BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS:M.Tech **SEMESTER : II**
BRANCH: SER **SESSION : SP/22**

SUBJECT: SR605 Cryogenic Propulsion

TIME: 2 hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to to be supplied the candidates in the examination hall.

Q.1(a)	Explain how the absorption refrigeration cycle is beneficial to the vapor compression refrigeration system.	[3]	CO1 L3
Q.1(b)	How Linde-Hampson System is utilized in the liquefication processes of air? Explain clearly with suitable sketches.	[7]	CO1 L4
Q.2(a)	What are the different mechanical properties that are considered while designing a cryogenic vessel? Write any two formulas that are specially utilized for such design of vessel.	[6]	CO2 L4
Q.2(b)	What are different methods adopted to measure the temperature of the cryogenic fluids? Explain the working mechanism of any one of them.	[4]	CO2 L3
Q.3(a)	What are the different types of propellant pumps available for pumping the liquid into the combustion chamber? Explain clearly the working principle of the pumps that are suitable for the cryogenic fluids. Also write the reasons for the same.	[6]	CO3 L4
Q.3(b)	Write any two methods that are adopted to start the turbopump at t=0? Also write the advantages of one over the others.	[4]	CO3 L3
Q.4(a)	How cryogenic propellant is different from other types of liquid propellants? Explain the main challenges associated in utilizing the cryogenic propellants in the practical applications.	[6]	CO3, CO4 L4
Q.4(b)	Explain with suitable sketches how geysering could be supressed by the use of cross-feed recirculation arrangements.	[4]	CO4 L4
Q.5(a)	Explain how the test readiness procedure followed for flight vehicle would be different from that conducted for lab scale applications.	[4]	CO5 L3
Q.5(b)	Why detection systems are so important for cryogenic rocket engine applications? Explain clearly all the procedures that are followed and methods adopted for this purpose.	[6]	CO5 L3

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