

00044

**BACHELOR OF TECHNOLOGY IN  
MECHANICAL ENGINEERING  
(COMPUTER INTEGRATED  
MANUFACTURING)**

**Term-End Examination**

**June, 2010**

**BME-018 : ENGINEERING MATERIALS**

*Time : 3 hours*

*Maximum Marks : 70*

---

*Note : Answer any five of the following questions. Use of calculator is allowed.*

---

1. A copper specimen of 70 mm gauge length and 13.40 mm diameter was tested in tension. Following two diameters were recorded in the plastic range of deformation. 14  
Load = 26.80 kN,  $d_1 = 13.12$  mm  
Load = 25.30 kN,  $d_2 = 9.60$  mm  
Calculate strength coefficient and strain hardening exponent.
  
2. (a) What is Mho's hardness scale ? Why is it difficult to measure hardness of steel on Mho's scale ? Explain. 7  
(b) Explain how Brinell hardness and vickers hardness are similar. What is the difference between two methods ? 7

3. (a) What are the various types of electric heating processes for making steel ? Describe any one of them. 7
- (b) Describe different methods of surface hardening. Give examples of surface hardened parts. 7
4. (a) Define thermal conductivity. Give units of thermal conductivity and explain mechanism of thermal conduction through materials. 7
- (b) What are voids in grinding wheel ? What roles do they play in functioning of the grinding wheel ? 7
5. (a) What is plasticiser ? Give examples. Which property of polymer is improved by addition of plasticisers ? Explain. 7
- (b) A Unidirectional Fibre Reinforced Plastics (FRD) is produced with fibre volume ratio of 70%. The density of fibre is  $1520 \text{ kg/m}^3$  and that of matrix is  $1400 \text{ kg/m}^3$ . Determine the weight percentages of matrix and fibre and the density of the composite. Also determine the modulus of elasticity of composite if  $E_f = 75 \text{ MPa}$ ,  $E_m = 3 \text{ GPa}$ . 7
6. In a fracture test a 3 - point bend specimen of thickness 24 mm and depth 29 mm is supported over a span of 110 mm. The specimen is precracked. The crack occurs at a load of 16800 N and crack length is measured after fracture as 12.20 mm. Calculate the  $K_{IC}$  from the data. 14

7. (a) What are the functions of cutting fluids ? 7  
Why oil - water emulsions are used as cutting fluids ? Explain.
- (b) Define the terms tribology and friction. Also 7  
explain about boundary lubrication and film lubrication.
-