



***Strategic Plan for Learning and Teaching  
Department of Chemical Engineering***

<b>Branch Name:</b>	Chemical Engineering (CHE)	<b>Session :</b>	2018-2019
<b>Subject Name:</b>	Ceramic Technology	<b>Year:</b>	4 <sup>th</sup>
<b>Subject Code:</b>	CHE 704B	<b>Semester :</b>	7 <sup>th</sup>

<b>Course Objective:</b>	To impart a basic knowledge about ceramics and about various fields in ceramics
<b>Course Outcome:</b>	<ul style="list-style-type: none"> <li>Will develop the ability to learn the process of preparing a white ware article</li> <li>Understand the importance and types of ceramic coatings, and the process of preparing and applying the same</li> <li>Having an idea on preparation of glass and different glass articles, importance and types of refractories, different advanced ceramics materials and products.</li> </ul>

**Teaching-Learning Plan:**

Lecture Class No.	Reference to the WBUT Syllabus	Subject Topics to be discussed/ covered/ delivered	Text book / Referred book Sl.No.
1	Module 1	Introduction to Ceramics: Definition & Classification of ceramic materials based on composition, properties & applications (Refractories, cement, Glass & Whitewares, Electro-ceramics & magnetic ceramics &);	1,2
2		Fine ceramics & Glass-ceramics, Cermets	
3		Fundamental Structural principles, composition, properties & uses: Natural ceramic minerals & materials such as Clay family, Quartz/Quartzite, Feldspar, sillimanite,	
4		Bauxite family, Dolomite, Magnesite, etc &	
5		Synthetic Ceramic Raw Materials such as sintered Al <sub>2</sub> O <sub>3</sub> , fused Al <sub>2</sub> O <sub>3</sub> , Mullite, Mag-Al Spinel, ZrO <sub>2</sub> , TiO <sub>2</sub> / Titanate, Ferrites, spinel etc.	
6		Importance of synthetic ceramic raw materials, Preparation & composition;	
7		General techniques of preparation: powder preparation: Sol-Gel, Co-precipitation,	
8		solvent vaporization; Characterization & uses.	
9		Thermal changes and behaviours of ceramic materials: Bauxite family, magnesite, dolomite,	
10		chromite, graphite, clay minerals	
11	Module 2	Materials properties & behaviours: Particle mechanics and rheology, Newtonian fluid, plastic flow, dilatant liquid, thixotropy, Deflocculation,	1,5
12		effect of electrolytes on Zeta potentials applications in ceramic processings.	
13		Beneficiation Processes, Comminution: Equipments, milling, particle size distribution.	
14		Principles of ceramic fabrication: Size reduction, size separation, Body preparation, Filtration, Methods of forming;	
15		Forming processes: Dry pressing, cold isostatic pressing,	
16		plastic forming – Extrusion, Jiggering, Jolleying;	
17		Casting process: Slip Casting, Drying –drying processes, Mechanisms in drying,	
18		defects shaping, surface finishing, and glazing.	
19		Firing – Firing system, Pre sintering processes, sintering, and	
20		vitrification and cooling.	

21	Module 3	Cement: Definition & different types of cement,	2,3
22		Raw materials and their physico – chemical characteristics,	
23		manufacturing processes of Pozzolana,	
24		Portland cement, cement making kilns viz,	
25		Rotary and shaft kiln. Refractory used in Rotary kiln,	
26		reactions occurred in different zones of rotary kiln.	
27		Testing of different properties of cement:	
28		Hydraulicity, Soundness,	
29		Compressive strength,	
30		Heat of setting & hardening etc;	
31	Module 4	Glass: Definition of glass: Thermodynamic study for glass formation, Glass transitions Conditions of vitrification;	3,5
32		Glass processing: selection of raw materials, effects of different oxides on glass properties, batch preparation, melting in glass tank furnace, refining of glass, Forming process: Blowing, molding , shaping etc; .	
33		Properties of glass: Optical properties of glasses namely, Refractive index, Birefringence, ultraviolet– visible absorption,	
34		Colloidal colours, Solarisation, Infra-red absorption, Photosensitive/Photo chromic glasses.	
35		Whitewares: Definition, Raw materials, compositions, Body preparation & fabrication,	
36		Drying, Firing, Glazing & decorations, Defects & remedies, Current trend & future challenges.	
37		Powder Metallurgy: process description, Maintenance of metal powders,	
38		Blending of powders, Compaction, Pre-sintering, Sintering,	
39		Secondary operation, Products of powder metallurgy,	
40		Advantage of the process, Disadvantages & limitation, Design.	

#### Recommended Text/ Reference Books:

Sl.No.	Name of Text/ Reference Book	Name of Author	Publisher & edition
1	Elements of Ceramics	F.H Norton	
2	Introduction to Ceramics	W.D Kingery	
3	Industrial Ceramics	Singer & Singer.	
4	Hand book of ceramics ; Vol – I & II	S. Kumar	
5	The Technology of Ceramics and Refractories	P.P. Budnikov.	

#### Course Co-ordinator / Faculty

Sl. No.	Name of the Course Co-ordinator / Faculty	Signature of Course coordinator / Faculty		Signature of HOD	
1	Dr. Sujoy Bose				

**DURGAPUR INSTITUTE OF ADVANCED TECHNOLOGY AND MANAGEMENT**

**2nd Internal Class Test, 2017**

**Chemical Engineering, 7th Semester,**

**Time: 60 mins. Ceramic Technology (Subject Code: ChE 704B) Full Marks: 30**

**Answer All Questions**

1. (a) What do you mean by Portland cement? [2]  
(b) What is the percentage of Gypsum added in cement production? [2]  
(c) What are the different types of Ceramics? [2]  
(d) What are the different types raw materials used for cement manufacture? [2]  
(e) What is Clinker? [2]
2. (a) Discuss Annealing of Glass. [5]  
(b) Explain the uses of glass. [5]
3. (a) Differentiate between wet process and dry process for manufacture of cement . [10]