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

CLASS: MTech **SEMESTER : II**
BRANCH: SER **SESSION : SP/2023**

SUBJECT: SR577 BOUNDARY LAYER THEORY

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)	Classify the different types of fluids based on their behaviors.	[5]	1	1
Q.1(b)	Derive the boundary layer equation from N-S equation. Mention the assumptions taken	[5]	1	4
Q.2(a)	Differentiate between exact and approximate solution with suitable examples.	[5]	2	3
Q.2(b)	With suitable assumptions, show that the ratio of pressure force and viscous force decides the extent of boundary layer in direction normal to the wall.	[5]	2	4
Q.3(a)	Obtain an expression for the adiabatic temperature rise. Briefly discuss the applicability of this equation in real life problem.	[5]	3	4
Q.3(b)	Using the basic equations of flow, obtain the non-dimensional parameters on which the real fluid flow depends upon.	[5]	3	4
Q.4(a)	What do you understand by unsteady boundary layer? What is it important to study the unsteadiness in a flow?	[5]	4	1
Q.4(b)	Identify the factors responsible for turbulence in the flow.	[5]	4	2
Q.5(a)	Mathematically show that porous walls with constant suction delays the boundary layer separation.	[5]	5	4
Q.5(b)	A circular cylinder placed in a flow experiences a vortex induced vibration. With the basic concepts of boundary layer controls, design an economical control technique so as to reduce the vibration on the body.	[5]	5	5

::::::26/04/2023::::::E