Registration no:

8th Semester Regular / Back Examination 2016-17
Composite Material And Structure
BRANCH: Aeronautical
Time: 3 Hours
Max Marks: 70
Q.CODE: Z103
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Classify composite materials on the basis of
(i) matrix & (ii) reinforcement.

b) What is a (i) laminate (ii) Lamina

c) Define a orthotropic materal.

d) Writedown the independent elastic constants for an orthotropic materials.

e) Differentiate between micro and macro mechanics.

f) What are the methods of producing glass fibers?

g) What do you mean by a balanced laminate?

h) Writedown the elements of the transformed reduced stiffness matrix.

i) What is natural axis and fibre axis?

j) Write down the stress-strain relation for a anisotropic material.

Q2 **a)** Derive the stress-strain relationship for the specially orthotropic material from the generalised Hooke's law. **(8)**

b) Explain Pultrusion **(2)**

Q3 **a)** Derive the governing differential equation for a laminated anisotropic plate. **(5)**

b) Explain in detail the general characteristics of composite materialsand state some of its application? **(5)**

Q4 **a)** Distinguish between open mould and close mould processes. **(5)**

b) Discuss various processes for manufacturing of fibres. **(5)**

Q5 **a)** Derive the equations for [A], [B], and [D] matrices. **(5)**

b) Explain Maximum Stress Failure theory **(5)**

Q6 **a)** Density of composite made from unidirectional glass fibre in an epoxymatrix is 1950 Kg/m^3. If density of glass fibre is 2.540 Kg/m^3 and density of epoxy is 1300 Kg/m^3 , Calculate the volume fraction of fibre and weight fraction of fibre. **(5)**

b) For orthotropic lamina, Engineering constants along the principal material axes are E_1 = 150 Gpa, E_2 = 20 Gpa, G_{12} = 5 Gpa, μ_{12} = 0.2 Determine the reduced stiffness matrix [Q]. **(5)**

Q7 Compute [A] matrix for a [0/45/-45] laminate with the following laminate properties. E_1 = 145 Gpa, E_2 = 10.5 Gpa, μ_{12} = 0.28 and G_{12} =7.5 GPa. Thickness of each lamina is 0.5 mm. **(10)**

Q8 **Write short answer on any TWO:** **(5 x 2)**
a) Cross ply and angle ply laminates
b) Anisotropic and isotropic materials
c) Netting analysis
d) Failure criteria of composites