

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

Term-End Examination,

December 2019

BME-018 : ENGINEERING MATERIALS

Time : 3 Hours]

[Maximum Marks : 70

Note : (i) Attempt *any five* questions.

(ii) Use of calculator is allowed.

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1. a) A copper specimen of 64 mm gauge length and 12.80 mm diameter was tested in tension. Following two diameters were recorded in the plastic range of deformation
Load = 25.75 kN, $d_1 = 12.176$ mm
Load = 24.25 kN, $d_2 = 8.581$ mm
Calculate strength coefficient and strain hardening exponent. 8
b) Distinguish between charpy and Izod impact tests. 6
 2. a) Classify low, medium and high carbon steels. 6
b) Explain eutectoid and peritectic transformation by the help of Fe-C phase diagram. 8
 3. a) Silica and fireclay bricks have thermal conductivity that increases with temperature but magnesite and fused alumina have decreasing thermal conductivity. Explain. 7

(2)

- b) List the automotive parts that are made of ceramic. What are difficulties due to which widespread use of ceramic in industry does not become possible? 7
4. a) Differentiate between a bifunctional and a trifunctional monomer with the help of example. Show by sketch how a polymer containing both types of molecules will form. 8
- 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 respectively 72 GPa and 3GPa. Find modulus of elasticity of the laminated composite under isostrain and isostress conditions. 6
5. a) Using expressions for stress components. Show that shearing stress along line of crack vanishes. What is the effect of zero shear stress? 7
- b) Explain by the help of sketches, the model that explains fatigue crack growth in a ductile material. 7
6. a) Explain dry friction, boundary lubrication and film lubrication. 6
- b) What are the different methods of surface treatment? Explain any one of them. 8
7. a) Define modulus of resilience and modulus of toughness.
- b) Differentiate between annealing and process annealing.
- c) What are different types of bonding used to make grinding wheels?
- d) How are composite cylinders and tubes manufactured?

$$4 \times 3\frac{1}{2} = 14$$

