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B.E., DEGREE EXAMINATIONS MAY/JUNE 2013

Seventh Semester

AERONAUTICAL ENGINEERING

AER118: Composite Materials and Structures

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10x1=10 Marks)

1. ---------- is a stack of plies of composite.

a) Lamina b) Laminate c) Ply d)Matrix

2. Young's modulus of steel is same in all

a) Axis b) Direction c) Orientation d) All of the above

3. The ratio between applied stress and resulting strain are called

a) Resilience b) Stiffness c) Elasticity d) None of the above

4. A homogeneous body has properties that are same at all

a) Direction b) Points c) Axis d) Orientation

5. Which of the following laminate exhibit isotropic in – plane response?

a) Cross ply laminate b) Angle ply laminate

c) Hybrid laminate d) Quasi-isotropic laminate

6. Assumption made in small deformation theory was

a) Each lamina is orthotropic b) Each lamina is homogeneous

c) Each lamina is elastic d) All of the above

7. In sandwich structures

a) Stiffness to weight ratio is high b) Strength to weight ratio is high

c) Honeycomb is used for energy absorption d) All of the above

8. The compressive buckling of facing in between the honeycomb walls, (caused by thin facings) are called

a) Face dimpling b) Face wrinkling c) Splicing d) Shear crimping

9. Change in dimension of a material under load over a period of time is called

a) Creep b) Fracture c) Failure d) All of the above

10. A method of constructing fabric by interlocking series of loops of one or more yarns is called

a) Sizing b) Roving c) Molding d) Knitting

PART B (10 x 2 = 20 Marks)

11. What are advanced composites?
12. Distinguish between long fibers and short fibers.
13. Define micro mechanics.
14. Distinguish between natural axis and arbitrary axis.
15. Define the term: Balanced laminate.
16. What is inter laminar shear?
17. Distinguish between face dimpling and face wrinkling.
18. What is the purpose of the attachment of core with facings?
19. Explain the difference between fibers and whiskers.
20. What is pre-peg?

PART C (5 x 14 = 70 Marks)

21. a) (i) What are the advantages of composite materials as compared to isotropic materials. (7)

(ii) State various applications of composite materials. (7)

(OR)

b) Write a detailed account about the various types fibers which are generally used in composite materials.

22. a) Obtain an lamina stress relations for a lamina with respect to arbitrary axes.

(OR)

b) Using elasticity approach, obtain an expression for the upper bound on apparent young's modulus for anisotropic composite materials.

23. a) Explain the Tsai-Hill and Tsai-Wu failure theories used for a lamina.

(OR)

b) Explain various features for the following laminates.

(i) Cross – ply laminates (7)

(ii) Angle – ply laminates (7)

24. a) Discuss in detail the design concepts for construction of a sandwich beam.

(OR)

b) (i) Discuss in detail about failure modes of sandwich panels.

(ii) Discuss about the materials used for sandwich construction.

25. a) Write short notes on the following:

(i) Auto clave molding (7)

(ii) Filament winding (7)

(OR)

b) Explain the following in detail:

(i) Resin transfer molding (8)

(ii) Preparation of fiber reinforced laminates by hand lay-up (6)

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