B.E. (Aeronautical Engineering) Fifth Semester (C.B.S.)

Aerodynamics - II

Paper - III

P. Pages : 2 **TKN/KS/16/7460**

Time : Three Hours * 0 9 1 9 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers wherever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1. a) Differentiate between the 'flow over an airfoil' and the 'flaw over a finite wing". **4**

b) Write short notes on the following. **4**

a) Induce drag.

b) Wash in & wash out. **3**

c) Aerodynamic twist & Geometric twist. **3**

OR

2. a) Draw the neat labeled sketches of the top view and front view of the streamline pattern over a finite wing and wing tip vortices. **3**

b) Why are the aerodynamic characteristics of a finite wing different from the properties of its airfoil section, Explain it briefly with neat sketch. **4**

c) Explain the effect of downwash? **3**

d) What are the General features of finite wing aerodynamics? Explain it. **4**

3. a) Prove that, the downwash and induce angle of attack, are constant along the span, for a wing with elliptical distribution. **7**

b) Derive the expression of Prandtl's lifting line theory and discuss the limitation of this theory. **7**

OR

4. a) How taper twisted wing affect the aircraft performance, Explain it? **4**

	b)	Why not all aircraft have high aspect ratio?	**3**
	c)	Applying Bio-Savart law to a straight vortex filament of semi infinite length, Calculate the Induce velocity.	**7**
5.	a)	Compare between high and low aspect ratio wings.	**3**
	b)	Write a short notes on wing tip devices.	**4**
	c)	Explain the lift characteristics of a complete aircraft.	**6**

OR

6.	a)	Solve Integro-differential equation and derive the expression for the coefficient of lift and coefficient of drag for general wing.	**7**
	b)	Calculate the downwash velocity and Induce drag for elliptical wing having coefficient of lift 0.65 wing span = 4m and mean geometric chord 0.75m, air is flowing on wing at speed of 600km/hr.	**6**
7.	a)	With a neat sketch, explain how the expansion waves are formed in supersonic flow.	**6**
	b)	Derive the basic potential Equation for compressible flow, using continuity equation.	**7**

OR

8.	a)	Derive the relations for small perturbation theory and explain its characteristics.	**9**
	b)	Explain Ackert's supersonic airfoil theory.	**4**
9.	a)	Explain in brief the different types of low speed wind tunnels.	**8**
	b)	Enlist various types of supersonic wind tunnels and give their respective areas of application.	**5**

OR

10	a)	Consider a low-speed subsonic wind tunnel with a 12/1 contraction ratio for the nozzle. of the flow in the test section is at standard sea level conditions with a velocity of 50m/s. Calculate the height differences in a U-tube mercury manometer with one side connected to the nozzle inlet and the other to the test section $\left(\delta = 1.23 \text{kg/m}^3\right)$.	**7**
	b)	Explain the principles of model testing with neat sketch.	**6**
11.	a)	Explain briefly about the flow visualization methods of supersonic flows with neat sketch.	**9**
	b)	Write a short notes on measurement of static pressure in wind tunnel.	**4**

OR

12.		Explain the performances Evaluation by flight test, briefly.	**13**

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