| BME-018 |

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING) / B.Tech. AEROSPACE ENGINEERING (BTAE) / BTMEVI Term-End Examination December, 2015

BME-018 : ENGINEERING MATERIALS

Time : 3 hours   *Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Use of calculator is allowed.*

1. (a) A steel specimen shows upper yield point at 210 MPa and lower yield point at 200 Mpa. If modulus of elasticity, E , for steel is 210×10^3 MPa, calculate modulus of resilience. *6*

    (b) Describe the procedure for finding Rockwell hardness. *8*

2. (a) Classify plain carbon steels. Describe the applications of low, medium and high carbon steels. *7*

   (b) What are brasses and bronzes ? What is hydrogen embrittlement of copper and how can it be avoided ? *7*

3. (a) What is insulator ? Describe the various types of insulators. *7*

   (b) Describe the properties of vitrified, resinoid and rubber bonding. *7*

4. (a) How are composite cylinders and tubes manufactured ? *6*

   (b) A composite is made of alternate layers of 60% E-glass and 40% epoxy resin. If moduli of elasticity of E-glass and epoxy are 72 GPa and 3 GPa respectively, find the modulus of elasticity of the laminated composite under isostrain and isostress conditions. Show loading on sketch. *8*

5. (a) An edge cracked beam carries crack in its central plane whose length is 5 mm. A load of 1000 N is applied opposite to the crack, so that the crack would tend to open in bending. Calculate the stress intensity factor of crack, if the beam has the following dimensions :

   $W = 25$ m, $B = 10$ mm, $S = 100$ mm *8*

   (b) Explain the cleavage and shear fracture at atomistic level. *6*

6. (a) Describe the various techniques for providing surface protection to wear. 7

(b) What are the different methods of surface treatment ? 7

7. (a) What is Moh's hardness scale ? Why is it difficult to measure hardness of steel on Moh's scale ?

(b) Differentiate between Annealing and Process Annealing.

(c) Define functionality of Monomer.

(d) Give classification of Lubricants. $4 \times 3\frac{1}{2} = 14$