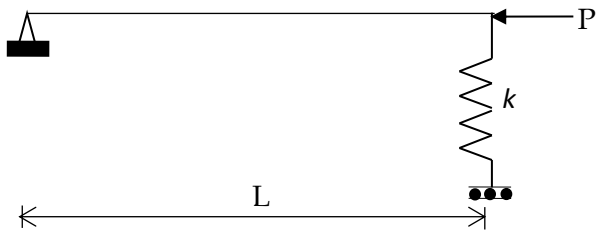
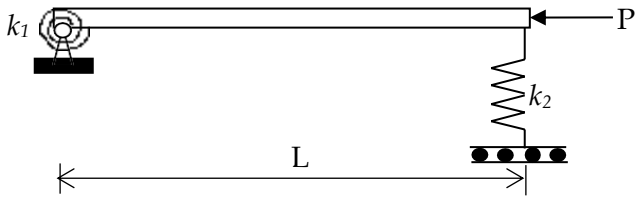
Assignment-01

1. Find the critical load P_{cr} and plot the Load vs deflection graph (Post-buckling) for the following figure

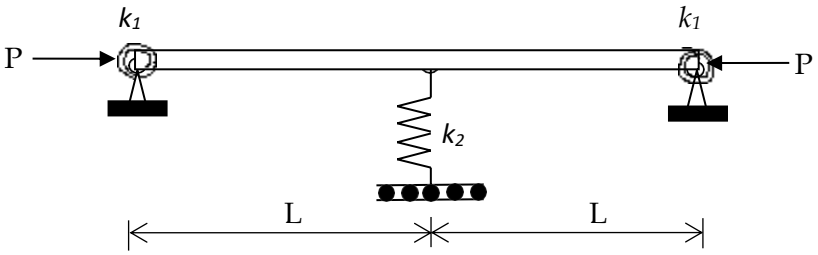


2. Find the critical load P_{cr} of the following spring bar systems using bifurcation and energy methods. Also, check the stability of systems. Assume small deflection theory.

a)



b)



3. Derive the basic differential equation and find the critical load for the column top end in fixed and bottom end is hinged.

4. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$. Find $A^3 = A^{-1}$

5. Discuss the nature of the matrix $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & -1 \\ 1 & -1 & 0 \end{bmatrix}$

6. Find the Taylor series expansion for the following :

i) $\frac{\sin x}{x-\pi}$ at $x = \pi$ ii) $3\sin x + 2\cos x$

7. Find the coefficient of $(x-\pi)^2$ in the Taylor series expansion of $f(x) = e^x + \sin x$ about $x-\pi$

8. Solve $\frac{d^4y}{dx^4} - y = 15cos2x$

9. Find the solution for the differential equation $\frac{d^2y}{dx^2} = 3x - 2$ with boundary conditions $y(0)=2$ and $y'(1) = -3$

10. Find the maximum and minimum values of $3x^4-2x^3-6x^2+6x+1$ in the interval (0,2)