

3707

B.Tech. (Civil Engineering) 8th Semester (G-Scheme)
Examination, July-2022
STRUCTURAL DYNAMICS
Paper- PEC-CEEL-414G

Time allowed : 3 hours] [Maximum marks : 75

Note: (1) Question No.1 is compulsory.

- (2) Each question carries equal mark (15 marks).
(3) Students have to attempt 5 questions in total at least one question from each
1. (a) What do you understand by degree of freedom?
(b) What is magnification factor?
(c) A harmonic motion has a time period of 0.2s and an amplitude of 0.4 cm. find the maximum velocity and acceleration.
(d) Discuss Dynamic load factor for various impulses.
(e) Explain Eigen values.
(f) Name a few methods for finding the fundamental natural frequency of a multi degree of freedom system. $6 \times 2.5 = 15$
 2. (a) Discuss how structural dynamic problem differ from its static loading? What are the different types of vibration in a structural problem? 7.5

Section-A

3707-P-3-Q-9 (22)

[P.T.O.

(2)

3707

- (b) Explain principal and working of piezoelectric transducers. 7.5
3. (a) Derive the equilibrium equation for a free vibration of viscous damping of single degree freedom system. 7.5
- (b) A 20 kg mass attached to the lower end of a spring whose upper end is fixed, vibrated with a natural period of 0.6s. Determine the natural period when a 3 kg mass is attached to the mid-point of the same with the upper and lower end fixed. 7.5

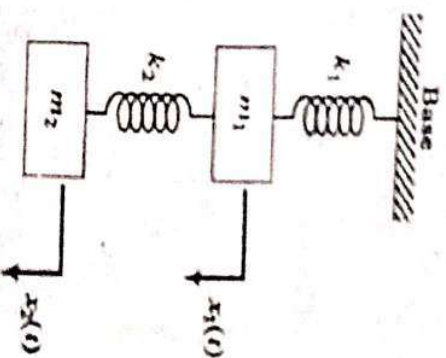
Section-B

4. Derive the equation of motion for damped force vibrations with constant harmonic excitation of a single degree freedom system. 15
5. Find the natural frequencies of the system shown in Figure, with $m1 = m2 = m3 = 2m$, $k1 = k2 = k3 = 2k$. Determine the response of the system when $k = 1000$ N/m, $m = 20$ kg, and the initial values of the displacements of the masses $m1$ and $m2$ are 1 and -1, respectively. 15

3707

(3)

3707



Section-C

6. What do you mean by decoupling of equations? Explain the concept of model superposition. 15
7. Explain consistent and lumped mass matrices. 15

Section-D

8. Explain in brief about the Rayleigh Ritz method of vibrational analysis. 15
9. Determine the response of spring mass damper system to a step input and the plot the system response for different amounts of damping. 15

3707