Uva Wellassa University, Sri Lanka
End Semester Examination – February/March 2012
SCT 442-2 Metallurgy & Repeat

Time: Two (02) Hours

Total **04** Questions
Answer **all** questions

1.

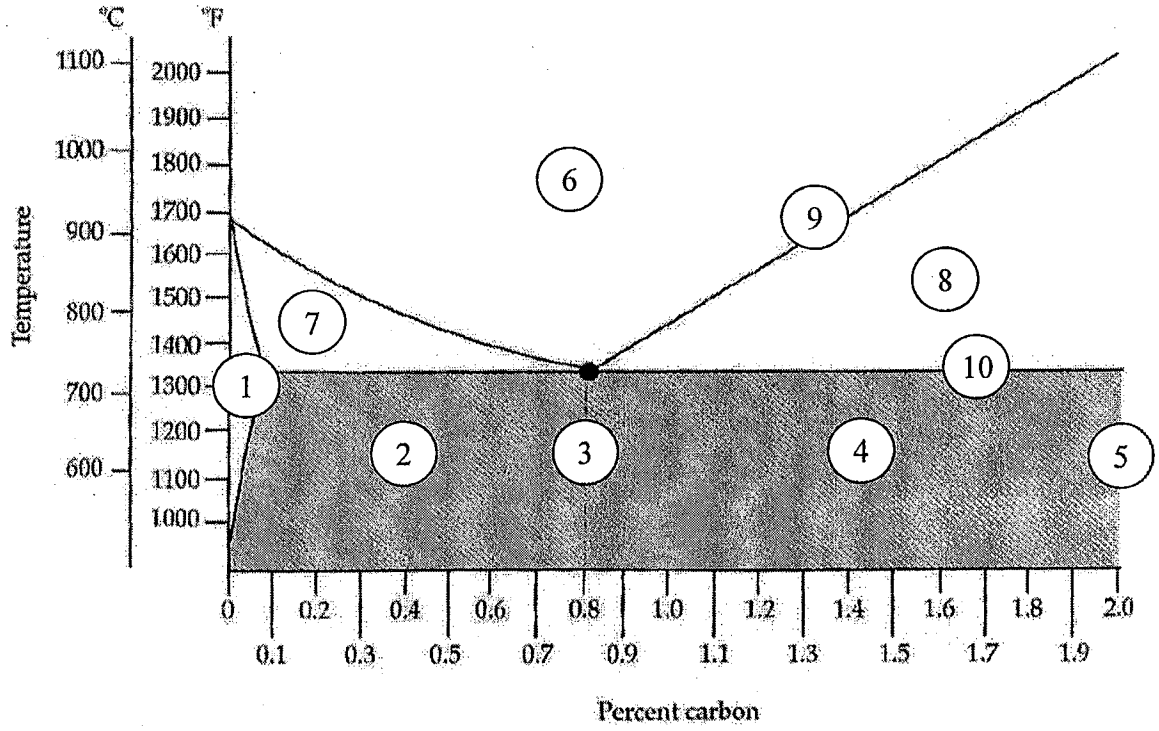

Fig Q1

I. Name the regions 1-10 in the Fig Q1.

(20 marks)

II. Compare the structures and applications of the materials in regions 1, 3, 5 and 6.

(20 marks)

III. What are the observations you can have if you slowly heat the material with 0.8% carbon above the line 9?

(20 marks)

IV. What are the differences in material properties of the materials formed in regions 2 and 4?

(20 marks)

20

V. If a material at region 6 is suddenly cooled to the region 2, what can you say about its structural and mechanical properties?

(20 marks)

2. Heat treatment of steel is very important to increase hardness, reduce hardness, stress relief and many other processes related to metal process industry.

I. Explain the metal quenching procedure describing the four stages of quenching.

(25 marks)

II. Name three quenching media and describe their applications.

(25 marks)

III. Compare annealing and normalizing, and discuss the hardness, internal stresses and other associated properties.

(25 marks)

IV. What is process annealing? What are the applications of process annealing?

(25 marks)

3. Besides main heat treatment processes, tempering and surface hardening are also used in many occasions in the metal industry.

I. What are the reasons to have tempering in metal industry? What are effects of tempering to the parent metal?

(25 marks)

II. Compare two types of tempering processes using a sketch of an isothermal diagram.

(25 marks)

III. Briefly discuss two types of surface hardening methods.

(25 marks)

IV. A tiny gear used in a clock mechanism needs to be surface hardened. Which case hardening method would you recommend for this application? Why?

(25 marks)

4.

I. Write down the three main types of hardening methods used to increase the hardness of non-ferrous materials.

(25 marks)

II. What are the similarities and dissimilarities of copper, bronze and brass?

(25 marks)

III. Discuss the applications of magnesium.

(25 marks)

IV. What is the reason that gold and platinum are expensive compared to other metals?

(25 marks)

20