BME-018

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

00343

Term-End Examination
December, 2016

BME-018 : ENGINEERING MATERIALS

Time : 3 hours   *Maximum Marks : 70*

*Note : Answer any **five** of the following questions. Use of scientific calculator and log table is allowed.*

1. (a)   What are Creep strength and Rupture strength ?   *4*

    (b)   The Larson-Miller parameters for an alloy at test levels of 10 MPa and 30 MPa are determined respectively as 18×10^4 and 16×10^4. Find the parameter for 20 MPa.   *10*

2. (a)   Describe the different methods of surface hardening process. Also suggest their applications.   *7*

(b) Suggest one alloying element each to improve the following properties of an alloy steel : 7

   (i) Wear Resistance

   (ii) Fatigue Strength

   (iii) Toughness

   (iv) Corrosion Resistance

   (v) Machinability

   (vi) Hardenability

   (vii) Hot Hardness

3. (a) What are the different types of bonding used to make a grinding wheel ? Describe the properties of each bonding. 7.

   (b) Discuss the properties of refractory materials. 7

4. (a) What is polymerisation ? Define degree of freedom of polymerisation. 7

   (b) What materials are used to make fibres for reinforcement in composites ? How do they improve the mechanical properties of composites ? 7

5. (a) With the help of a neat schematic diagram, describe crack length variation with component life. *5*

(b) What is Griffith's criterion of fracture ? A wide plate of mild steel is subjected to uniform tensile load causing a stress of 100 MPa. Calculate the critical crack length in the centre of the plate which (when reached) will cause the plate to fracture, if fracture toughness of mild steel is $1340 \dfrac{N}{mm^2} \sqrt{mm}$. *9*

6. (a) Define the 'cutting tool wear'. Describe the factors that influence the tool wear. *7*

(b) Enumerate the functions of cutting fluids. Why are oil-water emulsions used as cutting fluids ? *7*

7. Write short notes on any *four* of the following : $4 \times 3\dfrac{1}{2} = 14$

(a) Materials used as abrasives for making grinding wheels

(b) Mechanical properties of plastic as an engineering material

(c) Modulus of Resilience

(d) Functions of a lubricant

(e) Surface treatment of steels

(f) Properties of Glass

(g) Properties of High Speed Steel