Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

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)	Differentiate Type I and Type II superconductors mentioning their applications.	(2)
	b)	Give boiling point of following liquids a) Nitrogen b) Oxygen c) Hydrogen d) Helium e) Neon f) Argon.	(3)
	c)	Describe in detail the variation of mechanical properties of various materials at cryogenic temperatures.	(5)
2	a)	Explain two applications of superconductivity.	(2)
	b)	Explain Meissner effect and mention its significance?	(3)
	c)	Explain the application of cryogenics in the field of electronics.	(5)
3	a)	Explain Joule Thomson coefficient. Mention its significance.	(4)
	b)	Compare Claude Liquefaction system and Linde Hampson Liquefaction system.	(6)
4	a)	Explain the advantages and limitations of pre cooled Linde Hampson cycle?	(4)
	b)	Explain the working of Stirling cryocoolers with the help of neat diagrams.	(6)

PART B
Answer any three full questions, each carries 10 marks.

5	a)	Explain the limitations of Simple Linde-Hampson cycle which makes it inefficient for the liquefaction of Neon, Hydrogen and Helium.	(4)
	b)	With sketches, explain the different critical components present in gas liquefaction systems.	(6)
6	a)	Explain the significance of thermal valves in cryogenic refrigeration systems.	(3)
	b)	With the help of a T-s diagram explain working of a Simon Helium liquefier.	(7)
7	a)	Explain thermodynamically ideal isobaric source refrigeration system.	(4)
	b)	Explain the working of a Vuilleumier refrigerator. Derive an expression for COP of a Vuilleumier refrigerator.	(6)

8   a)   Explain the working of a stirling cycle refrigeration system.   (4)

     b)   Explain adiabatic demagnetisation process with the help of neat diagram.   (6)

PART C
Answer any four full questions, each carries 10 marks.

9   a)   Describe a typical multi -layer insulation.   (2)

     b)   Explain the different types and use of insulations in space applications.   (8)

10   With a neat sketch, explain the functions of the various elements of a Dewar vessel.   (10)

11   Briefly explain the cryogenic fluid transfer system.   (10)

12   With a neat sketch explain the types of heat exchangers used for cryogenic heat transfer.   (10)

13   a)   Explain different safety devices used in cryogenic liquid storage systems.   (3)

     b)   Explain the working principle of different types of cryogenic liquid level indicators.   (7)

14   a)   Explain the applications of a cryopump in detail.   (4)

     b)   Explain different temperature measuring techniques used in cryogenic applications.   (6)

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