SCHEME OF COURSE WORK

Course Details:

Course Title	**PRINCIPLES OF CHEMICAL ENGINEERING**		
Course Code	**15CH1101**	**L T P C**	**3 0 0 3**
Program:	**B.Tech.**		
Specialization:	**CHEMICAL ENGINEERING**		
Semester	**I**		
Prerequisites	**PHYSICS & CHEMISTRY**		
Courses to which it is a prerequisite	**CPC-I & II, MT,MUO, HT, MTO-I & II**		

Course Outcomes (COs):

CO 1 Write about the importance of Chemical Engineering and dimensions.
CO 2 Describe the importance of material balances, types of fluids, fluid flow and fluid moving machinery.
CO 3 Describe the importance of heat transfer and the related equipment.
CO 4 Describe the importance of mass transfer operations and the equipment of mass transfer operations.
CO 5 Identify the materials for construction and the economics and profitability of the process.

Program Outcomes (POs):

A graduate of chemical engineering will be able to

1	Able to apply the knowledge of mathematics, science, engineering fundamentals to solve complex chemical engineering problems.
2	Attain the capability to identify, formulate and analyse problems related to chemical engineering and substantiate the conclusions.
3	In a position to design solutions for chemical engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.
4	Able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5	Able to select and apply appropriate techniques from the available resources and modern chemical engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.
6	Able to carry out their professional practice in chemical engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
7	Able to understand the impact of the professional engineering solutions on environmental safety.
8	Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9	Able to function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10	Able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11	Able to apply knowledge of the engineering and management principles while managing projects in multidisciplinary environments.
12	Engage in independent and life-long learning in their specialized areas of chemical engineering.

Course Outcome Versus **Program Outcomes:**

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3											
CO-2	1											
CO-3	1								2			
CO-4	1											
CO-5	1								1			

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), put -: No Correlation

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Origin and History of Chemical Engineering, Functions of a Chemical Engineer. Professional and general aspects of chemical engineering. Difference between Chemical engineering science and technology. Origin and development of the Chemical Process Industry, Introduction	CO-1	Give some applications of chemical engineering	▫ Lecture / Discussion ▫ Powerpoint presentation	Assignment Quiz Mid
2	units and dimensions, dimensional analysis	CO-1 CO-2	What is the use of dimensional analysis in engineering applications and explain Buckingham method with an example?	▫ Lecture / Discussion ▫ Problem solving	Assignment Quiz Mid
3	Unit operations & unit processes, Mechanical unit operations	CO-1	Define Unit operations and unit processes?	▫ Lecture	Assignment Quiz Mid
4	Mechanical unit operations	CO-1	Explain filtration in detail with a neat sketch.	▫ Lecture ▫ presentation	Assignment Quiz Mid
5	Heat & Mass transfer	CO-1	Explain different modes of heat transfer with their basic equations.	▫ Lecture	Assignment Quiz Mid
6	Basic laws, Physical properties	CO-3	Explain the following: i)Hess law of heat summation ii)Standard heat of reaction	▫ Lecture	Assignment Quiz Mid
7	Material & energy balances Humidity & saturation	CO-3	What is meant by material balance? What are the steps to be followed in writing a material balance?	▫ Lecture	Assignment Quiz Mid
8	Flow of fluids, Rotary, reciprocating and centrifugal pumps	CO-4 CO-5	Define both laminar and turbulent flow. Explain the concept of boundary layer on a flat plate. Describe the operation of centrifugal pump with a neat sketch.	▫ Lecture	Assignment Quiz Mid
9	**Mid-Test 1**				
10	Heat transfer-conduction, convection, radiation, Flow arrangements in heat exchangers with profiles	CO-4	Describe the process of heat transfer by convection . Differentiate between natural and Forced convection	▫ Lecture	Assignment Quiz Mid
11	Heat transfer equipment, direct contact apparatus, industrial heat exchange equipment	CO-5	Describe the construction of a shell & tube heat exchanger with a neat sketch.	▫ Lecture ▫ Videos ▫ Powerpoint presentation	Assignment Quiz Mid

12	Evaporation & types of evaporators	CO-4 CO-5	Explain the process of evaporation in detail in a forced circulation evaporator.	▫ Lecture	Assignment Quiz Mid
13	Mass transfer - diffusion	CO-4	Discuss the classification of mass transfer operations according to phase contact.	▫ Lecture	Assignment Quiz Mid
14	Absorption, VLE	CO-4	Define relative volatility. What is meant by absorption.	▫ Lecture	Assignment Quiz Mid
15	Distillation	CO-4	Explain flash and differential distillation	▫ Lecture	Assignment Quiz Mid
16	Distillation, Extraction	CO-4	What is meant by extraction? Explain the use of triangular graph with a neat sketch.	▫ Lecture	Assignment Quiz Mid
17	Equipment for G-L operations, Selection of equipment for gas – liquid operations	CO-5	Discuss in detail about bubble cap columns with a neat figure.	▫ Lecture ▫ Powerpoint presentation ▫ videos	Assignment Quiz Mid
18	**Mid-Test 2**				
19/20	**END EXAM**				

GAYATRI VIDYA PARISHAD : : COLLEGE OF ENGINEERING(**Autonomous**)
MADHURAWADA : : VISAKHAPATNAM – 530048
DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN – 2014-15

Name of the Teacher: Mrs. P. J. Subba Lakshmi
Class : I B.Tech – I Sem
Subject: INTRODUCTION TO CHEMICAL ENGINEERING

Sl.No.	Topics proposed to be covered during the lectures	No of Periods
Unit-I		
1	Introduction	1
2	Unit Operations & unit process	2
3	Basic Laws	3
4	Units & Dimensions	4
	Unit-II	
5	Energy	2
6	Humidity & Saturation	3
7	Material Balance	3
8	Energy Balance	2
	Unit-III	
9	Introduction, Nature of a Fluid	1
10	Viscosity	1
11	Velocity profile & Flow field	1
12	Types of Fluid motion, Laminar & Turbulent Flow	1
13	Flow if a fluid past a solid surface	2
14	Pumping of Fluids	2
15	Reciprocating pumps	1
16	Rotary pumps	2
17	Centrifugal Pumps	1
	Unit-IV	
18	Conduction	2
19	Convection	2
20	Radiation	2
21	Flow arrangement in heat exchangers, Variation of fluid temperatures in heat exchangers	1
22	Heat Transfer Equipment(DPHE,STHE)	2
22	Evaporation, Types of evaporators	3

23	Multiple effect evaporation, Methods of feeding	2
	Unit-V	
24	Diffusion	1
25	Mass Transfer Operations	1
26	V.L.E, Relative Volatility , Boiling point diagram	1
27	Distillation :1)Equilibrium or Flash Distillation	1
	2)Simple Batch or Differential Distillation	1
	3) Steam Distillation 4)Azeotropic and Extractive Distillation	1
	5) Fractional Distillation	1
28	Reflux	1
29	Liquid-liquid Extraction, Extraction Schemes , distribution coeff., Triangular Diagram , Selection of solvent	2
30	Equipment for Gas Liquid Operations	2
31	Selection of equipment for Gas Liquid Operations	2
	Total no of Classes	60

Text Book:

1. Introduction to Chemical Engineering by S. K. Ghosal, S. K. Sanyal and S. Dutta,

TMH publications, 1993.