

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

DYNAMICS AND VIBRATIONS LABORATORY

V Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AMED28	Core	L	Т	Р	С	CIA	SEE	Total
		-	-	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		
Prerequisite: Theory of Machines								

I. COURSE OVERVIEW:

Dynamics and Vibrations Laboratory offers practical expertise with mechanisms and machines, enhancing design thinking for mechanical systems such as automobiles, airplanes, machine tools, and interdisciplinary applications. It functions as a platform for kinematics and kinetics.

II. COURSES OBJECTIVES:

The students will try to learn

- I. The importance of machine and mechanism theory extends into our daily lives, including the investigation of underlying mechanisms and inversion principles required for machine design.
- II. Controlling vibration and determining natural frequencies for the design of mechanical systems.
- III. The impact of friction in journal and antifriction bearings.
- IV. Discriminate Mobility Enumerate the mechanisms' linkages and joints.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO 1 Identify the gyroscopic effect for real-time applications in ships and airplanes.
- CO 2 Examine the life expectancy of ball bearings and their real-world applications.
- CO 3 Select the proper journal bearing for balancing machine components such as shafts.
- CO 4 Build out an inversion mechanism for a 4-bar mechanism to produce various mechanical components.
- CO 5 Design the shaft material to determine the critical speed of the shafts.
- CO 6 Choose balancing strategies for efficient balance of machines and buildings.

IV. COURSE CONTENT:

WEEK -1: GOVERNORS

Study the function of a Governor.

WEEK -2: GYROSCOPE

Determine the Gyroscope couple.

WEEK -3: STATIC FORCE ANALYSIS

Draw free body diagram and determine forces under static condition.

WEEK -4: DYNAMIC FORCE ANALYSIS

Draw free body diagram and determine forces under dynamic condition.

WEEK -5: BALANCING

Determine balancing forces and reciprocating masses.

WEEK -6: JOURNAL BEARING

Determine the bearing life.

WEEK -7: UNIVERSAL VIBRATION

Determine the longitudinal and transfer vibration.

WEEK -8: WHIRLING OF SHAFT

Determine critical speed of a shaft.

WEEK -9: MECHANISMS

Design various mechanism and their inversions.

WEEK -10: DIFFERENTIAL GEAR BOX

Study automobile differential gear box.

WEEK -11: INDEXING

Study geneva indexing mechanism.

WEEK -12: SCOTCH YOKE MECHANISM

Study the conversion of linear motion into rotational motion.

WEEK -13: LONGITUDINAL VIBRATIONS

Study longitudinal vibration.

WEEK -14: TRANSFER VIBRATIONS

Study transfer vibration.

V. TEXT BOOKS:

- 1. Thomas Bevan, "Theory of Machines", Pearson Education, 6th Edition, 2020.
- 2. S.S Ratan, "Theory of Machines", Tata McGraw-Hill, 5th Edition, 2021.

VI. REFERENCE BOOKS:

- 1. J. S. Rao, R.V. Dukkipati, "Mechanism and Machine Theory", New Age Publication, 1st Edition, 2021.
- 2. Uiker, Penock, Shigley, "Theory of Machines and Mechanisms", Oxford University Press,
- 4th Edition,2020.
 3. R.S. Khurmi, Guptha, "Theory of Machines", S.Chand & Co, New Delhi, 14th Edition, 2019.

VII. ELECTRONICS RESOURCES:

- 1. https://archive.nptel.ac.in/courses/112/106/112106270/
- 2. https://akanksha.iare.ac.in/index?route=course/details&course_id=509

VIII. MATERIALS ONLINE:

- 1. Course Content
- 2. Lab manual