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**B.TECH. (AEROSPACE ENGINEERING)
(BTAE)**

Term-End Examination

June, 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 permitted.

1. (a) What is the difference between a polymer and a plastic ? Explain. 5+5
(b) What are the applications of fiber reinforced composites ? Explain.

2. (a) What is meant by polymerization ? What is the difference between additional polymerization and condensation polymerization ? 5+5
(b) Explain the type of structure and molecular arrangement desired for producing synthetic fibers and rubbers.

3. (a) Explain the factors affecting the solubility and resistance of polymeric materials. 5+5
(b) Why are the plasticizers added to polymers ? Explain.

4. (a) What is degree of polymerization ? How are the rigidity and melting point of a polymer related to its degree of polymerization ? 5+5
- (b) What is a glass ? What is glass made from ?
5. (a) Distinguish between structure and properties of thermosetting and thermoplastic resins. 5+5
- (b) Describe the injection moulding process for plastics. How is it different from other thermoplastic forming techniques ?
6. (a) Why does addition polymerization need a monomer with carbon-carbon double bond to begin with ? 5+5
- (b) What are the two mechanism of elastic deformation of elastomers such as rubber, which are absent in metals ?
7. (a) What is the principle difference in the elastic and physical properties of particle and fibre reinforced composites which is important from the point of view of application ? 5+5
- (b) State whether the following statements are TRUE (T) or FALSE (F) :
- (i) Magnetic particle test can be done on all metals.
- (ii) Radiography has limitation on metal thickness.

- (iii) Industrial practice to mention hardness value as Rockwell C.
- (iv) Eddy Current test can also be used to measure the thickness of a non-conducting coating such as paint on a metal.
- (v) Elastic waves with frequencies higher than the audio range are known as ultrasonic.

8. (a) What is meant by the hardness of a metal ? 5+5
How it is determined ? Suggest any suitable method (NDT) to determine hardness index of a finished spur gear.
- (b) What are the major advantages of NDT ? Describe one of the NDT method for common flaws in casting.
- 9 (a) What are the techniques for non-destructive testing employed in ultrasonic testing ? 5+5
What are its advantages as compared to other methods of non-destructive testing?
Is it applicable for non-ferrous metals. Why or Why not ?
- (b) What are the advantages of X-ray technique as a non-destructive testing methods ? Explain X-ray technique as NDT in brief.

10. A unidirectional Kevlar 49 fiber-epoxy composite contains 60 percent by volume of Kevlar 49 fibers and 40 percent epoxy resin. The density of the Kevlar 49 fibers is 1.48 Mg/m^3 and that of the epoxy resin is 1.20 Mg/m^3 . 10
- (a) What are the weight percentage of Kevlar 49 and epoxy resin in the composite material, and
- (b) What is the average density of the composite ?
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