Roll No.								

B.E. (FULL TIME) DEGREE END SEMESTER EXAMINATIONS - APRIL 2014

MATERIALS SCIENCE AND ENGINEERING BRANCH

VII SEMESTER - REGULATION 2008

ML 9022 – PHYSICAL METALLURGY OF FERROUS AND ALUMINIUM ALLOYS

Time : 3 Hours Max. Marks : 100

ANSWER ALL QUESTIONS

PART – A (10 X 2 = 20 Marks)

1. Define the term entropy.
2. What is the mechanism of diffusion in metals and alloys?
3. What is the free energy change during solidification at solidification temperature?
4. What is the difference between homogeneous nucleation and heterogeneous nucleation?
5. What is martensite?
6. What is shape memory effect?
7. What is G-P zone?
8. Give an example of an alloy where there in precipitation hardening.
9. What is the difference between hot working and cold working?
10. What is the effect of temperature on recrystallisation?

PART – B (5 x 16 = 80 Marks)

11. Write in detail the processes of recovery, recrystallisation and grain growth.

12.a) Write in detail the different thermodynamic principles related to phase transformation.

(OR)

b) What are the different kinetic and diffusion factors related to phase transformation?

13.a) i) Derive expressions for critical nucleus size and critical free energy change for homogeneous nucleation. **(10)**

ii) Write briefly on constitutional super cooling. **(6)**

(OR)

b) i) Write briefly on overall transformation rate after considering nucleation and growth rates. **(10)**

ii) Explain the pearlitic transformation. **(6)**

14.a) Explain in detail the martensitic transformation in steel.

(OR)

b) i) What are lath and acicular martensites? **(6)**

ii) Give some examples and applications of shape memory alloys. **(10)**

15.a) Write in detail the age hardening process of Al-Cu alloy.

(OR)

b) Explain in detail the theories of precipitation hardening.