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10AE63

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Aerodynamics – II

Time: 3 hrs.

Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. Explain with a neat sketch the circulation concepts for the surface of a body with arbitrary shape. **(08 Marks)**
   b. Consider non lifting flow over arbitrary body and describe the procedure of calculating the pressure co-efficient at i^{th} control point through source panel method. **(12 Marks)**

2 a. Derive an equation for finite wing using lifting line theory. **(10 Marks)**
   b. Derive the expression for induced angle of attack and induced drag co-efficient using elliptical distribution. **(10 Marks)**

3 a. Explain critical mach number and obtain the expression for critical pressure co-efficient. **(10 Marks)**
   b. Derive the governing velocity potential equation for an in viscid, compressible, irrotational subronic flow over a body immersed in an uniform stream. **(10 Marks)**

4 a. Explain transonic area rule with a neat diagram. **(05 Marks)**
   b. Obtain an relations for the analysis of shock waves which acts tangential and normal to the upstream velocity. **(15 Marks)**

PART – B

5 a. Discuss briefly the following:
   i)   Vortex filament
   ii) Induced drag
   iii) Helmholtz's vortex theorem
   iv) Biot-savash law. **(16 Marks)**
   b. Explain the effects of downwash on tail plane. **(04 Marks)**

6 a. With a neat diagram explain slender body theory. **(06 Marks)**
   b. With relevant formula write a note on cylindrical co-ordinates, boundary conditions, pressure coefficient. **(14 Marks)**

7 a. What are high lift systems and explain these effects on airplane performance? **(12 Marks)**
   b. What is swept using? Bring out the aerodynamic characteristics of swept using. **(08 Marks)**

8 a. Derive an equation for an incompressible flow over a flate plate. **(10 Marks)**
   b. Explain boundary layer theory and draw the result of turbulent boundary layer properties over a flate plate. **(10 Marks)**

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