Roll No……..….. **Total No. of Printed Pages: 2**

Total No. of Questions: [09]

B. Tech. (Mech. Engg.) (Semester – 7th)
MECHANICAL VIBRATIONS
Subject Code: BMECD1723
Paper ID: [18112343]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. Discuss the different types of vibration.
b. What is the significance of critical damping?
c. What are the three elementary parts of a vibrating system?
d. What is the principle mode of vibration?
e. Discuss the structural damping.
f. What is torsional vibration absorber?
g. Explain the multi-degree freedom system with example.
h. Discuss the concept of resonance.
i. What is continuous system?
j. Define the term “Influence coefficient”.

Section – B **(5 marks each)**

Q2. A spring mass system has a mass of 10 kg, spring stiffness 250 N/m and damping coefficient of 15 N-s/m. Determine the natural frequency, critical damping coefficient, damping factor, damped natural frequency, logarithmic decrement and ratio of two successive amplitudes after which the original amplitude is 15%

Q3. Define transmissibility. Show that damping in vibration isolation is useful, when the frequency ratio is greater than $\sqrt{2}$.

Q4. Explain the working principle of dynamic absorber.

Q5. Explain the Stodola method with suitable example used in multi-degree of freedom system.

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 Figure 1. Derive suitable expression of motion for longitudinal vibration.

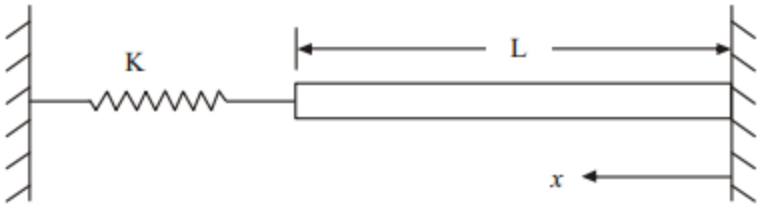


Figure 1

Section – C **(10 marks each)**

Q7. Find the natural frequencies of the three degree of freedom system using Holzer's method shown in **Figure 2**.

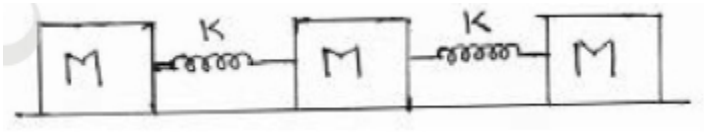


Figure 2

Q8. Derive an expression for the response of single degree of freedom system with viscous damping when it is under damped.

Q9. Explain the following:

a) Torsional vibration of circular shafts

b) Vibration measuring instruments