

		National Institute of Technology Meghalaya An Institute of National Importance											CURRICULUM				
Programme		Bachelor of Technology in Mechanical Engineering										Year of Regulation		2018			
Department		Mechanical Engineering										Semester		VIII			
Course Code	Course Name	Credit Structure											Marks Distribution				
		L	T	P	C	INT	MID	END	Total								
ME 418	MECHANICAL VIBRATION	3	0	0	3	50	50	100	200								
Course Objectives	To understand basic principles of metrology and able to obtain the equation of motion and natural frequency for the vibrating systems.	Course Outcomes	CO1	Understanding the free and forced vibration of single and multi-degree freedom systems, damped and un-damped vibrations. (Understanding)													
			CO2	Outline the equation of motion for mechanical systems under free and forced vibration with single DOF and solve related problems. (Applying)													
	CO3		Outline the equation of motion for mechanical systems under free and forced vibration with multi DOF and solve related problems. (Applying)														
	CO4		Analyze the eigen value problems and problems related to vibration of strings and rods.(Analyzing)														
	CO5		Analyze the vibration measuring instruments, principle of operation, functionality and solve related problems (Analyzing)														
No.	COs	Mapping with Program Outcomes (POs)											Mapping with PSOs				
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	CO1	3	3	0	0	0	0	0	0	0	0	0	0	3	0	0	
2	CO2	3	3	0	0	0	0	0	2	0	0	0	0	3	2	0	
3	CO3	3	2	3	0	2	0	0	2	0	0	0	2	2	3	0	
4	CO4	3	2	3	0	2	0	0	2	0	0	0	2	2	3	0	
5	CO5	3	2	3	0	2	0	0	2	0	0	0	2	3	0	0	
SYLLABUS																	
No.	Content												Hours		COs		
I	Fundamentals of Vibration Introduction, types of vibration, equations of motion for undamped free vibration, translational and torsional vibration, free damped vibration, forced vibration problems, harmonic excitation, rotating unbalance, critical speed, vibration isolation. Basics of noise, introduction, amplitude, frequency, wavelength, pressure level, noise dose level, measurement and analysis of noise.												11		CO1		
II	Two Degree of Freedom Systems Two degree undamped free vibration, Lagrangian energy method, coordinate coupling, undamped vibration absorber.												09		CO2		
III	Multi Degree of Freedom Systems and Continuous Systems Eigen value, Eigen vector, linear system, matrix method, influence coefficients, numerical methods, Rayleigh's approach, Dunkerley's method, Rayleigh-Ritz method, Duhamels integral. Transverse vibration of a string, longitudinal vibration of bar or rod, Euler equation for beams.												10		CO3 CO4		
IV	Vibration Measuring Instruments and Vibration Measurement Vibration instruments, transducer, vibrometer, velometer, accelerometer, seismometer. Frequency measuring instruments, single reed, multi reed, stroboscope, vibration exciters.												10		CO5		
Total Hours												40					
Essential Readings																	
1. L. Meirovitch, "Elements of Vibration Analysis", McGraw Hill, 2nd edition, 1986.																	
2. W. T. Thomson and M. D. Dahleh, Theory of Vibration with Applications, 5th edition, Pearson, 1997.																	
Supplementary Readings																	
1. F. S. Tse, I. E. Morse and R. T. Hinkle, Mechanical Vibrations, 2nd edition, CBS Publications, 2004.																	
2. J. S. Rao and K. Gupta, Introductory course on Theory and Practice of Mechanical Vibrations, 2nd edition, New Age Publication, 1999.																	
3. L. Meirovitch, Principles and Techniques of Vibrations, Prentice Hall International (PHIPE), 1997																	