

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

**CLASS: MTECH/PRE-PHD
BRANCH: SER**

**SEMESTER : II/I
SESSION : SP/2023**

SUBJECT: SR522 CRYOGENIC PROPULSION

TIME: 3 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.
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			CO	BL
Q.1(a)	How a cryogenic is helpful in surgery applications?	[2]	C01	L2
Q.1(b)	What is the function of a condenser and evaporator in a vapour-compression cycle?	[3]	C01	L3
Q.1(c)	What are main factors that are considered during the designing of a heat exchanger? Explain with an example of heat exchanger that is used for cryogenic applications.	[5]	C01	L4
Q.2(a)	What is a suspension system used in the designing of the cryogenic vessel? What are the main precautions or challenges associated with it? Explain with few examples and sketches for the same.	[5]	C02	L4
Q.2(b)	How an escaping vapour could be utilized for the refrigeration or minimization in losses of the cryogenic liquid? Explain with suitable sketch.	[5]	C02	L4
Q.3(a)	What are the main components of a turbo-pump feed system?	[2]	C03	L2
Q.3(b)	What is a resultant angle of impinging? Explain its importance with respect to the cryogenic rocket application.	[4]	C03	L4
Q.3(c)	How a shaft-riding seal is used for sealing application of a turbo pump feed system? Explain with suitable sketch.	[4]	C03	L4
Q.4(a)	How a boil-off rate of the cryogenic propellant is expected to cause a change in the performance of a cryogenic system?	[3]	C04	L4
Q.4(b)	What are main causes of a geysering process? Show with suitable sketches various phenomenon through which it leads to the formation of Taylor bubble in the feed line.	[7]	C04	L4
Q.5(a)	What is the difference between a control and regulation?	[2]	C05	L3
Q.5(b)	What are the preparations done during the test readiness process of the rocket testing system?	[4]	C05	L4
Q.5(c)	What is the importance of a detection system in the rocket engine testing facilities? Explain few main detection arrangements that are available in any test facilities.	[4]	C05	L4

:25/04/2023::E