



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

AEROSPACE STRUCTURAL DYNAMICS LABORATORY

VII Semester: AE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
AAEC45	Core	0	0	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			

Prerequisite: Aerospace Structural Dynamics

I. COURSE OVERVIEW:

This course focuses on mechanical devices that are designed to have mobility to perform certain functions. In this process they are subjected to some forces. This course will provide the knowledge on how to analyze the motions of mechanisms and design mechanisms to give required strength. This includes relative static and dynamic force analysis and consideration of gyroscopic effects on aero planes, ships, automobiles like two wheelers and four wheelers. Balancing of rotating and reciprocating masses, friction effect in brakes clutches and dynamometers are also studied. Mechanical vibrations give an insight into the various disturbances while designing vibratory systems.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. The basic principles of kinematics and their related terminology of machines.
- II. The Discriminate mobility; enumerate links and joints in the mechanisms.
- III. The concept of analysis and formulation of different mechanisms.

III. COURSE SYLLABUS:

Week-1: GOVERNORS

To study the function of a Governor.

Week-2: GYROSCOPE

To determine the Gyroscope couple.

Week-3: STATIC FORCE ANALYSIS

To draw free body diagram and determine forces under static condition.

Week-4: DYNAMIC FORCE ANALYSIS

To draw free body diagram and determine forces under dynamic condition.

Week-5: BALANCING

To determine balancing forces and reciprocating masses.

Week-6: BEARINGS

To determine the bearing life.

Week-7: LONGITUDINAL AND LATERAL VIBRATIONS

To determine the longitudinal and transfer vibration.

Week-8: VIBRATION ANALYSIS OF SHAFT

To determine critical speed of a shaft.

Week-09: MECHANISMS

To design various mechanism and their inversions.

Week-10: DIFFERENTIAL GEAR BOX

To study automobile differential gear box.

Week-11: FREE VIBRATION OF CANTIEVER BEAM

To study Vibrations in beam Structures

Week-12: FORCED VIBRATION OF CANTIEVER BEAM

To study Vibrations in beam Structures

IV. REFERENCE BOOKS:

1. Joseph E. Shigley, "Theory of Machines and Mechanisms", Oxford University Press, 4th Edition, 2010.
2. Thomas Bevan, "Theory of Machines", Pearson, 3rd Edition, 2009.

V. WEB REFERENCES:

1. <http://www.e-booksdirectory.com>