C 6064 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER B. TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2010

ME/AM 04 404 – METALLURGY OF MATERIAL SCIENCE

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

I. 1. Differentiate between the H.C.P. Structure and F.C.C. Structure.

2. Explain in detail any *two* properties of engineering materials.

3. Explain with neat sketches the mechanisms for 'dislocation' and 'twinning' as related to plastic deformation.

4. Distinguish between the terms. 'recovery' and 'recrystallisation' involved in process of heating cold worked metals.

5. Explain how a cooling curve is determined. What significant information can be obtained from a cooling curve?

6. What is austempering? Discuss its advantages and limitations.

7. What are cast irons? Name different types of cast irons.

8. Explain in detail about 'smart materials'.

(8 × 5 = 40 marks)

II. 1. What do you understand by 'Miller indices'? Explain Miller indices for Planes and Miller indices for directions.

Or

2. Explain the steps involved in the preparation of specimen for metallographic examination.

(15 marks)

III. 1. (a) Derive an expression for critical resolved shear stress.

(b) Distinguish between 'Plastic deformation' and 'fractures'.

(8 + 7 = 15 marks)

Or

2. (a) How the atoms are held together in a metallic-bond? Explain this diagrammatically.

(b) Explain the following :

(i) Ductile and brittle fracture.

(ii) Edge dislocation and screw dislocation.

(7 + 8 = 15 marks)

Turn over

IV. 1. Sketch an iron-carbon equilibrium diagram for steel indicating the important phase and explain in detail.

(15 marks)

Or

2. (a) Give an account of 'solid-state diffusion', with specific reference to the eutectoid reaction in plain carbon steels and the heat-treatment of Al alloys.

(b) Distinguish between 'annealing' and 'normalizing'.

(8 + 7 = 15 marks)

V. 1. (a) Mention the characteristics of white cast iron.

(b) Mention the purpose of alloying steels.

(7 + 8 = 15 marks)

Or

2. (a) Describe one method by which properties of grey cast iron may be improved.

(b) Give an account of nano materials.

(7 + 8 = 15 marks)

[4 × 15 = 60 marks]