June 12, 2024 10:30 am - 01:30 pm 1T01437 - B.E.(Mechanical) Engineering)(SEM-VII) (Choice Base Credit Grading System)(R- 2019-20)(C Scheme) / 42877 - Vibration Controls (DLOC - IV) QP CODE: 10056255

Duration: 3 Hours **Total 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)	
	a)	Explain pneumatic suspension.	**(5)**
	b)	What do you mean by active mass damper	**(5)**
	c)	Explain Resonance with its effect with examples	**(5)**
	d)	What is the function of a vibration isolator?	**(5)**
	e)	Give five examples of passive isolators	**(5)**
	f)	Explain the control of natural frequencies as a method of vibration control.	**(5)**
Q. 2	**a)**	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)**
	b)	Explain in detail the Active vibration isolation system.	**(08)**
Q. 3	**a)**	Explain Adaptive Passive Vibration Absorber (APVA) and its methods in detail.	**(10)**
	b)	Explain in detail classical control and optimal control.	**(10)**
Q. 4	**a)**	Explain in detail the optimally tuned vibration absorber	**(08)**
	b)	An industrial sewing machine has a mass of 430 kg and operates at 1500 rpm (157 rad/s). It appears to have a rotating unbalance of magnitude 0.8 kg -m. Structural engineers suggest that the maximum repeated force transmitted to the floor is 10,000 N. The only isolator available has a stiffness of $7x\ 10^6$ N/m and a damping ratio of 0.1. If the isolator is placed between the machine and the floor, will the transmitted force be reduced to an acceptable level? If not, what can be done?	**(12)**

Q. 5 **a)** Explain impact absorbers and absorber with ideal spring & viscous dashpot in detail. **(10)**

b) Discuss the transmissibility characteristics of different types of isolators **(10)**

Q. 6 **a)** Write a note on actuators and sensors for active vibration control. **(08)**

b) A diesel engine, weighing 3000 N, is supported on a pedestal mount. It induces vibration into the surrounding area through its pedestal mount at an operating speed of 6000 rpm. Determine the parameters of the vibration absorber that will reduce the vibration when mounted on the pedestal. The magnitude of the exciting force is 250 N, and the amplitude of motion of the auxiliary mass is to be limited to 2 mm. **(12)**
