**Annexure No. SA/14**

**School of Aeronautics (Neemrana)**

**I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan**

IAE-1 Date:28.01.19

Subject: Aerodynamics- 1 Batch: 10&11

Faculty Name: Mr. Ranjay Kr. Singh Semester: 6th

**(Answer any Four Questions. All Questions carry equal marks)**

**Total No. of Questions : 07** **Total Marks: 30**

1. Explain in detail laminar and turbulent boundary layer by considering the flow over the flat plate.
2. What do you understand by standard atmosphere? Write the importance and feature of ISA.
3. Find pressure, temperature, density and dynamic viscosity of air at altitude of 15 km. Properties of air at mean sea level is given as (P0 = 101325 pa, T0 = 288.15 k and Rair = 287 J/Kg-K, Lapse rate in troposphere= 6.5 K/Km, γair= 1.4).
4. Find the relation between pressure, temperature and density in troposphere.
5. The velocity distribution in boundary layer is given by

$$\frac{u}{U\_{\infty }}=\left(\frac{y}{δ}\right)^{\frac{1}{7}}$$

 Find:

1. Displacement thickness
2. Momentum thickness
3. Energy thickness of boundary layer

If boundary layer thickness is given as 25 mm and free stream velocity is 15 m/s.

1. Derive the momentum equation for turbulent boundary layer.
2. Define geometric and geo-potential altitude and find the relation between them.