INSTITUTE	**DIPLOMA STUDIES**
PROGRAM	**DIPLOMA ENGINEERING (MECHANICAL ENGINEERING)**
SEMESTER	**3**
COURSE TITLE	**THERMODYNAMICS**
COURSE CODE	**09ME2301**
COURSE CREDITS	**4**

Objective:

1 Thermodynamics is a discipline of energy transfer between surrounding and system. From the laws of thermodynamics gives the understanding the relationship between quantities of heat and work in different system. 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 different devices. Main purpose of this subject is to build up the understanding of basic principles of thermodynamics is required in various field of engineering

Course Outcomes: After completion of this course, student will be able to:

1 To understand the laws of thermodynamics
2 To understand the practical application related to laws of thermodynamics
3 To understand the concept and applications of energy, entropy.
4 To understand various gas laws.
5 To understand various thermodynamic cycle and its efficiency.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**FUNDAMENTAL OF THERMODYNAMICS** Introduction of thermodynamics, Basic properties, classification of system, Various system and its boundaries Energy, Zeroth law of thermodynamics & equilibrium, Processes & cycle, Quasi-static process	6
2	**FIRST LAW OF THERMODYNAMIC** Joule's experiment, First law of thermodynamics, Control mass & control volume concept, Energy equation, Equation of work for open system, Application of SFEE, Numerical	7

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Contents : Unit	Topics	Contact Hours
3	**SECOND LAW OF THERMODYNAMIC** Second law of thermodynamic, Kelvin-Plank & clausisus statements and equivalence, Reversible and irreversible processes, Carnot cycle and theorem, corollary, Entropy, Numerical	9
4	**IDEAL GASES AND PROCESSES** Ideal gas laws, Characteristic equation of gas & universal gas constant, Specific heat , thermodynamic processes and their relationship, Adiabatic and polytropic process, Numerical	11
5	**THERMODYNAMIC CYCLE** Classification of thermodynamic cycle, Concept of power cycle, Power producing cycles, Carnot cycle, Otto cycle, Diesel cycle, Dual combustion cycle, Brayton cycle.	9
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Fundamental of thermodynamics.** Fundamental of thermodynamics.	1
2	**Numerical based on energy interaction in system.** Numerical based on energy interaction in system.	1
3	**Numerical related to first law of thermodynamics.** Numerical related to first law of thermodynamics.	1
4	**Numerical based on Steady flow energy equation.** Numerical based on Steady flow energy equation.	1
5	**Numerical related to second law of thermodynamics.** Numerical related to second law of thermodynamics.	1
6	**6. Numerical based on ideal gas equation and boyle's law.** Numerical based on ideal gas equation and boyle's law.	1
7	**Numerical based on charel's law and gay-lussac law.** Numerical based on charel's law and gay-lussac law.	1
8	**Numerical based on adiabatic process.** Numerical based on adiabatic process.	1
9	**Numerical based on polytropic process.** Numerical based on polytropic process.	2
10	**Numerical based on otto cycle.** Numerical based on otto cycle.	2
11	**Numerical based on diesel cycle.** Numerical based on diesel cycle.	1
12	**Numerical based on brayton cycle.** Numerical based on brayton cycle.	1
Total Hours		**14**

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Textbook :

1 Engineering Thermodynamics, R.B. Varia, Atul Prakashan, 2018

References:

1 Engineering Thermodynamics, Engineering Thermodynamics, P.K. Nag, McGraw-Hill Education, 2005

2 Engineering Thermodynamics, Engineering Thermodynamics, R.K. Rajput, LAXMI PUBLICATIONS (P) LTD, 2007

3 Engineering Thermodynamics, Engineering Thermodynamics, J. B. Jones, R.E. Dugan, Prentice Hall India Learning Private Limited, 1998

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**
28.00	35.00	37.00			

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1 https://www.learnthermo.com/tutorials.php

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