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

CLASS: MTECH **SEMESTER : II**
BRANCH: SER(AERODYNAMICS) **SESSION : SP/2023**

SUBJECT: SR576 COMPRESSIBLE FLOWS

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 hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Illustrate the physically realistic solution of existence of a minimum area in a convergent-divergent duct.	[5]	1	3
Q.1(b)	Distinguish the features of under expanded and overexpanded conditions in a duct flow. Further describe the operations where such behaviors could be encountered.	[5]	1	2
Q.2(a)	Sketch and describe the condensation, rarefaction, compression and expansion processes for a right and a left running wave.	[5]	2	3
Q.2(b)	Explain the concept of mass motion velocity and hence show that the value of such velocities could even reach a supersonic speed	[5]	2	4
Q.3(a)	Sketch and show how could an aerofoil get to have a shock boundary layer interaction leading to severe flow separation.	[5]	3	3
Q.3(b)	How does Crocco's theorem differentiates a flow across curved and conical shocks	[5]	3	4
Q.4(a)	Supersonic wind tunnel starting depends strongly on the second throat of the diffuser. Justify with suitable explanation.	[5]	4	3
Q.4(b)	Describe the subcritical, critical and supercritical operations of Intake.	[5]	4	3
Q.5(a)	Show that the linearized pressure coefficient depends only on the x-component of perturbation velocity	[5]	5	4
Q.5(b)	Describe the Prandtl Glauert similarity rule for subsonic flows	[5]	5	3

::::::25/04/2023::::::E