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

Total No. of Questions: 09 **Total No. of Pages: 02**

B. Tech. (ME) (Sem. 7, 8)
MECHANICAL VIBRATIONS
Subject Code: ME-408
Paper ID: A0841

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

1. Write Briefly:

a) Classify various types of vibration.

b) What is vibration isolation?

c) Discuss beats phenomenon.

d) What is transmissibility?

e) Discuss different types of damping.

f) What do you understand by vibration absorber?

g) What are influence coefficients?

h) Define Maxwell Reciprocal Theorem.

i) What is the usefulness of Dunkerley's Method?

j) Where dry friction dampers are used?

SECTION B

2. Derive the relation to find the natural frequency of vibration in undamped fee vibration single degree of freedom vibratory system.

3. A spring mass system has spring stiffness of 'k' N/m and mass of ‘m’ kg. The natural frequency of system is 12Hz. When an extra 2kg mass is coupled to 'm', the natural frequency reduces to 2Hz. Find the value of 'k' and 'm'.

4. A spring-mass-damper system is defined by following parameters

m = 3kg, k = 100N/m, c = 3 Ns/m

Determine (a) critical damping constant (b) damping ratio (c) frequency of damped oscillation (d) logarithmic decrement.

5. Derive the frequency equation for lateral vibration of a string fixed at both ends.

6. Discuss various modes of vibration in details.

SECTION C

7. A steel shaft of uniform diameter simply supported at the ends carry two discs of weights 600N and 1000N as shown in figure 1. Determine the fundamental natural frequency using Dunkerley Method.

Take $E=196 \times 10^{9}$ N/m^2 and $I=4 \times 10^{-7}$ m^4.

8. Discuss various acceleration, frequency and velocity measurement devices.

9. Elaborate clearly the significance of under-damped, over-damped and critically-damped systems in free vibrator; systems with viscous damping? What are their application areas?

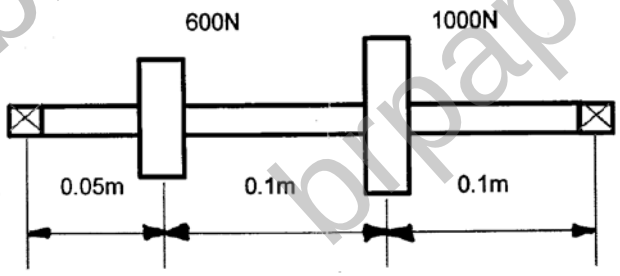

Figure 1