

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code: U2601

M.E. DEGREE EXAMINATION, NOV 2025

Second Semester

Structural Engineering

21PSE202 - STRUCTURAL DYNAMICS

(Regulation 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 20 = 100 Marks)

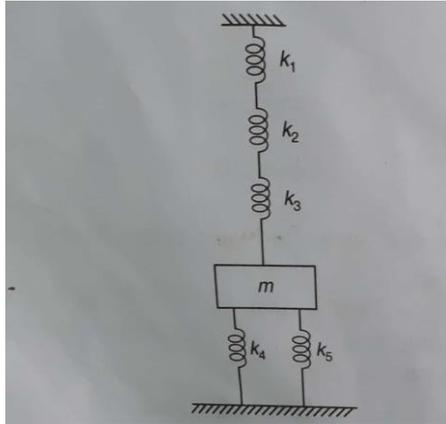
1. (a) A mass of one kg is suspended by a spring having stiffness of 600N/m . The mass is displaced downward from its equilibrium position by a distance of 0.0m . To determine CO2-App (20)
- a) Equation of motion in system
 - b) Natural frequency of the system
 - c) The response of the system as a function of time
 - d) Total energy of the system

A One kg mass is suspended by a spring having a stiffness of 1N/mm . Determine the natural frequency and static deflection of the spring.

Or

- (b) A simply supported rectangular beam has a span of 1.5m . It is 200mm wide and 20mm deep. It is connected at mid-span of a beam by means of a linear spring having a stiffness of 120 kg/cm and a mass of 500 kg is attached at the other end of spring. Determine the natural frequency of the system. Take $E = 3.1 \times 10^6\text{kg/cm}^2$ CO2-App (20)

2. (a) Consider the system shown in fig. If $K_1=2000\text{N/m}$, $K_2=1500\text{N/m}$, $K_3=3000\text{N/m}$ and $K_4=K_5=500\text{N/m}$, find the natural frequency of system and Take $m=27\text{kg}$ CO2-App (20)



- (b) A mass of 3.5 kg is suspended by a spring having a stiffness at 700 N/m. The mass is displaced downward from its equilibrium position by a distance of 0.02 m. Estimate equation of motion, normal frequency, the response of the system and total energy. CO2-App (20)
3. (a) Suggest a suitable seating arrangement of stadium. Typical seating arrangement has the form of steps from lower level to higher level supporting on stringer beams. The span length between two beams is 25 m. Assume the properties of T section Check the safety of the cross section if the people on it are applying a load of 0.4kN/m^2 with the frequency of 3Hz Check the safety of the cross section if the people on it are applying a load of 0.4kN/m^2 with the frequency of 5Hz. CO4-Ana (20)

Or

- (b) Suggest suitable seating arrangements of stadium. Typical seating arrangement has the form of steps from lower level to higher level supporting on stringer beams. The span length between two beams is 10 m Assume the properties of T section, Check the safety of the cross section if the people on it are applying a load of 0.4kN/m^2 with the frequency of 6Hz, Check the safety of the cross section if the people on it are applying a load of 0.4kN/m^2 with the frequency of 7Hz. CO4-Ana (20)

4. (a) Explain Wilson approach method towards dynamic vibration of nonlinear system. CO1- U (20)
- Or
- (b) Explain the procedure involved in finding response of damped MDOF systems. CO1- U (20)
5. (a) Explain in detail about base isolation techniques and how can reduce the vibration, while earthquake happened. CO1- U (20)
- Or
- (b) Differentiate static and dynamic load analysis and which is most preferable to design the tall structures. CO1- U (20)

