NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**BTech (METALLURGICAL AND MATERIALS ENGINEERING)**		
Course Title	**Ceramic Materials**		
Course Code	**MTPE20**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**Nil**		
Session	**January 2023**	**Section (if, applicable)**	**NA**
Name of Faculty	**Dr. N. Ramesh Babu**	**Department**	**MME**
Official Email	**nrb@nitt.edu**	**Telephone No.**	**9944932221**
Name of Course Coordinator(s)	**Nil**		
Official E-mail	**NA**	**Telephone No.**	**NA**
Course Type (please tick appropriately**)**	☑ **Core course**	☐ **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, devitrification; Introduction to glass–ceramics and tempering of glasses.

Introduction to ceramics processing, densification methods, theory of sintering, crystalline and noncrystalline 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 bioceramics.

COURSE OBJECTIVES	
To study the fundamentals of ceramic materials (structure, properties and processing) to understand their advantages and limitations and to apply those fundamentals for selecting and developing ceramic materials for different engineering applications.	
MAPPING OF COs with Programme Outcomes (POs)	
Course Outcomes	**PO correlation (**Enter Numbers only**) Low/medim/high**
1. Know the structure and properties of different ceramic materials	**5/3/1**
2. Understand the phase diagrams and comprehend the phase transformations in ceramic materials	**5/3/1**
3. Understand the testing methods for evaluating the mechanical properties of ceramic materials	**5/3/1**
4. Understand and design the electrical, magnetic and optical properties of ceramic systems	**5/2,3/1**
5. Select ceramic materials and to develop new ceramics for different engineering application	**5/2,3/1**

COURSE PLAN – PART II			
COURSE OVERVIEW			
Course covers 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 TEACHING AND LEARNING ACTIVITIES			**(** Add more rows)
S.No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	1-3 weeks	Ceramics, classification and crystal structures	PPTs and Board
2	4-6 weeks	Defects in ceramics, Glasses and glass–ceramics	PPTs and Board
3	7-9 weeks	Ceramics processing and mechanical properties	PPTs and Board
4	10-12 weeks	Electrical, magnetic and optical properties of ceramics	PPTs and Board

5	12-14 weeks	Ceramics for different applications	PPTs and Board

COURSE ASSESSMENT METHODS (shall range from 4 to 6**)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment(s)	21-24, Feb 2023	1 h	15
2	CT-1	21-24, March 2023	1 h	20
3	CT-2	18-21, March 2023	1 h	20
CPA	Compensation Assessment*	27-28, April 2023	1 h	20
4	Final Assessment *	15th May 2023	3 h	45

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

The student's feedback will be assessed based on the questionnaire prepared by the Institute, and the expected attainment to be greater than 75%. The feedback collected from the students by the Institute is to be informed to the teacher to improve the course content and delivery.

COURSE POLICY (including compensation assessment to be specified**)**

The students are advised to attend all the classes except for medical reasons.
At least 75% attendance in each course is mandatory as per institute norms.
A maximum of 10% shall be allowed under On Duty (OD) / Medical Grounds.

The relative grading system will be followed.

The passing minimum for the course shall be 35% or Class Average/2, whichever is maximum.

During an assessment, possessing written material or mobile phone, any form of communication or copying from other students will be treated as punishable conduct and appropriate action will be taken complying with the institute's policy

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.

- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

The course faculty is available for consultation by appointment through email/phone. The Course Coordinator's email id and phone number are available in the course plan.

FOR APPROVAL

N Ramesh Babu

Course Faculty _____

N Ramesh Babu

CC- Chairperson _____

HOD _____

Guidelines

a) The number of assessments for any theory course shall range from 4 to 6.

b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.

c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

d) The passing minimum shall be as per the regulations.

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2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.

f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.