

FACULTY OF ENGINEERING**B.E. 2/4 (Mech/Prod./AE) I-Semester (Main) Examination, Nov. / Dec. 2012****Subject : Metallurgy and Material Science****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions of Part - A and answer any five questions from Part-B.****PART – A (25 Marks)**

1. What is poly crystalline metal and how is it different from single crystal?
2. Explain the classification of crystal imperfections.
3. List some of the application of diffusion in mechanical engineering.
4. Draw the creep curve and show the different stages of creep on the creep curve.
5. Distinguish between solid solution, mixture and compound with examples.
6. What are plain carbon steels? Write the commercial name given to plain carbon steels.
7. Differentiate between TTT diagram and Iron-Iron carbide diagram.
8. What re the different microstructures observed in TTT diagram?
9. Draw a neat sketch of puddling furnace.
10. Explain the specialty of Ti alloy (Ti-6Al-4V) and list its properties and applications.

PART – B (5x10=50 Marks)

- 11.(a) "Presence of dislocations in metallic crystals successfully explains the discrepancy between the observed and theoretical yield strength values of metals". Discuss the above statement with necessary sketches. (5)
- (b) Explain the different modes of fracture with the help of neat sketches. (5)
- 12.(a) What is Low cycle fatigue? Explain the method to estimate the fatigue damage in metals. (5)
- (b) Explain Fick's Law of diffusion. (5)
- 13.(a) Draw and explain the cooling curves for the following: (5)
 - (i) pure metal
 - (ii) alloy-solid solution type
- (b) Explain various invariant reactions in binary phase diagrams. (5)
- 14.(a) Distinguish between carbursing and nitriding. (5)
- (b) Draw the TTT diagram for 0.8% Carbon steel and label the phases. (5)
15. Draw a neat sketch of Bessemer converter. Explain the process of steel making in Bessemer process. (10)
- 16.(a) What are cast irons? Explain its classification. (5)
- (b) Discuss in general the composition of high speed steel. Give classification of high speed steels. (5)
17. Write short notes on: (10)
 - (a) Hadfield steel
 - (b) Martempering
 - (c) Copper-Nickel alloys