CLASS: S. E. CHEMICAL ENGINEERING		Semester - IV	
SUBJECT :Plant Utilities			
Periods Per Week (Each of 60 min.)	Lectures	04	
	Practical	---	
	Tutorial	01	
		Hours	Marks
Evaluation System	Theory Examination	03	100
	Practical Examination	---	---
	Oral Examination	---	---
	Term Work		25
	Total		125

Detailed Syllabus		Lectures
4.6.1	Module 1 **Introduction** 4.6.1.1 Identification of common plant utility, Importance of utility in industry **Water** 4.6.1.2 Row water storage and treatment , Treatment of water, soft water and DM water, Cooling water system, Fire water system	10
4.6.2	Module 2 **Steam** 4.6.2.1 Properties of Steam, Steam generation of boiler, Types of boiler and their operation, Steam generation by utilizing process waste heat using thermic fluid, Re-generators and re-evaporators, Distribution of steam in plant, Efficient use of steam	10
4.6.3	Module 3 **Air** 4.6.3.1 Compressed air from blower and compressor, Air drying system for instrument air and plant air, Humidification and de- humidification of air	10
4.6.4	Module 4 **Refrigeration** 4.6.4.1 Principal of refrigeration, Refrigeration system like compression refrigeration, absorption refrigeration, and chilled water system, Types of refrigerants	10
4.6.5	Module 5 **Vacuum system** 4.6.5.1 Selection of Vacuum system, Operation of various process equipment under vacuum distillation, reactor, evaporators	10
4.6.6	Module 6 **Flaring and venting** 4.6.6.1 Introduction , Type of vent flares	10

Theory Examination:

1. Question paper will comprise of 7 questions, each of 20 marks
2. Only 5 questions need to be solved.
3. Question I will be compulsory and it will be based on entire syllabus,
4. (One Question will based on one modules) in this way there will be remaining six questions of 20 marks each out of Four will have to solve.

Term work:

A minimum of 10 assignments should be given at regular interval.

The performance of students should be evaluated based on each assignment giving suitable

weightage to punctuality and contents.

Point 1 and 2 above should account for 15 marks (out of 25 marks) for term work.

Average of minimum of two tests should account for 10 (out of 25 marks) marks for term work.

Suggested list of topics from where the assignment and practical are to be taken up are as

follows:

1 Performance study of cooling tower
2 Heal balance in boiler/ themic fluid system
3 Performance study of chilled water system
4 Performance of Humidification and De-Humidification system
5 Performance of ion Exchange for soft water and DM water generation
6 Study of following:
    Steam trap
    Emergency vents and safety valves
    Utility line diagram
7 Study of compressors
8 Study of vacuum systems

Text Books & Reference Books:

1. Wangham D.A., Theory and practice of Heat engine, ELBS Cambridge University Press, 1970.
2. Lyle O. Efficient Use of Steam, 1963
3. Thiked J.K. Thermal Environmental Engineering, Prentice Hall, 1970.