

# CBCS SCHEME

21AE34

## Third Semester B.E. Degree Examination, June/July 2023 Elements of Aeronautics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Explain in detail with application metallic and non-metallic used in aircraft. (10 Marks)  
b. Explain with neat sketch monocoque, semi-monocoque and Truss structures of aircraft. (10 Marks)

OR

- 2 a. Explain with neat sketches the high lift devices. (10 Marks)  
b. Explain with neat sketch, the principles operation of helicopters and their functions. (10 Marks)

### Module-2

- 3 a. For the given planform, 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.

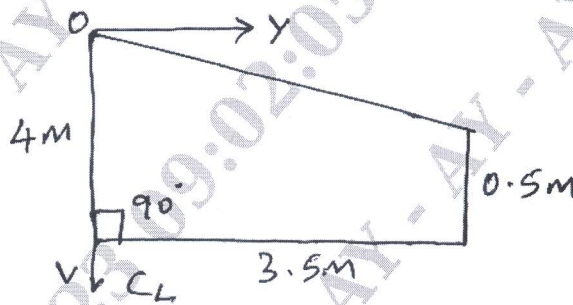


Fig. Q3 (a)

- b. Explain spoilers and airbrakes and clearly explain their difference. (10 Marks)  
c. Describe the following NACA aerofoils: (04 Marks)  
(i) NACA 2415  
(ii) NACA 23012  
(iii) NACA 632-218 (06 Marks)

OR

- 4 a. Define Mach number, speed of sound and Reynold's number with the aid of equations. (06 Marks)  
b. Derive the relationship between pressure, density and temperature (given pressure, density and temperature at initial altitude) at any altitude in the temperature gradient layer in atmosphere. (06 Marks)  
c. If an airplane is flying at an altitude where actual pressure and temperature are  $4.72 \times 10^4$  N/m<sup>2</sup> and 255.7 K respectively. What are the pressure, temperature and density altitudes? (08 Marks)

**Module-3**

- 5 a. What is aircraft power plant? Write the classification of aircraft power plant in brief. (08 Marks)
- b. With a neat sketch, explain Turbofan Engine and explain about Bypass ratio and its significance. (12 Marks)

OR

- 6 a. With a neat sketch, explain Brayton cycle and its application in jet engines. (10 Marks)
- b. What is Thrust Augmentation? Explain different thrust augmentation methods. (10 Marks)

**Module-4**

- 7 a. With a neat sketch, explain condition of static and dynamic stability of an aircraft. (10 Marks)
- b. With a neat sketch, explain contribution of control surfaces in maintaining aircraft stability and control. (10 Marks)

OR

- 8 a. Explain with a characteristics chart effect of power and altitude on performance of the aircraft. (10 Marks)
- b. Explain with neat sketch, inverted maneuvers of aircraft. (10 Marks)

**Module-5**

- 9 a. What is meant by system? What are the functions of aircraft systems? List the systems required for an aircraft. (10 Marks)
- b. Describe the working of a typical aircraft hydraulic system. (10 Marks)

OR

- 10 Write short notes on any five :
- Altimeter.
  - Turn co-ordinator.
  - Air speed indicator.
  - Communication system.
  - Navigation aids.
  - Weather system.

(20 Marks)

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