



**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE – SEMESTER- VIII (NEW SYLLABUS) EXAMINATION- SUMMER- 2018**

**Subject Code: 2183612**

**Date:02-05-2018**

**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.

	<b>MARKS</b>
<b>Q.1</b> (a) Define Cermet with examples.	<b>03</b>
(b) What are the basic application areas of cermets?	<b>04</b>
(c) What is cermet? Give examples. What are the advantages of using cermet materials over ceramics and/ metals, explain	<b>07</b>
<b>Q.2</b> (a) Define carbonitride based cermet.	<b>03</b>
(b) Define Titanium carbide based cermet.	<b>04</b>
(c) Why commercial titanium carbonitride based cermets are preferred over titanium carbide based cermets ?	<b>07</b>
<b>OR</b>	
(c) Why too little or too much chromium addition is detrimental for titanium carbonitride based cermets?	<b>07</b>
<b>Q.3</b> (a) Why is boron carbide so hard material?	<b>03</b>
(b) Describe methods of synthesis of Boron Carbide in detail.	<b>04</b>
(c) A strong metal-ceramic bond is essential for a satisfactory cermet production'- explain.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Describe features of cermet.	<b>03</b>
(b) Describe in detail the most commonly used production routes of cermets.	<b>04</b>
(c) Describe in detail the different preparation routes for the synthesis of titanium carbonitride.	<b>07</b>
<b>Q.4</b> (a) Define spontaneous polarization.	<b>03</b>
(b) Describe different polymorphs of BaTiO <sub>3</sub> with schematic.	<b>04</b>
(c) Describe methods of synthesis of Silicon Carbide in detail.	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) Discuss why zirconia has much toughness index.	<b>03</b>
(b) Describe polymorphic forms of zirconia.	<b>04</b>
(c) Describe the mechanism of transformation toughening in Zirconia.	<b>07</b>
<b>Q.5</b> (a) Define what is an implant material.	<b>03</b>
(b) Describe carbon based implant materials in detail.	<b>04</b>
(c) Define fracture toughness. Explain why does a FCC nickel crystal show a higher value of Critical Resolved Shear Stress whereas a HCP zinc crystal shows a lower value.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) Define composite material.	<b>03</b>
(b) Describe applications of ceramic composites.	<b>04</b>
(c) Describe synthesis and applications of Cermet materials.	<b>07</b>

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