

B.E DEGREE EXAMINATIONS: DEC 2014

(Regulation 2009)

Third Semester

AERONAUTICAL ENGINEERING

AER103: Aircraft Materials and Processes

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Which is the principal commercial source of Aluminum?
 - a) Alumina
 - b) Iron ilmenite
 - c) Bauxite
 - d) Rutile
2. Which is the principal ore of Titanium
 - a) Rutile
 - b) Iron ilmenite
 - c) Bauxite
 - d) Rutile and iron ilmenite
3. When the metal to be bent or permanently distorted without rupture is known as
 - a) Malleability
 - b) Hardness
 - c) Brittleness
 - d) Ductility
4. Which process invariably softens the metal and relieves internal strains
 - a) Normalizing
 - b) Hardening
 - c) Annealing
 - d) Carburizing
5. Which of the following is a non – magnetic and non – corrosive cobalt alloy?
 - a) Alnico
 - b) Stellite
 - c) Vitallium
 - d) All the above
6. What do you understand from SAE 2317?
 - a) Carbon steel
 - b) Nickel steel
 - c) Molybdenum steel
 - d) Ni – Cr steel
7. The process of cleaning parts by blowing abrasive particles against the surface is known as
 - a) Sand blasting
 - b) Granodizing
 - c) Galvanizing
 - d) Bonderizing

8. Which is very resistant to atmospheric condition
 - a) Al 3003
 - b) Al 1100
 - c) Al 5052
 - d) Al 6053
9. It refers to the failure of a solid body under load by breakage into two or more pieces
 - a) Fatigue
 - b) creep
 - c) Endurance
 - d) Fracture
10. Brittle fractures have been observed in _____ metals
 - a) BCC
 - b) HCP
 - c) FCC
 - d) Both BCC and HCP

PART B (10 x 2 = 20 Marks)

11. Define Ductility and Conductivity.
12. What are smart materials?
13. Give two examples for SAE Steel numbering system.
14. Define Quenching and Annealing.
15. Give examples of rivets used for joining structural assemblies.
16. List out the materials used in the construction of wings
17. What is the purpose of doping?
18. What are the uses of natural rubber and synthetic rubber?
19. Differentiate between brittle and ductile fracture.
20. Define Creep, Fracture and Fatigue.

PART C (5 x 14 = 70 Marks)

21. a) (i) Explain the criteria for selecting the aircraft materials. (7)
- (ii) Discuss the materials used for aircraft structures and engines. (7)
- (OR)**
- b) Explain in detail any two testing and inspection methods which are commonly used for aircraft materials with neat sketches.
22. a) (i) Describe the advantages and disadvantages of different titanium alloys (7)
- (ii) Explain the Air force - Navy Aeronautical and Military specifications with examples. (7)

(OR)

- b) (i) Write short note on Corrosion resisting steels. (7)
(ii) Explain the heat treatment and surface treatment of super alloys. (7)
23. a) (i) Explain the applications of Ablative and Super conducting materials in aerospace industry? (7)
(ii) Discuss the evolution and developments of materials in aerospace industry? (7)
- (OR)**
- b) Explain the following: Ablation process and Phenomenon of super conduction.
24. a) (i) Explain the classification, properties and applications of wood in aircraft. (7)
(ii) Explain in detail the uses of fabrics and dopes in aircraft. (7)
- (OR)**
- b) What is the purpose of painting? Explain the types of aircraft paints and aircraft painting process.
25. a) (i) Explain the methods employed to prevent corrosion? (7)
(ii) Explain the mechanism of fatigue. (7)
- (OR)**
- b) What are the stages of creep? Explain the mechanism of creep deformation with neat sketches.
