AEROSPACE STRUCTURAL DYNAMICS LABORATORY

VII Semester: AE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AAE113	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

I. COURSE OVERVIEW:

Structural Dynamics is defined as that branch of engineering science, which deals with the study of relative motion between various parts of a machine and forces which acts on them. The knowledge isvery essential for engineer in designing Various parts of a machine.

II. OBJECTIVES:

The course should enable the students to:

I The Importance of theory of machines and mechanism involved in the day-to-day life,and study of basic mechanisms and inversion mechanisms to form a machine.

II The information related design and analysis of mechanisms for a specific type of motion in a machine.

III The developmental use of rigid bodies motions and forces for transmission system, machine kinematics.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO1	**Identify** the gyroscopic effect for the real time applications of ships,aero planes.	Apply
CO2	**Examine** the life expectancy for ball bearing and their real timeapplication.	Analyze
CO3	**Select** the appropriate journal bearing for balancing of machine components such as shafts.	Apply
CO4	**Build** out the inversion mechanism for 4-bar mechanism to form different mechanical components.	Evaluate
CO5	**Design** the shafts material for calculate the critical speed of shafts	Create
CO6	**Choose** the balancing techniques for effective balancing of machinesand structures.	Create

IV. SYLLABUS:

LIST OF EXPERIMENTS

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-9	**MECHANISMS**
To design various mechanism and their inversions.	
Week-10	**DIFFERENTIAL GEAR BOX**
To study automobile differential gear box.	
Week-11	**FREE AND FORCED VIBRATION OF CANTIEVER BEAM**
To study Vibrations in beam Structures	
Week-12	**EXAMINATIONS**

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.

Web References:

1. nptel.ac.in/courses/112104168/L13.pdf
2. www.compositesworld.com/blog/post/fabrication-methods
3. www.ae.iitkgp.ernet.in/ebooks/chapter3.html
4. www.auif.utcluj.ro/images/VOLUME12_3/10_Chandramohan_Murali_67_71
5. www.kennametal.com/content/dam/kennametal/kennametal/common/Resources/Catalogs-Literature/Industry%20Solutions/Composite_material_machining_guide_Aerospace.pdf
6. home.iitk.ac.in/~mohite/Composite_introduction.pdf

Course Home Page:

LIST OF EQUIPMENTS REQUIRED FOR BATCH OF 36 STUDENTS:

S. No	Equipment Name	Quantity
1	Gyroscope	1
2	Governors	1
3	Differential gear box	1
4	Balancing test rig	1
5	Vibration analysis test rig	1
6	Dividing head	1
7	Demonstration of different models of mechanism	1