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BME-018

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

00280

Term-End Examination

June, 2015

BME-018 : ENGINEERING MATERIALS

Time : 3 hours *Maximum Marks : 70*

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

1. (a) What are True Stress and True Strain ? *4*

   (b) Find the maximum tensile load of a test specimen whose strength coefficient and maximum true strain were found by a test as 449·35 N/mm^2 and 0·3077 respectively. The original cross-sectional area of the specimen was 128·6144 mm^2. Also determine the ultimate tensile strength of the specimen. *10*

2. (a) What is Fatigue ? Discuss the mechanism of Fatigue failure of a metal. 7

(b) A 10 kN load is lifted by a steel wire rope 2 m long. What diameter of the rope should be selected, if the permissible stress is not to exceed 100×10^6 N/m^2 ? Find the elongation of the rope. Take Young's modulus as 200 kN/mm^2. 7

3. (a) Define heat treatment process. What do we achieve by carrying out heat treatment ? 7

(b) What are the critical temperatures of steel ? Explain the difference and significance of upper and lower critical temperatures of steel. 7

4. (a) Describe the process of decomposition of austenite in carbon alloyed steel with T-T-T diagram. 7

(b) What is surface hardness of steel ? How is it carried out ? What are its applications ? 7

5. (a) What is Tempering ? Briefly describe the process of tempering. 7

(b) Explain how properties of steel are changed by tempering at progressively high temperature. 7

6. (a) State the chemical composition, mechanical properties and uses of the following alloys : *6*

(i) Duralumin

(ii) Y-alloy

(b) Discuss how carbon content in steel influences its mechanical properties. *8*

7. A specimen of an alloy 25 mm in diameter and 200 mm gauge length is tested to destruction. It has an extension of 0·16 mm under a load of 80 kN and the load at the elastic limit is 160 kN. Maximum load is 180 kN. Total extension at fracture is 56 mm and neck diameter is 18 mm.

Determine the following : *14*

(a) Young's Modulus

(b) Stress at elastic limit

(c) Percentage elongation

(d) Percentage reduction in area

(e) Ultimate Tensile Stress