Time: 3Hrs **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 the sources of industrial vibration.	**(5)**
	b)	Discuss Skyhook damping	**(5)**
	c)	Explain significance of material selection in vibration isolation	**(5)**
	d)	Explain dynamic vibration neutralizers.	**(5)**
	e)	What do you mean by narrowband disturbance?	**(5)**
Q. 2	**a)**	A diesel engine, weighing 3500 N, is supported on a pedestal mount. It induces vibration into the surrounding area through its pedestal mount at an operating speed of 5000 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 300 N, and the amplitude of motion of the auxiliary mass is to be limited to 3 mm.	**(12)**
	b)	Explain the concept of negative stiffness in vibration isolation.	**(08)**
Q. 3	**a)**	Discuss ground hook control method for Semi-Active tuned vibration absorber.	**(10)**
	b)	Differentiate between classical control and optimal control	**(10)**
Q. 4	**a)**	Explain in detail the Active vibration isolation system.	**(08)**
	b)	An air compressor of mass 180 kg, with an unbalance of 0.01 kg-m, is found to have a large amplitude of vibration while running at 1400 rpm. Determine the mass and spring constant of the absorber to be added if the natural frequencies of the system are to be at least 25 percent from the impressed frequency	**(12)**

Q. 5 **a)** A structure supporting a rotating machine is found to vibrate excessively at an excitation frequency of 15 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 15% away from the excitation frequency? The supporting structure has an effective mass of 800 kg and a natural frequency of 10 Hz. **(12)**

b) Discuss the transmissibility characteristics of different types of isolators. **(08)**

Q. 6 **a)** The seat of a automobile, with the driver, weighs 900 N and is found to have a static deflection of 9 mm under self-weight. The vibration of the rotor is transmitted to the base of the seat as harmonic motion with frequency 6 Hz and amplitude 0.5 mm. **(12)**

a. What is the level of vibration felt by the pilot?

b. How can the seat be redesigned to reduce the effect of vibration?

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