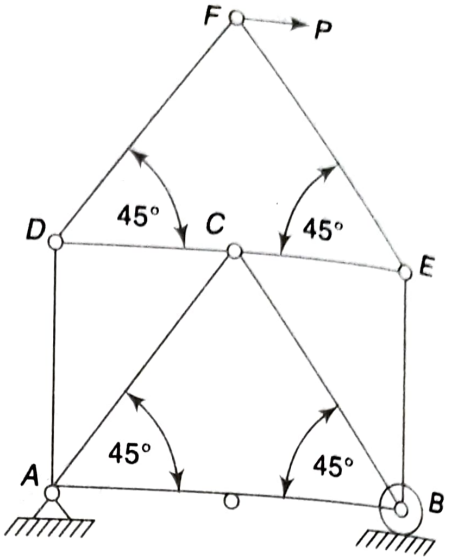

Fig. F

4.26 Determine the force S in the bar AB of the simple truss supported and loaded as shown in Fig. F. (*Ans.* $Sbd = 533.4\ N$)

4.27 Determine the axial force in each bar of the plane truss loaded as shown in Fig. G.

(*Ans.* $S_1 = -S_4 = +2P$; $S_2 = -S_6 = -2.236P$; $S_3 = +P$; $S_5 = 0$)

4.28 Determine the axial force in each bar of the plane truss supported and loaded as shown in Fig. H. $ABCD$ is a square; AC is horizontal.

(*Ans.* $S_1 = +P$; $S_2 = -S_3 = -S_5 = -S_6 = +0.707P$; $S_4 = 0$)

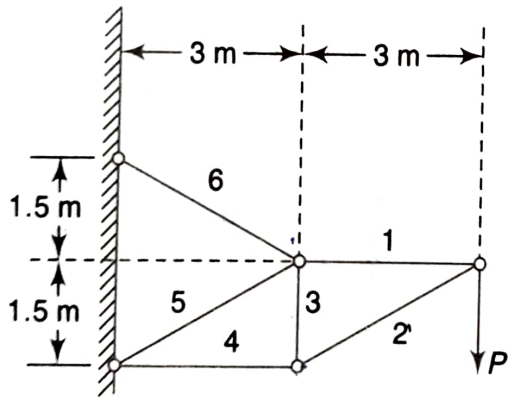

Fig. G

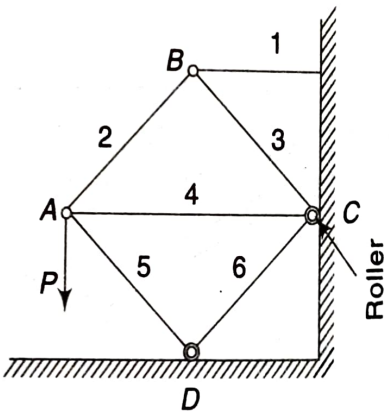

Fig. H

4.29 Determine the axial force S_i in each bar of the plane truss supported and loaded as shown in Fig. I. (*Ans.* $Ra = 500$ N; $Rb = 1500$ N; $Rc = +10$ kN; $S_4 = -7.07$ kN; $S_5 = -10$ kN; $S_6 = 21.2$ kN; $S_7 = -15$ kN; $S_8 = +15$ kN; $S_9 = -3.54$ kN)

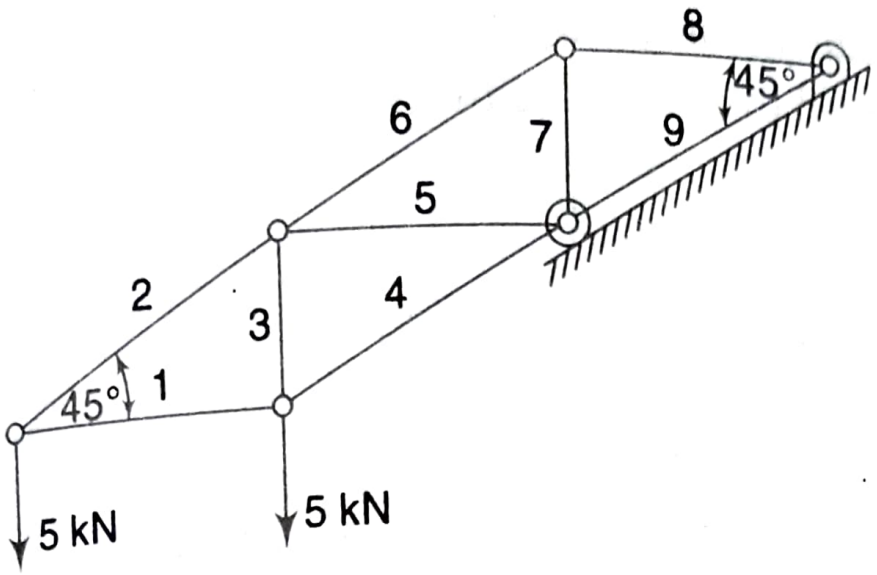

Fig. I

4.30 Using the method of joints, calculate the axial force in each of the bars 1, 2, 3 and 4 of the plane truss shown in Fig. J.

(*Ans.* $S_1 = -6P$; $S_2 = +1.414P$; $S_3 = +1.155P$; $S_4 = +2P$)

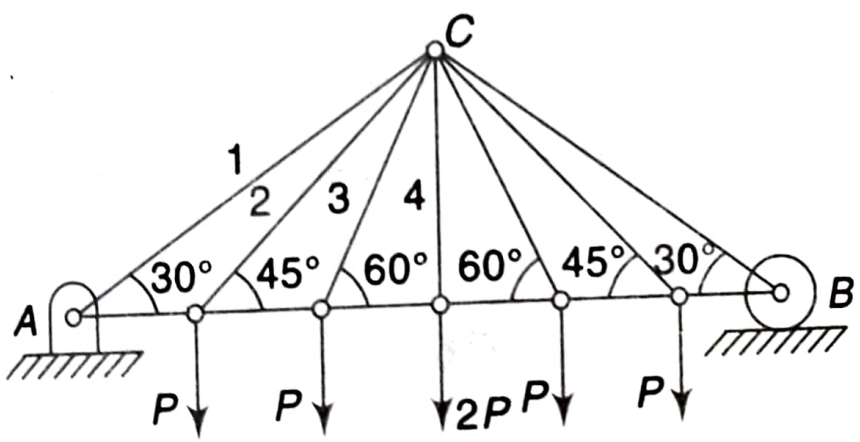

Fig. J