

For Production III Sem. 1,
Section: A

Department of Production Engineering
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

PRPC15 : THERMAL ENGINEERING - COURSE OUTLINE			
Course Title	Thermal Engineering		
Course Code	PRPC15	No. of Credits	03
Department	Mechanical Engineering	Faculty	M. Shahul Hameed
Pre-requisites Course Code	Nil		
Course Coordinator(s) (if, applicable)	---		
E-mail	hameed@nitt.edu	Telephone No.	0431-2503414
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
COURSE OVERVIEW			
<p>This course involves the understanding of fundamental principles on energy transfer and its effect on the various systems/devices and the surroundings. The course familiarizes the students with laws of Thermodynamics, concept of entropy, many application areas like thermodynamic cycles, air conditioning and refrigeration, IC engines and compressors in an interesting manner.</p>			
COURSE OBJECTIVE			
<ol style="list-style-type: none"> To explain the Principles of thermodynamics and to be able to use it in accounting for the bulk behavior of the simple physical systems To explain the importance of energy, its various forms and energy transfer. To provide in-depth study on thermodynamics of state, basic thermodynamic relations, and properties of pure substance To enlighten the basic concepts of vapor and gas power cycles To discuss about construction and working principles of Compressors and IC engines. 			
COURSE OUTCOMES (CO)			
After taking this course students will be able to:			Aligned Programme Outcomes (PO)
1.	Apply thermodynamic concepts and understand the fundamentals of first and second laws of thermodynamics and their application to wide range of systems		1, 2, , 5, 6, 8,9 and 12
2.	Evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process from such calculations.		1, 2, , 5, 6, 8,9 and 12
3.	Analyze the gas power, vapor power and refrigeration cycles.		1, 2, 5, 6, 12
4.	Understand about the constructional details of IC engines and methods of improving their efficiencies and reducing pollution.		2, 3,4, 5, 6, 8,9, 11, 12
5.	Understand principle of reciprocating compressor and methods to improve its efficiencies.		2, 3,4, 5, 6, 8,9, 11, 12
COURSE TEACHING AND LEARNING ACTIVITIES			

Sl. No.	Week	Topic	Mode of Delivery
01	1 st week	Review of basic concepts of thermodynamics, Properties, Temperature, Zeroth law of thermodynamics,	Lecture C & T;
02	2 nd week	Heat and work.as energy in transit.	Lecture C & T;
03	3 rd week	Properties of pure substances.	Lecture C & T; PPT
04	4 th week	First law of thermodynamics applied to control mass. Problems	Lecture C & T
05	5 th week	First law for Control volumes. Steady flow energy equation, Applications of SFEE. Problems.	Lecture C & T
06	6 th week	Second law of thermodynamics: Reversible and irreversible processes. Second law statements, Carnot heat engine and Carnot refrigerator,.	Lecture C & T;
07	7 th week	Clausius inequality. entropy: entropy change applied to systems, Availability: rreversibility,	Lecture C & T
08		Cycle Test	
09	8 th week	Vapor power cycles: Rankine cycle Reheat cycle - Regenerative cycle.	Lecture C & T;
10	9 th week	Refrigeration cycle and absorption cycle. Psychrometry. AC processes.	Lecture C & T
11	10 th week	Air standard power cycles: Assumptions regarding air standard cycles. Otto, Diesel, and Brayton cycles	Lecture C & T,
12	11 th week	.IC engines. Types, constructional details and operating principles	Lecture C & T; PPT
13	12 th week	Reciprocating compressor. Volumetric efficiency and isothermal efficiency	Lecture C & T
14		Cycle Test - 2	
15	13 th week	Problems on compressor and multi stage compressor.	Lecture C & T;

COURSE ASSESSMENT METHODS				
Sl. No.	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Cycle Test - 1	After 7 th week	60 Minutes	20
2.	Cycle Test – 2	After 12 th week	60 Minutes	20
3.	Assignment	Nil.	-----	10
4.	End Semester Examination	----	150 Minutes	50
Textbooks, Reference books Website addresses, Journals, etc.				
1. Sonntag, R.E., and Borgnakke, C, Fundamentals of Thermodynamics, 7th ed., John Wiley, 2009 2. Nag, P.K., Engineering Thermodynamics, 3rd ed., Tata McGraw-Hill, 2005 3. Kothandaraman.C.P. and Domkundwar.S "A Course in thermodynamics and Heat engines' Dhanpatrai Sons,1993.				

III Sem. Books.
'A' sections

COURSE EXIT SURVEY

1. Feedback from the students during class committee meeting.
2. End semester feedback on Course Outcomes.

COURSE POLICY (Attendance, Assessment, academic honesty, etc.)

CORRESPONDENCE

All the communication to the class (schedule of assessment/ course material/ any other information regarding this course) will be through the class representative.

ATTENDENCE

1. 75% attendance is essential to appear for the end semester examination.
2. A student having attendance in the range of 50 - 75% need to appear for the compensation assessment (CPA). Student who scores more than 60% marks in the CPA along with assessment criteria will be eligible for attending the end semester examination.
3. Students not having 50% attendance at the end of the semester will have to REDO the course.

ASSESSMENT

1. If any student is not able to attend any one or both of the Continuous Assessments (Cycle Tests I & II) due to genuine reasons, he is permitted to appear for a Compensation Assessment (CPA) with % weightage equal to 20%. (This is not valid for students who have attendance lag.). At any case, CPA will not be considered as an improvement test.
2. Finally, every student is expected to score minimum 33.33% of the maximum mark of the class in the total assessment (1, 2, 3, & 4) to pass the course. Otherwise the student would be declared fail and F grade will be awarded.


ACADEMIC HONESTY & PLAGIARISM

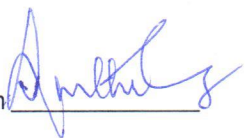
1. All the students are expected to be genuine during the course work. Acquiring information by wrong means like copying simulations, assignments, looking or attempting to look at another students paper or bringing and using study material in any form for copying during any assessment is considered dishonest.
2. Tendering of information such as giving one's program, simulation work, assignments to another student to use or copy is also considered dishonest.
3. Any practice which is considered dishonest during any assessment will lead to cancellation of the assessment process for the candidate.

ADDITIONAL COURSE INFORMATION

The Course Coordinator is available for consultation at times those are displayed on the coordinator's office notice board. Queries may also be emailed to the Course Coordinator directly at hameed@nitt.edu

FOR SENATE'S CONSIDERATION

Course Faculty 

CC-Chairperson 

HOD 