Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 91060

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Fourth Semester
Aeronautical Engineering
AE 6401 – AERODYNAMICS – I
(Regulations 2013)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Write the significance of stream function.

2. State Kelvin Circulation Theorem.

3. What do you mean by 'Magnus force' ?

4. Give a short note on D'Alemberts paradox.

5. Write the applications of Kutta Joukowski's theorem.

6. Draw a sketch of a thin airfoil.

7. Differentiate between vortex line and vortex filament.

8. What is meant by 'Subsonic Wing Theory' ?

9. Draw the combined laminar and turbulent flow on a flat plate.

10. What do you mean by critical Reynold's number ?

PART – B   (13×5=65 Marks)

11. a) Explain the Bernoulli's equation concept with examples.   (13)

(OR)

b) Explain the following :
   i) What is Euler's equation ? Explain with the suitable examples.   (7)
   ii) Derive Euler equation method.   (6)

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12. a) Derive the expression for determining the pressure drag and surface pressure measurements. (13)

(OR)

b) i) Applications of conformal mapping. (5)

ii) Explain Sources, Sinks, Vortexes and Doublets. (8)

13. a) Explain 2D thin Aerofoil theory with neat diagrams. (13)

(OR)

b) With the help of neat diagrams explain clearly Joukowski's airfoils and flow mapping method. (13)

14. a) Write short notes on : :

i) Strip theory (7)

ii) Lifting line theory. (6)

(OR)

b) i) Explain the concept of Biot-Savart Law. (4)

ii) Explain in detail about Vortex Lines, Vortex Tubes and Vortex Filaments. (9)

15. a) Derive the boundary layer momentum thickness and boundary layer integral equations. (13)

(OR)

b) Explain clearly with all the notations the turbulent boundary layers. (13)

PART – C   (1×15=15 Marks)

16. a) With the help of neat diagrams explain and analyze the concept of flow separation theory boundary layer control by considering the any cylinder body. Give all the mathematical formulation to understand the complete streamlines towards boundary layer across the body. (15)

(OR)

b) With the help of neat diagrams explain and analyze through the fundamentals solutions of Boundary layer equations. (15)

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