

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2143603
Date:17/05/2019
Subject Name: Introduction to Glass & Ceramic Technology-II
Time:02:30 PM TO 05:00 PM
Total Marks: 70
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Describe the sequences of reactions likely to happen when a tri axial body is heated.	03
	(b) A reaction bonded silicon nitride ceramic has a strength of 300 MPa and a fracture toughness of $3.6 \text{ MPa}\sqrt{\text{m}}$. What is the largest internal crack that the material can support without fracturing? Use $Y=1$ in the fracture toughness equation.	04
	(c) Describe the polymorphic transformation of zirconia. Describe the methodology of transformation toughening.	07
Q.2	(a) Describe the CaF_2 crystal structure	03
	(b) Calculate the density of NaCl from the knowledge of its crystal structure. Given data: Ionic radius of Na^+ and Cl^- are respectively 0.102 nm and 0.181 nm. Atomic mass of Na= 23 gm/ mol and that of Cl= 35.5 gm/mol.	04
	(c) Indicate major crystal planes in a hexagonal unit cell. Mention miller indices of major planes and directions with the help of schematic diagram.	07
	OR	
Q.3	(c) Describe any ternary phase diagram.	07
	(a) Describe various types of clay	03
	(b) Describe the kaolinite structure.	04
	(c) Describe the structure of feldspar.	07
	OR	
Q.3	(a) Define mullite.	03
	(b) Discuss the processing methods of silica.	04
	(c) Describe alumina silica phase diagram	07
Q.4	(a) Explain the Stanworth theory of network former, modifier and intermediate.	03
	(b) Explain the conclusions of Zachariason regarding oxide glass formation.	04
	(c) Describe the enthalpy versus temperature diagram for glass and crystal.	07
	OR	
Q.4	(a) Define normal & inverse spinel.	03
	(b) Describe chrome ore structure.	04
	(c) Describe synthesis of Alumina bricks in industry.	07
Q.5	(a) Differ between FCC and HCP structure with examples.	03
	(b) Describe alumina structure	04

- (c) Define tetrahedral and octahedral voids. Discuss over tetrahedral and octahedral voids of FCC crystal. 07

OR

- Q.5 (a) What is refractory stone? 03
(b) Describe annealing process. 04
(c) Describe network former, intermediate and modifier with examples. 07

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