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KC-8121

B. E. II (Sem. III) (Mechanical) Examination

November / December – 2012

Material Science & Metallurgy

(New Course)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. II (Sem. III) (Mechanical)**

Name of the Subject :

☛ **Material Science & Metallurgy (New Course)**

☛ Subject Code No. : **8 1 2 1** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Attempt all Questions.

(3) Use of Calculator is permitted.

(4) Figure to right indicate full marks.

(5) Assume suitable data if required.

1 (a) Explain Following Terms **06**

1)Creep Strength 2)Stiffness 3)Harden ability 4)Malleability 5)Toughness 6)Hardness

(b) State the importance of study of "Materials Science" and briefly explain "Engineering Requirements" of materials. **07**

OR

Explain selection criteria for engineering materials. **07**

(c) Explain the Spark Test and Magnetic test for metallic materials. **07**

2(a) 1. Write full names of following acronyms: BHN ; AISI ; ASTM ; TTT **05**

2. What is the significance of Liquidus, Solidus and Solves line in phase diagram? **05**

OR

2(a) What is Gibb's phase Rule? Define system phase and degree of freedom so that the degree of freedom eutectic point in a binary phase diagram is zero. **10**

2(b) Draw an iron-iron carbide equilibrium diagram For 0.8% Carbon steel **05**

3 (a) 1. State the difference between impurities and alloying elements. State importance of alloying. **05**

(b) Give composition properties and uses of malleable cast iron. **10**

OR

3 (a) 1. Draw microstructure of eutectoid steel. **05**

(b) Explain the effects on steel by alloying elements Silicon, Sulphur, Magnesium and Phosphorous. **10**

4 (a) (a) Differentiate Annealing and Normalising on the basis of (i) Rate of Cooling (ii) Microstructure after cooling (iii) Grain size distribution (iv) Internal Stresses (v) Mechanical properties and (vi) Applications. **10**

(b) Define Critical Cooling Rate of steel and show the same on a TTT diagram with complete labelling. **10**

OR

4(a) List various methods to prevent corrosion. Explain any one method in detail. **10**

(b) (i) Differentiate between white cast iron and grey cast iron. **05**

(ii) Explain :High temperature corrosion **05**

5(a) What is powder metallurgy? Describe various steps involved in powder metallurgy with each step controlling properties of final sintered component. **10**

(b) State the advantages or importance of non-destructive testing over destructive testing of materials. **05**

6 (a) Give advantages of powder metallurgy **05**

(b) Explain Ultrasonic method of inspection with reference to its working principle, advantages, limitations & applications. **10**
