



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2009 / 2010**

SUBJECT NAME : MATERIALS TECHNOLOGY  
SUBJECT CODE : DDA 2043  
COURSE : 2 DDT  
EXAMINATION DATE : APRIL/MEI 2010  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL FOUR (4)  
QUESTIONS

THIS EXAMINATION PAPER CONTAINS THREE (3) PAGES

- Q 1** (a) Material can be divided into 5 categories which are metals, ceramics, composites, polymers and electronic materials. Each material has their advantages and disadvantages. From the given statement, answer the following question:-
- (i) Give ONE (1) example of material for each category (5 marks)
  - (ii) List ONE (1) advantage and ONE (1) disadvantage for FOUR (4) materials categories only. (8 marks)
- (b) Mechanical property testing or destructive testing is used to determine the materials mechanical properties. There are several types of mechanical properties testing. List and describe FOUR (4) types of mechanical testing. (12 marks)
- Q2** (a) Give definition for the following terms:-
- (i) Schottky imperfection
  - (ii) Frenkel imperfection
  - (iii) Mixed dislocation
  - (iv) Edge dislocation
  - (v) Screw dislocation
- (5 marks)
- (b) State FIVE (5) factors which are involved in materials selection (5 marks)
- (c) Explain THREE (3) methods of materials selection. (9 marks)
- (d) The support cable rod for a new crane system for a light weight used is required to be designed to withstand a maximum load of 440KN. With 4 supports cables to bear the load equilibriumly. Plain carbon steels from 1045 series were selected. The minimum yield strength and tensile strength of this alloy are 620 MPa and 1130 MPa respectively. Assume safety factor,  $N = 5$
- Calculate the suitable size of cable rod diameter. (6 marks)
- Q3** (a) Heat treatment is used to adjust the microstructure and mechanical properties of a material for a specific purpose. There are several types of heat treatment for example annealing, normalizing, quenching, and tempering.
- Describe the purposes of each heat treatment. (8 marks)
- (b) Sketch the design flow chart in designing process. (5 marks)

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(c) By plotting phase diagram of Pb-Sn (Refer Figure Q3 (c)), plot the graph and make a phase analysis for composition of 30 % Sn at  $183\text{ }^{\circ}\text{C} + \Delta T$  and 30 % Sn at  $183\text{ }^{\circ}\text{C} - \Delta T$  by find:

(i) Each phase composition for 30 % Sn at  $183\text{ }^{\circ}\text{C} + \Delta T$  and 30 % Sn at  $183\text{ }^{\circ}\text{C} - \Delta T$ .

(6 marks)

(ii) Amount of weight proportion for each fraction for 30 % Sn at  $183\text{ }^{\circ}\text{C} + \Delta T$  and 30 % Sn at  $183\text{ }^{\circ}\text{C} - \Delta T$ .

(6 marks)

**Q4** (a) Give FIVE (5) types of corrosion.

(5 marks)

(b) Give FOUR (4) examples of corrosion protection method to avoid corrosion.

(4 marks)

(c) Differentiate between non ferrous metal and ferrous metal.

(2 marks)

(d) Give THREE (3) examples of the following:-

(i) Non ferrous metal.

(ii) Ferrous metal.

(6 marks)

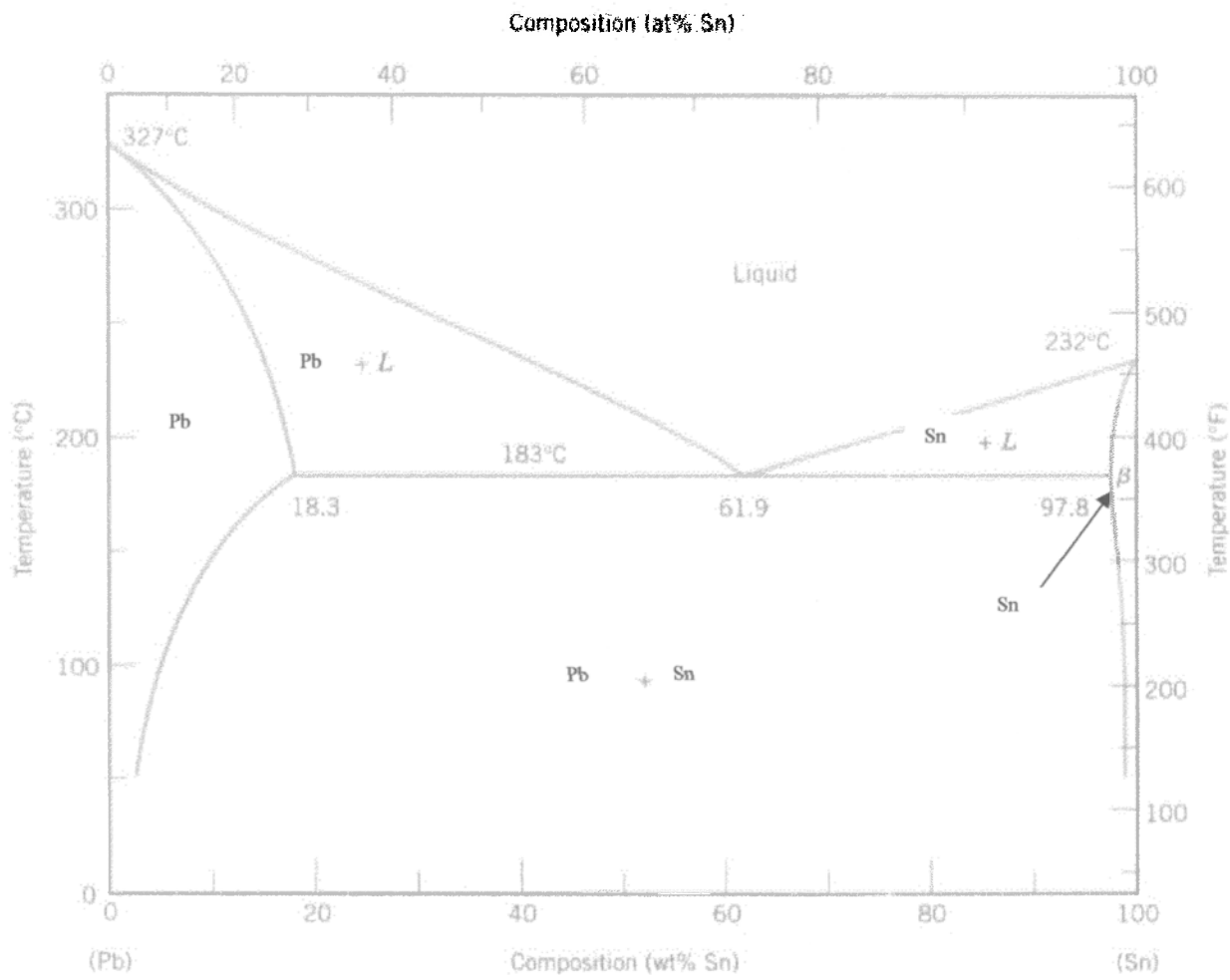
(e) Sketch and describe the cathodic corrosion protection method.

(8 marks)

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**Figure O3 (c)**