Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016

COURSE NAME	:	SEMICONDUCTOR MATERIAL ANALYSIS
COURSE CODE	:	BED 40702
PROGRAMME	:	BACHELOR OF ELECTRONIC ENGINEERING WITH HONOURS
EXAMINATION DATE	:	DECEMBER 2015 / JANUARY 2016
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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

Q1 (a) This question is based on Figure Q1.

(i) Identify **TWO (2)** types of chemical bonding.

(2 marks)

(ii) By the aid of Lewis diagram, give **TWO (2)** examples of different chemical bonding.

(4 marks)

(b) (i) Define the intrinsic and extrinsic semiconductors.

(2 marks)

(ii) Show a schematic diagram of silicon crystal lattice if this material is added with a dopant to form *p*-type semiconductor.

(4 marks)

(c) (i) Define the generation and recombination process of a semiconductor.

(2 marks)

(ii) Show a schematic diagram of energy level for recombination process.

(6 marks)

Q2 (a) Arrange an energy band for a *p*-type Si doped with 1 ppm Boron.

(10 marks)

(b) (i) Explain how an addition of Phosphorus helps to increase the conductivity of silicon.

(4 marks)

(ii) Organize a typical structure of electron movement in silicon crystal lattice when this material is doped with Phosphorus.

(6 marks)

Q3 (a) (i) Illustrate the structural shape of Carbon-Silicon.

(3 marks)

(ii) Named the structural shape of Carbon-Silicon.

(1 mark)

(iii) List **SIX (6)** key properties of Carbon-Silicon compound

(6 marks)

(b) Using a table, demonstrate **THREE (3)** key properties of Silicon-Germanium, Silicon-Tin and Germanium-Tin.

(10 marks)

Q4 (a) Using a table, distinguish the thermal conductivity, band gap and application of Boron Nitride, Aluminium Nitride and Gallium Nitride.

(10 marks)

(b) By the aid of diagram, discuss the direct and indirect band gap.

(10 marks)

Q5 (a) Using a table,

(i) Outline **SEVEN (7)** compounds from binary II-VI.

(7 marks)

(ii) Indicate the band gap energy of each outlined compound.

(7 marks)

(b) Choose one compound from binary II-VI and analyze the selected compound.

(6 marks)

- END OF QUESTION –

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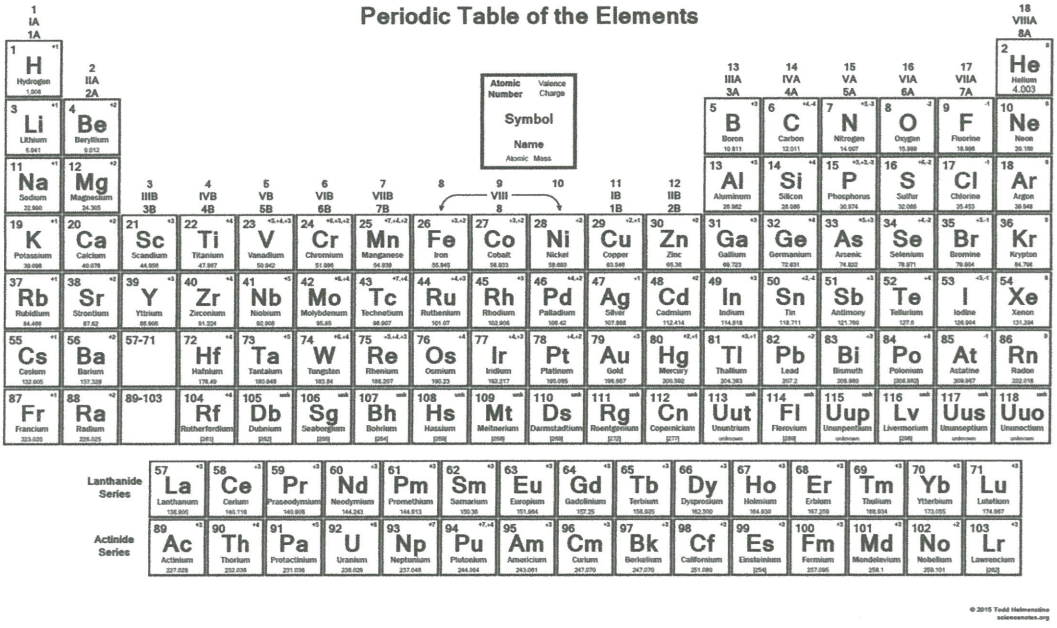

FIGURES Q1