No. of Printed Pages : 4

BME-018

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING) / B.Tech. AEROSPACE ENGINEERING (BTAE) / BTMEVI

01190

Term-End Examination

June, 2014

BME-018 : ENGINEERING MATERIALS

Time : 3 hours *Maximum Marks : 70*

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

1. (a) Derive the relationship between True strain and Engineering strain. What is Resilience ? Why is it important for spring material ?

(b) Suggest one suitable material for each of the following purposes, with justifications :

(i) File cabinet

(ii) Chisel

(iii) Water tub

(iv) Manhole cover

(v) Glass cutter *5+5*

2. (a) State the advantages of Normalising and Annealing.

(b) What is Tempering ? Is it essential for high carbon steel after quenching ? *5+5*

3. (a) Explain a Chain Polymerisation reaction. What is the Degree of Polymerisation ?

(b) Differentiate between Ceramics and Glass, with examples. What is the Glass Transition Temperature ? *5+5*

4. (a) Name two important ceramic insulators with their properties.

(b) Find the Young's Modulus of a brass rod of diameter 25 mm and of length 250 mm, which is subjected to a tensile load of 50 kN, when the extension of the rod is equal to 0·30 mm. *5+5*

5. (a) Distinguish between paramagnetism and ferromagnetism. Explain the mechanics involving electron spins.

(b) What do you understand by hardness of a grinding wheel ? What are voids in grinding wheel ? What role do they play in functioning of grinding wheel ? *5+5*

6. (a) What is meant by thermal shock ? Why do refractory materials have low thermal shock resistance ?

(b) Describe aluminium alloys commonly used for engineering applications. Give their properties and applications. *5+5*

7. (a) Describe different methods of surface hardening. Give examples of surface hardened parts.

(b) Differentiate between Austempering and Martempering. *5+5*

8. (a) Describe the following phases in iron-carbon phase diagram :

(i) Perlite
(ii) Ferrite
(iii) Cementite
(iv) Austenite
(v) Ledeburite

(b) A hammer weighing 50 N at the end of a swinging arm of length 800 mm is lifted to a height of 1600 mm from the level of Charpy test specimen. With what speed will the hammer strike the specimen ? If the hammer is released and no specimen is placed in its path, the hammer raises to a height of 1475 mm. How much energy is lost in friction and air resistance ? *5+5*

9. (a) Define the term Wear. What are the factors influencing wear ?

(b) A piece of copper originally 305 mm long is pulled in tension with a stress of 276 MPa. If deformation is entirely elastic, what will be the resultant elongation ?

Take E for copper = $11{\cdot}0 \times 10^4$ MPa. *5+5*

10. (a) A composite is made of alternate layers of 62% E-glass and 38% epoxy resin. If modulii of elasticity of E-glass and epoxy are respectively 75 GPa and 4 GPa, find modulus of elasticity of the laminated composite under isostrain and isostress conditions.

(b) Describe in brief the important properties of lubricants. *5+5*