



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3153902

SUBJECT NAME: NANO CERAMIC AND APPLICATIONS

B.E. 5th SEMESTER

Type of course: Material Science

Prerequisite: Basics of material science and fundamental of physics and chemistry

Rationale: The purpose of this course is to develop understanding of nanoparticles behavior in ceramic materials for various applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	INTRODUCTION: 1.1 Ceramics Materials. 1.2 Types of oxide ceramics 1.3 Oxide ceramics 1.4 Property of oxide ceramics 1.5 Application of oxide ceramics. 1.6 Non Oxide ceramics. 1.7 Properties of Non Oxide ceramics. 1.8 Application Of non Oxide ceramics. 1.9 Non Stochiometric in ceramics. 1.10 Slip casting Technique.	14	23%
2	Amourphous cermaics. 2.1 Amourphous Ceramics. 2.2 Glass Ceramics. 2.3 Properties of Amourphous ceramics. 2.4 Application Of amourphous ceramics. 2.5 Fabrication of Amorphous ceramics. 2.5.1 Pressed glass ceramics. 2.5.2 Blow Molding. 2.5.3 Plate Glass Drawing Process. 2.5.4. Tempered Glass 2.5.5. Hardning Process and armoured glass.	12	18%
3	Advanced Ceramics. 3.1 Introduction Advanced Ceramics 3.2 Property of Advance Ceramics. 3.3 Application of Advance ceramics application 3.4 Bio compatible ceramics materials. 3.5 Advance ceramics armours.	12	18%



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4	Transparent Ceramics materials: 4.1 Introduction 4.2 Property of Transparent ceramics 4.3 Preparation of Transparent ceramics. 4.4 Composite base transparent ceramics 4.5 Doping effect in Transparent Ceramics. 4.6 Advantage of transparent ceramics 4.7 Transparent ceramics base Thin films. 4.8 Application of Transparent ceramics.	12	18%
5	Nano Ceramics Materials. 5.1 Introduction. 5.2 Property of Nano Ceramics. 5.3 Preparation of Nano Ceramics. 5.4 Application Of Nano Ceramics. 5.5 Nano Composite. 5.6 Importance of nano composite. 5.7 property of nano composite 5.8 application of nano composite. 5.9 summary.	14	23%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
Remembrance R Level	Understanding U Level	Application A Level	Analyze N Level	Evaluate E Level
18	17	28	7	-

Legends: R : Remembrance; U : Understanding; A Application and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

1. FUNDAMENTAL OF CERAMICS by Michel W. Barsoum, McGraw Hill International edition, 1997
2. MODERN CERAMIC ENGINEERING by David. W. Richerson, Merceel Dekker, NY 1992
3. CERAMIC PROCESSING AND SINTERING by M. N. Rahman, Merceel Dekker, 2003
4. HANDBOOK OF ADVANCED CERAMICS by S. Somiya, Academic Press 2003
5. HANDBOOK OF ADVANCED CERAMICS, Parts 1 and 2, S. Somiya, Academic Press, 2006



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Course Outcome:

1. After learning the course the students should be able to:
2. Understand oxide and non-oxide ceramics and their typical properties
3. Understand nano- ceramics their basic principles, preparation and applications.
4. Introduced with Transparent ceramics, ceramic coatings, and ceramic thin films,
5. understand preparation and applications of Transparent ceramics.
6. Understand mechanical and electrical behavior of ceramic and nano ceramics.