

DESIGN LABORATORY
B.E, VII Semester, Mechanical Engineering
[As per Choice Based Credit System (CBCS) scheme]

Course Code	17MEL76	CIE Marks	40
Number of Lecture Hours/Week	03 (1 Hour Instruction+ 2 Hours Laboratory)	SEE Marks	60
RBT Levels	L1, L2, L3	Exam Hours	03

Credits -02

Course Objective:

- To understand the natural frequency, logarithmic decrement, damping ratio and damping.
- To understand the balancing of rotating masses.
- To understand the concept of the critical speed of a rotating shaft.
- To understand the concept of stress concentration using Photo elasticity.
- To understand the equilibrium speed, sensitiveness, power and effort of Governor.

PART A

1. Determination of natural frequency, logarithmic decrement, damping ratio and damping Co-efficient in a single degree of freedom vibrating systems (longitudinal and torsional)
2. Determination of critical speed of rotating shaft.
3. Balancing of rotating masses.
4. Determination of fringe constant of Photo-elastic material using Circular disk subjected diametric compression, Pure bending specimen (four point bending)
5. Determination of stress concentration using Photo elasticity for simple components like Plate with hole under tension or bending, circular disk with circular hole under compression, 2-d crane hook.

PART B

1. Determination of equilibrium speed, sensitiveness, power and effort of Porter/ Proel / Hartnell Governor. (at least one)
2. Determination of pressure distribution in Journal bearing
3. Determination of principle stresses and strain in a member subjected to combined loading using strain rosettes.
4. Determination of stresses in curved beam using strain gauge.
5. Experiments on Gyroscope (Demonstration only)

Course outcomes:

On completion of this subject, students will be able to:

1. To understand the working principles of machine elements such as Governors, Gyroscopes etc.,
2. To identify forces and couples in rotating mechanical system components.
3. To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft.
4. To measure strain in various machine elements using strain gauges.

5. To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing.
6. To determine strain induced in a structural member using the principle of photo-elasticity.

REFERENCE BOOKS

- [1] "Shigley's Mechanical Engineering Design", Richards G. Budynas and J. Keith Nisbett, McGraw-Hill Education, 10th Edition, 2015.
- [2] "Design of Machine Elements", V.B. Bhandari, TMH publishing company Ltd. New Delhi, 2nd Edition 2007.
- [3] "Theory of Machines", Sadhu Singh, Pearson Education, 2nd Edition, 2007.
- [4] "Mechanical Vibrations", G.K. Grover, Nem Chand and Bros, 6th Edition, 1996.

Scheme of Examination:

One question from Part A:	50 Marks
One question from part B:	30 Marks
Viva- Voce:	20Marks
Total:	100 Marks


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