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Total No. of Questions : 18

B.Tech. (Mechanical Engineering) (Sem.–7)

MECHANICAL VIBRATIONS

Subject Code : BTME-803

M.Code : 71996

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

Write briefly :

1) Differentiate Oscillation and Vibration.

2) In short define types of Vibrations.

3) Describe causes of vibrations.

4) Vibration is a necessary Evil. Explain.

5) What are various effects of vibrations? Explain.

6) What do you understand by Natural frequency?

7) With help of Figure explain multi-degree freedom system.

8) What do you understand by degrees of freedom?

9) Why soldiers are asked to break their steps while crossing a bridge? Explain.

10) What is the principle of vibration absorber? Explain with help of neat sketch.

SECTION-B

11) A spring mass system with mass m kg and stiffness k N/m has a natural frequency of 1 Hz. Determine the value of stiffness k1 of another spring which when arranged in conjunction with spring of stiffness k in series will lower the natural frequency by 20% and in parallel will raise the natural frequency by 20%.

12) Describe and differentiate Coulomb and Viscous Damping in detail.

13) Add two harmonic motions analytically which are represented by the equations :

$x(1) = 4 \sin(7t+\pi/6)$

$x(2) = 5 \cos(7t-\pi/12)$

Compare the result with graphical representation.

14) Torque T is applied at the midpoint of a uniform cross-section circular shaft of length 'l', which twists the shaft by angle α radians. If the torque is released suddenly, derive equation for resulting motion.

15) Describe torsional vibration absorber with neat sketch.

SECTION-C

16) Explain the following :

a) Vibration isolation transmissibility

b) Torsional vibration of circular shafts

17) A beam having length of 0.42 m, moment of inertia $10000 m^4$ and modulus of elasticity $196000\ N/m^2$ is supporting two masses 40 kg and 20 kg at a distance of 0.16 and 0.24 m from one end. Determine lowest natural frequency by Rayleigh's method.

18) Determine the normal function for the boundary conditions as one end fixed and the other end free of a cantilever system of length 'l', starting with the expression for strain energy during free longitudinal vibration of bar with uniform area of cross-section.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.