PVP 14

Code: ME7T4C

IV B.Tech - I Semester – Regular/Supplementary Examinations
October – 2018

MECHANICAL VIBRATIONS
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks
11 x 2 = 22 M

1.

a) Define the terms time period and frequency.
b) Name any two types of damping in machines.
c) Write any two vibration measuring instruments.
d) Define Degree of freedom and give examples of single and multi dof systems.
e) What is mode frequency and mode shape?
f) What is the need of vibration absorbers?
g) Define flexibility and stiffness coefficients.
h) What do you mean by proportional damping? Briefly explain.
i) Write the equation to find the natural frequency of bar.
j) Define node and element in FEM.
k) What do you mean by resonance? Briefly explain.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

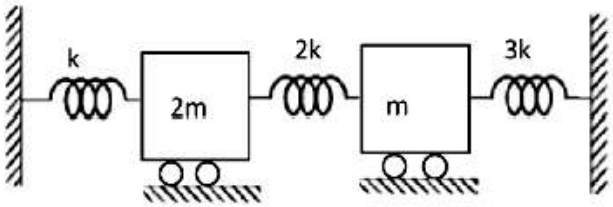
2. a) Derive the expression for logarithmic decrement and give its practical importance. 8 M

   b) A vibrating system consists of a mass of 50 kg, a spring with a stiffness of 30 kN/m and a damper. The damping provided is only 20% of the critical value. Determine the
   i) Damping factor ii) critical damping coefficient
   iii) natural frequency of damped vibrations
   iv) logarithmic decrement 8 M

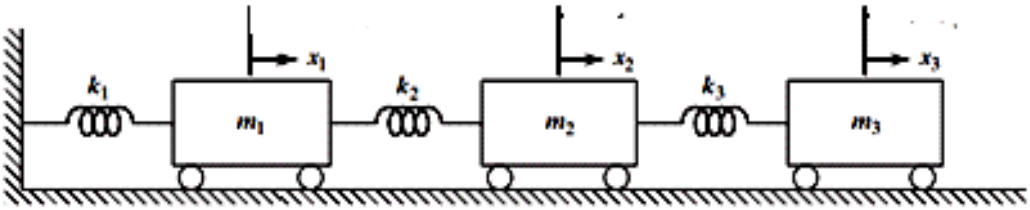
3. a) The following data relate to a shaft held in long bearing. Length of shaft = 1.2m; Diameter of shaft = 14 mm; Mass of a rotor at midpoint = 16 kg; Eccentricity of center of mass of rotor from center of rotor=0.4mm; Calculate the whirling speed of the shaft. 10 M

   b) What do you mean by whirling of shafts? What is whirling speed? Explain. 6 M

4. Determine the natural frequencies and mode shapes of the system as shown in figure. 16 M



5. Determine the natural frequencies and mode shapes of the system shown in figure as $k_1 = k_2 = k_3 = k$ and $m_1 = m_2 = m_3 = m$. 16 M



6. Derive an expression for lateral vibrations of beam with any two end conditions. 16 M