Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: U2602

M.E. DEGREE EXAMINATION, NOV 2023

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 mass of 1 Kg is suspended by a spring having a stiffness of 600   CO2-   (20)
         N/m. The mass is displaced downward from its equilibrium position   App
         by a distance of 0.01m.Find
         (i) Equation of motion of the system
         (ii) Natural Frequency of the system
         (iii) The response of the system as the function of time
         (iv) Total Energy of the system

                                    Or

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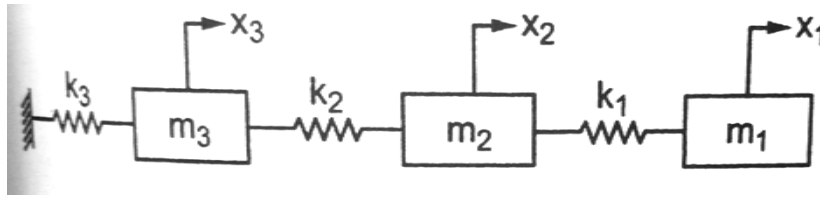   displacement at 2 seconds.

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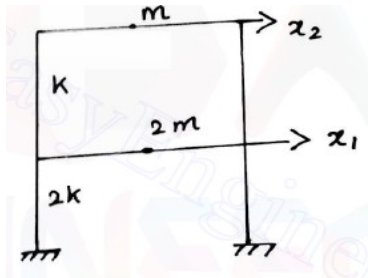
                                    Or

    (b) Derive equation of motion of a two degree of freedom system for   CO1- U   (20)
         free vibration.

3. (a) Determine the frequency and mode shape of the following fig   CO3-   (20)
App

m1=1Kg m2=1.5kg m3=2kg

<div align="center">Or</div>

(b) Design a seating arrangements of stadium. Typical seating   CO4-   (20)
arrangement has the form of steps from lower level to higher level   Ana
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.

4. (a) Explain Wilson approach method towards dynamic vibration of non   CO1- U   (20)
linear system.

<div align="center">Or</div>

(b) Explain the procedure for analysis of linear system of vibration.   CO1- U   (20)

5. (a) Briefly discuss about dynamic effect of moving loading? What are   CO1- U   (20)
criteria to be followed while designing the bridge structures.

<div align="center">Or</div>

(b) Differentiate static and dynamic load analysis and which is most   CO1- U   (20)
preferable to design the tall structures

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