

Time: 3 Hours

Marks: 80

Note :

- Question No.1 is compulsory.
- Solve ANY THREE questions from the remaining five questions.
- Figure to the right indicates full marks.
- Assume suitable data wherever required, but justify the same.

Marks

- Q. 1** Solve ANY FOUR questions from following. (Each question carries 5 marks)
- Explain Gyroscopic Vibration absorbers. (5)
 - Compare vibration isolator and vibration absorber. (5)
 - Explain the significance and limitations of active vibration control (AVC) over passive vibration control (PVC). (5)
 - Discuss need and basic scheme of Adaptive Vibration Absorber. (5)
 - Discuss Skyhook damping. (5)
 - Discuss Resonance Detuning and Decoupling.
- Q. 2** a) The seat of a automobile, with the driver, weighs 1000 N and is found to have a static deflection of 12 mm under self-weight. The vibration of the rotor is transmitted to the base of the seat as harmonic motion with frequency 5 Hz and amplitude 0.4 mm. (10)
- What is the level of vibration felt by the pilot?
 - How can the seat be redesigned to reduce the effect of vibration?
- b) Explain in detail Optimum design of Damped absorbers. (10)
- Q. 3** a) Discuss the transmissibility characteristics of different types of isolators. (10)
- b) Write a note on actuators and sensors for active vibration control (AVC). (10)
- Q. 4** a) Discuss ground hook control method for Semi-Active tuned vibration absorber (SATVA). (10)

- b) A structure supporting a rotating machine is found to vibrate excessively at an excitation frequency of 18 Hz. It is proposed to attach a vibration neutralizer tuned to this frequency. What should be the mass and stiffness of the neutralizer so that the resulting two natural frequencies are at least 20% away from the excitation frequency? The supporting structure has an effective mass of 1000 kg and a natural frequency of 16 Hz. (10)

Q. 5 a) Derive the stiffness of single acting air spring. (10)

b) Discuss Quarter-Car model of a Vehicle Suspension. (10)

Q. 6 a) Write a short note on Magnetorheological (MR) fluids and explain its different models in dampers. (10)

b) Discuss Adaptive Passive Vibration Absorber (APVA) and explain its methods in detail. (10)

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