F 3102 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch—Mechanical Engineering/Automobile Engineering

METALLURGY AND MATERIAL SCIENCE (M, U)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What is the significance of using miller indices ?
2. Give examples for line defects.
3. What is the significance of recrystallization temperature ?
4. Distinguish between the microstructures of pearlite and cementite.
5. List out the objectives of heat treatment.
6. What are the advantages of coating of metals ?
7. Briefly discuss the phenomenon of Polymorphism.
8. Write a note on testing of high speed steels for strength.
9. What do you mean by inter-crystalline fracture ?
10. Which are the notable microstructural changes due to creap ?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) Which are the optical properties of elements ? Discuss the effect of amorphous structure on the optical properties.

Or

(b) Define point defect, line defect and surface imperfections. Explain any three types of line defects.

Turn over

12. (a) List out any *five* reasons for alloying. Discuss any six prominent alloying elements. Identify any five alloys used in aerospace applications and discuss their properties.

Or

(b) Explain the Fe-C equilibrium diagram, in detail. What are its applications ?

13. (a) Compare the performance of cast Irons for any four mechanical applications. How their microstructure influence the mechanical properties ? Explain.

Or

(b) Explain the importance of all the non-ferrous alloys in automotive applications. Elaborate on the composition, properties and typical applications of any five non-ferrous alloys.

14. (a) Distinguish between tempering and austempering. Compare the microstructures, properties and applications of a part treated using these two methods.

Or

(b) Why strengthening of metals are required ? Explain any four such mechanisms, with the governing factors and effect on the properties.

15. (a) Explain the effect of impact loading as a ductile material. How is it useful in metal working such as forging ?

Or

(b) Explain the various bonding forces and energies influencing fracture and crack propagation. Discuss their variations for different metals and alloys.

(5 × 12 = 60 marks)