

Subject Code: 1ET4020302	Subject Title: Thermodynamics
Pre-Requisite	--

RATIONALE

Thermodynamics is a science of energy transfer and its effect on physical properties of substances. It is based upon observations of common experiences of energy transfer. Thermodynamic laws have been formulated based on these experiences. In this course, work and heat transfer with changes in associated properties is studied based on laws of thermodynamics. This course will provide an understanding of the basic principles of thermodynamics which is must for understanding of major fields of mechanical engineering and technology notably in steam and nuclear power plants, internal combustion engines, gas turbines, air conditioning, refrigeration, gas dynamics, jet propulsion, compressors and energy conversion in different devices.

COURSE OBJECTIVE

This course deals with the fundamentals of Thermodynamics including thermodynamic systems and properties, relationships among the thermos-physical properties, the laws of thermodynamics and applications of these basic laws in thermodynamic systems. This course will provide the essential tools required to study thermodynamic systems in Applied Thermodynamics

The course content should be taught and with the aim to develop different types of skills so that students are able to acquire following competency

- **Apply basic concepts, laws and principles of thermodynamics to use and select equipment/devices/machines working on these basics.**

TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
3	-	-	3	60	40	-	-

SUBJECT CONTENTS

SR NO	TOPIC	TOTAL HOURS	WEIGHTAGE %
1	Basic Concepts of Thermodynamics Identify a thermodynamic property and use it with appropriate units, Explain Zeroth law of thermodynamics	06	14
2	First Law of Thermodynamics Explain first law of thermodynamics, Apply first law of thermodynamics to real life situations	06	14
3	Ideal Gases And Thermodynamic Processes Explain various ideal gas laws & thermodynamic processes, Calculate amount of heat transfer, work transfer & internal energy associated with the process	10	24
4	Second Law of Thermodynamics Describe second law of Thermodynamics, Apply second law of thermodynamics in real life problems, Appreciate importance of entropy.	10	24
5	Thermodynamic Cycles Identify thermodynamic Processes in a cycle, Plot various cycles on Property diagram, Derive expression for Efficiency, Solve simple examples of power producing cycle	10	24

COURSE OUTCOMES:

Upon completion of the course students will be able to:

1. Use thermodynamic terminology correctly.

2. Explain fundamental thermodynamic properties.
3. Derive and discuss the first and second laws of

thermodynamics.

4. Solve problems using the properties and relationships of thermodynamic fluids.
5. Analyse basic thermodynamic cycles.
6. Students must have understanding of thermodynamic fundamentals before studying their Application in applied thermodynamics.
7. The understanding of thermodynamic properties and processes will assist students in other Related coursework.

SUGGESTED LIST OF STUDENT ACTIVITIES

Sr. No.	Activity.
1	Identify and list real situations which works on: a: Zeroth law. b: First law of thermodynamics. c: Second law of thermodynamics.
2	Prepare charts of diesel, dual and gasoline cycles. Tabulate main points of differences between them.
3	Write the specifications of domestic refrigerator available at your home and I.C.Engine of any two wheelers. Also draw & explain cycle on which domestic refrigerator and I.C.Engine works.
4	Prepare chart of p-v & p-h diagram for refrigeration cycle.
5	Prepare chart for different thermodynamics process with the help of p-v, t-s, h-s diagram.

SUGGESTED LEARNING RESOURCES:

A) List of Books:

Sr. No.	Title of Books	Author	Publication
1.	Thermodynamics	R. Yadav	CPH
2.	Thermodynamics for Engineers	M.L. Mathur	Dhanpatrai& sons
3.	Heat Engines	C.S. Shah & N.C. Pandya	CharotarPubli. House
4.	Elements of Heat Engines Vol. I&II	R.C. Patel &Karamchandani	Acharya Book Depot
6.	Thermodynamics	SAAD	Prentice-Hall
7.	Engineering Thermodynamics- 2nd edition	P. K. Nag	McGraw Hill Education
8.	Applied Thermodynamics	R.C. Patel	Acharya Book Depot
9.	Thermodynamics	Gupta	Pearson

(B) List of Software/Learning Websites:

- a. <http://www.nptel.iitm.ac.in/video.php?subjectId=112105123>(IIT-B video lectures)
- b. <http://www.thermofluids.net/>
- c. <http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv301-Page1.htm>
- d. <http://www.grc.nasa.gov/WWW/k-12/airplane/thermo.html>
- e. <http://www.youtube.com/watch?v=Xb05CaG7TsQ>
- f. <http://www.youtube.com/watch?v=aAfBSJObd6Y>
- g. <http://www.youtube.com/watch?v=DHUwFuHuCdW>