

**Fourth Semester B.Tech Degree Examination, Nov/Dec 2014**

**(2013 scheme)**

**Branch: Aeronautical Engineering**

**FUNDAMENTALS OF AERODYNAMICS**

Time:3 Hours

Max.Marks:100

**Instructions:** 1) Answer all questions from Part – A and three full questions from Part – B.

2) Choosing not more than one question from each Module.

**PART A**

(Answer all questions, each question carries 2 marks )

1. Define displacement thickness?
2. Explain Newton's law of viscosity?
3. what's the difference between forced vortex and free vortex?
4. Explain Kutta condition?
5. Define Biot and Savart law?
6. What do you mean by pitot static tube?
7. Explain Hodograph?
8. Define Mach waves and Mach angles?
9. How will you find center of pressure of supersonic profiles?
10. Explain shock induced separation?

**PART B**

(Answer one question from each module, 20Marks each)

**MODULE I**

- 11 (a) Derive continuity Equation?  
(b) Define Kutta-Joukowski's theorem?
- 12 (a) Derive Navier Stokes equation?  
(b) Define Blasius solution?

**MODULE II**

- 13 (a) Explain Airfoil and wing theory?

- (b) Define Karman Trefftz profiles?
- 14 (a) Give the limitations of lifting line theory?
- (b) Explain vortex line and horse shoe vortex?

### **MODULE III**

- 15 (a) Define Rankine Hugoniot relation?
- (b) How shock waves classified?
  
- 16 (a) How correction for subsonic and supersonic flow done?
- (b) Explain Rayleigh and Fanno flow?

### **MODULE 1V**

- 17(a) Define small perturbation potential theory?
- (b) Explain Lift and drag divergence?
- 18(a) Define Linearised 2-D supersonic flow theory?
- (b) Explain shock induced separation?