


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

	Course Title: THERMAL ENGINEERING LAB		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15ME56P
	Type of Course: Tutorial and practice	Credit : 03	Core/ Elective: Core(practice)
CIE- 25 Marks		SEE- 50 Marks	

Prerequisites: Learning concepts of Basic and applied Thermal engineering

Course Objectives:

By undergoing this lab the students will get enough confident about all the types of IC engines parts, so that they can rectify some sort of problems normally occurring in their automobiles.

COURSE OUT COMES

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

Course Outcome		CL	Linked experiments	Linked PO	Teaching Hrs
CO1	Appreciate the practical ways to find calorific values of fuel	<i>U/A</i>	01	2,3	06
CO2	Understand the various components and mechanisms of I. C. Engines. Appreciate the Mechanism of ports /Valves functioning in 2-stroke petrol /Diesel engine	<i>U/A</i>	2,3 & 13,14	2,3	24
CO3	Evaluating the performance characteristics of single cylinder petrol engine at different loads and single cylinder diesel engine at different loads and draw the heat balance sheet	<i>U/A</i>	4,5,6,7	2,3	24
CO4	Understand the method of finding the indicated power of individual cylinders of an engine by using morse test	<i>U/A</i>	8	2,3	06
CO5	Understand the method of evaluating the co efficient of performance of refrigerator	<i>U/A</i>	9	2,3	06
CO6	Understand the method of finding the thermal conductivity of material	<i>U/A</i>	10,11,12	2,3	12
		Total sessions			78

Legend U; Understand A; Application

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
THERMAL ENGINEERING LAB	0	3	3	0	0	0	0	0	0	0
<p>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 $\geq 40\%$ 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.</p>										

LIST OF GRADED PRACTICAL EXERCISES

The practical/Graded exercises should be properly designed and implemented with an attempt to develop different types of learning outcomes 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. PERFORMING EXPERIMENTS		
1	Determination of calorific value of liquid and gaseous fuel by using Bomb calorimeter /Boy's gas calorimeter	06
2	Draw the valve timing diagram of 4-stroke diesel engine	06
3	Plot the performance characteristics of single cylinder diesel engine for different loads	06
4	Draw the heat balance sheet of single cylinder diesel engine	06
5	Plot the performance characteristics of single cylinder petrol engine for different loads	06
6	Find the indicated power of individual cylinders of an engine by using MORSE test	06
7	Determine the volumetric efficiency of air compressor	06
8	Determine the coefficient of performance of refrigerator	06
9	Determine thermal conductivity of thick slab	06
10	Determine thermal conductivity of composite wall	03
11	Determine thermal conductivity of thick cylinder	03
PART- B. STUDY EXPERIMENTS		
13	Study of I.C. Engine parts (Cylinder block, head, piston and piston ring Connecting rod & crank shaft, spark plug, Carburettor, fuel injector and fuel pump)	06
14	Study of Differential, rear axle and power steering mechanism	06
15	Case study on Dismantling and assembly of engines	06
TOTAL		78



SUGGESTED STUDENT ACTIVITY

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 repetition should occur

1	Collect/ download product catalogues with specification of various types of energy conservation equipment/ devices and heat exchanger of recent trends.
2	Identify and list at least 10 equipments/devices which require heat transfer and prevention of heat transfer. Also state mode of heat transfer and methods used to prevent heat transfer.
3	At least one visit of any power plant/ industry where various items like air compressor, heat exchanger, cooling tower, condenser etc. can be shown to students.

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	1,2,3,4,5,6
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2,3,4,5,6
				Activity	05	Report	1,2,3,4,5,6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4,5,6
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, 4,5,6 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.
3. Student suggested activities report for 5 marks
4. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods

EQUIPMENT LIST

Serial no	Description	Quantity
1	Bomb calorimeter	1
2	Boys gas calorimeter	1
3	2- Stroke , Single- Cylinder petrol engine test rig	1
4	4 –Stroke , Multi cylinder petrol engine test rig(Morse test)	1
5	4 – Stroke , Single cylinder diesel engine test rig with Exhaust Gas Calorimeter	1
6	2 Stage reciprocating air compressor	1
7	Refrigeration unit	1
8	Thermal Conductivity Apparatus- Thick slab	1
9	Thermal Conductivity Apparatus- Composite wall	1
10	Thermal Conductivity Apparatus- Thick cylinder	1
11	Cut section models – petrol engine and diesel engine	2
12	I.C engine models	1

Scheme of Valuation for End Examination

Serial no	Description	Marks	
1	Part A Writing procedure	10	35
	Conducting of Experiment :Major Experiment(Group of Five)	10	
	Calculation, results, Inference	15	
2	Part B (Study experiment) One question to be asked to explain (with sketch) any one component.	10	
3	Viva	05	
TOTAL		50	

