

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021****Subject Code:3173628****Date:17/12/2021****Subject Name:Advanced Ceramics****Time:10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Differ between reaction bonded silicon nitride and hot pressed silicon nitride.	03
	(b) Explain the engineering applications of alumina.	04
	(c) Explain why a metal shows a ductile fracture but a polycrystalline ceramic or an ionic solid does show a brittle fracture.	07
Q.2	(a) Define carbonitride based cermet.	03
	(b) Define Titanium carbide based cermet.	04
	(c) Why commercial titanium carbonitride based cermets are preferred over titanium carbide based cermets?	07
OR		
	(c) Why too little or too much chromium addition is detrimental for titanium carbonitride based cermets?	07
Q.3	(a) Why is boron carbide so hard material?	03
	(b) Describe methods of synthesis of Boron Carbide in detail.	04
	(c) A strong metal-ceramic bond is essential for a satisfactory cermet production? - explain.	07
OR		
Q.3	(a) Describe features of cermet.	03
	(b) Describe in detail the most commonly used production routes of cermets.	04
	(c) Describe in detail the different preparation routes for the synthesis of titanium carbonitride.	07
Q.4	(a) Define spontaneous polarization.	03
	(b) Describe different polymorphs of BaTiO ₃ with schematic.	04
	(c) Describe methods of synthesis of Silicon Carbide in detail.	07
OR		
Q.4	(a) Discuss why zirconia has much toughness index.	03
	(b) Describe polymorphic forms of zirconia.	04
	(c) Describe the mechanism of transformation toughening in Zirconia.	07
Q.5	(a) Define an implant material.	03
	(b) Describe carbon based implant materials in detail.	04
	(c) Define fracture toughness. Explain why a FCC nickel crystal shows a higher value of Critical Resolved Shear Stress whereas a HCP zinc crystal shows a lower value.	07
OR		
Q.5	(a) Define composite material.	03
	(b) Describe applications of ceramic composites.	04
	(c) Describe synthesis and applications of Cermet materials.	07