Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Tech**
P2PUCC07

2nd Semester Regular / Back Examination 2017-18
COMPOSITE MATERIALS & APPLICATION
BRANCH : PRODUCTION ENGG, PRODUCTION ENGG AND OPERATIONAL MGT
Time : 3 Hours
Max Marks : 100
Q.CODE : C978
Answer Question No.1 which is compulsory and any FOUR from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

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

a) Name the various grades of glass fibres used as reinforcement in glass fibre reinforcement plastic (GRP).

b) State the functions of matrix and reinforcement in composite material.

c) Give some of the characteristics of C-fibers.

d) What are the advantages of thermo plastic matrices?

e) Explain the difference between isotropic and anisotropic materials.

f) What are the influences of fiber in a composite laminates?

g) What are 'whiskers'? Name some whiskers that are currently available?

h) Define angle ply laminates and cross play laminates.

i) Epoxy is most common type of matrix material. Why?

j) What are polyesters? In what way they can be compared with Polyamides?

Q2 **a)** With neat sketch, in detail describe the various open mould and close mould processes to manufacture the composites. **(10)**

b) Derive the expression for stiffness matrix and compliance matrix for an angle ply lamina using generalized Hooke's law. **(10)**

Q3 **a)** What is a composite? How are composites classified? Briefly explain each type of composites with their merits and demerits. **(10)**

b) What types of processes are used for recycling of composites? Explain briefly. **(10)**

Q4 **a)** Write a detailed account about the various types of fibers, which are generally used in composite materials. **(10)**

b) Explain orthotropic, isotropic and transversely isotropic material with compliance and stiffness matrices. **(10)**

Q5 **a)** What are thermoplastics? Explain their applications with examples. **(10)**

b) With the help of sketch/flow chart explain the stages involved in hand lay-up method for the production of polymer based composites. **(10)**

Q6 **a)** Give a detailed note on the different types of resigns, their properties and applications. **(10)**

b) What is rule of mixtures? Derive the rule of mixtures for calculating the Young's modulus of a fiber composite loaded parallel to the fibers? **(10)**

If the longitudinal modulus of a glass reinforced plastic lamina is to be doubled by substituting some of the glass fibers with carbon fibers and the total fiber volume remains unchanged at 0.5.Calculate the fraction of carbon fibers. Given E_c=300GPa, E_g=70GPa,E_m=5GPa.

Q7 **a)** Explain the manufacturing process of glass fiber and carbon fiber. What are their applications? **(10)**

b) Calculate the modulus of elasticity of a composite material consisting of 60% by volume of continuous E-glass fiber and 40% epoxy resin for the matrix when stressed under isostress conditions. (i.e the material is stresses perpendicular to the continuous fiber). The modulus of elasticity of the E glass is 72.4 GPa and that of the epoxy resin is 3.1 GPa. **(10)**