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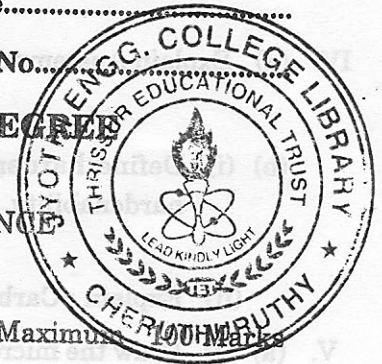
Name.....

Reg. No.....

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

**ME/AM 04 404—METALLURGY AND MATERIAL SCIENCE**

(2004 Admissions)



Time : Three Hours

Maximum Marks

Answer all questions.

- I. (i) Explain Miller indices.  
(ii) Explain Allotropy and polymorphism.  
(iii) How do materials fail ?  
(iv) Explain Edge and screw dislocation.  
(v) What is the purpose of heat-treatment ?  
(vi) Explain : lever rule.  
(vii) What are the advantages of composites over metals ?  
(viii) Structurally classify cast irons.

(8 × 5 = 40 marks)

- II. (a) (i) Given a medium carbon steel sample, indicate the procedure to polish, etch and view the microstructure.

(10 marks)

- (ii) Explain : Metallic bonds.

(5 marks)

Or

- (b) (i) Explain an electron microscope with a sketch.

(8 marks)

- (ii) Name different X-ray diffraction techniques and briefly explain any one of them.

(7 marks)

- III. (a) (i) What is the mechanism of fatigue ? Draw the S-N curves for steel and aluminium and explain how these curves are developed experimentally.

(10 marks)

- (ii) What are the protection that is given against fracture of materials ?

(5 marks)

Or

- (b) (i) Differentiate between slip and twinning.

(6 marks)

- (ii) What is strain hardening ? Discuss the mechanism of strain hardening.

(9 marks)

Turn over

IV. (a) Explain Austempering, Martempering and tempering of steel.

(15 marks)

Or

(b) (i) Define hardenability. Explain how it is measured. Discuss the factors that affect hardenability.

(8 marks)

(ii) Explain : Carburising and cyaniding.

(7 marks)

V. (a) (i) Draw the micro-structure of : (i) Malleable iron ; and (ii) SG iron. Indicate their properties and uses.

(8 marks)

(ii) Discuss the properties of copper and its alloys.

(7 marks)

Or

(b) (i) Explain : composites its types and applications.

(7 marks)

(ii) Discuss : Shape memory alloys and Nano materials.

(8 marks)

[4 × 15 = 60 marks]