Total No. of Questions: [3]

Total No. of Printed Pages: [2]

PRN No.	

Paper Code	U 324 - 263 (ESE)

May 2022 (ENDSEM) EXAM
T.Y. B. TECH(MECHANICAL) (SEMESTER - II)
COURSE NAME: NECHANICAL VIBRATION
COURSE CODE: MEUA32183
(PATTERN 2018)

Time: [1Hr] [Max. Marks: 30]

Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

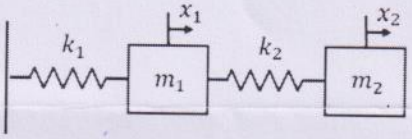
Q.1 **a)** Plot Transmissibility curve for different values of damping ratio, mark spring controlled, mass controlled and damping controlled regions and illustrate important observations **[4]**

b) A mass of 20kg is suspended by spring having stiffness 15000 N/m. The viscous damping causes the amplitude to decrease to one-tenth of the initial value in four complete oscillations. If a periodic force of 150cos60t is applied to the mass in vertical direction, find the amplitude of forced vibration. **[6]**

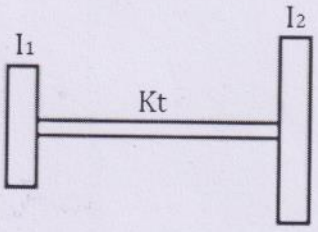
OR

b) A machine of mass one tonne is acted upon by an external force of 2450 N at frequency of 1500 rpm. To reduce the effects of vibration, isolator of rubber having static deflection of 2 mm under the machine load and damping ratio is 0.2 is used. Determine amplitude of vibration of machine and phase lag **[6]**

Q.2 **a)** Write the equation of motion for 2DOF free undamped system as shown in figure (only equation of motion, derivation for the solution is not expected) **[4]**

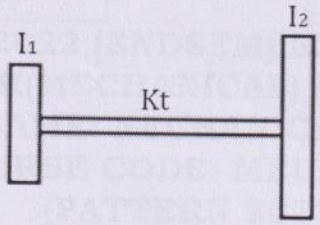


b) Determine the natural frequency of torsional vibrations of shaft with two circular discs of uniform thickness at the ends. The masses of disc are M_1= 500 kg and M_2 = 1000 kg and corresponding diameters are D_1= 125 cm and D_2= 190 cm. The length of shaft is 300cm and its diameter is 10cm. Take G = 0.83×10^{11} N/m^2 **[6]**



OR

b) Write the equations for amplitude ratio for two rotor semidefinite system shown in Figure below **[6]**



Q.3 **a)** Illustrate working principle of Dynamic Vibration Absorber **[4]**

b) The static deflection of the vibrometer mass is 20 mm. The instrument when attached to a machine vibrating with a frequency of 125 cpm, records relative amplitude of 0.03 cm. Find for the machine: **[6]**
(i) The amplitude of vibration; (ii) The maximum velocity of vibration and;
(iii) The maximum acceleration.

OR

b) A vibrometer consists of a seismic mass of 1 kg, spring of stiffness 50 N/m and a damping factor of 0.7. The amplitude of displacement shown on vibrometer scale is 10 mm. If the vibrometer is mounted on a machine vibrating at 30 rad/s, determine the amplitude of vibration of a machine. **[6]**