APPLIED THERMODYNAMICS

Course Code	19ME3402	**Year**	II	**Semester**	II
Course Category	Program Core	**Branch**	ME	**Course Type**	Theory
Credits	3	**L – T – P**	2– 1 – 0	**Prerequisites**	Engineering Thermodynamics
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes		**Levels**
After successful completion of the course, the student will be able to		
CO1	Learn the terminology, basic concepts and working principles of IC engines.	L1
CO2	Understand the various stages of combustion process in SI and CI engines.	L2
CO3	Analyze thermodynamic analysis of Rankine cycle.	L3
CO4	Assess thermodynamic analysis of gas power cycles.	L4
CO5	Evaluate the COP of refrigeration systems and understand various Psychometric processes.	L3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1: Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1											3	
CO2	3	2											2	
CO3	3	2		2		2	2						3	2
CO4	3	1		2		2	2						3	2
CO5	3	1		2		2	2						2	

Syllabus

UNIT No.	**Contents**	**Mapped COs**
I	**IC Engines:** Working and classification of IC engines, comparison of two stroke and four stroke engines, comparison of SI and CI Engines. **Testing and Performance of IC Engines:** Methods of testing IC Engines, performance analysis of IC Engines.	CO1
II	**Combustion in IC Engines: SI Engine**: stages of combustion, normal combustion, abnormal combustion, variables affecting delay period and knocking, pre-ignition. S**tages of Combustion in CI Engine**: normal combustion, abnormal combustion, variables affecting delay period and knocking. Fuel requirements and fuel rating of SI and CI engines.	CO2
III	**Vapour Power Cycles:** Vapour power cycle, simple Rankine cycle, mean temp of heat addition thermodynamic variables affecting efficiency and output of Rankine cycle. **Methods to Improve Thermal Efficiency of Rankine Cycle:** Reheating, Regeneration, Factors affecting Rankine cycle, Adiabatic flame temperature.	CO3

IV	**Gas Power Cycle:** Brayton cycle, Simple gas turbine plant, closed cycle and open cycle for gas turbines, condition for maximum pressure ratio and optimum pressure ratio, actual cycle.	CO4
V	**Refrigeration:** Bell-Coleman cycle-vapour compression cycle, effect of vapour condition on COP of VCR, vapour absorption cycle, properties of common refrigerants. **Principles of Psychrometry and Air-Conditioning:** Psychometric terms, Psychometric processes and air conditioning systems.	CO5

Learning Recourse(s)

Text Book(s)

1. Ganesan V/ Internal Combustion Engines / Tata McGraw Hill,2017.
2. CP Arora / Refrigeration and Air Conditioning / TMH.
3. V.P.Vasandani and D.S.Kumar / Treatise on Heat Engineering / Metropolitan book Co. Pvt. Ltd.

Reference Book(s)

1. Mahesh M Rathore, Thermal Engineering, McGraw Hill Publications - 2012.
2. CengalY.A and Boles M.A, Thermodynamics: An Engineering Approach,5/e, McGraw-Hill, 2006.
3. Yahya,S.M.,Turbines,CompressorsandFans,4/e,TataMcGrawHill,201 0.
4. Nag P.K, Engineering Thermodynamics, 4/e, Tata McGraw- Hill,2008.
5. Onkar Singh, Thermal Turbomachines, 3/e, Wiley India,2014.
6. P.L.Ballaney, Thermal Engineering, 2/e, Khanna,2005.