FIRST SEMESTER 2015-2016
Course Handout (Part II)

Date: 03/08/2015

In addition to part-I (general handout for all courses in the time-table), this handout provides the specific details regarding the course.

Course No.: ME F214/MF F214

Course Title: Applied Thermodynamics

Instructor-in-charge: Manoj S. Soni

Instructor: Anil Jindal, Sanjeev Jakhar, Nikhil Gakkhar, Ravi Inder Singh

Scope and Objective: This course is designed to acquaint the students with the thermodynamics of power developing and power absorbing machines. The course discusses about gas and vapour cycles, combined power generation cycles, refrigeration cycles, gas mixtures and psychrometrics, gas turbine cycle's thermodynamic relations etc.

Text Book:

1. **Nag P.K.** "Basic and Applied Thermodynamics", Tata McGraw-Hill Publishing Company Ltd., 2nd edition 2009.

Reference Books:

1. **Arora C.P.,** "Refrigeration and Air Conditioning" Tata McGraw-Hill Publishing Company Ltd., 2000, 2 nd ed.
2. **Nag P.K.** "Power Plant Engineering", Tata McGraw-Hill Publishing Company Ltd., 2008. 3rd ed.
3. **Borgnakke C., Sontag R. E.,"** Fundamental of Thermodynamics", Wiley India, 2010, 7 th ed.
4. **Yunus Cengel, Michael Boles**, "Thermodynamics (SI Units) - An Engineering Approach", Tata McGraw-Hill Publishing Company Ltd., 2010. 7th ed.

Course Plan:

Lect. No.	Topic	Objective(s)	Chapter(s)
1.	Introduction		
2.	Availability and Irreversibility	Available Energy, Reversible Work and Irreversibility	(RB3) 10.1 (TB)8
3.	Availability and Irreversibility	Second Law efficiency Exergy Balance Equation	(RB3) 10.2-10.3 (TB)8
4.	Vapour Power Cycles	Rankine Cycle	(TB) 12.1-12.2
5.	Vapour Power Cycles	Actual Vapour Cycle and comparison with Carnot Cycle	(TB) 12.3, 12.4
6.	Vapour Power Cycles	Mean temperature of heat addition	(TB) 12.5
7.	Vapour Power Cycles	Reheat Cycles	(TB) 12.6
8.	Vapour Power Cycles	Regenerative Cycles	(TB) 12.7, 12.8
9.	Vapour Power Cycles	Reheat-Regenerative Cycle including feed water heating	(TB) 12.9, 12.10
10.	Vapor Power Cycles	Binary Vapor cycles; Process heat and Byproduct power	(TB) 12.12 to 12.15
11.	Boilers and accessories	Types of boilers Fire tube, water tube etc.	(RB2)6.1-6.3.3
12.	Boilers and accessories	Circulation	(RB2) 6.3.3-6.3.5
13.	Boilers and accessories	Modern water tube boiler, Economisers, Superheater, Reheater, Air Preheater	(RB2) 6.4-6.6 (RB2) 6.4-6.8
14.	Condensers	Types, design calculation, air removal, Efficiency	(RB2) 8.1-8.3
15.	Gas Power Cycles	Carnot, Stirling, Ericsson cycle	(TB) 13.1 to 13.3
16.	Gas Power Cycles	Otto and Diesel Cycle	(TB) 13.4 to 13.6
17.	Gas Power Cycles	Dual Cycle	(TB) 13.7
18.	Gas Power Cycles	Comparison of A. S. C.	(TB) 13.8
19.	Compressors	Gas Compression	19.1 -19.3
20.	Compressors	Gas Compression	19.4-19.5
21.	Gas Turbine Cycles	Brayton Cycle	(TB) 13.9.1 to 13.9.3
22.	Gas Turbine Cycles	Effect of Pressure Ratio on Brayton Cycle	(TB) 13.3.4
23.	Gas Turbine Cycles	Intercooling, Reheating, and	(TB) 13.9.5,

		Regeneration	13.9.6
24.	Combined power cycle	Combined Cycle Plants	(RB2) 3.4-3.6.3
25.	Refrigeration Cycles	Reversed Heat Engine Cycles; Gas cycle refrigeration	(TB) 14.2, 14.5
26.	Refrigeration Cycles	Vapor compression cycle	(TB) 14.3 (RB1) 3
27.	Refrigeration Cycles	Multistage Vapour Compression System	(TB) 14.3 (RB1) 8
28.	Refrigerants	Chemical and physical Requirements, and substitute of Refrigerants	(TB) 14.3.3-14.4 (RB1) 4
29.	Vapour Absorption Systems	Principle of Vapour Absorption Systems	(TB)14.5-14.6 (RB1) 12
30.	Vapour Absorption Systems	Li-Br Vapour Absorption Systems and Electrolux systems	(RB1)12
31.	Gas Mixtures and Psychrometrics	Mixtures	(TB)10.8 to 10.10
32.	Gas Mixtures and Psychrometrics	Basic Concept of Psychrometry	(TB) 15.1, 15.2 (RB1)14
33.	Gas Mixtures and Psychrometrics	Psychrometric processes and Air Conditioning	(TB) 15.3-15.4 (RB1)15
34.	Psychrometry of Air-conditioning Processes	Summer Air Conditioning	(TB) 15.5-15.5.2 RB1)15
35.	Psychrometry of Air-conditioning Processes	Winter Air Conditioning	(TB) 15.5.3 (RB1)15
36.	Load Calculations-cooling and heating	Design conditions	(RB1)16
37.	Load Calculations-cooling and heating	Heat Gains, Cooling and Heating Load estimation	(RB1)19
38.	Compressible fluid flow	Stagnation properties, Flow through Nozzle	(TB) 17.1-17.3
39.	Compressible fluid flow	Chocking, Normal shocks	(TB) 17.4-17.5
40.	Compressible fluid flow	Adiabatic and diabatic flow	(TB) 17.6

Note: Additional latest topics will be covered from time to time during lecture hours and based on the same reading assignments will be given.

Evaluation Scheme:

Components	Duration	Weightage (%)	Maximum Marks [200]	Date & Time	Remarks
Tutorial Tests	50 min.	20	40	Tut hour	Surprise in nature. Closed Book*
Online Quiz	Online	10	20		Announced
Mid Semester Test	90 min.	30	60	6/10 8:00 - 9:30 AM	Open book
Comprehensive Test	3 hrs.	40	80	3/12 FN	Closed Book

*** During tutorial tests, thermodynamics tables and charts will be permitted.**

Mid-semester grading: It will be announced normally in the month of October. It is done in the same manner as that of the final grading

Tutorials Tests: Best FOUR will be taken out of SIX.

Chamber Consultation Hours (Instructor Incharge): will be announce in class

Notices: All notices related to this course will be put on the Mech.Engineering notice board only.

Make-up Policy: Make-up will be given only to the genuine students. The request application for make-up test must reach the Instructor-in-charge before commencement of the scheduled test (documentary proof is essential). No make-up will be allowed for the tutorial tests.

Instructor-in-charge
MEF214/MFF214
Dr. M.S. Soni