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00441

B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

December, 2013

BAS-022 : COMPOSITE MATERIALS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions. **All** questions carry **equal** marks. **Use** of scientific calculator is **allowed**.*

1. (a) State three ways to improve the impact strength of plastics. 5+5
   (b) Describe the mechanism of adhesion for polymers that are used as adhesives.

2. (a) Describe the range of properties available in polyurethaues. 5+5
   (b) Enumerate the steps in making a thermoplastic composite.

3. (a) What are the most commonly used matrices for thermosetting composites ? 5+5
   (b) What makes ceramics different from other engineering materials like metals and plastics ?

4. (a) What is a glass and how is it different from a ceramic ? 5+5
   (b) Distinguish between addition and condensation polymerization and state which is the better method.

5. (a) What do you mean by 'composit materials' ? What are the general properties of polymeric materials. 5+5

(b) Explain briefly polymerization mechanism.

6. (a) Distinguish between thermoplastics and thermosetting plastics. 5+5

(b) What is meant by the term compounding of plastics ? What are the functions of ingredients used in compounding of plastics ?

7. (a) State the characteristics of long chain polymers. Describe briefly the deformation behaviour of plastics. 5+5

(b) Define monomer and polymer. What do you mean by thermo mechanical properties? Explain with the help of suitable examples.

8. (a) Explain chain polymerisation reaction. What is the degree of polymerisation ? A particular type of polyethylene has a molecular mass of 140,000g/mol. What is its degree of polymerisation ? 5+5

(b) State whether the following statements are **True (T) or False (F)**

(i) Brinell test is done to assess the hardness of a metal.

(ii) Radiography can be done using X- rays or γ-ray (both)

(iii) Radiography is a cheaper NDT.

(iv) Surface roughness assessment uses a capacitance probe.

(v) Magnetic particle inspection can be done on ferromagnetic materials only.

9. (a) State some important Non-Destructive Testing (NDT) and their field of application. Also explain their limitations. 5+5

(b) Describe in brief the ultrasonic inspection technique.

10. Calculate : 10

(a) the modulus of elasticity

(b) the tensile strength, and

(c) the fraction of the load

carried by the fiber for the following composite material stressed under isostrain condition. The composite consists of a continuous glass - fiber - reinforced - epoxy resin produced by using 60 percent by volume of E-glass having a modulus of elasticity of $E_f = 72GPa$ and a tensile strength of 2400MPa and a hardened epoxy resin with a modulus of $E_m = 3GPa$ and a tensile strength of 62MPa.