[Total No. of Questions : 8] [Total No. of Printed Pages : 3

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MVSE-201

M.E./M.Tech. II Semester

Examination, November 2019

Structural Dynamics

Time : Three Hours

Maximum Marks : 70

Note: i) Answer any five questions out of eight.
ii) All questions carry equal marks.
iii) Missing data, if any, may be suitable assumed.

1. a) Derive equation for single degree of freedom system as accelerometer. 7
   b) A radio set of 15kg mass must be isolated from a machine vibrating with an amplitude of 0.05mm at 500cpm. The set is mounted on four isolators, each having a spring scale of 31400N/m and damping factor 392N-sec/m. 7
   - What is amplitude of vibration of radio?
   - What is dynamic load on each isolator due to vibration?

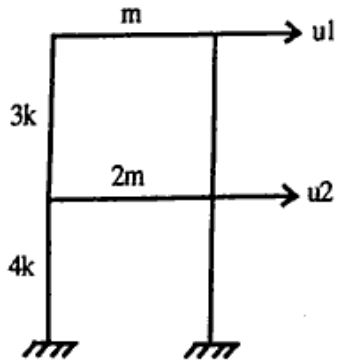
2. a) Derive equation for motion for single degree of freedom system damped forced vibration. 7
   b) Write short note on following: 7
      i) D'Alembert's principle
      ii) Logarithmic decrement
      iii) Transient vibration
      iv) Steady state vibration

3. a) Short note on: 7
      i) Energy method
      ii) Rayleigh method
      iii) Laplace Transformation
      iv) Fourier Transformation
   b) Explain Duhamel's integral for undamped system. 7

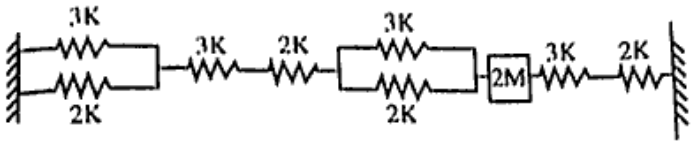
4. Derive equation of natural frequency for axial vibration of bar and bending vibration of beam as continuous system. 14

5. Explain Rayleigh's method for estimating fundamental frequency of continuous system and explain modification made by Rayleigh Ritz approach. 14

6. A two storey shear frame with degree of freedom u1, u2 and slab masses are m1 and m2 and column interval stiffness are 4k, 3k respectively for each frame from bottom to top. Find the response of motion of building in terms of natural frequency and mode shape for undamped free vibration condition. 14



7. Find natural frequency for given system below. 14



8. Write short note on (any four): 14
   i) Orthogonality principal of normal modes
   ii) Mode shape
   iii) Eigen value problem
   iv) Stiffness influence coefficient
   v) Flexibility influence coefficient
   vi) Matrix iteration technique for Eigen value

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