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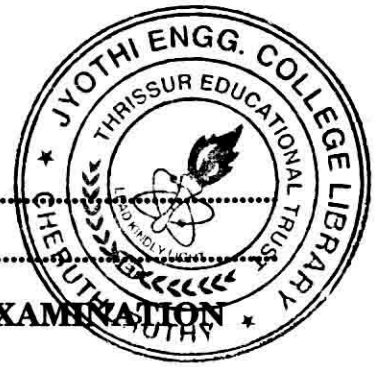
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THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION NOVEMBER 2013

AN/AM/ME 09 306—METALLURGY AND MATERIAL SCIENCE

Time : Three Hours   Maximum : 70 Marks

Part A

Answer any **five** *questions.*
Each question carries 2 marks.

1. What is the no. of atoms in BCC ?

2. Define burger's vector.

3. State phase rule.

4. What is meant by super alloys ?

5. What is the minimum amount of Cr required to achieve stainless property ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 marks.

6. Explain any *one* method of grain size measurement.

7. State I and II Law of Fick.

8. Draw creep curve. Explain its stages.

9. State Hume–Rothery rules.

10. Draw Cu-Ni Phase diagram.

11. What is the difference between Malleable Iron and ductile Iron based on the microstructure ?

(4 × 5 = 20 marks)

Part C

Answer Section (a) **or** *(b).*

12. (a) Explain Ionic and metallic bonding. How the properties of the materials depends on bonding ?

Or

(b) Explain how crystal structure is determined by X-ray diffraction.

13. (a) Derive an expression for the critical resolved shear stress.

Or

(b) Define fracture toughness. Explain how it is determined.

Turn over

14. (a) Draw Iron carbon diagram. Label the phases. Explain the cooling of eutectic alloy.

Or

(b) Draw TTT diagram for :

   (i) Low carbon steel ; and

   (ii) Medium carbon steel.

15. (a) What is meant by tool steel ? Describe chemical composition, properties and applications of any three types of tool steels.

Or

(b) Discuss the properties and applications of any two titanium alloys.

(4 × 10 = 40 marks)