DEPARTMENT OF METALLURGICAL AND MATERIALS ENGG.

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	CERAMIC MATERIALS		
Course Code	MTPE11	**No. of Credits**	3
Department	MME	**Faculty**	Dr.R.Mahendran
Pre-requisites Course Code	---	**Section (if, applicable)**	--
Course Coordinator(s) (if, applicable)		**Department**	MME
Other Course Teacher(s)/Tutor(s) E-mail	--	**Telephone No.**	9994904601 Intercom : -
Course Type	**Elective course**		

Syllabus (approved in BoS)

Ceramics as a class of engineering materials; general characteristics of ceramics; classification of ceramics; production of ceramic powders; bonding in ceramic Materials, variations in properties as a function of bonding; concept of co-ordination number, ratio of ionic radii and corresponding crystal structures of oxides, silicates, other non-oxide ceramics, theoretical density of ceramics, polymorphism in ceramics.

Defects in crystalline ceramics, non-stoichiometry, Kgroger-Vink notations, significance of defects with respect to applications; Glasses: types, structure, bridging and non-bridging oxygen, significance of oxygen to silicon ratio, commercial oxide glasses, devetrification; Introduction to glass–ceramics and tempering of glasses.

Introduction to ceramics processing, densification methods, theory of sintering, crystalline and non-crystalline phases in ceramic microstructures; mechanical properties of ceramic materials and testing of ceramic materials; Toughening Mechanisms.

Electrical, magnetic and optical properties of important ceramic systems, correlation of properties with structure

Classification of refractories, characteristics of refractories. Production of refractories, properties and applications of various refractories.Ceramics for sensor applications,Introduction to bio-ceramics and bio-glass. Applications of bio-ceramics

COURSE OVERVIEW

To study the fundamentals (structure, properties and processing) of ceramic materials to understand its advantages and limitations and to apply those fundamentals for selecting and developing ceramic materials for different engineering applications.

COURSE OUTCOMES (CO)	
Course Outcomes	**Aligned Programme Outcomes (PO)**
Upon completion of this course, the student will be able to: 1. Know the structure and properties of different ceramic materials 2. Understand the phase diagrams and comprehend the phase transformations in ceramic materials 3. Understand the testing methods for evaluating the mechanical properties of ceramic materials 4. Understand and design the electrical, magnetic and optical properties of ceramic systems 5. Select ceramic materials and to develop new ceramics for different engineering applications	1, 2, 5, 11 1, 3, 11 2, 5, 11 1, 2, 3, 11 1, 3, 10, 11

COURSE PLAN – PART II			
COURSE OVERVIEW			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	1st to 4th week, Jan, 2020	Ceramics as a class of engineering materials; general characteristics of ceramics; classification of ceramics; production of ceramic powders; bonding in ceramic Materials, variations in properties as a function of bonding; concept of co-ordination number, ratio of ionic radii and corresponding crystal structures of oxides, silicates, other non-oxide ceramics,.	Power point Presentation, Chalk and Board
2	1st Feb, 2020 to 1st week, Mar 2020	Theoretical density of ceramics, polymorphism in ceramics Defects in crystalline ceramics, non-stoichiometry, Kgroger-Vink notations, significance of defects with respect to applications; Glasses: types, structure, bridging and non-bridging oxygen, significance of oxygen to silicon ratio, commercial oxide glasses, devetrification;.	Power point Presentation, Chalk and Board
3	1st to 4th week, Mar, 2020	Introduction to glass–ceramics and tempering of glasses, Introduction to ceramics processing, densification methods, theory of sintering, crystalline and non-crystalline phases in ceramic microstructures; mechanical properties of ceramic materials and testing of ceramic materials; Toughening Mechanisms.	Power point Presentation, Chalk and Board

4	4th week, Mar to 1st week Apr, 2020	Electrical, magnetic and optical properties of important ceramic systems, correlation of properties with structure	Power point Presentation, Chalk and Board
5	2nd to 4th week, Apr 2020	Classification of refractories, characteristics of refractories. Production of refractories, properties and applications of various refractories.Ceramics for sensor applications,Introduction to bio-ceramics and bio-glass. Applications of bio-ceramicsmodeling	Power point Presentation, Chalk and Board

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment - I	4th week Feb,2020	1 hr	20
2	Assessment - II	1st week of Apr, 2020	1 hr	20
3	Assignment	--	--	10
4	Compensation Assesment	3rd week of Apr, 2020	1 hr	20
5	Final Assessment	May 2020	3hrs	50

COURSE EXIT SURVEY
Student's Feedback

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, , academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc) : communication through class reps through mobile and E-mail.

ATTENDANCE : Minimum attendance 75%. If less than 75% attendance, He /She will be prevented from writing the end semester and re-do the course. Students secured F grade should re-appear the examination as per Institute norms

COMPENSATION ASSESSMENT : If any students miss the test in genuine ground (production of certificate or letter from the authorized personnel), She / he will be permitted for compensation assessment

ACADEMIC HONESTY & PLAGIARISM : If any students involve in malpractice in test or final examination, She /he will be prevented from writing the final assessment and awarded F grade and re-do the course (as per Instt. Regulations)

ADDITIONAL INFORMATION

Nil

FOR APPROVAL

Course Faculty **CC-Chairperson** **HOD**