CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
MEL203	MATERIALS TESTING LAB	PCC	0	0	3	2

Preamble:

The objective of this course is to give a broad understanding of common materials related to mechanical engineering with an emphasis on the fundamentals of structure-property-application and its relationships. A group of 6/7 students can conduct experiment effectively. A total of six experiments for the duration of 2 hours each is proposed for this course.

Prerequisite: A course on Engineering Mechanics is required

Course Outcomes:

After the completion of the course the student will be able to

CO 1	To understand the basic concepts of analysis of circular shafts subjected to torsion.
CO 2	To understand the behaviour of engineering component subjected to cyclic loading and failure concepts
CO 3	Evaluate the strength of ductile and brittle materials subjected to compressive, Tensile shear and bending forces
CO 4	Evaluate the microstructural morphology of ductile or brittle materials and its fracture modes (ductile /brittle fracture) during tension test
CO 5	To specify suitable material for applications in the field of design and manufacturing.

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3				3							
CO 2	3	3	1		3				3	2	2	1
CO 3	3	3	3	1	3				3	2	3	2
CO 4	3	3	3	3	3	2	2	1	3	2	3	2
CO 5	3	3	3	1	3	2	2	1	3	2	3	2

Assessment Pattern

Mark distribution

Total Marks	CIE	ESE	ESE Duration
150	75	75	2.5 hours

Continuous Internal Evaluation Pattern:

Attendance	:	15 marks
Continuous Assessment	:	30 marks
Internal Test (Immediately before the second series test)	:	30 marks

End Semester Examination Pattern:

The following guidelines should be followed regarding award of marks

(a) Preliminary work	: 15 Marks
(b) Implementing the work/Conducting the experiment	: 10 Marks
(c) Performance, result and inference (usage of equipments and troubleshooting)	: 25 Marks
(d) Viva voce	: 20 marks
(e) Record	: 5 Marks

General instructions:

Practical examination to be conducted immediately after the second series test covering entire syllabus given below. Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners. The number of candidates evaluated per day should not exceed 20. Students shall be allowed for the University examination only on submitting the duly certified record. The external examiner shall endorse the record.

A minimum of 10 experiments are to be performed.

SYLLABUS

LIST OF EXPERIMENTS

1. To conduct tension test on ductile material (mild steel/ tor-steel/ high strength steel) using Universal tension testing machine and Extensometer.
2. To conduct compression test on ductile material (mild steel/ tor-steel/ high strength steel) using Universal tension testing machine and Extensometer.
3. To conduct tension test on Brittle material (cast iron) using Universal tension testing machine and Extensometer.
4. To conduct shear test on mild steel rod.
5. To conduct microstructure features of mild steel/copper/ brass/aluminium using optical microscope, double disc polishing machine, emery papers and etchent.
6. To conduct fractography study of ductile or brittle material using optical microscope.

7. To conduct Hardness test of a given material. (Brinell, Vickers and Rockwell)
8. To determine torsional rigidity of mild steel/copper/brass rod.
9. To determine flexural rigidity of mild steel/ copper/brass material using universal testing machine.
10. To determine fracture toughness of the given material using Universal tension testing machine.
11. To study the procedure for plotting S-N curve using Fatigue testing machine.
12. To conduct a Toughness test of the given material using Izod and Charpy Machine.
13. To determine spring stiffness of close coiled/open coiled/series/parallel arrangements.
14. To conduct bending test on wooden beam.
15. To conduct stress measurements using Photo elastic methods.
16. To conduct strain measurements using strain gauges.
17. To determine moment of inertia of rotating bodies.
18. To conduct an experiment to Verify Clerk Maxwell's law of reciprocal deflection and determine young's Modulus of steel.
19. To determine the surface roughness of a polished specimen using surface profilometer.

Reference Books

1. G E Dieter. Mechanical Metallurgy, McGraw Hill,2013

2. Dally J W, Railey W P, Experimental Stress analysis , McGarw Hill,1991

3. Baldev Raj, Jayakumar T, Thavasimuthu M., Practical Non destructive testing, Narosa Book Distributors,2015