

Fourth Semester B.E. Degree Examination, June/July 2016
Elements of Aeronautics

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART - A

- 1 a. Define the following with equations and figure where ever it is needed.
 - i) Aspect ratio ii) mean aerodynamic chord iii) wing sweep iv) Anhedral/Dihedral
 - v) decalage with respect to bi-plane vi) aero dynamic decalage with respect to mono - plane. (06 Marks)
 - b. Discuss classification of air flow based on time dependence, compressibility, viscosity, flow type and speed range. (07 Marks)
 - c. What are the main components of air (structural and non structural) and give their specific functions. (07 Marks)
- 2 a. For the given plan find : i) LE sweep ii) $\frac{1}{4}C$ line sweep iii) aspect ratio iv) MAC v) x, y co-ordinates of $\frac{1}{4}C$ of MAC. (12 Marks)

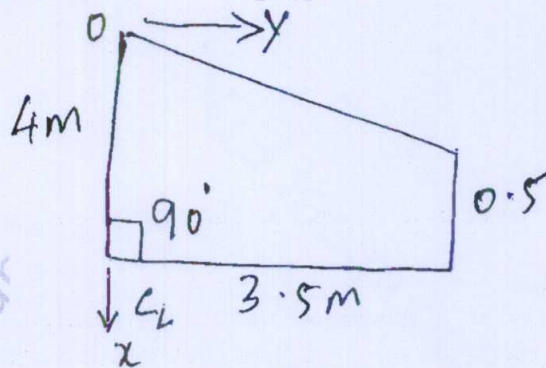


Fig.Q2(a)

- b. Describe the following NACA aerofoils :
 - i) NACA 2415 ii) NACA 23012 iii) NACA 632 - 218. (08 Marks)
- 3 a. Derive the relationship between pressure, density and temperature (given pressure, density and temperature at initial altitude). (10 Marks)
 - b. If an airplane is flying at an altitude where actual pressure and temperature are $4.72 \times 10^4 \text{ N/m}^2$ and 255.7 K respectively, what are the pressure, temperature and density altitudes. (10 Marks)
- 4 a. State Kepler's 3 laws of orbit motion with figures and equations where ever needed. (10 Marks)
 - b. A balloon has a mass of 10 kg and volume 16 m^3 . Find the maximum latitude it can reach under ISA conditions. (10 Marks)

PART - B

- 5 a. How are aircraft structure design considerations different from civil/mechanical static structures? (10 Marks)
- b. Describe the type of loads imposed on structure, giving aerodynamic load distribution on fuselage and wing. (10 Marks)

- 6 Describe the following type of engines with schematic diagram.
i) Turbojet engine ii) Turbo fan engine iii) Turbo prop. (20 Marks)
- 7 a. What is meant by system? What are the functions of aircraft system? List the systems required for an aircraft. (12 Marks)
b. Describe the working of a typical aircraft hydraulic system. (08 Marks)
- 8 Write short notes on any five :
i) Altimeter
ii) Turn co-coordinator
iii) Air speed indicator
iv) Communication system
v) Navigation aids
vi) Weather system. (20 Marks)
