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RM-6561

B. E. - II (Sem. IV) (Mechanical) Examination

May / June – 2010

Material Science & Metallurgy

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

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. - 2 (Sem. 4) (Mech.)**

Name of the Subject :

☛ **Material Science & Metallurgy**

☛ Subject Code No. : **6 5 6 1** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Figures to the right indicate full marks.

(4) Draw neat sketch wherever necessary.

(5) Answers to the **two** sections should be written in **two separate** answer books.

SECTION - I

1 Attempt any **four** from following : **20**

(a) Define following :

(i) Ductility

(ii) Brittleness

(iii) Plasticity

(iv) Malleability

(v) Conductivity.

(b) Differentiate endurance and fatigue limit.

(c) What is creep? Draw a typical curve and explain the different stages on creep.

(d) Differentiate true and engineering stress.

(e) Explain polymerization.

2 Answer the following :

(a) Explain different methods of producing motor powders. 8

OR

(a) Draw the Blast furnace. Show various temperature zones. 8

(b) Application of powder metallurgy. 7

3 Answer any **three** from following : **15**

(i) Exlain Malleable cast iron.

(ii) Explain kaldo process for steel.

(iii) How the stainless steel is produced in electric furnace?

(iv) Explain specimen preparation for microscopic examination.

SECTION - II

4 (a) Answer any **six** : **12**

(i) What is Atomic weight?

(ii) What is Atomic number?

(iii) What is Allotropy?

(iv) What is Isotopes?

(v) What is conductivity?

(vi) What is martensite?

(vii) What is system?

(viii) What is APF?

(b) Answer the following : **12**

(i) Explain hardening heat treatment process for steel.

(ii) Derive the value of atomic packing factor for HCP and BCC structure with necessary sketch.

5 Answer the following :

(i) Explain X-ray diffraction in detail. Define Bragg's law and derive its formulae with sketch. **8**

(ii) Draw and label Fe–Fe_3C diagram and explain various phases. **7**

OR

(ii) Explain peritectic reaction with neat sketch. **7**

6 Answer the following :

(i) The lattice constant for a unit cell of copper is 3.615 A^o. Calculate the spacing of (111) plane. **6**

(ii) Explain Lever Arm Principle. **5**

OR

(ii) Explain Hume–Rothery's Rules. **5**