Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019

COURSE NAME	:	MATERIALS TESTING
COURSE CODE	:	BDB 40203
PROGRAMME	:	BDD
EXAMINATION DATE	:	DECEMBER 2018 / JANUARY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE (5)** QUESTIONS **ONLY**

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 (a) Explain why compression testing suitable for brittle materials.

(4 marks)

(b) Sketch the typical engineering stress-strain for brittle (ceramic), ductile (metal) and plastic (polymer).

(5 marks)

(c) Creep are classified based on temperature. Differentiate between logarithmic creep and recovery creep.

(5 marks)

(d) Select THREE (3) indenters and their method that commoly used in the laboratory.

(6 marks)

Q2 (a) Identify FOUR (4) Non Destructive Testing for surface inspection.

(4 marks)

(b) Sketch the steps of liquid penetrant inspection.

(4 marks)

(c) Deferentiate the principle between ultrasonic and radiography testing.

(6 marks)

(d) Select THREE (3) visual inspection that are used for storage tank and pipeline.

(6 marks)

Q3 (a) List the abrasives materials for polishing.

(2 marks)

(b) Identify TWO (2) purposes of sectioning.

(2 marks)

(c) Write the steps of hot mounting process for metal specimens.

(5 marks)

(d) Compare the advantages of hot mounting to cold mounting.

(5 marks)

(e) Select in detail the main component of light optical microscope.

(6 marks)

Q4 (a) Explain the information we can get from Transmission Electron Microscope (TEM).

(4 marks)

(b) Sketch the interaction of electron-solid in Scanning Electron Microscope (SEM).

(4 marks)

(c) Distinguish between secondary electron and backscattered electron.

(6 marks)

(d) Evaluate two SEM images (sample of Al_2O_3/Ni composite) as shown in **Figure Q4(d)** in term of signal and function

(6 marks)

Q5 (a) Explain the funtions of X-Ray Diffraction (XRD) in the characterisation of materials.

(4 marks)

(b) Interpret the XRD result as shown in **Figure Q5(b)**.

(4 marks)

(c) Differentiate the applications between X-Ray Fluorescence (XRF) and XRD in materials science and engineering.

(6 marks)

(d) Evaluate the type of vibration for FTIR in **Figure Q5(d)**.

(6 marks)

Q6 (a) Explain the applications of thermogravimetric analysis (TGA) in Materials Engineering.

(4 marks)

(b) Write TWO (2) the uses of dynamic mechanical analysis (DMA).

(4 marks)

(c) Examine SIX (6) of typical weight loss profile of TGA as shown in **Figure Q6(c)**.

(6 marks)

(d) Evaluate the normal plot for thermal analysis of Differential Scanning Calorimeter (DSC) in polymer sample as shown in **Figure Q6(d)**.

(6 marks)

- END OF QUESTION -

FINAL EXAMINATION

SEMESTER/SESSION: SEM I/2018/2019 PROGRAMME: BDD
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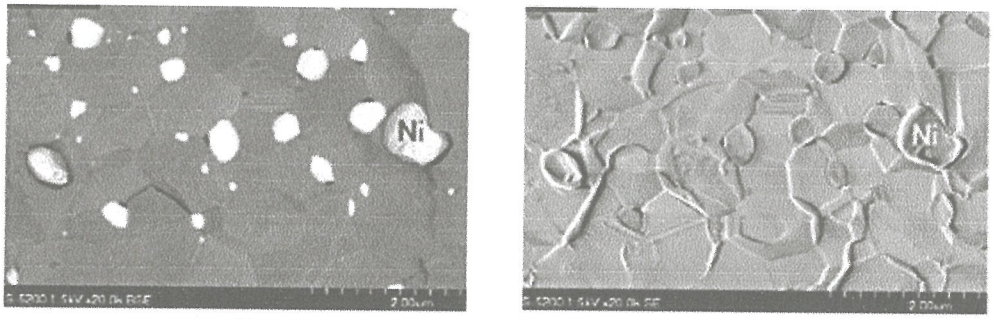

(i) (ii)

Figure Q4(d)

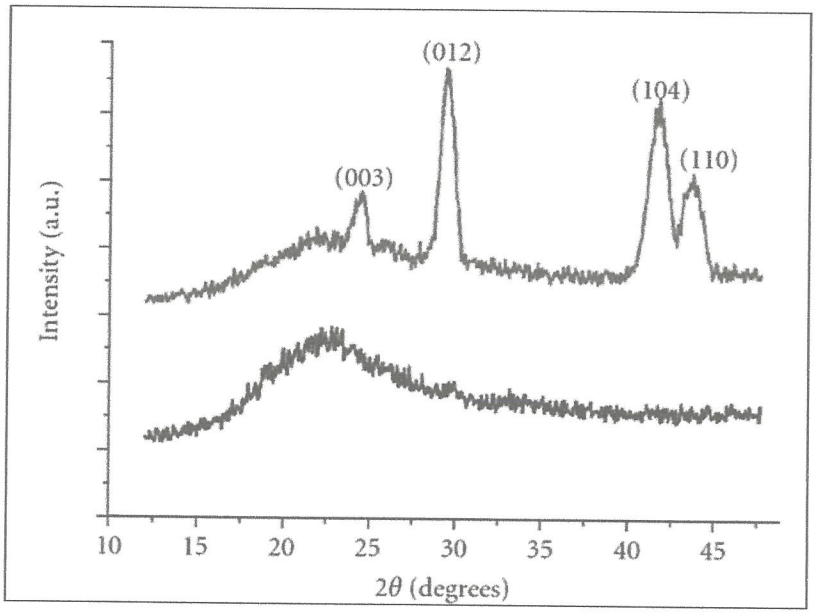

Figure Q5(b)

FINAL EXAMINATION

SEMESTER/SESSION: SEM I/2018/2019 PROGRAMME: BDD
COURSE NAME : MATERIAL TESTING COURSE CODE: BDB40203

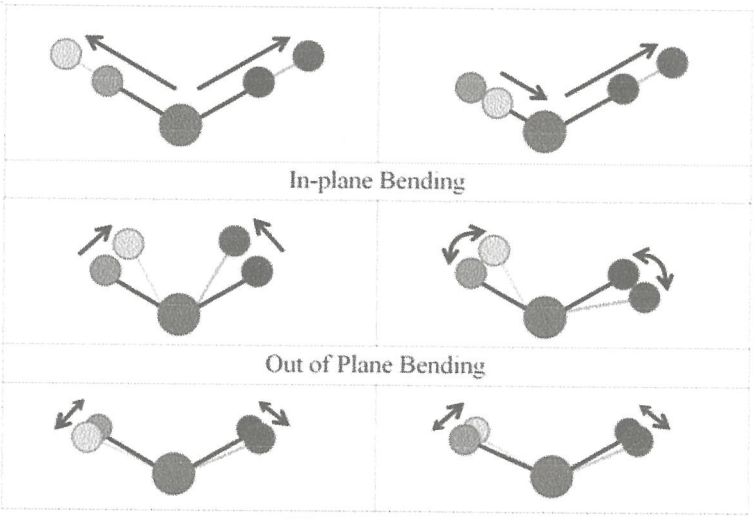

Figure Q5(d)

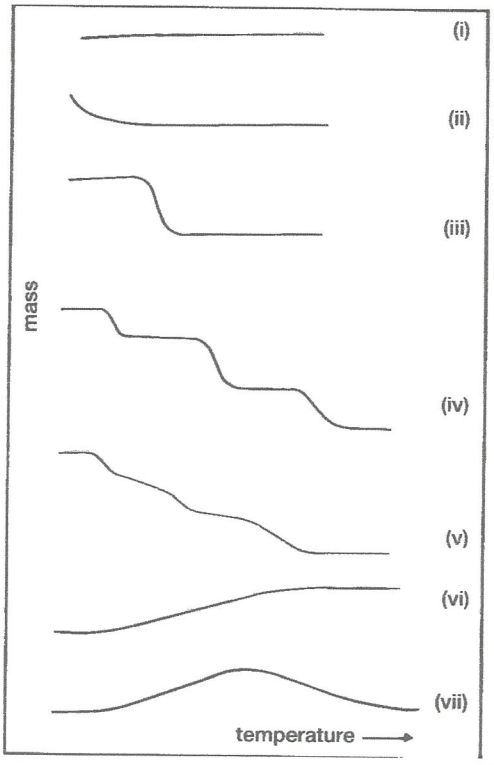

Figure Q6(c)

FINAL EXAMINATION

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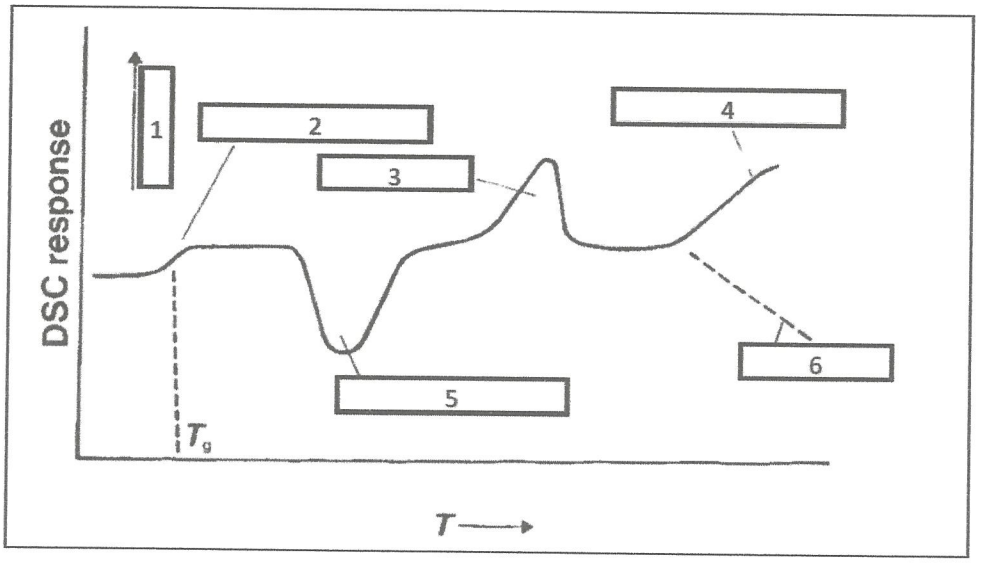

Figure Q6(d)