Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
400 level 1st Semester Examination – June/July 2017
SCT 444-1 Glass Technology

Uva Wellassa University

Instructions to candidates
Duration: 01 hour
Number of questions: 03
Mark allocation: 80
Answer all questions

1.

a. There are three main criteria to define a glass. What are they? Briefly describe each case.
(6 marks)

b. Draw a diagram showing the change in enthalpy as a function of temperature for the formation of glass under rapid cooling and slow cooling. Label each section of this diagram.
(8 marks)

c. Briefly describe the glassy structure of silicon dioxide (SiO_2) using different atomic ordering of Si and O.
(6 marks)

d. Why and how radial distribution function contributes to determine the glass structure?
(5 marks)

2.

a. Most of the commercial glasses are based on the soda-lime-silica ternary system. The addition of soda (Na_2O) and lime (CaO) into silica results considerable changes of physical properties such as melting temperature, chemical durability, viscosity, glass transition temperature, thermal expansion coefficient, density, and electrical resistivity. Describe briefly these changes of physical properties when going from pure silica glass to soda-lime-silica glass.
(8 marks)

b. Most of the commercial glass products are also based on borosilicate glasses, glass fibers, and glass ceramics. Write down two (02) applications (each case) that are based on above different types of glasses.
(6 marks)

c. Viscosity of "glass forming melts" plays a major role in glass production. List the major reference points including viscosity and temperature values for "soda-lime-silica glass melt".
(8 marks)

d. Briefly describe the optical properties of glasses including coloration of glasses.
(8 marks)

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3.

a. Explain briefly the relationship between the elastic modulus and atomic structure of glasses.

(5 marks)

b. How do we strengthen glass?

(5 marks)

c. Write down the best glass type for the following products.

(i) Windows (ii) Telescope mirrors (iii) Electrical insulating tapes
(iV) High thermal resistance glass plates (v) Lenses

(5 marks)

d. Write classical forming methods for the following commercial glass products.

(i) Glass containers (ii) Flat glasses (iii) Glass fibers (iv) Lamp glasses
(v) Glass spheres

(10 marks)