Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bangalore

Course Title: **MECHANICAL TESTING AND QUALITY CONTROL LAB**		
Scheme (L:T:P) : **0:2:4**	Total Contact Hours: **78**	Course Code: **15ME37P**
Type of Course: **Tutorial and practice**	Credit **:03**	Core/ Elective: **Core(practice)**
CIE- 25 Marks		SEE- 50 Marks

Prerequisites: Learning concepts of Strength of Materials and Mechanical Measurements

Course Objectives:

1. Evaluate the Mechanical Properties and quality of the materials used in engineering applications.

On successful completion of the course, the students will be able to attain CO:

Course Outcome		CL	Linked experiments	Linked PO	Teaching Hrs
CO1	Examine the Quality of lubricant by finding the properties of lubricants	***U/A***	1,2,3	1,2,3,6,8, 10	**18**
CO2	Enumerate hardness and impact resistance of the materials before and after heat treatment	***U/A***	4,5	1,2,3,8,9,10	**15**
CO3	Evaluate the behavior of different materials experimentally subjected to tensile, compressive, shear and bending loads	***U/A***	6,7,8,9	1,2,3,8,9,10	**27**
CO4	Analyze the measuring dimension with specified dimensions on components	***U/A***	10,11,12, 13	1,2,3,8,10	**15**
C05	Know about Weld defects/surface cracks	***U***	14	1,2,3,8,10	**03**
				Total sessions	**78**

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
MECHANICAL TESTING AND QUALITY CONTROL LAB	**03**	**03**	**03**	**-**	**-**	**1**	**-**	**03**	**02**	**03**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

LIST OF GRADED PRACTICAL EXERCISES

The practical/Graded exercises should be properly designed and implemented with an attempt to develop different types of learning out comes in affective domain and psychomotor domain, so that students are able to acquire the necessary skills. Following is the list of experiments to be carried out.

Exercise No.	Practical/Exercise	Apprx. Hrs. Required
PART A. MECHANICAL TESTING		
1	Determine co efficient of friction of ant two oil by using Thurston oil tester and compare their results	06
2	Determine flash and fire point of any two lubricants of different grade and compare their results	06
3.	Determine viscosity of given oil by using Redwood viscometer/Saybolt viscometer.	06
4	Calculate Impact Value of Mild Steel, COPPER using CHARPY/ IZOD Impact Test & compare	06
5	Calculate hardness number by Brinell /Rockwell method Using hardness testing machine	09
6	Determination of yield stress, ultimate stress, breaking stress, percentage reduction in area, percentage elongation, Young's modulus by conducting tension test on Ductile Materials like Mild Steel, Aluminium in Universal testing machine. Draw Stress Strain Curve for both and compare	12
7	Find out Compressive Strength of C.I , M.S using Compression Testing Machine	06
8	Conducting bending test on wood specimen by UTM and evaluate the results	06
9	Conducting Shear test on mild steel specimen by UTM and evaluate the results	03
PART- B. QUALITY CONTROLL		
10	Standard use of basic measuring instruments: Surface plate, v-block, sprit level, combination set, filler gauge, plate gauge, wire gauge, screw pitch gauge, radius gauge, vernier caliper, micrometer and slip gauges, vernier height gauge, Vernier depth gaugeto measure dimension of given jobs.	06
11	Determine unknown angle of component using sine bar and slip gauges.	03
12	Measurement of screw thread elements by using screw thread micrometer, screw pitch gauge.	03
13	Measurement of gear tooth elements by using gear tooth vernier caliper	03
14	Study on surface defects by Dye penetrant test/ ultrasonic portable equipment(Not for conduction)	03
	TOTAL	**78**

Elements of Workshop Technology (Vols. 1 and II) by Hajra Chaudhary

SUGGESTED LIST OF STUDENT ACTIVITYS

1. Each student should submit any one of the following type activity or any other similar activity related to the course and before take up get it approved from concerned Teacher and HOD.
2. Each student should conduct different activity and no repeation should occur

1	Ask the students to bring two replaced Automobile/ Mechanical components, ask to select the instruments and measure the at least three dimensions. Record it in a sheet
2	Market Survey specific to properties of Various type of Materials used in Mechanical/Automobile industry or Any Engineering industries in local vicinity
3	Take the students for industrial visit for a nearby industry Select any two materials used for various mechanical engineering applications. Compare their mechanical properties

Course Delivery:

The course will be delivered through Demonstration and Shop practices

Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECT ASSESSMENT	**CIE** (Continuous Internal Evaluation)	**IA** Tests	Students	Two Tests (Average of two tests to be computed)	10	Blue books	1,2,3,4,5
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2,3,4,5
				Student Activity	05	Report	1,2,3,4,5
				TOTAL	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4,5
INDIRECT ASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2,3, Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4,5 Effectiveness of Delivery of instructions & Assessment Methods

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

- **MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY**

RUBRICS MODEL

RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	**Unsatisfactory**	**Developing**	**Satisfactory**	**Good**	**Exemplary**	**Student Score**
	1	**2**	**3**	**4**	**5**	
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	5
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	2
Average / Total marks=(4+5+3+2)/4=14/4=3.5=4						

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the given activity.

Note to IA verifier*: *The following documents to be verified by CIE verifier at the end of semester

1. Blue books (10 marks)
2. Student suggested activities report for 5 marks
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods

Scheme of Valuation for End Examination

Serial no	Description	Marks
1	**Writing procedure** a) One experiment on (Mechanical testing) One experiment on (Quality control)	05+05=10
2	**Conducting of Experiment** a) One experiment on Mechanical testing(Group of five)+ One experiment on Quality control (Individual)	10+10=20
3	**Calculation and results,(Both experiments)**	15+5=20
	TOTAL	50

EQUIPMENT LIST: Quantity : 01 Each

1. Hardness Testing Machine
2. Impact Testing Machine
3. Thurston Oil Tester
4. Pensky Martin Flash & Fire point Equipment
5. Redwood and Saybolt viscometer.
6. Universal Testing Machine – (20 ton – 40 ton range)
7. Surface plate, v-block, sprit level, combination set, filler gauge, screw pitch gauge, radius gauge, verniercaliper, micrometer and slip gauges,vernier height gauge, Vernier depth gauge
8. Gear Tooth Vernier
9. Universal Bevel Protractor
10. Digital Micrometer
11. Digital Screwgauge
12. Sine Bar & Slip Gauges
13. Spirit Level
14. Surface Plate (Granite)
15. Wire and plate gauge.