

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M. TECH DEGREE EXAMINATION**

Civil Engineering

(Structural Engineering and Construction Management)

04CE6411—Structural Dynamics

Max. Marks : 60

Duration: 3 Hours

PART A

Answer All Questions

Each question carries 3 marks

1. Explain the principle of virtual work.
2. Differentiate between coulomb and viscous damping.
3. Explain Duhamel's Integral.
4. Write a brief note on modal analysis
5. Explain normal mode shapes
6. Enumerate the boundary conditions for longitudinal vibration of a bar.
7. Write short notes on Stodola's method.
8. Explain Rayleigh-Ritz method

PART B

Each question carries 6 marks

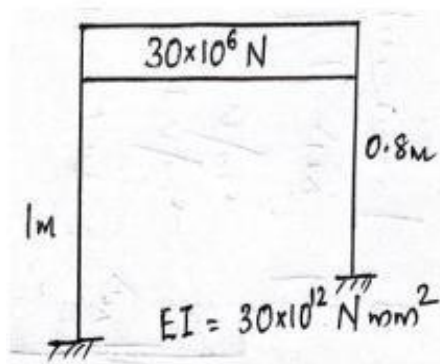
9. A vertical cable 3 m long has a cross sectional area of 4 cm^2 and it supports a weight of 50 kN. What will be the natural period and natural frequency of the system? $E = 2.1 \times 10^6 \text{ kg/cm}^2$.

OR

10. Explain vibration control.
11. Explain critical damping, under damping and over damping

OR

12. Find the amplitude and displacement at 1sec of the frame shown, if initial displacement is 25mm and initial velocity is 25mm/s.



13. Explain vibration measuring equipments

OR

14. Suggest a suitable design such that the force transferred to machine foundation is minimum

15. Write the equation of motion of damped and undamped forced vibration of multi degree freedom system

OR

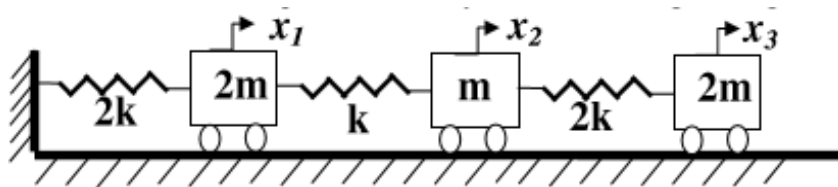
16. Derive orthogonality conditions.

17. A steel rod of diameter 15 mm having length 3m is hinged at its both ends. Find the first three natural frequencies of transverse vibration. Take density of steel as 7850 kg/m^3 and modulus of elasticity as 200 GPa

OR

18. Determine the frequency equation for transverse vibration of a cantilever

19. Determine the natural frequencies of the system shown in figure using matrix method



OR

20. Explain Dunkerleys method.