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BME-018

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

00672

Term-End Examination

December, 2017

BME-018 : ENGINEERING MATERIALS

Time : 3 hours *Maximum Marks : 70*

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

1. Draw a stress – strain diagram for mild steel. Define upper yield, lower yield strength and ultimate tensile strength. 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+8*

2. Describe a cooling curve for pure iron. Will this curve change in the presence of impurity ? Discuss. A hypoeutectoid steel which is cooled slowly from γ-state to room temperature was found to contain 10% eutectoid ferrite. Assume no change in structure occurred on cooling from just below the eutectoid temperature to room temperature. Calculate carbon content of steel. *6+8*

3. What are the various refractory materials ? Explain why they are termed so. What are the limitations of refractory materials ? Discuss with examples. *3+3+4+4*

4. What is a Composite material ? Give the advantages of composite materials. A unidirectional FRP is produced with a fibre volume ratio of 60%. The density of fibre is 1480 kg/m^3 and that of matrix is 1200 kg/m^3. Determine the weight percentage of the matrix and fibre and the density of the composite. Also determine the modulus of elasticity of the composite if $E_f = 70$ MPa, $E_m = 3$ GPa. *14*

5. How is Griffith's theory modified to consider plastic deformation in close vicinity of crack tip ? Explain fracture of ductile and brittle materials in tension test. What is the role of temperature in developing brittle fracture ? *6+4+4*

6. What do you mean by Lubrication ? Describe the functions of lubricants with suitable examples. Explain the different mechanisms of lubrication. *6+8*

7. Write short notes on any ***four*** of the following : *14*

   (a) Universal Testing Machine

   (b) Classification of Steels

   (c) Izod Impact Test

   (d) Rockwell Hardness Number

   (e) Metal Spraying