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Total No. of Pages : 02

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 k_1 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 :
- Vibration isolation transmissibility
 - Torsional vibration of circular shafts
- 17) A beam having length of 0.42 m, moment of inertia 10000m^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.