No. of Printed Pages : 3

BAS-012

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

00168

June, 2015

BAS-012 : AERODYNAMICS – I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Using Kutta-Joukowski theorem, explain the expression for lift in terms of circulation. *6*

(b) Discuss lift on rotating cylinder in uniform flow. *4*

2. (a) How does Van der Waal's equation differ from ideal gas equation ? Explain. *4*

(b) Draw the pitching moment curve for supersonic profiles. How do pitching moment and centre of pressure vary with angle of attack for a supersonic profile ? *6*

3. Derive the expression for the induced angle of attack considering an elliptical lift distribution. *10*

4. What are wind tunnels ? Explain the difference between subsonic and supersonic wind tunnels, using neat sketches. *10*

5. (a) The weight of an aircraft is 50,000 kg and the drag produced is 5,000 N in cruise flight. Calculate the lift and drag coefficients in cruise, if the aircraft moves at a velocity of 1000 km/hr. Assume sea level conditions and planform area = 90 m^2. *6*

   (b) Briefly explain the terms convective and local acceleration in fluid flow. *4*

6. (a) Distinguish between the following : *2×3=6*

   (i) Uniform and Non-Uniform Flow

   (ii) Steady and Unsteady Flow

   (iii) Rotational and Irrotational Flow

   (b) How are streamlines and equipotential lines related to each other ? *4*

7. Derive the general Navier-Stokes equation for an unsteady, incompressible and viscous flow. *10*

8. Define the following terms : *5×2=10*

   (a) Ideal Fluid

   (b) Incompressibility

   (c) Circulation

   (d) Reynolds Number

   (e) Turbulence

9. Write short notes on any ***two*** of the following : *2×5=10*

(a) Supercritical Airfoil

(b) Magnus Effect

(c) Doublet Flow

(d) Aircraft Flaps