Sanjay Ghodawat University, Kolhapur
Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19
EXM/P/09/01

Year and Program:2018-19 **School of Technology** **Department of FY M.Tech**

Course Code: MMD 508 **Course Title:** Noise, Vibration and Harshness **Semester – II**

Day and Date: Monday 27-05-2019 **End Semester Examination (ESE)** **Time:** 2.30 to 5.30 pm **Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

			Marks	Bloom's Level	CO
Q.1	a)	Describe briefly the Lagrange's equation for multi degree of freedom system.	05	L_2	CO1
		OR			
	a)	Determine the Influence Coefficients with suitable example of multi degree freedom system.			
	b)	Explain the Eigen value and Eigen Vector Method	06	L_3	CO1
Q. 2	a)	An accelerometer has a suspended mass of 0.01 kg with a damped natural frequency of vibration of 150 Hz. When mounted on an engine undergoing an acceleration of 1g at an operating speed of 6000 rpm, the acceleration is recorded as 9.5 m/s^2 by the instrument. Find the damping constant and the spring stiffness of the accelerometer.	05	L_3	CO2
		OR			
	a)	Design the seismic instrument with response of vibration			
	b)	Evaluate the vibration severity by using ISO 10816 standards	06	L_3	CO2
Q.3	a)	Explain the experimental modal analysis procedure with necessary equipment.	05	L_2	CO3
		OR			
	a)	Describe the use of the frequency-response function in modal analysis.			

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	b)	Explain non-destructive technique for damage detection in structures using changes in modal frequency and mode shapes.	06	L_3	CO3
Q. 4	a)	Write a note on Vibration absorbers.	05	L_2	CO4
		OR			
	a)	Explain the active and passive isolator.			
	b)	A 50-kg mass is subjected to the harmonic force F(t)=1000cos120t in N. Design an undamped isolator so that the force transmitted to the base does not exceed 5% of the applied force. Also, find the displacement amplitude of the mass of the system with isolation.	06	L_3	CO4
Q.5	a)	Explain the differential equation describing a nonlinear system.	09	L_2	CO5
		OR			
	a)	Explain the geometric nonlinearity and material nonlinearity.			
	b)	Solve the nonlinearity of inertia properties for nonlinear free vibration.	09	L_3	CO5
	c)	Examine the jump phenomenon for the softening and hardening spring. Describe the effect of damping.	10	L_4	CO5
Q.6	a)	Two ball bearings, each with 16 balls, are used to support the shaft of a fan that rotates at 750 rpm. Determine the frequencies, in hertz, corresponding to the following defects: cage, inner race, outer race, and ball. Assume that d=15 mm, D=100 mm and $\alpha=30^0$.	10	L_4	CO6
	b)	Write the brief description about the different types of monitoring techniques in Machine vibration	09	L_2	CO6
		OR			
	b)	Explain the use of condition monitoring with a case study.			
	c)	Analyze the different orbit shape for fault of machine.	09	L_4	CO6

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