PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Summer 2017 - 18 Examination

Semester: 2   Date: 21/05/2018
Subject Code: 03209152   Time: 02:00PM TO 04:30PM
Subject Name: Structural Dynamics   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) A cantilever bar is to be modelled by a mass less uniform bar to which are attached with two **(15)** lumped masses representing the mass of original system as k=2AE/L and m=ϱAL. Determine the natural frequencies and the normal modes of this model.
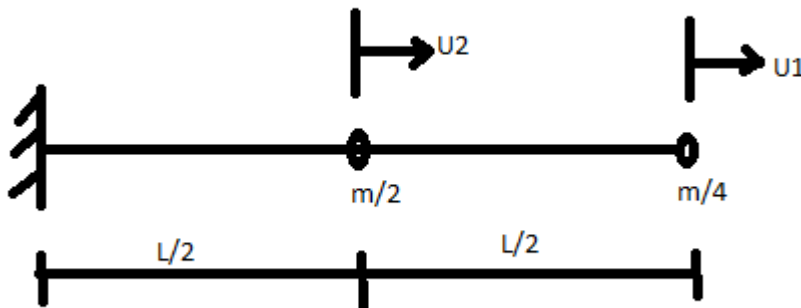
Q.2 Answer the following questions. (Attempt any three) (Each five mark)   **(15)**

A) Define the following terms.
   1. Degree of freedom   2. Time of period   3. Lumpe Mass Model

B) Explain half power bandwidth.

C) Derive the expression for harmonic motion of damped system.

D) Use the classical Rayleigh-Ritz method to derive a dynamic matrix enabling the approximate natural frequencies and normal modes of a uniform cantilever beam, in bending to be found. use the following two-term series to represent the displacement:

   $Y = a1x2 + a2x3$

   Where x is the distance along the beam from the fixed end. The length of the beam is L.

Q.3 A) What do you mean by single degree of freedom? Explain force displacement relation.   **(07)**

B) Derive the expression for viscously damped free vibration for single degree of freedom system.   **(08)**
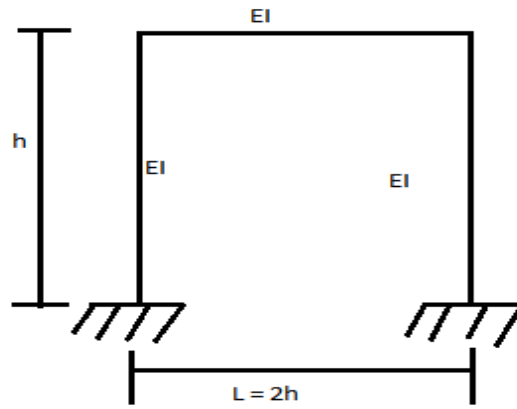
OR

B) Enlist the energy methods in structural dynamics. Explain any two in brief   **(08)**

Q.4 A) Explain coulomb damped free vibration system.   **(07)**

OR

A) Calculate the lateral stiffness for the frame shown in fig. assuming the elements to be axially rigid. **(07)**

B) What do you mean by time stepping method? Explain methods based on interpolation of excitation in detail. **(08)**