GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Marine Engineering
Semester	V	Version	2.1.1.1
Effective from Academic Year	2017-18	Effective for the batch Admitted in	July 2015
Subject code	2MR504	Subject Name	Dynamics Of Vibration

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	25	25	50

Pre-requisites:

Learning Outcome:

After successful completion of the course, student will understand about

- Comply with the TAR (Training Assessment Record – Appendix I) Book Competency number 9.8 & 9.9

Theory syllabus

Unit	Content	Hrs
1	**Free vibrations:** • Free Harmonic Vibrations, Linear motion of an elastic system, Angular motion of an elastic system. • Differential equation of motion. Free Vibration of springs in series and parallel. Simple and Compound pendulums, Single and two degrees of freedom.	7
2	**Damped vibrations:** • Idea of Viscous and Coulomb damping, Linear and angular vibrations with viscous damping, Forced damped liner and angular Vibrations, Periodic movement of support.	6
3	**Forced vibrations:** • Forced Linear and angular vibrations, periodic force transmitted to support, periodic movement of the support. • Periodic Motion: simple Harmonic motion; Application of S, H, M. to masses and springs. Simple Pendulum and Compound Pendulum. Centrifugal Force and its application to conical pendulum. Unloaded Governor, Curved tracks and machine parts, stress in thin rim due to centrifugal action.	6
4	**Forced Damped Vibration:** • To write differential equation of motion and find amplitude, frequency	4
5	**Torsional vibrations:** • Single rotor system, rotor at end and rotor in the middle. Effect of inertia of Shaft, Two rotor system, rotors at both ends and rotors at one end. Three rotor and multirotor systems. Torsionally equivalent shafts, Geared system.	7
6	**Transverse vibrations of beams:** • Single Concentrated load, effect of the mass of the beam, Energy method several concentrated Loads uniformly distributed load, Dunkerley's empirical method for several concentrated loads. • Whirling of shafts Whirling of shafts, critical speed, effect of slope of the disc, effect of end thrusts.-7	10
7	**Balancing:**	9

	• Balancing of masses rotating in different planes, dynamic forces at bearings, Primary and secondary balance of multi cylinder inline Engines and Configurations.	
8	**Gyroscope:** • Gyroscopic couple, Vector representation of torque and angular momentum, steady rectangular precession, vector treatment; Steady conical precession; • Motion involving steady precession; Application to Ship's stabilization.	**5**
	TOTAL	**54**

Practical content

- To study the undammed free vibrations of equivalent spring mass system;
- To determine the radius of gyration of a given bar by using bifilar suspension;
- To study gyroscopic effect and to find out gyroscopic couple both in magnitude and direction;
- To study free vibrations of two rotor system and to determine the natural frequency of vibrations theoretically and experimentally;
- Static and dynamic balancing of shaft;
- To study the damped torsion oscillation and determine the damped coefficient;
- To determine the characteristic curves of sleeve position against controlling force and speed for the governor;

Text Books

1	Dynamics of machinery - Farazdak Haidri

Reference Books

1	Advanced Mechanics of Machines - J. Hannah & R. C. Stephens
2	Theory of Machines - P. L. Ballaney