

Roll No.

24480

**B. Tech 7th Sem. (ME)
Examination – May, 2018**

MECHANICAL VIBRATION

Paper : ME - 409 - F

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note: Attempt *five* questions. Question No. 1 is *compulsory* and attempt at least *one* question from each section.

1. Explain following :

4 × 5 = 20

(a) Resonance

(b) Critical Speed

(c) Flexibility matrix

(d) Continuous and discrete vibration systems

SECTION - A

2. (a) A body is subjected to two harmonic motions as given below :

$$X_1 = 15 \sin(\omega t + \pi/6) \text{ and } X_2 = 8 \cos(\omega t + \pi/3)$$

What harmonic motion should be given to the body to bring it to equilibrium? 10

- (b) A body weighing 5 kg is hung on two helical springs in parallel. One spring is elongated 1 cm by a force of 0.3 kg; the other force requires a force of 0.2 kg for same elongation. Calculate the natural frequency of vibration. 5
- (c) Explain energy method in brief. 5

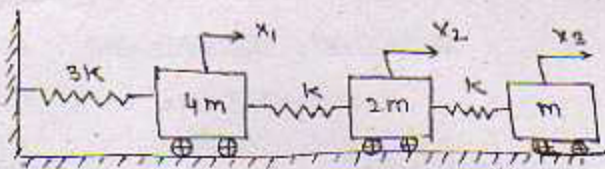
3. What is Logarithmic Decrement? Derive an expression for it. 20

SECTION - B

4. Discuss the following:
- (a) Energy dissipated by damping 10
- (b) Critical speed of a light shaft having a single disc without damping. 10
5. What do you understand by Transient Vibration? Explain base excitation solution by laplace transforms. 20

SECTION - C

6. Explain normal mode vibrations and co-ordinate coupling in detail. 20
7. Find the fundamental natural frequency and the corresponding mode shape for the following system by the method of matrix iteration.



A Three degree of Freedom system 20

SECTION - D

8. What do you understand by Vibration of Continuous System ? Derive suitable expression for lateral vibration of a string. 20
9. What is torsional vibration ? Derive an expression for torsional vibration in case of a shaft having torque 'T' acting at both ends. 20