ADVANCED MECHANICAL DESIGN LAB

Course Code:13ME2213 **L P C**

0 3 2

Pre requisites:: Mechanical vibrations, Advanced mechanical design and mechanics of composites theory

Course Outcomes:

At the end of lab, a student will be able to

CO1: Perform bending test, tension test on steels and validate the ofnumerical bending analysis results with experimental test results

CO2: Prepare the fibre composites using hand lay-up method andanalyse the composite parts using FEA package

CO3: Demonstrate the gyroscopic effect and estimate the torsionalfatigue strength of steels

CO4: Calculate the natural frequency of spring and spring-mass dampersystem

CO5: Demonstrate the static and dynamic balancing and estimate theunbalanced mass on the given rotational components

Note: Any **ten** exercises from the following

1. Vibration measurements
2. Universal Testing Machine– Bending test
3. Composite Fabrication – Hand lay-up
4. Fatigue Testing Machine – Bending
5. Gyroscope
6. Static and dynamic balancing
7. Design of parts of IC Engine – crankshaft, connecting rod, piston,valve gears
8. Design of power transmission systems – complete design of beltdrive and gear reducer and Drafting.
9. Creep test
10. Experiments using strain gauges
11. Load cell and strain gauge based study on cantilever
12. Inductive Pick up Strain Gauge based study on cantilever

Modelling packages: CATIA, UNIGRAPHICS, Pro-E
Analysis packages: ANSYS, NISA

Program Outcomes (POs):

At the end of the program, the students in CAAD will be able to

PO 1	acquire knowledge in latest computer-aided design and analysis tools
PO 2	create 3D models of real-time components using latest CAD software
PO 3	acquire technical skills to formulate and solve engineering and industrial problems
PO 4	carry out analysis for the design of new products
PO 5	have proficiency to solve problems using modern engineering design tools
PO 6	have capability to work in multidisciplinary streams
PO 7	apply project and finance management skills to organise engineering projects
PO 8	prepare technical reports and present them effectively
PO 9	engage in lifelong learning
PO 10	realize professional and ethical responsibilities
PO 11	conduct surveys, analyse data, plan, design and implement new ideas into action

CO-PO matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	S	M	M	S						
CO-2	S	S	M	M	S						
CO-3			S	S					M		
CO-4			S	S					M		
CO-5			S	S					M		

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Course Outcome-Assessment

Course outcomes	Delivery methods	Assessment methods	Sample viva questions
CO1	Demonstration and conducting experiments	Contineous assessment, Lab record, Internal and External Lab Exam	1. Write stress strain diagram 2. Classify elements 3. Nature of stresses in bending
CO2	Demonstration and conducting experiments	Contineous assessment, Lab record, Internal and External Lab Exam	1. Classify composite materials 2. Various fabrication methods 3. Types of fibers and matrix
CO3	Demonstration and conducting experiments	Contineous assessment, Lab record, Internal and External Lab Exam	1. Define gyroscopic effect 2. Define fatigue strength 3. Draw S-N curve
CO4	Demonstration and conducting experiments	Contineous assessment, Lab record, Internal and External Lab Exam	1. Physical significance of natural frequency 2. Various damping methods 3. Diferentiate free, damped and forced vibrationa
CO5	Demonstration and conducting experiments	Contineous assessment, Lab record, Internal and External Lab Exam	1. What is the need of balancing 2. Methods balancing of rotating and reciprocating masses 3. Differentiate static and dynamic balancing

Assessment methods

Continuous assessment methods: Perrmnce inconducting of experiments on system, Lab record

Mid semester assessment methods: Cycle – I Lab Exam, Cycle – II Lab Exam

End semester assessment methods: External Lab Exam