INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

ASSIGNMENT

Course Name	:	**MECHANICAL VIBRATIONS**
Course Code	:	**A70346**
Class	:	IV B. Tech I Semester
Branch	:	**Mechanical Engineering**
Year	:	2018 - 2019
Course Coordinator	:	VVSH Prasad, Professor.
Course Faculty	:	VVSH Prasad, Professor

OBJECTIVES:

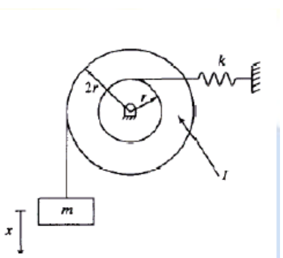
I. **Develop** an understanding of vibration, natural frequency, and mode shape, damping and forcing and establishing ground resonance parameters for mechanical structures.

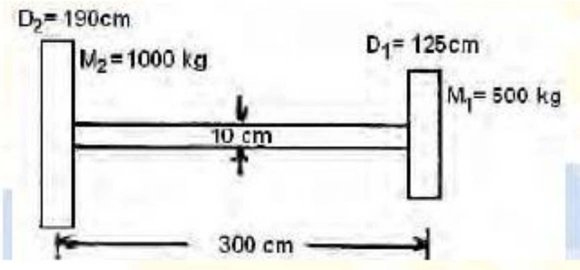
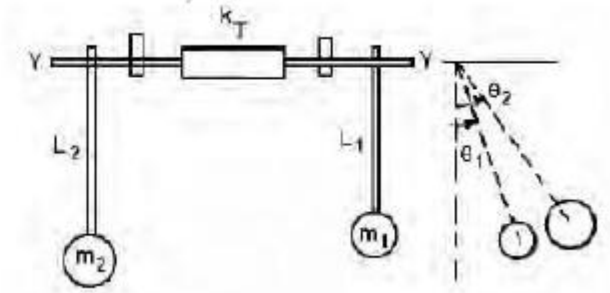
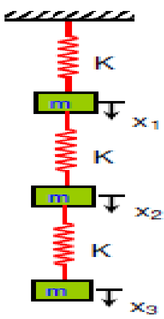
II. **Analyze** vibration problems by constructing and solving the differential equations of single degree of freedom cases.

III. **Analyze** vibration problems by energy methods and spectrum analysis by Laplace transformation methods, time-frequency plots.

IV. **Apply** modal analysis and synthesis to two degree of freedom cases and continuous vibration systems.

V. **Apply** this understanding to vibration design problems to multi dof and critical speeds of rotors.

S No	QUESTION	Blooms taxonomy level	Course Outcomes
	ASSIGNMENT - I		
1	Determine the frequency of oscillations for the system shown in fig. Also determine the time period if m = 4 kg and r = 80 mm 	Understanding, Remembering	2,3
2	A machine part of mass 2.5Kg vibrates in a viscous medium. A harmonic exiting force of 30N acts on the part and causes resonant amplitude of 14mm with a period of 0.22 sec. Find the damping coefficient if the frequency of the exciting force is changed to 4Hz. Determine the increase in the amplitude of forced vibration upon removal of the damper.	Applying, Understanding	3,1
3	Determine the natural frequency of torsional vibrations of a shaft with two circularises of uniform thickness at the ends. The masses of the discs are M1= 500 kg andM2 = 1000 kg and their outer diameters are D1 = 125 cm and D2 = 190 cm. The length of the	Understanding, Remembering	2,5

	shaft is l = 300 cm and its diameter d = 10 cm as shown in fig. G = 0.83 x 10^{11}N/m^2  		
4	Two pendulums of different lengths are free to rotate y-y axis and coupled together by a rubber hose of torsional stiffness 7.35 X 103 Nm / rad as shown in figure. Determine the natural frequencies of the system if masses m1 = 3kg, m2 = 4kg, L1 = 0.30 m, L2 = 0.35 m.  	Applying, Remembering	1,3
5	Obtain the stiffness coefficients of the system shown in Fig  	Understanding, Applying	1,5
ASSIGNMENT - II			
1	A seismic instrument is mounted on a machine running at 1000 rpm. The natural frequency of the seismic instrument is 20 rad/sec. The instrument records relative amplitude of 0.5 mm. Compute the displacement, velocity and acceleration of the machine. Damping in seismic instrument is neglected.	Remembering, Understanding	1,3
2	Explain the consequences of misalignment and pre loaded shafts on the performance of the machine assembly with plots.	Evaluating,	4
3	Explain bode plots for amplitude and phase to represent the seismic and accelerometer range.	Understanding	1
4	Find the lowest natural frequency of transverse vibrations of the system shown in Fig. by stodola's method. E=196 GPa, I=10-6 m4, m1=40 kg, m2=20 kg	Understanding, Applying	2,3

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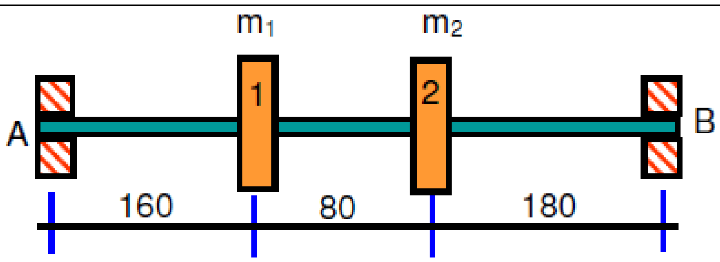
<tr><td></td><td>
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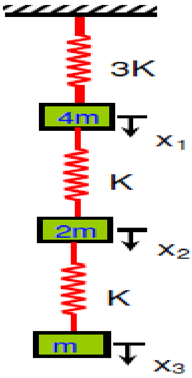
<tr><td>5</td><td>For the system shown in Fig. find the lowest natural frequency by holzer's method(carryout two iterations)

</td><td>Evaluating,</td><td>4</td></tr>
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Prepared By:
VVSH Prasad, Professor

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