NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

This course outline template acts as a guide for writing your course outline. As every course is different, please feel free to amend the template/ format to suit your requirements.

COURSE OUTLINE TEMPLATE			
Course Title	**Thermal Engineering**		
Course Code	**PRPC 15**	**No. of Credits**	**3**
Department	**MECHANICAL**	**Faculty**	**Dr.M.UDAYAKUMAR**
Pre-requisites Course Code	**Knowledge of Calculus**		
Course Coordinator(s) (if, applicable)	**NIL**		
Other Course Teacher(s)/Tutor(s) E-mail	**NIL**	**Telephone No.**	**9487257871**
Course Type	**Core course**		

COURSE OVERVIEW

- **Review of the Laws of thermodynamics . Presentation of ths same mathematically with Engineering prespective**
- **Apply the above laws to analyse the systems and flow devices to determine heat and work transfer and to calculate efficiencies**
- **Formulate and obtain solutions for simplified models for ic engines and gas turbine systems. Introduction to actual ic engine systems.**
- **Analyse perfomance of compressors and gas turbines. Compressible fluid flow and its relevance to flow processes.**
- **Analyse steam power cycles using property data sheets and charts. Introduction to refrigeration and air conditioning.**

COURSE OBJECTIVES

- **Impart knowledge of thermodynamics, to enable students formulate the real life energy transfer problems mathematically and solve them.**

- **Train the students to build simple matematical models(ideal cycles) for power and refrigeration cycles and study the influence of different parameters on**

performance.

- **Provide skill to modify the ideal cyles to practical devices like ic engines, gas tubines steam power plant and refrigerators and air conditioners.**
- **Intoduce the limaitations imposed by compressibnle fluids on design of systems involving their use (like air and water vapour)**

COURSE OUTCOMES (CO)

Course Outcomes	**Aligned Programme Outcomes (PO)**
On completion of the course, the students will be able to: 1. Mathematically express the laws of thermodynamics and apply them to various processes and cycles. 2. identify the factors influencing performance of ic engine cycles gas turbine cycles, steam power plant operation and refrigeration systems. 3. Gain insight into the behavior of compressible fluids and gain ability to use the gas tables and steam tables to analyse different processes involving them. 4. Understand the different systems and subsystems associated with ic engines, gas turbines and steam power plants and air conditioners..	**PO-1, PO-2, PO-3, PO-4, PO-5,PO-6, PO-7, PO-8, PO-9, PO-10, PO-11, PO-12**

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	**Week**	**Topic**	**Mode of Delivery**
1	**WEEK-1**	**Introduction to Thermal Engineering Review of basic concepts of thermodynamics, Heat and work**	**Chalk and Talk**
	WEEK-2	**First law of thermodynamics for analyzing flow and non flow systems**	
	WEEK-3	**Second law of thermodynamics, equivalence between statements,**	

		Carnot cycle, Clausius inequality and entropy, efficiency	
	WEEK-4	**Problems on I law and II law**	
	WEEK-5	**Air standard cycles: otto, diesel and dual cycles.**	
	WEEK-6	**SI engines and CI engines. 4-S and 2-S cycle engines.Their comparison. Wankel engine.**	
	WEEK-7	**Reciprocating compressors- single and multi stage :power and vol efficiency. Gas turbine cycle**	
	WEEK-8	**GT cycle variations for improving th. Efficiency and work ratio**	
	WEEK-9	**Sonic velocity, mach No., wave propagation, use of isentropic flow tables**	
	WEEK-10	**Normal shock, Shock Tables, Flow through convergent –divergent nozzle.**	
	WEEK-11	**Properties of steam Steam tables and charts. Problems on steam flow and non flow**	
	WEEK-12	**Rankine cycle and its modifications.**	

	WEEK-13 **WEEK-14**	**Psychrometry and air conditioning processes.Refrigeration- Bell coleman cycle** **Vapour compression refrigeration, vapour absorption cycle.**		
COURSE ASSESSMENT METHODS				
S.No.	**Mode of Assessment**	**Week/Date**	**Duration**	**% Weightage**
1	**Cycle Test-1**	**7th week**	**1 Hour**	**20%**
2	**Cycle Test-1**	**12th week**	**1 Hour**	**20%**
3	**Retest**	**14th week**	**1 Hour**	
4	**Assignments**	**9th week – 14th week**	**2 Nos (5 marks each)**	**10%**
5			**3 Hour**	**50%** **Total = 100 Marks**

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. **Nag , P.K. "Engineering Thermodynamics", 3 Ed., Tata McGraw Hill, 2012**
2. **C. Borgnakke and R. Sonntaag, "Fundamentals of Thermodynamics", 7 Ed.Wiley 2015**
3. **Rudramoorthy,R., " Thermal Engineering", Tata Mc Graw Hill, 2009**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

1. **Feedback from students during class committee meeting**
2. **Anonymous feedback through questionnaire (as followed currently)**

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

1. **Test 1 and Test2 will be conducted in the class. Use of approved Tables and scientific calculator permitted**
2. **75% attendance compulsory for wring the end semester examination**

ADDITIONAL COURSE INFORMATION

The Faculty is available for consultation after the class hours in the Mech. Engg. Dept. Faculty may also be contacted on mobile : 9487257871

FOR SENATE'S CONSIDERATION

Course Faculty _____ CC-Chairperson _____ HOD _____