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

A description...

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

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| Code : | 16AE2005 | Duration : | 3hrs |
| Sub. Name : | INDUSTRIAL 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. |  | For Troposphere temperature is given by , where To is temperature at the base of layer.   1. Determine the relation for pressure and density in the layer as function of h and pressure po and density ρo at the base of the layer. 2. Estimate the range of “a” for which atmospheric layer is stable and explain the stability of atmosphere. | CO1 | 10  10 |
| (OR) | | | | |
| 2. | a. | For turbulent flow, the velocity profile is given by . Here y is distance from wall, Ue velocity at the boundary layer and u is velocity at distance y from wall. Find its displacement thickness in terms of boundary layer thickness δ. | CO1 | 10 |
| b. | For laminar flow, the velocity profile is given by . Here y is distance from wall, Ue velocity at the boundary layer and u is velocity ay distance y from wall. Find its displacement thickness in terms of boundary layer thickness δ. | CO1 | 10 |
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| 3. | a. | Consider a sail boat moving with velocity U with wind velocity V going from tail to nose of the boat. Let area of sail be A and its drag coefficient be Cd. If the sail boat is totally driven by drag due to wind, determine the   1. Power coefficient. 2. Maximum power coefficient. | CO2 | 10 |
|  | b. | Explain operation of Wind Energy Collectors with neat diagram. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Derive the expression for Betz limit for power coefficient from basic principles. | CO2 | 10 |
| b. | Explain the difference between horizontal axis wind turbines with vertical axis wind – turbine. | CO2 | 10 |
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| 5. |  | Discuss the influence of turbulence on the drag flat head cylinder in flow (flat end of the cylinder facing the flow). | CO2 | 20 |
| (OR) | | | | |
| 6. |  | Explain the method of estimation of mean aerodynamic load using quasi-steady assumption. | CO2 | 20 |
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| 7. |  | Consider the movement of a body in an unsteady incompressible viscous fluid. Let D, ρ, μ, l, t and V be drag, density, viscosity, body length, time and velocity. Find the various non-dimensional parameter(s) involved in the analysis. | CO2 | 20 |
| (OR) | | | | |
| 8. |  | For spring/mass/damper system, derive solution of governing equation. From this solution arrive at MECHANICAL ADMITTANCE FACTOR. | CO3 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss AERODYNAMIC Damping method of accounting it in estimation response of buildings to load due to wind. | CO3 | 15 |
|  | b. | Write short notes on Indian Standard Code IS875 part 3 wind loads. | CO3 | 5 |