Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(ME) (Sem.–7,8)

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) Explain methods of vibration analysis.

(b) Distinguish periodic and harmonic vibrations.

(c) Define transmissibility.

(d) Explain torsion vibration damper.

(e) Describe forced harmonic vibration.

(f) Write short notes on : torsion vibration of two rotorsystems.

(g) Explain orthogonality principle.

(h) State eigen vector.

(i) Explain influence coefficients.

(j) Describe combined rectilinear and angular modes.

SECTION-B

2. A vibrating system of single degree of freedom is defined by the following :

   Mass (m) = 3 kg; Stiffness k = 100 N/m; Damping coefficient c = 3 N-S/m.

   Determine the following :

   (i) Damping factor

   (ii) Damped natural frequency

   (iii) Logarithmic decrement

   (iv) Number of cyles after which the original amplitude is reduced to 20 percent

3. Starting from the general solution of transverse vibration of beams, derive an expression for the natural frequency of a simply supported beam.

4. Derive an expression for the magnification factor (MF) for a single degree of freedom system subjected to damped force vibration and thus obtain the condition for peak amplitude.

5. Explain the following :

   (i) Natural frequencies for various end conditions

   (ii) Torsional vibration of circular shaft.

6. Discuss in detail Holzer's and Stodola method.

SECTION-C

7. A machine of mass 75 kg is mounted on springs of stiffness 12 kN/cm with an assumed damping factor 0.2. A piston within the machine of mass 2 kg has a reciprocating motion with a stroke of 7.5 cm and a speed 50 Hz. Assuming the motion of the piston to be harmonic, determine :

   (i) Amplitude of the machine

   (ii) Transmissibility

   (iii) Force transmitted to the foundation

   (iv) The phase angle of the transmitted force with respect to the exciting force.

8. (i) Discuss in detail Untuned viscous damper.

   (ii) Describe in detail Matrix alteration method.

   (iii) Write short notes on Euler's equation of motion for beam vibration.

9. Explain the following :

   (i) Damping factor

   (ii) Vibration absorber

   (iii) Vibration measuring instruments