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

CLASS: MTECH **SEMESTER : I**
BRANCH: SER **SESSION : MO/18**

SUBJECT: SR502 ELEMENTS OF AERODYNAMICS.

TIME: 3:00 HRS. **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) Describe the fundamental difference between the conservation and non-conservation form of fundamental governing equations of flow. What are the potential uses and its advantages in implementation of such forms? [5]

Q.1(b) Differentiate between stream function and velocity potential. Show that they are mutually perpendicular. [5]

Q.2(a) Construct an equation which states that when the velocity increases the pressure decreases and vice versa. [5]

Q.2(b) Using Kutta Joukowski theorem and theory of transformation, show that the coefficient of lift is directly proportional to 2π [5]

Q.3(a) Use Kutta condition to demonstrate flow around a finite angle and a cusped trailing edged aerofoil. Also describe the Kutta condition in details. [5]

Q.3(b) Show that the quarter chord point is the centre of pressure and aerodynamic centre for a symmetric aerofoil. [5]

Q.4(a) Explain the process of simulation of a finite wing surface using bound and free vortices. Explain also how it could be visualized for geometrically twisted wings. [5]

Q.4(b) Point out the results obtained for a specific wing having elliptical lift distribution. [5]

Q.5(a) Obtain and illustrate an expression for the momentum thickness. [5]

Q.5(b) Demonstrate with suitable diagrams what are the causes of Couette backflows? Explain. [5]

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