

**Scheme & Syllabus of
UNDERGRADUATE DEGREE COURSE**

B.Tech. VII & VIII Semester

Ceramic Engineering



Rajasthan Technical University, Kota
Effective from session: 2020-21



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme B.Tech. : Ceramic Engineering 4th Year - VII Semester

THEORY											
SN	Category	Course Code	Course Title	Hours Per Week			Marks				Cr
				L	T	P	Exm Hrs	IA	ETE	Total	
1	PCC	7CR4-01	Traditional Ceramic Processing Techniques	3	0	0	3	30	120	150	3
2	OE		Open Elective-I	3	0	0	3	30	120	150	3
			Sub Total	6	0	0		60	240	300	6
PRACTICAL & SESSIONAL											
3	PCC	7CR4-21	Traditional Ceramic Processing Techniques Lab	0	0	3	2	45	30	75	1.5
4		7CR4-22	Ceramic Equipment Design Lab-I	0	0	3	2	45	30	75	1.5
5		7CR4-23	Ceramic Equipment Design Lab-II	0	0	2	2	30	20	50	1
6	PSIT	7CR7-30	Industrial Training	1	0	0		75	50	125	2.5
7		7CR7-40	Seminar	2	0	0		60	40	100	2
8	SODECA	7CR8-00	Social Outreach Discipline & Extra Curricular Activities					0	25	25	0.5
			Sub Total	3	0	8		255	195	450	9
	Total OF VII SEMESTER			9	0	8		315	435	750	15

L: Lecture, **T:** Tutorial, **P:** Practical, **Cr:** Credits

ETE: End Term Exam, **IA:** Internal Assessment

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THEORY											
SN	Category	Course Code	Course Title	Hours Per Week			Marks				Cr
				L	T	P	Exm Hrs	IA	ETE	Total	
1	PCC	8CR4-01	Advanced Ceramic Processing Techniques	3	0	0	3	30	120	150	3
2	OE		Open Elective-II	3	0	0	3	30	120	150	3
			Sub Total	6	0	0		60	240	300	6
PRACTICAL & SESSIONAL											
3	PCC	8CR4-21	Advanced Ceramic Processing Techniques Lab	0	0	2	2	30	20	50	1
4		8CR4-22	Refractory Lab-II	0	0	2	2	30	20	50	1
5	PSIT	8CR7-50	Project	3	0	0		210	140	350	7
8	SODECA	8CR8-00	Social Outreach Discipline & Extra Curricular Activities						25	25	0.5
			Sub Total	3	0	4		270	205	475	9.5
			Total OF VII SEMESTER	9	0	4		330	445	775	15.5

L: Lecture, **T:** Tutorial, **P:** Practical, **Cr:** Credits

ETE: End Term Exam, **IA:** Internal Assessment



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List of Open Electives for Ceramic Engineering

Subject Code	Title	Subject Code	Title
Open Elective - I		Open Elective - II	
7AG6-60.1	Human Engineering and Safety	8AG6-60.1	Energy Management
7AG6-60.2	Environmental Engineering and Disaster Management	8AG6-60.2	Waste and By-product Utilization
7AN6-60.1	Aircraft Avionic System	8AN6-60.1	Finite Element Methods
7AN6-60.2	Non-Destructive Testing	8AN6-60.2	Factor of Human Interactions
7CH6-60.1	Optimization Techniques	8CH6-60.1	Refinery Engineering Design
7CH6-60.2	Sustainable Engineering	8CH6-60.2	Fertilizer Technology
7CE6-60.1	Environmental Impact Analysis	8CE6-60.1	Composite Materials
7CE6-60.2	Disaster Management	8CE6-60.2	Fire and Safety Engineering
7CS6-60.1	Quality Management/ISO 9000	8CS6-60.1	Big Data Analytics
7CS6-60.2	Cyber Security	8CS6-60.2	IPR, Copyright and Cyber Law of India
7EE6-60.1	Electrical Machines and Drives	8EE6-60.1	Energy Audit and Demand side Management
7EE6-60.2	Power Generation Sources.	8EE6-60.2	Soft Computing
7EC6-60.1	Principle of Electronic communication	8EC6-60.1	Industrial and Biomedical applications of RF Energy
7EC6-60.2	Micro and Smart System Technology	8EC6-60.2	Robotics and control
7ME6-60.1	Finite Element Analysis	8ME6-60.1	Operations Research
7ME6-60.2	Quality Management	8ME6-60.2	Simulation Modeling and Analysis
7MI6-60.1	Rock Engineering	8MI6-60.1	Experimental Stress Analysis
7MI6-60.2	Mineral Processing	8MI6-60.2	Maintenance Management
7PE6-60.1	Pipeline Engineering	8PE6-60.1	Unconventional Hydrocarbon Resources
7PE6-60.2	Water Pollution control Engineering	8PE6-60.2	Energy Management & Policy
7TT6-60.1	Technical Textiles	8TT6-60.1	Material and Human Resource Management
7TT6-60.2	Garment Manufacturing Technology	8TT6-60.2	Disaster Management



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Scheme & Syllabus

IV Year- VII Semester: B. Tech. (Ceramic Engineering)

7CR4-01: Traditional Ceramic Processing Techniques

Credit 3
3L+0T+0P

Max. Marks: 150(IA:30, ETE:120)
End Term Exam: 3 Hours

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Ceramic Building Materials: Common Bricks, Facing & Stock Bricks, Engineering Bricks, Blue Bricks, Hollow Bricks, Perforated Bricks, Hollow tiles, Glazed Bricks, Roofing Tiles, Flower Pots, Salt Glazed Stoneware Pipes, Floor Tiles, Wall Tiles, Exterior Decorated Tiles. Sanitary Earthen wares, Vitreous China Sanitary wares, Fireclay & Stoneware sanitary wares.	9
3	Ceramics in Home: Stoneware Table wares, Earthenware tableware vases etc, Semi-vitreous China wares, Hotel China wares, Bone china Dinnerware, Hard Porcelain tableware, Heat Resistant wares, Stoneware Kitchen wares, Art wares, Dental Porcelain.	9
4	Chemical Ceramics: Stoneware, Chemical Stoneware, White Chemical Stoneware, Chemical Porcelain, Carbon & Graphite Shapes, Delanium Carbon,& Graphite, Kemite & Karcite laboratory equipments& Filters.	8
5	Engineering Wares: Mullite Porcelain, Steatite Porcelain, Sintered Boron Carbide, Sintered Silicon Carbide, Thoria& Uranium Dioxide Ceramics. Fused Alumina Grinding Wheels, Ceramic Cutting Tools.	7
6	Ceramics in Electrical Industries: Low Tension Insulators, High Tension Insulator, High Temperature Insulators, Sparking Plug Insulators, High Frequency Ceramic Insulators, Low Loss Steatite, Alumina, Zircon & Cordierite Ceramics.	8
Total		42

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Scheme & Syllabus

IV Year- VII Semester: B. Tech. (Ceramic Engineering)

7CR4-21: Traditional Ceramic Processing Techniques Lab

Credit 1.5
0L+0T+3P

Max. Marks: 75 (IA: 45, ETE:30)

1. Compounding & fabrication of earthen wares.
2. Determination of dry & fired properties of earthen wares.
3. Compounding & fabrication of stoneware table wares.
4. Determination of dry & fired properties of stoneware table wares.
5. Compounding & fabrication of chemical stoneware.
6. Determination of dry & fired properties of chemical stoneware.
7. Compounding & fabrication of electrical porcelain
8. Determination of dry & fired properties of electrical porcelain.
9. Determination of mechanical properties of insulator by UTM machine.

7CR4-22: Ceramic Equipment Design Lab-I

Credit 1.5
0L+0T+3P

Max. Marks: 75(IA: 45, ETE: 30)

1. Design of ball mill.
2. Design of electric heating laboratory furnace.
3. Design of cement rotary kiln.
4. Design of tunnel kiln and its bricks lining for industries.
5. Design of tunnel driers.

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IV Year- VII Semester: B. Tech. (Ceramic Engineering)

7CR4-23: Ceramic Equipment Design Lab-II

Credit 1
0L+0T+2P

Max. Marks: 50(IA: 30, ETE: 20)

1. Design of LD converter lining.
2. Design of gas/oil fired furnace.
3. Design of spray drier.
4. Design of seebeck coefficient measurement setup.
5. Design of two/four probe resistivity measurement setup.

7CR7-30: Industrial Training

Credit 2.5
0L+0T+1P

Max. Marks: 125

7CR7-40: Seminar

Credit 2

Max. Marks: 100

7CR8-00: Social Outreach Discipline & Extra Curricular Activities

Credit 0.5

Max. Marks: 25

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IV Year- VII Semester: B. Tech. (Ceramic Engineering)

8CR6-01: Advanced Ceramic Processing Techniques

Credit 3
3L+0T+0P

Max. Marks: 150(IA:30, ETE:120)

End Term Exam: 3 Hours

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Science of Colloidal Processing: Science of colloidal processing of ceramics: Introduction, types of colloids, attractive surface forces, electrostatic, steric and electrostatic stabilizations, structure of consolidated colloids. Rheology: Detailed study of rheology of ceramic systems, Vander waals forces between macroscopic bodies, effect of intervening media, lyophobic collides, Stabilization Phenomena: Electrostatic stabilization in double layer and surface charges, Repulsion between two double layers, Stability of electrostatically colloids, electrokinetic phenomena, polymeric stabilization.	9
3	Sol-Gel Processing: Polymeric gel route, metal alkoxides - preparation & its properties, sol gel process for metal alkoxides, sol-gel preparation techniques for colloidal gel & polymeric gel, Application of Sol-Gel: Application in thin film & coating, fiber & monolithics.	9
4	Solid -State and Viscous sintering: Sintering of polycrystalline & amorphous materials, Analysis of sintering: Theoretical analysis of sintering, numerical simulations of sintering, phenomenological sintering equations, Sintering stresses and its measurement.	8
5	Powders synthesizing: Powder characteristics, Powder preparation methods: Mechanical synthesis, mechanochemical synthesis, chemical methods, vapor phase reactions.	7
6	Liquid Phase Sintering: Introduction, elementary features of liquid phase sintering, microstructure produced by liquid phase sintering, stages in liquid Phase sintering: Stages in liquid phase sintering, controlling factors.	8
Total		42

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IV Year- VII Semester: B. Tech. (Ceramic Engineering)

8CR4-21: Advanced Ceramic Processing Techniques Lab

Credit 1
0L+0T+2P

Max. Marks: 50 (IA: 30, ETE: 20)

1. Synthesis of advanced ceramic sample by citrate-nitrate method.
2. Study of grain and grain boundary resistivity by Cole-Cole plot.
3. Synthesis of advanced ceramic sample by co-precipitation method.
4. Determination of magnetic loss of ferrite.
5. Synthesis of advanced ceramic sample by combustion method.
6. Arrhenius plot for determination of activation energy of conduction.
7. Synthesis the varistors sample through solid state ceramic route.
8. Study the varistors characteristics.
9. Determination of Curie temperature for ferro-magnetic materials.

8CR4-22: Refractory Lab-II

Credit 1
0L+0T+2P

Max. Marks: 50(IA: 30, ETE: 20)

10. Preparation of monolithic refractory.
11. Effect of casting parameter on the properties of cast refractories.
12. Synthesis of insulation refractory.
13. Determination of thermal conductivity of insulation refractory
14. Study of thermal shock resistance and PLCR of refractory brick
15. Shaping of refractory brick by dry pressing/hand moulding method.
16. Designing and layout of refractory bricks in furnaces.

8CR7-50: Project

Credit 7

Max. Marks: 350

8CR8-00: Social Outreach Discipline & Extra Curricular Activities

Credit 0.5

Max. Marks: 25

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