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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESI 2011/2012**

**COURSE NAME : MATERIAL TECHNOLOGY
AND SELECTION**

COURSE CODE : BPC 21903

PROGRAMME : 3 BPB

EXAMINATION DATE : JANUARY 2012

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSIST OF THREE (3) PAGES

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- Q1 A crystalline structure is one in which the atoms are located at regular and recurring positions in three types of atom structure in metals.

Explain with brief illustrate:

(a) Face-centered Cubic

(10 marks)

(b) Hexagonal Close-packed

(10 marks)

- Q2 The nonferrous metals include metal elements and alloys are not based on iron compositions. In addition, many of nonferrous metal have properties other than mechanical that make them ideal for application in which steel would be quite unsuitable. There are few examples of nonferrous metals such as aluminum, magnesium, copper, nickel, zinc and refractory metals.

Describe **TWO (2)** of the example of the nonferrous metals given with the main features and their compositions.

(10 marks)

- Q3 The copper-nickel system is a solid solution alloy throughout its entire range of compositions plotted on the horizontal axis and temperature axis. Given pure copper melts at 1083°C (1356K) and pure nickel at 1455 °C (1728K) whereby the liquid and solid phases present in the copper-nickel system at an aggregate composition of 50% nickel and a temperature of 1260 °C (1533K).

(a) Construct the phase diagram for the copper-nickel alloy system with the vertical projections from the intersection points to the x -axis and the corresponding compositions.

(15 marks)

(b) Indicate the line intersects of solidus at composition of 62% nickel and intersection with the liquidus occurs at a composition of 36% nickel into the phase diagram in Q3 (a).

(15 marks)