SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583
QUESTION BANK

Subject with Code : R&C((19ME3116) **Course & Specialization**: M.Tech – Th. Engg

Year & Sem: I & II-Sem **Regulation:** R19

UNIT-I

1.	(a)	What is Cryogenic and its necessity in the recent era?	L2(5M)
	(b)	Give the applications of Cryogenics in different fields.	L3(5M)
2.	(a)	A Carnot refrigerator using R12 as working fluid operates between 40ºC and -30ºC.e Determine the work of compression and cooling effect produced by the cycle.	L4(5M)
	(b)	Discuss the effects of evaporator and condenser temperatures on Carnot COP.	L2(5M)
3.		Derive the equation for Carnot COP.	L3(10M)
4.		Discuss the standard vapour compression refrigeration system comparing with Carnot cycle and derive the cycle efficiency.	L2(10M)
5.		An ideal refrigeration cycle operates with R134a as the working fluid. The temperature of refrigerant in the condenser and evaporator are 40ºC and -20ºC respectively. The mass flow rate of refrigerant is 0.1 kg/s. Determine the cooling capacity and COP of the plant.	L4(10M)
6.		Explain actual VCRS systems.	L2(10M)
7.	(a)	Describe the comparison between a VCRS cycle with and with out subcooling.	L2(5M)
	(b)	Describe the effect of superheat on specific refrigeration effect and work of compression.	L2(5M)
8.	(a)	Explain the working principle of a flash tank.	L2(5M)
	(b)	Discuss the intercooling in multi-stage compression.	L2(5M)
9.		Discuss multi-evaporator system with multi-compression, intercooling and flash gas removal.	L2(10M)
10.		Explain Cascade system and its applications, advantages and auto cascade system.	L1(10M)

UNIT-II

1.	(a)	Classify the compressors used in refrigeration system.	L3(5M)
	(b)	Explain briefly the performance of reciprocating compressors.	L2(5M)
2.		Describe the ideal reciprocating compressor on P-V and P-θ diagrams.	L3(10M)
3.	(a)	What are the various methods available for controlling the capacity of compressors?	L1(3M)
	(b)	With neat sketch explain hot gas by-pass system for controlling the capacity of compressor.	L2(7M)
4.	(a)	Give important properties that must be considered while selecting lubricating oil in refrigerant compressors.	L3(5M)

	(b)	Explain the method of lubrication to compressors.	L2(5M)
5.		Describe the different types of screw compressor with neat sketches.	L3(10M)
6.		Discuss the working principle of scroll compressors and its advantages.	L2(10M)
7.	(a)	What is the effect of angle of pre-rotation vanes on capacity of a centrifugal compressor?	(5M)
	(b)	Give the refrigerant capacity of centrifugal compressors.	(5M)
8.		Discuss the performance aspects of centrifugal compressor.	L2(10M)
9.		How can you select impeller speed and impeller diameter in centrifugal compressors.	L3(10M)
10.		A backward curved centrifugal compressor is to compress refrigerant R134a. The diameter of the impeller is 0.6 m and the blade angle is 60^o. The peripheral area is $0.002m^2$ and the flow coefficient (ratio of normal component of velocity to tip speed) is 0.5. If the pressure and temperature of refrigerant at the exit of the impeller are found to be 7.702 bar and 40^oC, find the specific work and power input to the compressor. The impeller rotates at 9000 RPM. The tangential component of velocity at the inlet to the impeller may be assumed to be negligible. Find specific work input(w) and power input(W)	(10M)

UNIT-III

1.	(a)	Classify the condensers and discuss about air cooled condensers.	L2(5M)
	(b)	Explain the function of water cooled condensers.	L2(5M)
2.		With neat sketch explain evaporative condenser function.	L2(10M)
3.	(a)	Give the equation for condenser heat rejection ratio (HRR).	L2(5M)
	(b)	Discuss about mean temperature difference in a condenser.	(5M)
4.		Derive the overall heat transfer coefficient for design of a condenser.	L3(10M)
5.		What is the concept of Wilson's plot and how it is useful to design the condensers and evaporators?	L2(10M)
6.	(a)	How can you classify the evaporators?	(5M)
	(b)	What are the complexities arise in design of evaporator?	(5M)
7.	(a)	With neat sketch explain flooded evaporator working principle.	(6M)
	(b)	Discuss about shell-and- tube liquid chillers.	(4M)
8.		Give the selection criteria for refrigerants and explain about thermodynamic and thermo-physical properties.	(10M)
9.	(a)	Give the Classification of fluids used as refrigerants.	(5M)
	(b)	How can you designate the refrigerants?	(5M)
10.		What are the important environmental and safety properties of refrigerants?	(10M)

UNIT-IV

1.	(a)	What is the need of low temperature insulations?	(5M)
	(b)	Write short note on Vacuum insulation.	(5M)
2.		Discuss about powder insulation.	(10M)
3.		Explain the effect of residual gas on the thermal conductivity of selected multilayer insulations.	(10M)
4.		Describe about adiabatic demagnetization cooling process.	(10M)
5.		Discuss the process of Gas separation system.	(10M)
6.		What are the uses of cryogenic systems?	(10M)
7.	(a)	Write about composite insulation.	(5M)
	(b)	How can foam-filled honeycomb insulation improve the effectiveness?	(5M)
8.		Write short notes on heat flows into a cryogenic system.	(10M)
9.		Discuss the process for vapour cooling to reduce heat in leaks.	(10M)
10.		Explain the particular storage and containment developments in cryogenics.	(10M)

UNIT-V

1.	(a)	Describe the process of liquification of gases.	(5M)
	(b)	Explain the liquification principle.	(5M)
2.		Discuss the different types of liquification methods and explain any one method.	(10M)
3.		Explain Linde system for air liquification.	(10M)
4.	(a)	Describe the modified Claude cycle for liquification system.	(5M)
	(b)	Write the short note on combination of Isenthalpic and Isentropic expansion for liquification.	(5M)
5.		What you know about mixed refrigerant cycle?	(10M)
6.		Explain ^{3}He-^{4}He dilution refrigerator	(10M)
7.		Discuss about liquification of Hydrogen and helium.	(10M)
8.		How low temperature solids as improved strength?	(10M)
9.		Discuss the super conductors and their cooling requirements.	(10M)
10.		Give the application of low temperatures.	(10M)

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