



Department of Metallurgical and Materials Engineering

Course Plan [EVEN semester- Jan 2025 - May 2025]

Course Title: Ceramics and Refractories	Code: MT 351
Credits: (3-0-0) 3	Pre-requisite: Nil
Instructor: Prof. Jagannatha Nayak	Mobile: 9900711945 E-mail : jagan@nitk.edu.in
Objectives: <ul style="list-style-type: none"> • The Main objectives of the course are : • To study the various crystal structures of ceramics including defect • Introduce to various methods of ceramic processing • To study the mechanical properties • Study of Refractories 	
Expected Learning Outcomes: Upon completing the course, student is expected: <ul style="list-style-type: none"> • To be able to appreciate the strong influence of structure (both crystal structure and microstructure) on the properties of ceramics. • To be able to identify a ceramic material or refractory for a given application. 	
Course Coverage including tutorials:	Hours
Introduction	01 hr
Structure of ceramics: bonding, Pauling's rules, oxide structures, silicate structures, structure of glasses; Defects in ceramics, Kroger-Vink notation;	16 hrs
Processing of ceramics: powder processing, forming, calcination, sintering; grain growth; Microstructure of ceramics	06 hrs
Properties and testing of ceramics: physical, mechanical, thermal; Brittle Fracture, Toughening mechanisms; Formation and properties of glasses;	12 hrs
Refractories: Definition of refractory, Classification, Properties and testing of refractories; General Production method of refractories, Selection of refractories for metallurgical applications, Special types of refractories.	05 hrs
Total:	40 Hrs
Evaluation Scheme: <ul style="list-style-type: none"> • Continuous Evaluation: 30% { Quizzes [20%] + Assignments [10%]} • Examination: 70 % (Mid-Semester 20%; End-Semester 50%) 	

References:

1. Michel Baersoum, Fundamentals of Ceramics, McGraw Hill, 1997.
2. W. D. Kingery, Introduction to Ceramics, Wiley Inter science, 1976.
3. D. W. Richerson, Modern Ceramic Engg., Marcel Decker Inc. New York and Basel, 1984.
4. F. H. Norton, Refractories, Mcgraw-Hill; 4 Reprint edition,1992.
5. A. R. Chesti, Refractories, Manufacture, properties& applications refractories.
6. A.O Surendranthan, An introduction to ceramics and refractories, CRC Press NY 2015

Important Note:

- Students are advised not to miss any tests/quizzes as the tests will not be repeated. No improvement test/quiz will be conducted.
- Students are advised to go through the NITK academic regulations; especially
- Regulation no. G7. Attendance Requirements:
- Students are required to put up 100% attendance.
- Students who fail to maintain 75% attendance will not be allowed to write the End-semester examination and will be awarded **FA** grade irrespective of his/her academic performance, and irrespective of nature of absence [Refer NITK-Regulations].

Sd/-
(Course Instructor)