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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech I Semester End Examinations (Supplementary) - July, 2017

Regulation: IARE-R16

INTRODUCTION TO AEROSPACE ENGINEERING (Power Electronics and Electrical Drives)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

- (a) Discuss the Historical perspective of aeronautics. [6M]

(b) A wind tunnel located at a pressure altitude of 500m ($\rho = 1.16 \text{ Kg/m}^3$, $P=95472 \text{ N/m}^2$) has a circular section of 5m. Air travels at 100m/s inside test section, speed of air in larger diameter is 20m/s. Determine upstream diameter, upstream pressure and mercury column height. [8M]
- (a) Discuss the parameters affecting aerodynamic forces. [7M]

(b) Define Mach number? Derive an expression for speed of sound. [7M]

UNIT – II

- (a) Using Helmholtz vortex theorem, derive an expression for induced drag coefficient for elliptical lift distribution. [8M]

(b) Write short notes on the following. [6M]

 - wing vortices
 - Downwash
- (a) Briefly explain variation of lift and drag coefficient with respect to angle attack. [6M]

(b) Explain the principle of lift theory. Discuss the effect of sweep back on maximum lift. [8M]

UNIT – III

- (a) Discuss the formation of boundary layer over bluff bodies. [7M]

(b) Discuss in detail about Deep stall and Pitching moments. [7M]
- (a) Explain in detail about [7M]

 - laminar flow
 - Turbulent flow
 - Laminar sub layer

(b) Discuss the influence of mach number on drag coefficient. [7M]

UNIT – IV

7. (a) Explain longitudinal stability of aircraft in detail . [7M]
(b) Explain gliding & turning of aircraft. [7M]
8. (a) With the help of P-v and T-s diagram, explain the working of closed cycle gas turbine. [7M]
(b) Explain dutch roll with the help of neat sketch . [7M]

UNIT – V

9. (a) Discuss the development of aircraft structures. [7M]
(b) Briefly discuss the effect of temperature in hypersonic flow. [7M]
10. Explain in brief about [14M]
i. orbital maneuvers
ii. Rocket trajectories
iii. ballistic entry

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