

Menofia University  
Faculty of Engineering, Shebin El-Kom  
Basic Engineering Science Department  
2<sup>nd</sup> Semester Examination, 2013-2014  
Date of Exam: 12 / 6 / 2014



Subject: Physics of non-crystalline materials  
Code: BES636  
Year: Postgraduate (Engineering Physics)  
Time Allowed : 3 hours  
Total Marks : 100 marks

**Answer the following questions.**

**Question 1**

**(20 marks)**

- a) Compare Bragg's equation with those of laue and show that they are equivalent.
- b) X-rays are incident from (111) planes of a single cube crystal with a lattice parameter of 0.2nm. The first order maximum is observed in the direction of  $87^\circ$  to the incident ray. Calculate the Bragg angle and the wavelength of the x-rays.

**Question 2**

**(20 marks)**

Calculate the atomic packing factor (APF) for: i) Simple cubic lattice, ii) Body centered cubic lattice and iii) Face centered cubic lattice.

**Question 3**

**(30 marks)**

Write short notes on the three techniques of preparation of non-crystalline materials with referring to the advantages and disadvantages of each one.

**Question 4**

**(15 marks)**

What is the meaning of coordination number and describe how this number referring to the physical properties of chalcogenide glasses.

**Question 5**

**(15 marks)**

Explain briefly the glass transition and the factors that determine the glass-transition temperature?

*With my Best Wishes*