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

CLASS: MTech   SEMESTER : II
BRANCH: SER   SESSION : SP/19

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.

Q.1(a)	Classify the different types of fluids based on their stress-strain curve.	[5]
Q.1(b)	Using the theory of similarity, prove that the fluid flow is dependent upon the Mach and Reynolds number.	[5]
Q.2(a)	For the case of a plate inclined to an angle of β, prove that the velocity at the edge of the boundary layer is proportional to the arc length of the plate.	[8]
Q.2(b)	Differentiate between an exact and approximate solution.	[2]
Q.3(a)	Obtain the energy equation for a three-dimensional, constant thermal conductivity flow.	[5]
Q.3(b)	A blunt nosed reentry vehicle is entering the atmosphere at a speed of 500m/s. Using suitable assumptions, evaluate the stagnation temperature rise on the vehicle.	[5]
Q.4(a)	Distinguish between Natural and Forced convection using suitable examles.	[5]
Q.4(b)	Write the unsteady boundary layer equations.	[5]
Q.5(a)	Prove that use of suction ports on the surface of the body is expected to delay the separation point.	[5]
Q.5(b)	Using suitable examples, distinguish between active and passive control technniques.	[5]

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