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

CLASS: MTECH **SEMESTER : II**
BRANCH: AEROSPACE **SESSION : SP/2024**

SUBJECT: SR580 ELEMENTS OF HYPERSONIC FLIGHT

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.**
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	What a hypersonic flow differs from a supersonic flow?	[5]	1	2
Q.1(b)	With a neat sketch, discuss the Velocity – Altitude Map. Also, describe the significance of the lift and ballistic parameter.	[5]	1	2
Q.2(a)	For an infinite Mach number, shows that $\beta=1.2\theta$.	[5]	2	4
Q.2(b)	With a neat sketch, discuss the centrifugal force corrections applied to Newtonian theory.	[5]	2	3
Q.3(a)	Write the governing equations applicable for the hypersonic flow. Also show that	[2]	3	1
Q.3(b)	Derive the hypersonic small disturbance equation.	[8]	3	5
Q.4(a)	What are the limitations in solving the fluid flow problem using Method of characteristics.	[5]	3	2
Q.4(b)	How does the theory of similarity support in solving the hypersonic flow problems.	[5]	4	2
Q.5(a)	With a neat sketch, discuss the different types of shock – shock interactions in a hypersonic flow.	[5]	5	3
Q.5(b)	Discuss the shockwave boundary layer interaction in case of a hypersonic flow.	[5]	5	3

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