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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech (Civil Engineering) (2012 to 2017) (Sem.-7, 8)

DYNAMICS OF STRUCTURES

Subject Code : BTCE-806

M.Code : 71865

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Answer briefly :**

- a) Define the term: dynamic load factor.
- b) When do you model a system as multiple D.O.F. system?
- c) What is mode shape?
- d) List the approximate methods used to find the mode shapes and frequencies.
- e) State the orthogonality conditions.
- f) If two springs with stiffness of k_1 and k_2 are connected in parallel, find the equivalent stiffness of combined system.
- g) What do you mean by critical damping?
- h) List any four isolation devices.
- i) State the concept of shear building.
- j) What is resonant frequency ratio?

SECTION-B

2. Write equation of motion for two degree of freedom system shown in fig. 1 using Lagrange's equation in terms of relative displacements.

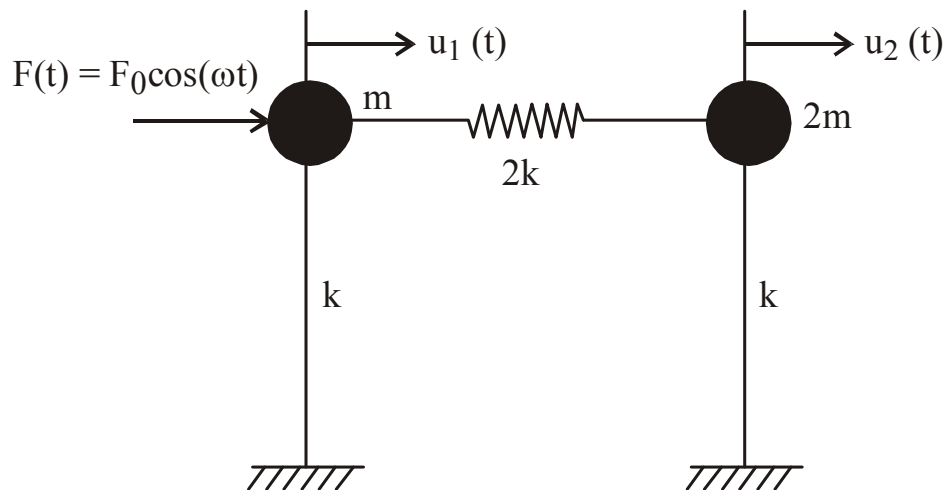


Fig.1

3. Write briefly about Rayleigh's Method.
4. What is D'Alembert's Principle? Explain how the principle is employed in the vibration problems?
5. A SDOF system is excited by sinusoidal force. The displacement observed at resonance is 50 mm. When the frequency ratio is 10, then the displacement is 5 mm. Estimate the damping ratio of the system.
6. Discuss briefly the modal analysis method.

SECTION-C

7. A machine of wt. = 90 kN is supported on springs of stiffness $k = 6.35 \times 10^{11}$ N/mm, subjected to an exciting force of 500 kN and $w = 60$ rad./sec, assuming 20% of damping. Find :
- steady-state amplitude.
 - force-transmitted to foundation.

8. Determine natural period of vibration for SDOF system shown in fig.2

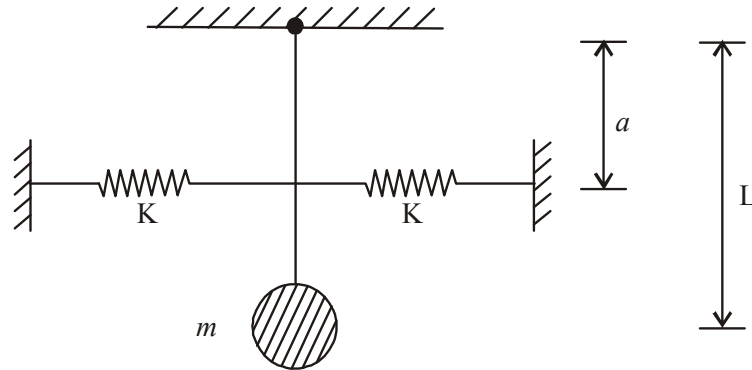


Fig.2

9. a) What is meant by damping? What are the methods to evaluate the damping? Explain any one method.
- b) Write down the procedure of numerical integration techniques.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.