Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **14AE2006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **AERODYNAMICS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain with neat sketch the force and Moment acting on a Airfoil. | CO2 | 4 |
| b. | Derive the Integral form of Continuity equation with neat sketch. | 16 |
| (OR) | | | | |
| 2. | a. | Write down the Equation for Continuity in one dimensional, compressible and incompressible flow. | CO2 | 4 |
| b. | In a two dimensional flow, the fluid velocity components are u = x – 4y and v = - y – 4x. Show that the flow satisfies the continuity equation and obtain the expression for the stream function. If the flow is potential, obtain also the expression for the velocity potential. | 16 |
|  |  |  |  |  |
| 3. |  | Write the short note on following   1. Path Line. 2. Stream Line. 3. Streak Line. | CO1 | 6+6+8 |
| (OR) | | | | |
| 4. | a. | Derive the Navier – stoke’s Equation with sketch. What is calorically perfect gas? | CO2 | 16 |
| b. | Derive the angular velocity in three dimentional flow. | 4 |
|  |  |  |  |  |
| 5. | a. | Show that equipotential lines and stream lines are mutually perpendiculars. | CO1 | 4 |
| b. | Explain the flow with combination of uniform flow with source and find out the stagnation points. | 4 |
| c. | Derive the Stream function of following :   1. Doublet Flow. 2. Vortex Flow. | 6+6 |
| (OR) | | | | |
| 6. | a. | Derive the stream function and velocity potential for uniform flow. | CO1 | 4 |
| b. | How will you obtain the stagnation points for a flow over a semi-infinite body in combination of uniform flow with source and sink. Also derive the equation of stagnation streamline for ranking oval. | 16 |
|  |  |  |  |  |
| 7. | a. | Illustrate concept of Vortex sheet and its significances. | CO1 | 8 |
| b. | Prove that flow over a spinning cylinder create lift & doesn’t Drag (Neglect the Viscous effect). | 12 |
| (OR) | | | | |
| 8. | a. | Derive the classical thin airfoil theory equation for cambered Airfoil. | CO2 | 14 |
| b. | Explain the following with neat sketch   1. Biot-Savart Law. 2. Helmholtz’s Theorem. | 3+3 |
|  | |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. |  | Derive the fundamental equation of prandtl’s lifting line theory and state how do you obtain lift and induced drag coefficients inversely vary with Aspect Ratio. | CO2 | 20 |