DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN

COURSE OUTLINE			
Course Title	**Thermodynamics and Fluid mechanics Laboratory**		
Course Code	**ICLR 10**	**No. of Credits**	**2**
Department	**ICE A & B**	**Faculty**	**R.Arumukam**
Pre-requisites	**None**		
Course Coordinator	**----**		
Teacher's E-mail	**arumukam@nitt.edu**	**Telephone No.**	**9578772329**
Course Type	**Core Laboratory Course**		

COURSE OVERVIEW
To introduce the students to various instruments and testing methods associated with fluid flow and thermal engineering.

COURSE OBJECTIVES
To understand 1. the principles of thermal energy and its transformation to mechanical energy, 2. thermodynamics - concepts and properties, first and second law, 3. the working knowledge of thermodynamics & fluid mechanics.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1 An understanding of heat, work, internal energy, 1st and 2nd law of thermodynamics	Would have developed an ability to apply the knowledge of mathematics, sciences, and engineering fundamentals to the field of instrumentation & control.

2. An understanding of Dimensional Analysis, fluid statics and dynamics	Would have developed an ability to apply the knowledge of mathematics, sciences, and engineering fundamentals to the field of instrumentation & control.
3. An understanding of fluid mechanics fundamentals, including concepts of mass and momentum conservation.	Would have developed an ability to apply the knowledge of mathematics, sciences, and engineering fundamentals to the field of instrumentation & control.
4. An ability to apply the Bernoulli equation & control volume analysis to solve problems in fluid mechanics.	Would have learnt necessary skills to develop mathematical models, and deploy appropriate techniques and IT tools to design advanced control systems and associated instrumentation for problems dealt in R & D organizations.

COURSE TEACHING AND LEARNING ACTIVITIES

Sl. No.	Week	Experiment	Mode of Delivery
1	1	Introduction and instructions to lab experiments	Chalk and talk
2	2	Performance test on single cylinder four stroke diesel engine	Experiment
3	3	Coefficient of discharge of venturimeter	Experiment
4	4	Morse test on multi cylinder petrol engine	Experiment
5	5	Coefficient of discharge of V- notch	Experiment
6	6	Performance test on reciprocating air compressor	Experiment
7	7	Characteristic test on gear oil pump at constant speed	Experiment
8	8	Performance test on vapour compression refrigeration system	Experiment
9	9	Determination of operation characteristic of Francis turbine	Experiment
10	10	Performance test on air-conditioning tutor	Experiment
11	11	Losses due to pipe friction	Experiment
12	12	Viscosity index of lubricant	Experiment
13	15	Objective-type test	Test

COURSE ASSESSMENT METHODS

Every student has to complete the minimum of ten experiments (five in fluid mechanics and five in thermal engineering) with proper record in order to understand the experiments.
At the end of Fourth week: The students have to finish minimum of three experiments

At the end of Eighth week: The students have to finish minimum of six experiments
At the end of Twelfth week: The students have to finish eleven experiments.
At the end of Fifteen week: Final assessment based on objective test.
The students have to do the experiments cyclically.

The course assessment will be split equally between fluid mechanics and thermal engineering laboratory, with each component carrying 50% weightage.

Fluid Mechanics Laboratory	Thermal Engineering Laboratory
* Experimentation and Observation: 10% * Record work: 20% * Examination: 20%	* Experimentation and Observation: 10% * Record work: 20% * Examination: 20%
Total weightage: 100%	

ESSENTIAL READINGS

Reference Books:

1. Zemansky, Heat and Thermodynamics, 7th edition, McGraw Hill, New York, 1997.
2. Ojha C.S.P., Berndtsson R., Chandramouli P.N., Fluid Mechanics and Machinery, Oxford University Press,2010.
3. Nag P.K., Engineering Thermodynamics, 2nd Edition, Tata McGraw Hill, 1995.

COURSE EXIT SURVEY

A survey will be taken from the students at the end of the semester through a questionnaire on coverage of syllabus, usefulness of course plan, teaching efficiency etc.

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

1. The minimum attendance for this course is 80 %
2. Students having less than 80 % attendance must redo the course after a year along the next batch.
3. Copying others' readings in note book is considered as plagiarism and shall be awarded zero marks for the respective experiment.
4. Students are required to maintain and prepare the record note book in proper format.
5. Students should be alert at all times and should adhere to the safety policy of the laboratory.
6. Students should not operate any machinery in the absence of any supervisor.

ADDITIONAL COURSE INFORMATION
The faculty is available for consultation at the times given by the faculty member. Queries to the course teacher may also be emailed to the email-id arumukam@nitt.edu
FOR SENATE'S CONSIDERATION
Course Faculty R.A. (R. ARUMUKAM) CC-Chairperson Goldin R. Bennet 2-8-2017 HOD 2/8/2017 Date: 2/8/17

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TIRUCHIRAPPALLI-620 015.
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