

INSTITUTE	DIPLOMA STUDIES
PROGRAM	DIPLOMA ENGINEERING (MECHANICAL ENGINEERING)
SEMESTER	5
COURSE TITLE	THERMAL ENGINEERING -II
COURSE CODE	09ME1503
COURSE CREDITS	4

Objective:

- 1 Subject knowledge of thermal engineering is mandatory in many industries. Objective of this course to enhance the skill of students in the field of mechanical engineering. Students are able to working and construction of internal combustion engine, Refrigeration and air conditioning. Awareness of alternate fuels is required as emerging field and as per the current scenario. It is also helpful to identify the need alternative fuels of society which will be provided by the course content. It also improves ability to find eco friendly alternative fuels. Students will able to measure the performance of I.C. engine, Refrigeration and air conditioning.

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

- 1 To study about I.C. Engine.
- 2 Determine performance of I.C. Engine.
- 3 To study about characteristic and properties of alternative fuels.
- 4 To study about refrigeration system
- 5 Determine performance of VCR system
- 6 Working of various air-conditioning equipment

Pre-requisite of course:Basics of thermodynamics and thermal engineering -1

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	INTERNAL COMBUSTION ENGINE Concept of I.C. engine, Classification of I.C. engine, , Main component of I.C. engine, S.I & C.I. engine, working principle of petrol engine, Working principle of 2-stroke and 4- stroke engine, MPFI-necessity and functioning, Concept of scavenging and turbocharger, Performance testing of I.C. engine	14

Contents : Unit	Topics	Contact Hours
2	ALTERNATE FUELS Needs of alternative fuels, Classification, Characteristics and properties of fuel used in I.C. engine, Implementation issues with CNG, LPG and Biodiesel fuel, Effect on pollution, Supply system requirement for CNG and LPG in vehicle, Conversion device kit	5
3	REFRIGERATION Concept of refrigeration, Vapor compression refrigeration cycle with P-V, T-S and P-h diagram, Main component of VCRs and working, Introduction about refrigerant, Classification of refrigerant, Properties of refrigerant including R22, R134a, Hydro carbon and R717, Need of new refrigerant, Basic component of Vapor absorption refrigeration system, Performance of VCRs based on COP, Simple Numerical	14
4	AIR-CONDITIONING Concept of air-conditioning, Classification and application, Representation of psychrometry, measures of various properties of air, Different air conditioning processes, Requirement of duct system, Material, Construction and working, Working of Split A/C, Window A/C and desert cooler, Fan types application, common troubles and remedies.	9
Total Hours		42

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	To study about basic thermodynamic properties. To study about basic thermodynamic properties.	2
2	Demonstration of I.C. engine parts Demonstration of I.C. engine parts	2
3	Demonstrate working of four stroke I.C. engine. Demonstrate working of four stroke I.C. engine.	2
4	Demonstrate working of two stroke I.C. engine. Demonstrate working of two stroke I.C. engine	2
5	Performance test of I.C. engine Performance test of I.C. engine	4
6	Demonstration of VCRS parts Demonstration of VCRS parts	2
7	Performance test of VCRS Performance test of VCRS	2
8	Determination propertied of air Determination propertied of air	4
9	Determination of capacity of window/split air –conditioner Determination of capacity of window/split air –conditioner	4

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
10	Industrial Visit Industrial Visit	4
Total Hours		28

Textbook :

- 1 Thermal Engineering II, K.K. Patel, Atul Prakashan, 2018

References:

- 1 A Text book of thermal engineering by R.S. Khurmi & J.K. Gupta, S. Chand & Co publication.
- 2 Thermal Engineering by P.L. Ballney, Khanna Publication
- 3 Refrigeration and Air-conditioning by R.K. Rajput S.K. Kataria & Sons Publication.
- 4 Refrigeration and Air-conditioning by Arora & Domkundwar
- 5 I.C. engine by Domkundwar

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
20.00	35.00	45.00			

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 <http://nptel.ac.in/courses/112105128/>
- 2 http://nptel.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Ref%20and%20Air%20Cond/New_index1.html
- 3 <http://www.youtube.com/playlist?list=PLE2DA184A2E479885>
- 4 <http://www.kolpak.com/asset/?id=tuqvr>