Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: ME467

Course Name: Cryogenic Engineering

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1	(a)	Explain the various properties of Helium IV?	(5)
	(b)	Explain how the ultimate and yield strengths of engineering materials change with cryogenic temperature?	(5)
2	(a)	What is Debye characteristic temperature?	(3)
	(b)	What is super conductivity?	(3)
	(c)	Explain the application of cryogenics in the field of electronics industry.	(4)
3	(a)	Explain the significance of inversion temperatures of gases.	(3)
	(b)	Illustrate the working of a simple cascade gas liquefaction system.	(3)
	(c)	Explain the working of Precooled Linde Hampson System? Derive the expression for liquid yield for the precooled system.	(4)
4	(a)	Compare Claude Liquefaction system and Linde Hampson Liquefaction systems.	(4)
	(b)	Explain the use of a precooling system in Linde Hampson gas liquefaction systems.	(3)
	(c)	Draw and explain the T-P diagram for a real gas.	(3)

PART B

Answer any three full questions, each carries 10 marks.

5	(a)	With a neat sketch, explain any one system for the liquefaction of Hydrogen. Derive expressions for liquid yield and work of liquefaction.	(8)
	(b)	Name the important critical components of gas liquefaction systems.	(2)
6	(a)	Explain the significance of heat exchanger effectiveness on the performance of a cryogenic liquefier.	(5)
	(b)	What is the significance of ortho to para conversion during the liquefaction of hydrogen?	(5)
7	(a)	Prove that COP of an ideal Stirling cycle refrigerator is same as that of Carnot	(4)

refrigerator.

(b) Explain the working of Claude refrigerator. Derive an expression for COP assuming that the expander work is utilized to compressor the gas. (6)

8 (a) With a neat sketch and T-S diagram, explain working of Philips refrigerator. (5)

(b) Explain the working of a dilution refrigerator with neat schematic. (5)

PART C

Answer any four full questions, each carries 10 marks.

9 (a) What is vapour shielding in cryogenic vessels? (4)

(b) Write short notes on insulations used in cryogenic applications. (6)

10 With neat sketches explain the functions of the different components of a typical Dewar vessel. (10)

11 Explain the various features of cryogenic fluid transport system. (10)

12 a) Explain any one pressure measurement system used in cryogenic applications. (5)

b) Write a short note on liquid level gauges. (5)

13 a) Discuss the instrumentation systems used in cryogenic applications. (5)

b) With neat sketch explain any three types of heat exchangers used in cryogenic systems. (5)

14 Illustrate the working of constant volume gas thermometer? (10)

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