Roll No. | | | | | | | | | | | | |

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (ME) (2012 Onwards) (Sem.–7,8)

MECHANICAL VIBRATIONS

Subject Code : BTME-803

M.Code : 71996

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1. Answer briefly :

a) What are the main causes of vibration?

b) Define Simple Harmonic Motion.

c) State the different types of vibrations.

d) Define normal mode of vibration.

e) What is vibration isolation?

f) Define transmissibility in a forced excitation system.

g) State the number of degrees of freedom of a continuous system.

h) A light cantilever of length 'L' has a mass 'M' fixed at its free end. What will be the frequency of lateral vibrations in the vertical plane?

i) What do you mean by critically damped system?

j) Define the term "influence coefficient".

SECTION-B

Q2. What are the principles on which a vibrometer and an accelerometer are based? Explain with a neat sketch.

Q3. What is the Semi-Definite system? Derive an expression for determining the frequency of the system.

Q4. A machine runs at 5000 rpm. Its forcing frequency is very near to its natural frequency. If the nearest frequency of the machine is at least 20% from the forced frequency, design a suitable vibration absorber for the system. Assume the mass of the machine as 30 kg.

Q5. Determine the flexibility influence coefficient for the system as shown in fig. 1. Assume $E=2.1*10^{11}$ N/m^2.

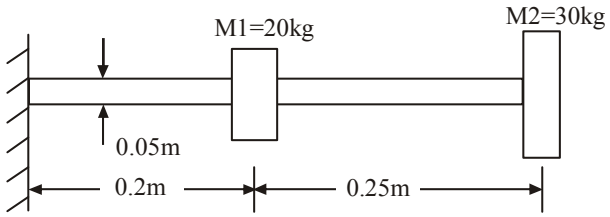

FIG.1

Q6. A bar of length L is fixed at one end and connected at the other end by a spring of stiffness 'K' as shown in fig. 2. Derive suitable expression of motion for longitudinal vibration.

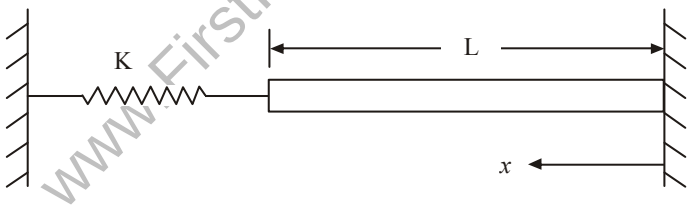

FIG.2

SECTION-C

Q7. Derive an expression for the response of single degree of freedom system with viscous damping when it is under damped.

Q8. Write the limitations of dynamic vibration absorber. Prove that natural frequency of centrifugal pendulum absorber is always proportional to the speed of the rotating body.

Q9. Use Stodola's method to determine the natural frequency of spring mass system as shown in fig. 3.

Assume $m_1 = m_2 = m_3 = m$ and $K_1 = K_2 = K_3 = K$

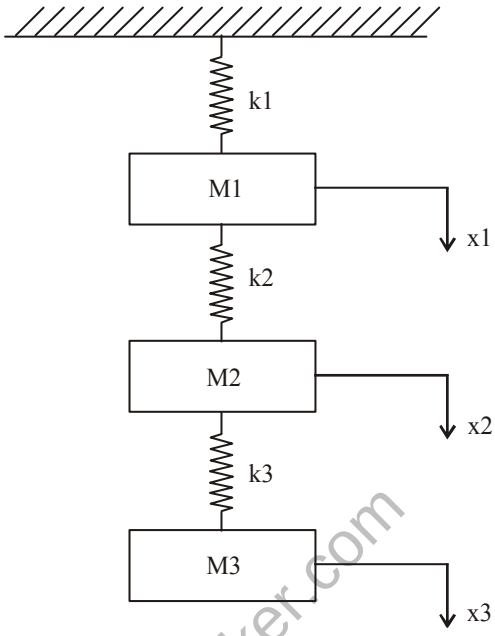

FIG.3

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.