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**Question Paper Code : 71322**

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Third Semester

Aeronautical Engineering

AE 6302 – ELEMENTS OF AERONAUTICS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate between air breathing and rocket propulsion?
2. Why composite materials are preferred for airframe construction?
3. What are the characteristics of troposphere region?
4. Define mach number? How it is related to temperature?
5. Write the functions of main plane and tail plane.
6. Name some secondary control surfaces in an aircraft.
7. State the uses of titanium alloys in aircraft industry.
8. What are the general considerations for the fuselage design of an airplane. Name any two.
9. What is 'Ramjet' engine?
10. What is cryogenic propellant? Give example.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the major components of an airplane with a neat sketch and explain their functions.

Or

(b) (i) Bring out the essential differences.between piston type engines and jet engines for aircraft propulsion. (8)

(ii) Discuss briefly the choice of material for aircraft engine components. (5)

12. (a) (i) Describe an aerofoil and explain its nomenclature. (4)

(ii) Define centre of pressure, coefficient of pressure and aerodynamic centre. (4)

(iii) Express lift and drag of an aerofoil in terms of normal and axial forces. (5)

Or

(b) (i) What is international standard atmosphere? How are the various regions of atmosphere classified? (6)

(ii) An aircraft is cruising at an altitude of 12 km. Find the pressure, temperature and density at that altitude. (7)

13. (a) (i) Discuss the classification of flight vehicles. Mention the criteria for classification. (8)

(ii) Write short notes on horizontal stabilizer and vertical stabilizer. (5)

Or

(b) (i) Describe the flight instruments measuring ALTITUDE and VELOCITY of an aircraft. (8)

(ii) Discuss the pitot-static system of an aircraft (5)

14. (a) (i) Describe with a neat diagram, a basic hydraulic system with hand pump. (8)

(ii) Differentiate between hydraulic and pneumatic system. (5)

Or

(b) (i) With neat sketch, explain the construction of a typical aircraft wing. Show all the structural components of wing construction and mention the types of loads/stresses experienced by the structural members. (8)

(ii) Discuss the need for Alclad aluminum alloys for aircraft structures. (5)

15. (a) (i) Describe the operation of turbojet engine with a neat diagram. (8)

(ii) Differentiate between turbo fan and ramjet engine. (5)

Or

(b) (i) How are rocket engines classified? (5)

(ii) State the advantages and disadvantages of liquid propellants rocket engine over other types. (8)

PART C — (1 × 15 = 15 marks)

16. (a) Briefly describe the modern developments in aircraft design with respect to the following: New airfoil profiles, new fuselage designs, propulsion system flight control systems and use of composite materials.

Or

(b) Establish reasons for the correctness of the following statements

(i) The turbofan engine is more efficient than turbojet engine. (3)

(ii) In an all metal airplane, fuselage is fabricated with semi-monocoque construction. (4)

(iii) Flaps are lowered during take off and landing. (4)

(iv) After burners are used in fighter aircraft while takeoff and climbing. (4)