

Faculty of Engineering & Technology, SRM University, Kattankulathur – 603203
School of Mechanical Engineering

Department of Mechanical Engineering
Course plan

Course code : ME0232 Date : 19/12/2013
Course title : Thermodynamics and Fluid Mechanics
Semester : 4
Academic year / semester : 2013-2014 / Even
(November 2013 – May 2014)

Section details:

Section	Class Room No.	Details of Faculty member				Student contact time
		Name	Room No.	Intercom No.	e-mail id	
EIE-A		M.Shivasankar	H 313		shivasankar.v@ktr.srmuniv.ac.in	Monday-12:15 to 12:45
EIE-B		S.Malarmannan	H 502		malarmannan.s@ktr.srmuniv.a.in	Wednesday-12:15 to 12:45
EIE-C		S.Arulkumar	MEB 104G		arulkumar.s@ktr.srmuniv.ac.in	Friday-12:15 to 12:45
EIE-D		R.Manojkumar	MEB 208		manojkumar.r@ktr.srmuniv.ac.in	Tuesday-12:15 to 12:45
ICE-A		N.Vijayakrishna	MEB 104F		vijayakrishna.n@ktr.srmuniv.ac.in	Thursday-12:15 to 12:45

Direct assessment details:

Name of assessment	Marks	Topics	Tentative date	Duration
Cycle test – I	10	Basic of thermodynamics and System	5-February-2014	100 minutes
Surprise test	05	Cycle and Systems	B/W cycle test-1 and 2	10 – 15 min
Cycle test – II	10	Thermodynamics Systems , Refrigeration and Air-Conditioning	5-March-2014	100 minutes
Model examination	20	Entire Syllabus	15-April-2014	3 hours
End semester examination	50	Entire Syllabus	5-May-2014	3 hours
Attendance	05	N/A		

Syllabus of the course

		L	T	P	C
ME0203	Thermodynamics and Fluid Mechanics	3	0	0	3
	Prerequisite				
	Nil				

(Use of approved Steam tables are permitted in the University Examinations)

PURPOSE

To enable the students to develop understanding of Mechanical Engineering concepts and principles and apply these to solve the practical problems encountered in their profession.

OBJECTIVES

The students will be able to

- 1-Understand the basic thermodynamic principles and concepts.
- 2-Understand the principles of working of various Mechanical Engineering systems and their operating characteristics.
- 3-Understand the principles of Fluid Mechanics and the Measurement Techniques of Fluid properties.

UNIT -1 BASIC OF THERMODYNAMICS

Systems, Zeroth Law, First Law - Concept of Internal Energy and Enthalpy, Applications to closed and open systems - Second Law - Concept of Enthalpy - Clausius Inequality.

UNIT – 2 CYCLES AND SYSTEMS

Otto, Diesel and Brayton cycles, IC engines - 4 stroke and 2 stroke engines - Brake power - Efficiencies - Heat Balance - Simple problems only. Properties of steam - Use of steam tables and mollier diagram - Rankine cycle - Simple problems.

UNIT – 3 REFRIGERATION AND AIR CONDITIONING SYSTEMS

Vapour compression refrigeration systems - COP - Simple problems - Basics of air conditioning systems, Reciprocating compressors - Volumetric efficiency - Power required - Rotary compressors - Heat transfer - Modes of heat transfer - Simple problems on conduction, convection and radiation.

UNIT- 4 BASICS OF FLUID MECHANICS

Introduction - Properties of fluid - Density, viscosity, pressure and velocity - Types of fluid flow - Continuity equation - Energy / Head of fluid - Euler's equation - Bernoulli's equation, flow through pipes - Hagen Poiseuille's law - major and minor losses.

UNIT- 5 FLUID MEASUREMENTS

- Flow Measurements - Orifice meter, Venturi meter, Rota meter and Elbow meter
- Pressure Measurement -Total and static pressure measurements using pitot tube, manometer, mechanical gauges
- Velocity Measurements - Anemometers - Cup and Vane types, Hot wire anemometers, Laser anemometers

TEXT BOOKS

- Sarkar B.K., *Thermal Engineering*, Tata McGraw Hill Co. Ltd., India, 1999
- Rajput.R.K *Fluid Mechanics and Hydraulic Machines*, S.Chand & Co., India 1998

REFERENCE BOOKS

- Rayner & Joel, *Basic Engineering Thermodynamics*, Addison Wesley Publishing Company Ltd., 5th Edition, 1996
- Nag.P.K., *Engineering Thermo Dynamics*, Tata McGraw Hill Co. Ltd., India, 1995
- Rajput R.K., *Thermal Engineering*, Laxmi Publications (P) Ltd., NewDelhi, Edition. 2001
- Shames.I.H, Koga Kusha, *Mechanics of Fluids*, Tokyo, 1998
- D.S.Kumar, *Fluid Mechanics and Fluid Power Engineering*, S.K.Kataria & Sons Publishers, India, 6th Edition, 2003

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×				×						
2	Category	GENERAL (G)			BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)			PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing			Design		Thermal		General			
							X					
4	Course Coordinator	Mr. S.Malarmannan										

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LESSON PLAN

COURSE CODE : ME0232
 COURSE TITLE : THERMODYNAMICS AND FLUID MECHANICS
 YEAR/SEMESTER : II / IV
 YEAR : 2013-14

Sl. No	Hours	TITLE/DETAILS OF CHAPTER	REFERENCES
BASIC OF THERMODYNAMICS			
1	1	Thermodynamic Systems	T1 Chapter -1.4,R1 Chapter-1.2
2	1	Zeroth law and first law of Thermodynamics	T1 Chapter 2.2,R2 Chapter-2.1
3	1	Tutorial-Problem based on first law of thermodynamics	T1 Chapter 2.2
4	1	Concept of internal energy and enthalpy	T1 Chapter 3.1, R3 Chapter 3.1,3.8.5
5	1	Application to closed and open systems	T1 3.9,3.10, R3 Chapter 3.9,3.10
6	1	Tutorial-Problem Based on S.F.E.E	T1 Chapter 3.9,3.10R3 Chapter 3.9,3.10
7	1	Second Law of Thermodynamics	T1 Chapter-3.8.5,R3 Chapter -4.1
8	1	Concept of enthalpy	T1 Chapter 4.7,R3 Chapter 3.8.5
9	1	Clausius Inequality	R3 Chapter 4.7
CYCLES AND SYSTEMS			
10	1	Otto Cycle-Derivation	T1 Chapter 16.1,R3 Chapter-21.4
11	1	Diesel cycle-Derivation	T1 Chapter 16.3,R3 Chapter21.5
12	1	Tutorial Diesel engine and Brayton Cycles	T1 Chapter 16.1 & 16.3, R3 Chapter21.5,21.10
13	1	Brayton cycle	T1 Chapter 16.7, R3 Chapter21.10
14	1	IC Engines – 4 Stroke and 2 Stroke Engines	T1 Chapter 17.1,17.6&17.7, R3 Chapter23.12,23.13
15	1	Brake Power & Efficiencies	T1 Chapter 17.21,R3 Chapter 23.39
16	1	Heat Balance of IC engines	T1 Chapter-23,R3 Chapter 23
17	1	Properties of Steam, Use Steam tables and Mollier diagram	T1 Chapter 6.1-6.6- 6.7&6.11, R2 Chapter9.1
18	1	Rankine cycle Simple problems	T1 Chapter 11.4,R2 Chapter 15.2
REFRIGERATION AND AIR			

CONDITIONING SYSTEMS			
19	1	Vapour compression refrigeration systems - COP - Simple problems	T1 Chapter 20.1, R3 Chapter-26.3
20	1	Tutorial-Problem based on Vapour Compression Refrigeration System	T1 Chapter 20.1
21	1	Basics of air conditioning systems	R3 Chapter 27.1-27.3
22	1	Reciprocating compressors - Volumetric efficiency	T1 Chapter 18.5-18.7, R3 Chapter-24.3
23	1	Power required - Rotary Compressors	T1 Chapter 18.9&18.13, R3 Chapter 24.4
24	1	Heat transfer - Modes of heat transfer	T1 Chapter-18.5,R3 Chapter 28.1
25	1	Simple problems on conduction	T1 Chapter -18.5,R3 Chapter 28.1
26	1	Simple problems on convection	T1 Chapter 18.5,R3 Chapter 28.1
27	1	Simple problems on radiation	T1 Chapter-18.5,R3 Chapter 28.1
BASICS OF FLUID MECHANICS			
28	1	Introduction - Properties of fluid	T2 Chapter 1.1,1.2,R5 Chapter-1.1
29	1	Density, viscosity, pressure and velocity	T2 Chapter 1.2,1.3,2.1&5.7,R5 Chapter-1.11
30	1	Types of fluid flow	T2 Chapter 5.3, R5 Chapter1.13
31	1	Continuity equation	T2 Chapter 5.5, R5 Chapter-3.7
32	1	Energy / Head of fluid - Euler's equation ,Bernoulli's Equation	T2 Chapter 6.3,6.4 & 6.6,R5 Chapter-4.2
33	1	Tutorial- Problem Based on Bernoulli's equation	T2 Chapter 6.4,6.6,
34	1	Flow through pipes Hagen Poiseulli's - law	T2 Chapter 9.2,11.1,11.6-11.10
35	1	Major and minor losses	T2 Chapter 11.2-11.4,R5 Chapter -10.3
36	1	Tutorial-Problem based on flow through pipe	T2 Chapter 11.2-11.4,R5 Chapter -10.3
FLOW MEASUREMENTS			
37	1	Flow Measurements - Orifice meter	T2 Chapter 6.7.2
38	1	Venturi meter-Rota meter and Elbow meter	T2 Chapter 6.7.1
39	1	Tutorial – Problems based on venture meter	T2 Chapter 6.7.1
40	1	Pressure Measurement -Total and static pressure measurements using Pitot tube	T2 Chapter 6.7.3
41	1	Manometer	T2 Chapter 2.6&2.7
42	1	Tutorial- Problem based on Pressure measurements	T2 Chapter 2.6&2.7
43	1	Mechanical gauges	T2 Chapter 2.5.2, R5 Chapter-5.7
44	1	Velocity Measurements – Anemometers , Cup and Vane types	R4, Chapter A-1,R5 Chapter-5.7
45	1	Hot wire anemometers	R4, Chapter A-1, R5 Chapter-5.8

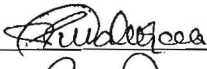
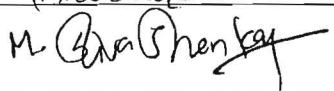
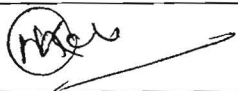
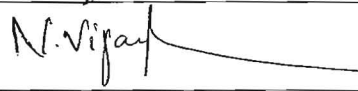
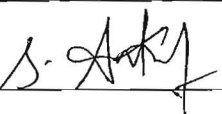
Text Books:

1. Sarkar B.K., *Thermal Engineering*, Tata McGraw Hill Co. Ltd., India, 1999
2. Rajput.R.K *Fluid Mechanics and Hydraulic Machines*, S.Chand & Co., India 1998
3. W.P. Graebel Engineering Fluid Mechanics, Taylor & Francis Publisher , London 2011

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5. D.S.Kumar, *Fluid Mechanics and Fluid Power Engineering*, S.K.Kataria & Sons Publishers, India, 6th Edition, 2003

Name of the Faculty:

Sl. No	Name of the Faculty	Signature
1	Mr.S.Malarmannan	
2	Mr.M.Shivasankar	
3	Mr.R.Manojkumar	
4	Mr.N. Vijayakrishna	
5	Mr.S.Arulkumar	


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