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Question Paper Code : 80005

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fourth Semester

Aeronautical Engineering

AE 8401 — AERODYNAMICS – I

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define circulation.
2. How stream function and potential function are related to irrotational flow?
3. Define Magnus effect.
4. Define Kutta condition.
5. What is 'Joukowski transformation'?
6. What are the assumptions made in thin airfoil theory?
7. State the limitations of 'lifting line theory'.
8. Define horse shoe vortex.
9. What do you mean by 'boundary layer'?
10. Define 'Momentum thicknesses'.

PART B — (5 × 13 = 65 marks)

11. (a) What is Bernoulli's theorem? Derive the expression for Bernoulli's equation. (13)

Or

(b) (i) Define the terms 'source' and 'sink flows'. (5)

(ii) Derive an expression for 'stream function' and 'velocity potential function' for source flow. (8)

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12. (a) Briefly explain Kutta – Joukowski theorem. (13)

Or

(b) (i) Show that streamlines and equipotential lines are mutually perpendicular. (8)

(ii) Explain in detail the D'alemberts paradox. (5)

13. (a) Explain in detail about thin airfoil theory. (13)

Or

(b) Explain Cauchy Riemann relations in detail. (13)

14. (a) Explain the following in detail.

(i) Horse shoe vortex (5)

(ii) Biot – savart law. (8)

Or

(b) Derive the fundamental equation of Prandtl's lifting line theory. (13)

15. (a) What is displacement thickness? Derive an expression for displacement thickness of flow over a flat plate. (13)

Or

(b) Define the concept of boundary layer and briefly explain in detail the incompressible boundary layer over the flat plate. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Derive an expression for the Flow defection angle (θ) –shock angle (β) – Mach number (M) relation, and explain the different conditions.

Or

(b) Derive Blasius equation.

Fourth Sem
Aero
2017

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