

Reg. No. :

**Question Paper Code : 52537**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth Semester

Aeronautical Engineering

AE 6604 — AIRCRAFT MATERIALS AND PROCESSES

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any four crystalline imperfections.
2. Describe Crystal Structure.
3. What is hardening in heat treatment of steel?
4. Define 'Modulus of Elasticity'
5. List any four types of corrosion?
6. Enumerate the heat treatment processes done on magnesium alloy parts.
7. State the classification of plastics.
8. What are the manufacturing processes carried out on rubber parts of air craft?
9. What are the testing methods for determining the factors affecting the mechanical properties of high temperature materials?
10. State the factors to be considered for the selection of materials to avert high temperature problems in a new design aircraft.

PART B — (5 × 13 = 65 marks)

11. (a) In NDT testing, describe the importance of X-ray diffraction.

Or

- (b) Discuss briefly the general materials required for aerospace applications.

12. (a) Discuss the methods adopted for determining the yield point of a material.
- (i) Divider method (7)
  - (ii) Drop of beam method (6)

Or

- (b) What is Creep? Explain with neat sketch various stages of Creep. (13)

13. (a) Explain the following operations in heat treatment.
- (i) Hardening (4)
  - (ii) Tempering (4)
  - (iii) Annealing (5)

Or

- (b) Discuss the following inspection methods:
- (i) Radiography (6)
  - (ii) Magnaflux (7)

14. (a) Discuss briefly manufacturing processes of plastic components of aircraft.

Or

- (b) Explain the various manufacturing processes of rubber components of aircraft.

15. (a) Discuss causes for troubles over the entire airframe due to aerodynamic heating.

Or

- (b) State the specific material applications in the following aircraft components.
- (i) Propeller blades
  - (ii) Exhaust collector
  - (iii) Cowling
  - (iv) Engine mount

- (v) Fire wall
- (vi) Oil tank
- (vii) Fuel tank
- (viii) Landing gear
- (ix) Fuselage
- (x) Wings
- (xi) Instrument Board
- (xii) Wing ribs
- (xiii) Wing leading edge

PART C — (1 × 15 = 15 marks)

16. A graduate Aero Engineer must have knowledge on the weight, strength and reliability of materials used in air craft construction.
- (a) Discuss the economic factors considered for the selection of material for the construction of air craft.

Or

- (b) Discuss the engineering factors in determining the choice of particular material for the construction of air craft.