Hall Ticket No | | | | | | | | | | | Question Paper Code: AAEB10

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech IV Semester End Examinations (Regular), November – 2020

Regulation: IARE–R18

AERODYNAMICS

Time: 2 Hours **(AE)** **Max Marks: 70**

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. Write briefly about i) Wing characterstics. ii) Induced drag iii) Down wash **[5M]**
2. What is stream function? Express the properties of stream function. **[5M]**
3. Explain Prandtl's classical lifting line theory and write its fundamental equation. **[5M]**
4. Describe lifting flow over a circular cylinder and square object. **[5M]**
5. Explain about the aerofoils nomenclature in detail. **[5M]**
6. Write the importance center of pressure and aerodynamic center towards the stability of aircraft, and represent the pressure distribution wing section. **[5M]**
7. The relative comparison between skin friction drag and pressure drag for various aerodynamic shapes. **[5M]**
8. How primary and secondary vortex are generated? Explain. **[5M]**

PART – B

9. What is airfoil selection criteria? Explain in detail about NACA 4, 5 and 6 digit airfoils. **[10M]**
10. Differentiate between pathline and streamline with suitable diagrams. Determine the Euler Equation. **[10M]**
11. Explain stream function and velocity potential function. Obtain the Laplace equation in terms of stream function and velocity potential function. **[10M]**
12. State the advantages and disadvantages of vortex panel method over thin airfoil theory while solving for the performance parameters of an airfoil in incompressible inviscid flow. **[10M]**
13. Explain Biot-Savart law and obtain an expression for the velocity induced by a semi-infinite vortex filament at a point in the flow. **[10M]**
14. What do you understand by the Cl vs Alpha curve? Draw the curve and indicate stalling conditions. Give your view about wing thickness problem for thin-aerofoil theory. **[10M]**
15. What are the different boundary layer control methods utilized in aerofoils. Explain each one of them with suitable diagrams. **[10M]**
16. Explain the physics of turbulent boundary layer. Write the importance of boundary layer transition on a golf ball using suitable diagram. **[10M]**
17. What is the vortex tube? Explain about Helmholtz's theorems. **[10M]**
18. A flat plate of 10 ft span and 6ft chord is placed in an air stream of 100 mph under standard sea level conditions. if the transition Reynolds number is 10^6 , calculate the total skin friction drag of the plate in lbs. **[10M]**

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