ATME College of Engineering

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE MODULE

Faculty Name			Academic Year: 2025-26 (EVEN SEM)				
Department: Mechanical Engineering							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BMEL606L	**DESIGN LAB**	**Core**	Knowledge of Dynamics and Machines and Design of Machine Elements	**-**	**2**	**2**	**30**

Objectives

1. To understand the concepts of natural frequency, logarithmic decrement, damping and damping ratio.
2. To understand the techniques of balancing of rotating masses.
3. To verify the concept of the critical speed of a rotating shaft.
4. To illustrate the concept of stress concentration using Photo elasticity.
5. To appreciate the equilibrium speed, sensitiveness, power and effort of a Governor.
6. To illustrate the principles of pressure development in an oil film of a hydrodynamic journal bearing.
7. To visualize different mechanisms and cam motions
8. Modern computing techniques are preferred to be used wherever possible

Topics Covered as per Syllabus

Experiments

1. Determination of natural frequency, logarithmic decrement, damping ratio and damping coefficient in a single degree of freedom vibrating systems (longitudinal and torsional)
2. Balancing of rotating masses.
3. Determination of critical speed of a rotating shaft
4. Determination of equilibrium speed, sensitiveness, power and effort of Porter/Proell /Hartnel Governor.
5. Determination of Pressure distribution in Journal Bearing
6. Determination of Fringe constant of Photo elastic material using. a) Circular disc subjected to diametral compression. b) Pure bending specimen (four point bending).

Demonstration Experiments (For CIE)

1. Study the principle of working of a Gyroscope and demonstrate the Effect of gyroscopic Couple on a plane disc.
2. Demonstration and study of operation of different Mechanisms and their Inversions: Slider crank chain, Double slider crank chain and its inversions, Quick return motion mechanisms- Peaucellier's mechanism. Geneva wheel mechanism, Ratchet and Pawl mechanism, toggle mechanism pantograph and Ackerman steering gear mechanism.
3. Demonstration of stress concentration using Photo-elasticity for simple components like plate with a hole under tension or bending, circular disk with circular hole under compression

List of 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

List of URLs, Text Books, Notes, Multimedia Content, etc

Course Outcomes	At the end of the course, the students will be able to: 1. Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts. 2. Carry out balancing of rotating masses. 3. Analyse the governor characteristics. 4. Determine stresses in disk, beams, plates and hook using photo elastic bench. 5. Determination of Pressure distribution in Journal bearing 6. Analyse the stress and strains using strain gauges in compression and bending test and stress distribution in curved beams.

Internal Assessment Marks: 40

Scheme of Examination:

- Writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks
- SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code:	BMEL606L	**TITLE:** DESIGN LAB					**Faculty Name:**				
List of Course Outcomes	**Program Outcomes**										
	PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	3	3	-	-	-	-	-	-	-	-	-	2
CO-2	3	3	-	-	-	-	-	-	-	-	-	2
CO-3	3	3	-	-	-	-	-	-	-	-	-	2
CO-4	3	3	-	-	-	-	-	-	-	-	-	2
CO-5	2	3	-	-	-	-	-	-	-	-	-	-
CO-6	3	3	-	-	-	-	-	-	-	-	-	2

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Subject Code: BMEL606L	**TITLE:** DESIGN LAB	**Faculty Name:**	
List of Course Outcomes	**Program Specific Outcomes**		
	PSO1	**PSO2**	
CO-1	3	-	
CO-2	3	-	
CO-3	3	-	
CO-4	3	-	
CO-5	3	-	
CO-6	3	-	

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution