Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Aerospace Engg.) (2012 Onwards) (Sem.–5)

AERODYNAMICS-II

Subject Code : ASPE-303

Paper ID : [A2929]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.**

SECTION-A

Q.1 Attempt the following :

a) Define induced drag.

b) Define Drag Divergence Mach number and explain its importance.

c) Define supersonic leading edge.

d) Explain the effect of fowler flap on lift curve with the help of a sketch.

e) Explain transonic area rule.

f) Explain the importance of *'velocity potential equation'*.

g) Explain laminar boundary layer.

h) What do you mean by adverse pressure gradient?

i) Define compressibility.

j) What do you mean by non-lifting flows?

SECTION-B

Q.2 How lifting flow over circular cylinder is generated? Obtain the relevant expressions.

Q.3 Derive Navier-Stokes equations for two dimension flow.

Q.4 Define Prandtl-Glauert Rule for subsonic flow. Calculate lift curve slope of a profile at $M_\infty = 0.32$ using P-G rule for the following given data :

$C_L = 0.2$ at $\alpha = 3°$ and $C_L = -0.1$ at $\alpha = -2°$.

Q.5 Explain the turbulent boundary layer properties over a flat plate at low speeds.

Q.6 Explain Prandtl's lifting line theory and its limitations.

SECTION-C

Q.7 a) Explain the various factors affecting critical mach number. (4)

b) Linearize velocity potential equation. (6)

Q.8 Write notes on the following :

a) Simplified horse-shoe vortex model (5)

b) Subsonic flow past an axially symmetric body at zero incidence (5)

Q.9 a) Derive expression for induced drag coefficient for a wing having elliptical planform. (6)

b) Define downwash. Explain the influence of downwash on tail plane. (1,3)