



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

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| COURSE NAME | : | MATERIALS SCIENCE |
| COURSE CODE | : | BNJ 10602 |
| PROGRAMME CODE | : | BNG |
| EXAMINATION DATE | : | JULY / AUGUST 2023 |
| DURATION | : | 2 HOURS |
| INSTRUCTION | : | <ol style="list-style-type: none">1. ANSWER ALL QUESTIONS2. THIS FINAL EXAMINATION IS CONDUCTED VIA CLOSE BOOK.3. STUDENTS ARE PROHIBITED TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK |

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

TERBUKA

CONFIDENTIAL

- Q1** (a) List **THREE (3)** component in automobile. For each component, determine the class of materials used in its structure. (6 marks)
- (b) Show that the atomic packing factor for BCC is 0.68. (5 marks)
- (c) Calculate the planar atomic density for the following crystal planes in FCC gold, which has a lattice constant of 0.28846 nm.
- (i) (100) (7 marks)
- (ii) (111) (7 marks)
- Q2** (a) Define materials and list the classes of materials (4 marks)
- (b) With an appropriate diagram, illustrate the basic step in fabricating clay product from loose particles to the solidified finished body. (5 marks)
- (c) Compare between thermoplastic and thermoset and give **ONE (1)** example of each type of the polymer. (6 marks)
- (d) Briefly illustrate **TWO (2)** of the following metal forming processes as stated below.
- (i) Extrusion
- (ii) Rolling
- (i) Drawing (10 marks)
- Q3** **Figure Q3** shows a phase diagram containing 70 wt % Ni and 30 wt % Cu.
- (a) When the temperature at 1350 °C,
- (i) Identify the phases present. (4 marks)

- (ii) Describe the chemical composition of the phases. (4 marks)
 - (iii) Calculate the amount of each phases present. (8 marks)
 - (b) Propose the possible phases at 1500 °C. (3 marks)
 - (c) Shows with sketching the microstructure of the alloy at 1350 °C and 1500 °C by using circular microscopic field. (6 marks)
- Q4**
- (a) Strain and stress behavior consist of two deformation mechanisms which are elastic deformation and plastic deformation. Illustrate both mechanisms using plot of stress and strain curve by providing some illustration on the material changes and condition at each critical points of this plot. (10 marks)
 - (b) Discuss **FOUR (4)** most effective methods of improving fatigue performance which is related to the improvement in design. (8 marks)
 - (c) Identify general types of hardness measurement and briefly explain **TWO (2)** of the measurement. (7 marks)

-END OF QUESTIONS –

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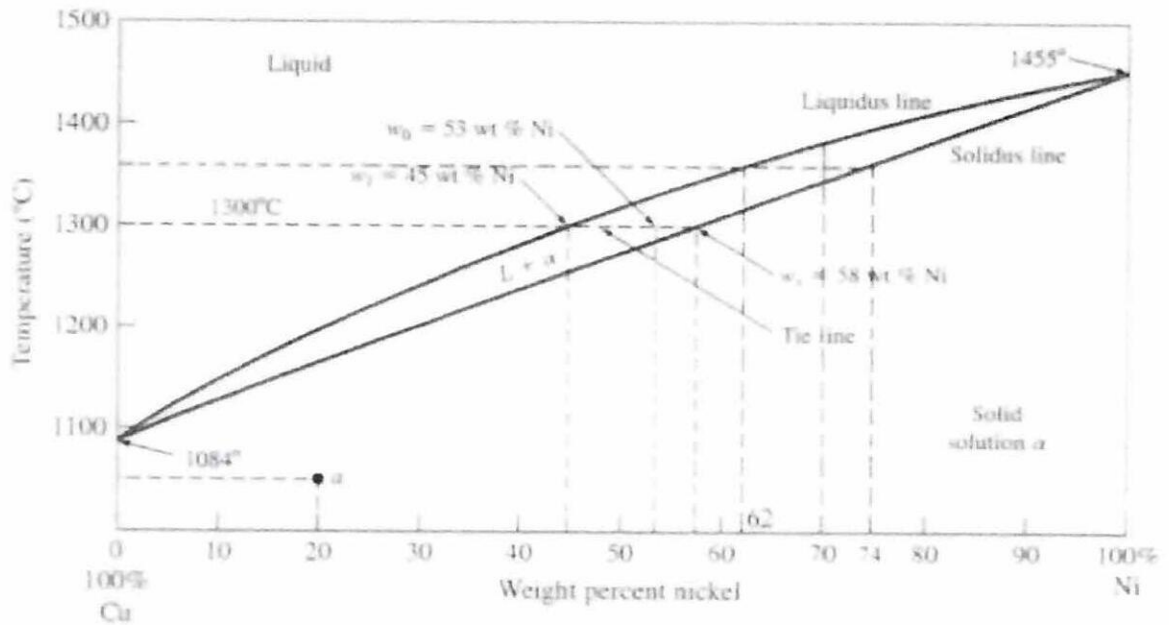


Figure Q3