

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.

- Q. 1** Solve ANY FOUR questions from following. (Each question carries 5 marks)
- a) What are important vibration control methods? (5)
  - b) Explain Gyroscopic Vibration absorbers. (5)
  - c) Explain the significance and limitations of active vibration control (AVC) over passive vibration control (PVC). (5)
  - d) Write a note on semi-active isolation. (5)
  - e) What is the function of a vibration isolator? (5)
  - f) What do you mean by narrowband disturbance? (5)
- 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. (12)
    - a. What is the level of vibration felt by the driver?
    - b. How can the seat be redesigned to reduce the effect of vibration?
  - b) Explain Adaptive Passive Vibration Absorber (APVA) and its methods in detail. (08)
- Q. 3**
- a) Explain in detail Piezoelectric transducers for active vibration control (08)
  - b) A precision electronic system supported on an elastic pad (with no damping) has a mass of 15 kg and a natural frequency of 20 rad/s. It is estimated that the system requires a damping ratio of 0.85 to control the vibration. Assume that the available dashpots can provide damping constants only in the range 0 to 400 N-s/m. Suggest whether passive vibration control will satisfy the requirements. If not, what would be required damping constant for the active vibration control system. (12)
- Q. 4**
- a) Explain the factors affecting vibration level and their control. (08)
  - b) Explain vibration control with different methods to achieve it. (12)
- Q. 5**
- a) What do you mean by Coulomb damping. Explain the Isolators with Coulomb damping. (10)
  - b) Write a note on dynamic vibration neutralizer and self-tuned pendulum neutralizer. (10)
- Q. 6**
- a) Explain impact absorbers and absorber with ideal spring & viscous dashpot in detail. (10)
  - b) Write a note on actuators and sensors for active vibration control (AVC). (10)

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