

Khulna Polytechnic Institute

Refrigeration & Air Conditioning Technology

Lesson Plan

Subject Name: **RAC SYSTEM ANALYSIS**

Subject Code: **67271**

Semester: 7th

Week	Type of Class	Content	Remarks
1 st	Theory	1.1 Describe the thermodynamic states of pure Substances. 1.2 Explain the temperature and specific volume phase Diagrams for water & normal substance.	
	Theory	1.3. Explain P-V and T-S phase diagram for a normal Substance. 1.4 Explain of reversible and irreversible expansion of a liquid with T-S diagram.	
	Theory	1.5 Explain saturation pressure versus saturation Temperature phase diagram of pure substances. 1.6 Illustrate the method of calculation of enthalpy with the help of PH diagram. 1.7 Explain reversed Carnot cycle and effect of Operating temperature with T-S diagram.	
	Practical	1 Draw and solve problems on PH diagram using different refrigerant at different condition.	
2 nd	Theory	1.8 Explain Reversed Carnot cycle with T-S diagram using gas as a refrigerant. 1.9 Explain the limitation of reversed Carnot cycle.	
	Theory	1.10 Explain the actual refrigeration system. 1.11 State meaning of standard cycle and standard rating vapor compression refrigeration cycle.	
	Theory	2.1 Describe dry versus wet compression processes of vapor compression system with T-S diagram. 2.2 Explain throttling versus isentropic expansion of liquid on P-V and T-S diagram. 2.3 Explain the effect of evaporator pressure with p-h diagram.	
	Practical	2 Draw and solve problems on PH diagram using different refrigerant at different condition.	
3 rd	Theory	2.4 Explain the effect of condenser pressure with p-h diagram. 2.5 Explain the effect of the mechanical refrigeration cycle with the change of condenser cooling media.	
	Theory	2.6 Explain the effect of liquid sub cooling with p-h diagram. 2.7 Explain the effect of suction superheat with p-h diagram.	
	Theory	2.8 Explain the vapor compression cycle using liquid vapor regenerative heat exchanger with p-h diagram. 2.9. Explain the effect of foreign material on the performance of the refrigeration cycle. 2.10 Solve problems on the effect of evaporator pressure, condenser pressure, liquid sub cooling, section super heat liquid vapor regenerative heat exchanger etc of vapor compression refrigeration cycle.	

	Practical	3 Draw and solve problems on PH diagram using different refrigerant at different condition.	
4 th	Theory	3.1 Illustrate sensible heating and sensible cooling process in psychometric chart. 3.2.Explain the humidification and dehumidification process in psychometric chart. 3.3 Illustrate cooling and adiabatic humidification in psychometric chart.	
	Theory	3.4 Illustrate heating and humidification in psychometric chart. 3.5 Explain with sketch humidification by steam. 3.6 Illustrate the adiabatic chemical dehumidification in psychometric chart.	
	Theory	4.1 Calculate the psychometric variables during sensible heating and cooling process. 4.2. Calculate the psychometric variable during heating and humidification. 4.3 Calculate the psychometric variable when two air streams are mixed.	
	Practical	4 Draw and solve problems on PH diagram using different refrigerant at different condition.	
5 th	Theory	4.4 Solve problems to find the bypass factor using psychometric chart. 4.5 Calculate the psychometric variables during the process of cooling and dehumidification. 4.6 Calculate the sensible heat factor during the psychometric process.	
	Theory	4.7 Solve problems to calculate dew point and apparatus dew point. 4.8 Solve problems to find the ADP of cooling coil, entry & exit conditions of air for cooling coil, dehumidified air quantity, mass flow rate of air from given inside and outside design air condition room sensible & latent heat gain and by pass factor.	
	Theory	Class Test-01	
	Practical	5 Draw and solve problems on PH diagram using different refrigerant at different condition.	
	Theory	5.1 Describe aqua ammonia absorption refrigeration cycle. 5.2 Explain elementary properties of binary mixture.	
	Theory	5.3 Explain concentration diagram for binary mixture. 5.4 Explain enthalpy concentration diagram.	
	Theory	5.5 Explain steady flow process with binary mixture for: a) Adiabatic mixing of two stream b) Mixing of two streams with heat exchanger c) Throttling process d) Simple heating and cooling	
	Practical	6 Draw and solve problems on PH diagram using different refrigerant at different condition.	
Week	Type of Class	Content	Remarks
7 th	Theory	5.6 Explain rectification of binary mixture. 5.7 Describe the energy balance for various component of aqua-ammonia.	

	Theory	5.8 Describe the analysis process of aqua-ammonia refrigeration system using concentration enthalpy chart in SI unit. 5.9 Explain practical single effect water lithium bromide absorption chillers.	
	Theory	5.10 Explain double effect water lithium bromide absorption system. 5.11 Describe the analysis process of water lithium bromide system.	
	Practical	7 Draw and solve problems on psychometric process of different air conditioning systems	
8 th	Theory	Quiz Test-01	
	Theory	6.1 Describe simple air conditioning system with mass and volume flow rate of supply air. 6.2 Explain the apparatus dew point of summer air conditioning.	
	Theory	6.3 Explain summer air conditioning system with ventilation air zero bypass factor.	
	Practical	8 Draw and solve problems on psychometric process of different air conditioning systems	
9 th	Theory	6.4 Explain summer air conditioning system with ventilation air bypass factor of certain amount.	
	Theory	6.5 Describe comfort air conditioning system and effect of its various psychometric processes using a psychometric chart.	
	Theory	6.6 Explain comfort air conditioning and effective temperature using psychometric chart.	
	Practical	9 Draw and solve problems on psychometric process of different air conditioning systems	
10 th	Theory	7.1 Illustrate the refrigerating capacity of a condensing unit.	
	Theory	7.2 Explain the refrigerating capacity versus evaporator temperature.	
	Theory	7.3 Mention the parameters that effect the reciprocating compressor with the decrease of evaporating pressure at constant condensing pressure.	
	Practical	10 Draw and solve problems on psychometric process of different air conditioning systems	
11 th	Theory	7.4 Illustrate the refrigeration capacity with the change in condensing and evaporating temperature.	
	Theory	7.5 Illustrate the refrigerating capacity with the change in condensing temperature and entering water temperature.	
	Theory	7.6 Describe with sketch to determine the performance curve and capacity given by the manufactures,	
	Practical	11 Calculate the refrigerating capacity of compressor, condenser, evaporator and balanced capacity of a plant.	
12 th	Theory	7.7 Illustrate the characteristic of a condensing unit from given condensing temp, evaporating temp and refrigerating capacity chart.	

	Theory	7.8 Find the refrigerating capacity of a plant when compressor, condenser or controlling device or evaporator from different companies are assembled together	
	Theory	Quiz Test-01	
	Practical	12 Calculate the refrigerating capacity of compressor, condenser, evaporator and balanced capacity of a plant.	
13 th	Theory	Class Test-01	
	Theory	Model Test-01	
	Theory	Review Class	
	Practical	13.Determine the condensing and evaporating temperature from a running mechanical refrigeration unit.	
14 th	Theory	Review Class	
	Theory	Review Class	
	Theory	Model Test-02	
	Practical		
15 th	Theory	Review Class	
	Theory	Review Class	
	Theory		
	Practical	Model Test-03	
16 th	Theory		
	Theory		
	Theory		
	Practical		

All classes are conducted according to semester plan.