

ELEMENTS OF AERONAUTICS

Unit wise-Question bank

UNIT I

AIRCRAFT CONFIGURATIONS

PART - A

Two Marks

1. What is an Aircraft?
2. Define Aeroplane.
3. List some components of Aircraft.
4. What is an empennage?
5. What is the primary objective of fuselage?
6. What is the purpose of elevator?
7. What is the purpose of Aileron?
8. State two kinds of Aircraft.
9. Differentiate between monoplane and biplane.
10. What is the function of flap and spoiler?
11. What is the function of landing gear?
12. Why power plants are used in an Aircraft?
13. What an the axis of an aircraft?
14. What is an Ornithopter?
15. List some power driven aircrafts?
16. What are amphibian types of Aircrafts.

17. List some non-power driven aircrafts.
18. List the classification of rotorcrafts.
19. List some basic instrument for flying.
20. What is the principle behind the working of Altimeter.
21. What is an air speed?
22. What is static and dynamic pressure?
23. What is gyroscope?
24. List some gyro instruments.
25. Name some engine instruments.
26. Write down the contribution of Sir. George Caley, to the development of aircraft.
27. Explain aerial steam carriage.
28. Write about cayley's triplane.
29. Explain, Pitcher's hang glider "The Hawk"
30. What is Aeronautical Triangle?
31. What is red wing and white wing?
32. How a hot- air balloon floats in air?
33. What are float planes?
34. List the divisions of fuselage.
35. What are the two general types of landing gear?
36. What is the function of wings of an Aircraft?
37. Distinguish between a glider and a sail plane.
38. What is the purpose of turn and sideslip indicator?
39. What are control tabs and for what purpose they are used.

40. What is Kruger flap?

UNIT II
INTRODUCTION TO PRINCIPLES OF FLIGHT

PART - A

Two Marks

1. What is atmosphere?
2. What is Thermosphere?
3. What is Stratopause?
4. What is Mesopause?
5. What is Tropopause
6. Define lapse rate.
7. What is absolute altitude?
8. What is geometric altitude?
9. What is geopotential altitude?
10. State, Newtons law of gravitation?
11. Show how pressure and density varies with altitude in graph?
12. What is ISA? List its values at sea level?
13. Differentiate isothermal and gradient layer?
14. What is spoiler?
15. What is a slat?
16. Define drag.
17. Explain how interference drag can be minimized?
18. Differentiate form and pressure drag?
19. List some primary, secondary and auxiliary control surfaces.
20. Differentiate Anhedral and Dihedral wing.
21. What is range and endurance?
22. What is absolute and service ceilings.
23. What is TAS and EAS?

24. What are the types of flaps?
25. What is airfoil?
26. Write the Lift and Drag equation?
27. Show how temperature varies with altitude with a neat graph.
29. What is Trim drag?
30. Suggest an idea to minimize Pressure drag.
31. What is Isothermal and Gradient Layer?
32. What are the types of Airspeeds?
33. What are the types of Altitudes?
34. Write the relation between pressure and temperature.
35. Write down the hydrostatic equation.
36. Show how pressure and density varies with altitude with a neat graph.
37. Calculate the temperature at 25 km altitude..

UNIT 3
INTRODUCTION TO AERODYNAMICS
PART - A

Two Marks

1. Define Aerodynamics
2. What is Aerodynamics Shape?
3. What is Aero elasticity?
4. State Bernoulli's principle.
5. State Aerodynamic principle
6. Differentiate steady and unsteady flow.
7. Differentiate laminar and turbulent flow
8. Differentiate uniform and non- uniform flow.
9. State Kutta - Joukowski theorem
10. What are two basic sources of Aerodynamic forces
11. What is tugging?
12. List the aerodynamic forces acting on Aircraft.

13. What is drag?
14. Define lift, and thrust.
15. What are the main function of NACA?
16. List the classification of NACA airfoils.
17. What are supercritical airfoils?
18. Define chord and camber.
19. What is chord line?
20. What is stalling speed?
21. Define stalling
22. What is stalling
23. Define mach number?
24. List the different regions of mach number.
25. Define aspect ratio
26. Give some effect of aspect ratio.
27. Define Aerodynamic centre.
28. Locate the Aerodynamic centre for different airfoils.
29. Define centre of pressure.
30. Define wing loading
31. How does wing loading affects performances and rate of climb of aircraft?
32. Draw L/D curve for wing of an Aircraft.
33. What is D.O.F?
34. What is stability? Give its types?
35. What is Aerobatics?
36. List some aerobatic maneuvers
37. What is Dynamic Stability?
38. List the D.O.F for an Aircraft.
39. What are the axes of an Aircraft?
40. What is Downwash?

UNIT IV
INTRODUCTION TO AIRPLANE STRUCTURE AND MATERIALS
PART - A

Two Marks

1. What is a structure?
2. What are Tailerons?
3. Differentiate VTOL and STOL.
4. What are the primary objectives of fuselage?
5. What are the general requirements of fuselage.
6. List the type of construction of fuselage.
7. What is radome?

8. List the properties of composite materials?
9. What are the advantage in using semi-monologue over monologue structure.
10. Classify wing according to location.
11. What is the types of wing design.
12. What is empty weight?
13. What is gross weight?
14. What is wet wing?
15. What are ribs and spars?
16. List some types of wing profiles?
17. What is wing span ?
18. What are bays?
19. What are longerons?
20. What is carry through structure?
21. Differentiate metallic and non - metallic materials.
22. List some non - metallic materials
23. What are the uses of aluminium?
24. List some aluminium alloys?
25. What are the uses of composite materials?
26. What are the uses of Stainless steel?
27. What are the uses of Titanium?
28. What is Y-alloy ?
29. List the constituents of Magnalium and Hindalumin
30. What are ferrous and non-ferrous materials?
31. What are bulkheads?
32. What is the main purpose of stringers?

33. What are rings?
34. List some advantages of Semi-monocoque construction.
35. What is composite material?
36. What are called Spars?
37. Draw a semi-cantilever wing .

UNIT V
POWER PLANTS USED IN AIRPLANES
PART - A

Two Marks

1. What is power plant?
2. What is Engine cowling?
3. What is Engine Mount?
4. What are the types of turbo engines?
5. What is Trimming?
6. What are air breathing engines?
7. Differentiate piston and jet engine?
8. Differentiate solid propellant and liquid propellant rockets.
9. Distinguish between air breathing propulsion and rocket propulsion
10. What is the basic operating principle of a piston engine?
11. Define specific impulse of a rocket.
12. What is jet thrust?
13. What is reciprocating engine?
14. Classify different types of rocket engine?
15. What is cryogenic propellant? Give Example?
16. What is ramjet engine?
17. What is scramjet engine?
18. What are the advantages and disadvantage of rocket propulsion.
19. List some application of rockets?
20. What is oxidizer?

21. What are hypergolic propellants?
22. List the parts of turbojet engine?
23. Which engine is advantageous turbojet or turboprop. Justify.
24. Write down the thrust equation?
25. List some use of propeller.
26. What is the operating principle of jet engine?
27. State Newton's third law.
28. List some types of Nozzles.
29. Classify rocket according to their basic function.
30. Classify rocket according to the propellants used.
31. What is Nuclear rocket?
32. List some advantages and disadvantages of Liquid propellant rocket.
33. What are the types of liquid propellant feed system?
34. List some types of Oxidizer and fuel.
35. What is monopropellant and bipropellant?
36. What is thrust augmentation?
37. What is after burner?
39. What is Ramjet engine?
40. Expand SCRAMjet

ELEMENTS OF AERONAUTICS

Unit wise-Question bank

UNIT I

AIRCRAFT CONFIGURATIONS

PART - B

16 Marks

1. Discuss the classification of flight vehicles. Mention the criteria for classification.
2. Explain the classification of heavier than air aircraft, with necessary diagrams.
3. Explain with neat sketch the components of airplane and their functions.
4. Explain briefly why the biplane era of aero plane development short lived.
5. Explain the working principle of air data instrument system used in a/c with suitable sketch.
6. Explain the function of flaps, winglets and slats.
7. With neat illustrations, explain in detail the salient features of airplanes with biplane and monoplane design from aerodynamics point of limitations of each type.
8. Explain the term "Biplane interference"?
9. Explain the evolution of Aircraft with neat diagrams, wherever necessary.
10. Explain the engine instruments, used in aircrafts?

UNIT II

INTRODUCTION TO PRINCIPLES OF FLIGHT

PART – B

16 Marks

1. Explain the structure of atmosphere by dividing into different layers.
2. Derive an relationship between pressure and temperature with respect to attitude.
3. Derive hydrostatic equation.
4. Define drag. List the types of drag and explain each of them.
5. What is induced drag? Explain briefly.
6. Derive an expression for lift, generated by aircraft.
7. Explain the types of flaps.
 8. Derive an expression of moment generated in the aircraft.
 9. Explain the types of airspeed and attitude.
 10. Explain the evaluation of monoplane.
 11. Calculate the values of Pressure and temperature at 49Km altitude
 12. Calculate the values of Pressure and Temperature at 13Km altitude

UNIT 3

INTRODUCTION TO AERODYNAMICS

PART – B

16 Marks

1. What are the Aerodynamic forces acting on aircraft? Explain
2. What is NACA? Classify NACA airfoils.
3. Explain 6 series NACA airfoil with an example.
4. What is mach number? Explain the different regimes using mach number with near diagrams.
5. Explain a) Aspect Ratio c) Centre of pressure
 b) Wing loading d) Aerodynamic centre
6. Explain the characteristics of an airfoil, when subjected to different angle of attacks.
7. Draw and Explain lift /drag curve for a aircraft wing.
8. Explain the stability of an aircraft, after disturbance with its types.
9. Explain the directional movements of an aircraft.
10. Derive an relation, to determine the speed of sound.
11. What is aerobatics? List few aerobatic maneuvers and explain how it is achieved?

UNIT IV

INTRODUCTION TO AIRPLANE STRUCTURE AND MATERIALS

PART – B

16 Marks

1. Explain a) Wing heavy b) Tail heavy c) Nose heavy
2. What are the general types of construction of fuselage? Explain
3. Explain monocoque and semi- monocoque construction of fuselage.
4. What ate the components of wing? Explain the wing structure?
5. Explain the fuselage structure of an aircraft.
6. What are metallic and non- metallic materials. Explain using examples.
7. List the uses of, (i) Aluminium alloys (ii) Titanium (iii) Stainless Steel and

Composite Materials

8. Explain about geodesic construction.
9. Distinguish monologue and semi - monologue structure.
10. Explain briefly about ? (i) Monospar (ii) Two Spar and (iii) Multi Spar.

UNIT V POWER PLANTS USED IN AIRPLANES

PART - B

16 Marks

1. Derive thrust equation.
2. Explain how propeller produces thrust for aircraft propulsion.
3. What are the merits and limitations of turbojet engine?
4. What are the methods of thrust augmentation?
5. With a neat sketch, explain the working of an turbojet engine?
6. With a neat sketch, explain the working of an four stroke piston engine.
7. Compare piston and jet engine.
8. Distinguish between turbojet and turboprop.
9. State and classify rocket engines.
10. State the advantage and disadvantage of solid and liquid propellant rocket.
11. Explain the operation of solid propellant rocket with a neat sketch.
12. Enumerate the types of rockets.

