Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20070

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fourth Semester

Aeronautical Engineering

AE 8401 – AERODYNAMICS – I

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Stokes theorem.
2. What is potential function?
3. What is the difference between ideal and real fluid?
4. What are Kutta conditions?
5. State Cauchy — Riemann relations.
6. What is complex potential?
7. State Biot and Savart Law.
8. What is vortex filament?
9. What is boundary: Layer thickness?
10. What is meant by shape parameter?

PART B — (5 × 13 = 65 marks)

11. (a) Discuss on steam function and velocity potential.

Or

(b) What do you meant by elementary flow? Explain their combinations,

12. (a) Explain D' Alembert paradox and Magnus effects.

Or

(b) What is starting vortex? Explain real flow over smooth and rough cylinder.

13. (a) Explain the methodology of conformal transformation.

Or

(b) State and explain aerofoil theory and its applications.

14. (a) Explain bound vortex and trailing vortex.

Or

(b) What is lifting line theory? Explain in detail also state its limitations.

15. (a) Discuss on boundary layer equation for a steady two dimensional flow.

Or

(b) What is Blasius solution? Explain boundary layer growth over a flat plate.

PART C — (1 × 15 = 15 marks)

16. (a) An aeroplane has a wing of chord 3m and span 30m. In level flight at 750 kmph the engines delivers certain power 70% of which is used to overcome the rag of wings. Assuming the drag and lift coefficients to be 0.025 and 0.51 respectively. Calculate the lift an the power developed by the engine. Assuming air density = 1.02 kg/m^3 also calculate the circulation around the wings.

Or

(b) An aeroplane flying in a horizontal direction at 720 km/hr having a wing area of 26 m^2 weigh 25 kN. Determine lift and drag coefficients if the engine develops 6000 kW and 60% of its power is used to overcome the drag resistance of the wing. Take density of air as 1.2 kg/m^3.