Hall Ticket Number:

Code No. : 16505 N (A)

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (Mech. Engg.: CBCS) VI-Semester Main Examinations, May-2019

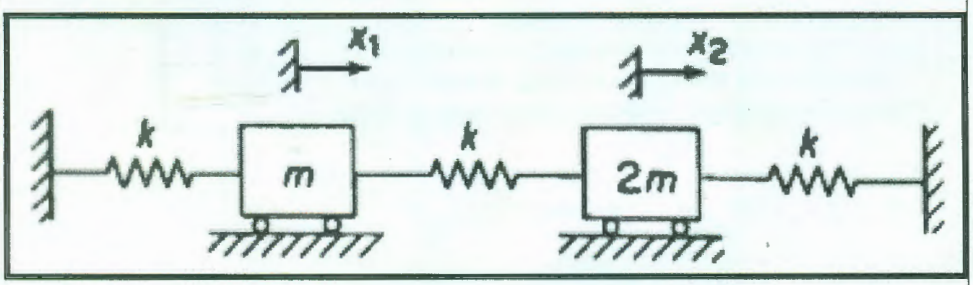
Vibration Analysis and Noise Control

(Elective-I)

Time: **3** hours Max. Marks: **70**

*Note:Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Q.No.	Steam of the question	M	L	CO	PO
	Part-A (10 × 2=20 Marks)				
1.	Discuss the importance of the study of Mechanical Vibrations and list the main causes for it.	2	2	1	1
2.	Define: Time period and Circular frequency for SHM.	2	1	1	1
3.	Outline the importance of Orthogonality principle for vibration systems.	2	2	2	1
4.	Discuss the significance of Expansion theorem in the field of Mechanical Vibrations.	2	2	2	1
5.	What are Random Vibrations ? Give a practical example for it.	2	1	3	1
6.	How do you distinguish between linear and non linear vibrations?	2	1	3	1
7.	Define Acoustic Intensity and Acoustic Energy Density.	2	1	4	1
8.	What is a plane wave and a spherical wave? Sketch both of them and indicate their acoustic intensities.	2	1	4	1
9.	Name any two materials used for sound absorption.	2	1	5	1
10.	Discuss in brief about weighting networks.	2	2	5	1
	Part-B (5 ×10=50 Marks)				
11. a)	Derive the natural frequency of a single degree of freedom spring mass system by any two methods.	4	3	1	2
b)	The mass of a single degree damped vibrating system is 7.5 kg and makes 24 free oscillations in 14 seconds when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.25 of its initial value after five oscillations. Compute : (i) stiffness of the spring (ii) logarithmic decrement (iii) damping factor, (i.e. the ratio of the system damping to critical damping).	6	3	1	2
12. a)	Explain in brief about Diagonalization of Mass and Stiffness Matrices.	4	2	2	1
b)	Compute the natural frequencies and sketch the mode shapes for the system shown in the figure below.	6	3	2	2



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13. a)	Discuss the boundary conditions that have to be incorporated in the case of a beam, when one of it's end is considered as free end, simply supported(pinned) and fixed (clamped).	4	2	3	1
b)	Develop the equation for the natural frequencies of a uniform rod in torsional oscillation with one end fixed (i.e. at x=0) and the other end free (i.e. at x=L) where L is the length of the rod.	6	3	3	2
14. a)	Explain in brief about octave and one-third octave band analysis.	4	2	4	1
b)	When operating independently in the presence of background noise, measurements at a given location of the sound pressure level for machines 1,2 and 3 are respectively 88dB , 90 dB and 87 dB .When the machines are turned off , the sound pressure level at the same point is 86dB. Calculate the overall sound pressure level of the three machines independent of the background noise.	6	4	4	2
15. a)	Discuss Noise Control Strategies.	5	2	5	1
b)	Explain in brief about the instruments used for Noise measurement.	5	2	5	1
16. a)	Obtain the equation for free vibration response of a single degree of freedom spring, mass and damper system for critically damped case.	5	3	1	2
b)	Explain the Modal Analysis procedure.	5	2	2	1
17.	*Answer any **two** of the following:*				
a)	Discuss the application of Rayleigh's Method and the Rayleigh-Ritz method for vibrations of continuous systems.	5	3	3	2
b)	Explain the terms Speed of Sound, Wavelength, Frequency, Acoustic Pressure and Particle Velocity.	5	2	4	1
c)	Discuss the Impact of noise on humans.	5	2	5	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	60%
2	Knowledge on application and analysis (Level-3 & 4)	40 %
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable, subject to a maximum of 10%)	------

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