



Subject Code:09ME1502

Subject Name: Dynamics of Machine

Semester –V

Objective: This subject introduces in mechanical to understand the fundamental of the Machine dynamics. In industries, the mechanical engineers/technicians have to perform balancing elements in motion to avoid excessive vibration. Such requirement needs knowledge of balancing and vibration. For mechanical engineer, knowledge of vibration isolation is necessary to overcome vibration due to certain reason and it is also required in foundation of various machines. This course also offers knowledge about flywheel and governor.

Credits Earned: 4Credits

Course Outcomes:

- Analyze unbalance force in rotating mass and its effects
- Analyze natural frequency of damped and undamped vibration
- Develop methods to overcome ill effects of vibration
- Design of flywheel for IC engine
- Analyze performance of governor and distinguish function of flywheel and governor

Teaching and Examination Scheme

Teaching Scheme (in Hrs)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA	(CSE)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Sr.no	Content	Total hrs.	%weightage
1	Balancing of rotating and reciprocating mass: Basic concept of balancing, static and dynamic balancing, effects produced due to unbalanced mass, analytical and graphical methods to resolve unbalance of revolving mass in single plan and multiple planes, concept of balancing of reciprocating mass.	12	30
2	Introduction to mechanical vibration: basic terminology of vibration, types of vibration, natural frequency, basic elements and lumping parameters, concept of degree of freedom. Single Degrees of Freedom System (Linear and Torsional): Undamped free vibrations, equivalent systems, determination of natural frequency; Types of dampers, damping coefficient, damping effects: under, over and critically damped system, damping factor, damped natural frequency and logarithmic decay; concept of vibration isolation.	9	20
3	Flywheel: Concept of turning moment diagram, fluctuations of energy, co-efficient of fluctuations of speed and co-efficient of fluctuations of energy, methods to construct turning moment diagram and its example, moment of inertia and mass calculation of flywheel.	9	20
4	Governor: Types of governor and its function, difference between flywheel and governor, working of centrifugal governor, concept of control force, stability of governor, sensitivity of governor and hunting of governor.	12	30

References:

1. Theory of Machines, Rattan S S, Tata McGraw-Hill
2. Theory of Machines, R.S.Khurmi, S.chand, New Delhi.
3. S.S. Rao, Mechanical Vibrations, Pearson.
4. R.L. Norton, Kinematic and Dynamics of Machinery, McGraw-Hill.
5. V.P.Singh, Mechanical Vibration
6. A.G. Ambekar, Mechanical vibrations and noise engineering



Suggested Theory distribution:

The suggested theory distribution as per Bloom’s taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
26%	37%	37%	---	---	---

Suggested list of Lab Exercises:

1. Balancing of rotating mass in different plane
2. Experimental analysis of Free Undamped longitudinal Vibration of single degree of freedom system
3. Experimental analysis of Free Undamped torsional vibration of single degree of freedom system
4. Experimental analysis of forced vibration
5. Experimental analysis of forced damped vibration
6. Flywheel design for IC engine and punching press.
7. Performance analysis of governors

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by blackboard, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory