

Code No: G1504/R13

M. Tech. I Semester Supplementary Examinations, January-2017

MECHANICAL VIBRATIONS

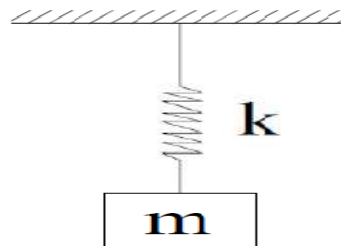
(Common to MD, MED and CAD/CAM)

Time: 3 hours

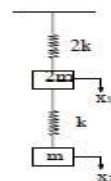
Max. Marks: 60

*Answer any FIVE Questions
All Questions Carry Equal Marks*

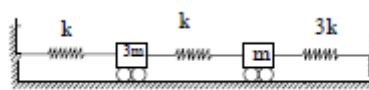
1. a Determine the differential equation of a spring mass system (shown in the figure below) and its natural frequency by using
 - i. D' Alembert's principle
 - ii. Rayleigh's method.



- b Explain the classifications of vibration with examples.
2. Find the natural frequency and mode shapes of the system if $m = 2 \text{ kg}$, $K = 400 \text{ N/m}$, for the figure given below.

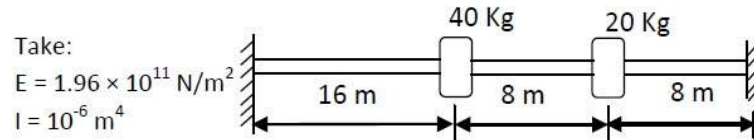


3. Determine the Eigen values and test their orthogonality property for the given diagram.



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4. a Find the natural frequency of transverse vibrations for the system shown below by Rayleigh Method. 6



- b Explain with neat sketch of working of Vibrometer. 6
5. Explain the procedure adopted for Rayleigh method to determine the natural frequency of multi-degree of freedom system with an suitable example. 12
6. Prove that the critical speed of whirling speed for a rotating shaft is same as the frequency of natural transverse vibration. 12
7. a A mass of 50 kg suspended from spring produces a static deflection of 0.017m and when in motion, it experience a viscous damping force with a value of 250 N at a velocity of 0.3m/s. calculate the periodic time of damped vibration if the mass is then subjected to periodic disturbing force having a maximum value of 200N and making 2 Cps. Find the amplitude of the ultimate force. 6
- b Explain the transmissibility and transmitted force for a spring mass damper system. 6
8. Write short on any three of the following: 12
- Damping ratio
 - Undamped system (no damped)
 - Under damped
 - Critical damped
 - Logarithmic decrement.
