Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U2602

M.E. DEGREE EXAMINATION, NOV 2024

Second Semester

Civil Engineering

21PSE202 - Structural Dynamics

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

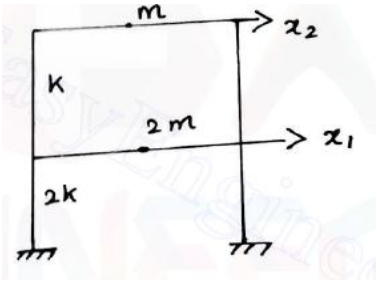
PART A - (5 x 20 = 100 Marks)

1. (a) A System vibrating with a natural frequency of 6Hz starts with an initial amplitude of 2cm and an initial velocity of 25cm/s. CO2- App (20)
(a) Determine the natural period, amplitude, maximum velocity, maximum acceleration and phase angle. Also write the equation of motion of a vibrating system.
(b) A One kg mass is suspected by a spring having a stiffness of 1N/mm. Determine the natural frequency and static deflection of the spring.

Or

(b) For a SDOF system, mass is 10 kg stiffness = 6.25kn/m, damping coefficient = 20Ns/m. Initial displacement at t=0 is zero and initial velocity is 150m/s. Obtain the equation of motion and final the displacement at 2 seconds. CO2- App (20)

2. (a) Determine the natural frequencies and the mode shapes for the shear building as shown in fig CO2- Ana (20)



Or

	(b)	The details of a 2 storey building with 3m×3m plan area are as follows. Floor to floor height = 3m Column dimensions = 230×230mm Thickness of slab = 100mm Perform the Eigen value analysis and find the Eigen values and Eigen vector by assuming the columns are mass less and infill walls are not present.	CO2- Ana	(20)
3.	(a)	Design a 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 11.7 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/m2 with the frequency of 3Hz.	CO4- Ana	(20)
		Or		
	(b)	Design a 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 20 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/m2 with the frequency of 5Hz.	CO4- Ana	(20)
4.	(a)	A reinforced concrete chimney idealized as the lumped-mass cantilever is subjected at the top to a step force p(t) of 1000kips.m=208.6 kip-sec^2/ft and EI=5.469 x10^{10} kip-ft^2.Solve the equation of motion after transforming them to the first two modes.	CO5- Ana	(20)
		Or		
	(b)	A reinforced concrete chimney idealized as the lumped-mass cantilever is subjected at the top to astep force p(t) of 1000kips.m=208.6 kip-sec^2/ft and EI=5.469 x10^{10} kip-ft^2 .Determine the response of the system.	CO5- Ana	(20)
5.	(a)	Briefly discuss about dynamic effect of moving loading? What are criteria to be followed while designing the bridge structures.	CO1- U	(20)
		Or		
	(b)	Explain in detail about base isolation techniques and how can reduce the vibration, while earthquake happened.	CO1- U	(20)