Roll No. | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 09

B.Tech. (ME) (Sem.–7th & 8th)

MECHANICAL VIBRATIONS

Subject Code : ME-408

Paper ID : [A0841]

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

INSTRUCTION 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 has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

1. Write briefly :

   (a) What are the three elementary parts of a vibrating system?

   (b) Explain the beat phenomenon.

   (c) What is the use of logarithmic decrement?

   (d) Advantages of vibrating study.

   (e) Discuss briefly the vibration response parameters.

   (f) Define vibration isolation.

   (g) How we can reduce the undesirable vibrations?

   (h) Define the magnification factor.

   (i) What are principal co-ordinates?

   (j) What do you mean by semi-definite system?

SECTION-B

2. Determine the effect of the mass of the spring on the natural frequency of the system shown in fig.-1.

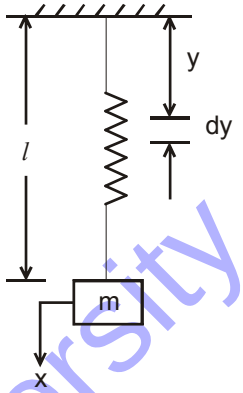

Fig.-1

3. A single cylinder petrol engine of total mass 320 kg is mounted on steel frame causes a vertical deflection of 0.2 cm. The reciprocating parts have a mass of 24 kg and moves through a vertical stroke of 15 cm with simple harmonic motion. A dashpot is provided the damping resistance which is directly proportional to velocity and amounts 490 N at 0.3 m/sec. velocity.

   Determine :

   (a) Speed of the driving shaft at which resonance will occur.

   (b) the amplitude of steady state forced vibration when the driving shaft of the engine rotates at 480 r.p.m.

4. Draw a neat sketch of dry friction damper and explain its working.

5. Split the harmonic motion $x = 10 \sin (wt + \pi/6)$ into two harmonic motions, one having a phase angle of zero and the other of 45°.

6. Determine the natural frequency of the mass 15 kg as shown in fig. 2, assuming the cord do not stretch and slides over the pulley rim. Assume that the pulley has no mass.

   Given $K_1 = 8 \times 10^3$ N/m, $K_2 = 6 \times 10^3$ N/m.

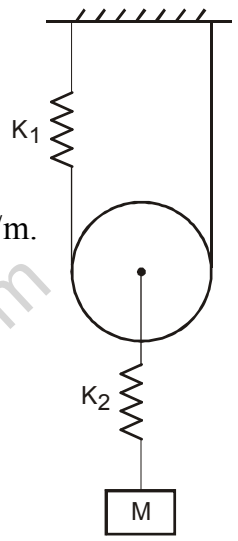

Fig.-2

SECTION-C

7. Find the natural frequencies for torsional vibrations of fixed shaft.

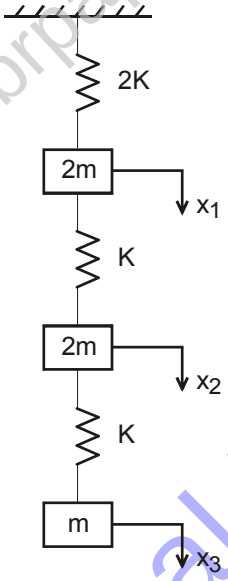

Fig.-3

8. Determine the fundamental frequency of the system shown in fig. 3.

9. Find the natural frequencies of a bar shown in fig. 4.

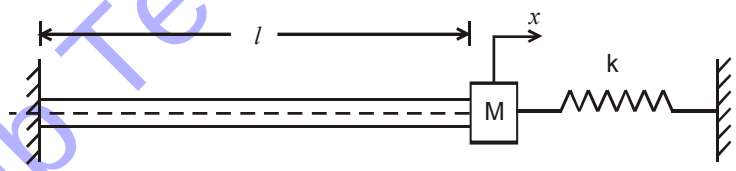

Fig.-4