

**Faculty of Engineering & Technology**  
**Fourth Semester B.E.(Aeronautical Engineering)**  
**(C.B.S) Examination**  
**AIRCRAFT MATERIALS**

Time—Three Hours]

[Maximum Marks—80

**INSTRUCTIONS TO CANDIDATES**

- (1) All questions carry marks as indicated.
- (2) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Assume suitable data wherever necessary.
- (5) Illustrate your answers wherever necessary with the help of neat sketches.
- (6) Discuss the reaction, mechanism wherever necessary.
- (7) Use of Non-programmable calculator is permitted.

1. (a) What are the properties of Engineering Materials ?  
Explain it with examples in detail. 7
- (b) Explain the use of aluminium in Aircraft Construction. 6

**OR**

2. (a) Discuss the influence of adding following alloying elements on properties of steel :

- (i) Chromium
- (ii) Vanadium
- (iii) Molybdenum. 6

(b) Are the heat treatment procedures same for steel and aluminium alloys ? If yes, justify your answer. 7

3. (a) What are Composite Materials ? Write its advantages and disadvantages. 7
- (b) Describe about 'Fiber Orientation'. 6

**OR**

4. (a) Write properties, application and the fabrication of glass fibres. 8
- (b) Compare composite with Metals. 5
5. (a) Write in brief about PMC's. 8
- (b) Explain about compression molding. 6

**OR**

6. (a) Are pre-impregnated materials called as prepregs ? If yes, what are prepregs ? Explain about its manufacturing procedure. 8
- (b) Explain with diagram "Hand lay-up method". 6

7. (a) Define Creep. Explain the mechanism of Creep. 8
- (b) Explain with the help of graphs the transient and viscous creep. 5

**OR**

8. (a) Write a note on "Low temperature and High temperature creep ". 6
- (b) Describe about "Deformation at Elevated Temperatures." 7
9. (a) Explain and plot the typical graphs for stress amplitude versus number of cycles for steel and aluminium alloy. 6

(b) A sample of glass has a crack of half length  $2\mu\text{m}$ . The Young's modulus of glass is  $70\text{ GNm}^{-2}$  and the specific surface energy is  $1\text{ Jm}^{-2}$ . Estimate its fracture strength and compare it with its Young's modulus. 7

**OR**

10. (a) Distinguish between "Ductile and Brittle fracture". 6
- (b) Write a short note on "factors affecting fatigue properties" of a material. 7
11. (a) What are superalloys ? Give their composition, properties and application of superalloys. 7

(b) What are high temperature ceramics ? Explain. 7

**OR**

12. (a) Illustrate with an example solid solution strengthening. 5

(b) Write a note on "Nickel Base Superalloys". 9