SRM UNIVERSITY
FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CHEMICAL ENGINEERING
COURSE PLAN

GN0204	E	Stoichiometry and Engineering Thermodynamics	3	0	0	3

Course Code : GN0204 **Course Title :** Stoichiometry and Engineering thermodynamics
Semester : VI **Course Time** : Jan-Apr 2011

Day	**D**	
	Hour	**Timing**
Monday	3rd	
Tuesday	2nd	09.35-10.25 a.m
Friday	5th and 6th	01.30-03.10 p.m

Location: SRMEC-School of Bio-Engineering Block
Faculty Details

Sec	**Name**	**Office**	**Office hour**	**Mail id**
Genetic 'A'	**Ms.N.Saritha**	VBT Block (V405)	8.30 a.m – 4.00 p.m	**Sari_chem@yahoo.co.in**

Required Text Books:
1.David M. Himmelblau, "Basic Principles and Calculations in Chemical Engineering", 6th Edn., Prentice-Hall of India, New Delhi, 1998
2.Smith, J.M., Van Ness, H.C., and Abbott, M.M., "Introduction to Chemical Engineering Thermodynamics", 6th Edn., McGraw Hill International Edition, Singapore 2001
3.Bhatt B.I. and Vora S.M., "Stoichiometry", 3rd Edn., Tata McGraw-Hill Publishing Company, New Delhi, 1996
4.Rao Y.V.C, Chemical Engineering Thermodynamics (1997), University Press, Hyderabad

Objectives:
To familiarize:
1.The formulation and solution of material balances in chemical process system
2.To know about the transformation of energy from one to another

Assessment Details:
Cycle test I **:** 10marks **Surprise Test I** **:** 5marks
Cycle Test II : 10marks **Attendance** **:** 5marks
Model Exam **:** 20marks
Test Schedule:

S.No	**Date**	**Test**	**Topics**	**Duration**
1		Cycle Test-I	30%	100 min
2		Cycle Test-II	30%	100 min
3		Model Exam	100%	3 hrs

Outcomes:
Students who have successfully completed this course will have full understanding of the following concepts

Course Outcome	Program Outcome
• Students will recognize that mass and energy balance equation • Students will be able to select and evaluate the problems based on the process constraints and conditions.	• An ability to apply knowledge of math, science and engineering. • An ability to identify, formulate and solve engineering problems. • An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Detailed Session plan:

INTRODUCTION					
S. No	**Topics to be covered**	**Time (min)**	**Ref**	**Teaching method**	**Testing method**
1	Introduction	50	1,2,3	BB	Group Disussion
2	Units and dimensions	50	1,2,3	BB	Group Disussion
3	The mole unit, mole fraction (or percent) and mass fraction (or percent),	50	1,2,3	BB	Problem solving
4	Analyses of a mixture, concentrations,	50	1,2,3	BB	Problem solving
5	Basis of calculations,	50	1,2,3	BB	Problem solving
6	Predicting P-V-T properties of gases using the following equation of state: ideal gas law.	50	1,2,3	BB	Problem solving
7	Predicting P-V-T properties of gases using the following equation of state: Van der Waals equation	50	1,2,3	BB	Problem solving
8	Predicting P-V-T properties of gases using the following equation of state: Redlich-Kwong equation, calculation of density.	50	1,2,3	BB	Problem solving
9	Problem solving	50	1,2,3	BB	Group Disussion
CHEMICAL EQUATION AND MATERIAL BALANCES					
10	Basics of chemical equation and stoichiometry,	50	1,2	BB	Group Disussion
11	Limiting reactant, Excess reactant, Conversion, Selectivity, Yield.	50	1,2	BB	Group Disussion
12	Basic concepts involved in material balance calculations,.	50	1,2	BB	Group Disussion ,&Problem solving
13	Material balance problems without chemical reactions:	50	1,2	BB	Group Disussion

					,& Problem solving
14	Membrane separation,	50	1,2,3	BB	Group Disussion
15	Mixing, Drying, Crystallization.	50	1,2,3	BB	Group Disussion
16	Basic concepts of recycle, bypass and purge streams	50	1,2,3	BB	Group Disussion
17	Problems solving	50	1,2	BB	Group Disussion
18	Problems solving.	50	1,2	BB	Group Disussion
BASIC CONCEPTS AND FIRST LAW OF THERMODYNAMICS					
19	Basic concepts: work, energy, heat	50	4	BB	Group Disussion
20	Basic concepts: internal energy, extensive and intensive properties, state and path functions,	50	4	BB	Group Disussion
21	First law of thermodynamics	50	4	BB	Group Disussion
22	energy balance for closed systems	50	4	BB	Group Disussion
23	Equilibrium, the reversible process		4	BB	Group Disussion
24	Constant-v and constant-p processes	50	4	BB	Group Disussion & Problem solving
25	Enthalpy, heat capacity	50	4	BB	Group Disussion ,& Problem solving
26	Energy balances for steady-state flow processes.	50	4	BB	Group Disussion ,& Problem solving
27	Problem solving	50	4	BB	Problem solving
VOLUMETRIC PROPERTIES OF PURE FLUIDS.					
28	PVT behavior of pure substances	50	4	BB	Group Disussion
29	Virial equations of state	50	4	BB	Group Disussion
30	The ideal gas	50	4	BB	Group Disussion
31	Equations for process calculations (for an ideal gas in any mechanically reversible closed-system process):	50	4	BB	Group Disussion

	isothermal process, isobaric process				,
32	Equations for process calculations (for an ideal gas in any mechanically reversible closed-system process): isothermal process, isobaric process, isochoric process, adiabatic process, and polytropic process	50	4	BB	Group Disussion
33	Application of the virial equations	50	4	BB	Group Disussion
34	Introduction to cubic equations of state: van der Waals equation, Redlich/Kwong equation	50	4	BB	Group Disussion
35	Theorem of corresponding states	50	4	BB	Group Disussion
36	Acentric factor	50	4	BB	Group Disussion
SECOND LAW OF THERMODYNAMICS					
37	Statements of second law of thermodynamics	50	1,3	BB	Group Disussion
38	Heat engines, Carnot's theorem,. ideal-gas temperature scale	50	1,3	BB	Group Disussion
39	Carnot's equations	50	1,3	BB	Group Disussion
40	Concept of entropy, Clasius inequality	50	1,3	BB	Group Disussion
41	Entropy changes of an ideal gas undergoing a mechanically reversible process in a closed system	50	1,3	BB	Group Disussion
42	Mathematical statement of the second law	50	1,3	BB	Group Disussion
43	Entropy balance for open systems	50	1,3	BB	Group Disussion
44	Statement of the third law of thermodynamics	50	1,3	BB	Group Disussion ,Assignment
45	Problem solving	50	1,3	BB	Group Disussion