P D A College of Engineering

B.E. in Respective branch Name Scheme of Teaching and Examinations 2022

Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2023-24)

VII SEMESTER (Swappable VII and VIII SEMESTER)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD)and Question Paper Setting Board (PSB)	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	IPCC	22CC71	Advanced Refractories	TD-Respective Dept. PSB- Respective Dept.	3	0	2		03	50	50	100	4
2	IPCC	22CC72	Glass technology-11	TD-Respective Dept. PSB- Respective Dept.	3	0	2		03	50	50	100	4
3	PCC	22CC73	structural ceramics	TD-Respective Dept. PSB- Respective Dept.	4	0	0		03	50	50	100	4
4	PEC	22CC7411/ 22CC7412/ 22CC7413	Non-destructive testing/electro magnetic ceramics/ Composite materials/	TD-Respective Dept. PSB- Respective Dept.	3	0	0		03	50	50	100	3
5	OEC	22CCOE7511/ 22CCOE7512	Open Elective-II- Ceramic technology/smart materials	TD-Respective Dept. PSB- Respective Dept.	3	0	0		03	50	50	100	3
6	PROJ	22CC76	Major Project Phase-II		0	0	12		03	50	50	100	6
										300	**300**	**600**	**24**

Professional Elective Course

22XX7411		22XX7413	
22XX7412			

Open Elective Course

22XXOE7511			
22XXOE7512			

PCC:ProfessionalCoreCourse,**PCCL**:ProfessionalCoreCourselaboratory,**PEC**:ProfessionalElectiveCourse,**OEC**:OpenElectiveCoursePR:ProjectWork,**L:**Lecture,**T**: Tutorial, **P**: Practical **S= SDA**: Skill Development Activity, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation. **TD-** Teaching Department, **PSB**: Paper Setting department, **OEC**: Open Elective Course, **PEC**: Professional Elective Course. **PROJ**: Project work

Note: VII and VIII semester rsofI V years of the program

(1) InstitutionscanswaptheVIIandVIIISemesterSchemesofTeachingandExaminationstoaccommodateresearchinternships/industryinternshipsaftertheVI

semester**.**
(2) CreditsearnedforthecoursesofVIIandVIIISemesterSchemeofTeachingandExaminationsshallbecountedagainstthecorrespondingsemesterswhethertheVIIor VIIIsemestersiscompletedduringthebeginningofthe IVyearorthe later part ofIVyearsoftheprogram.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering andTechnology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Eachgroupwillprovideanoptiontoselectonecourse.Theminimumnumberofstudents'strengthsforofferingprofessionalelectivesis10.However,thisconditionalshall notbeapplicabletocaseswheretheadmissiontotheprogram isless than10.

OpenElectiveCourses:

Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they canopt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under theguidanceof the ProgramCoordinator/Advisor/Mentor. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this conditionshallnot be applicabletoclass where the admissiontothe programis lessthan10.

PROJECTWORK(21MEP75): TheobjectiveoftheProjectwork is

(i) Toencourageindependentlearningandtheinnovativeattitudeofthestudents.

(ii) Todevelopinteractiveattitude,communicationskills,organization,timemanagement,andpresentationskills.

(iii) Toimpartflexibilityandadaptability.

(iv) Toinspireteamworking.

(v) Toexpandintellectualcapacity,credibility,judgmentandintuition.

(vi) Toadheretopunctuality,settingandmeetingdeadlines.

(vii) Toinstallresponsibilitiestooneselfandothers.

(viii) Totrainstudentstopresentthetopicofprojectworkinaseminarwithoutanyfear,facetheaudienceconfidently,enhancecommunicationskills,involveingroupdiscussiontopresent and exchange ideas.

CIEprocedureforProjectWork:

(1) Singlediscipline: TheCIEmarksshallbeawardedbyacommitteeconsistingoftheHeadoftheconcernedDepartmentandtwoseniorfacultymembersoftheDepartment,oneofwhomshallbe theGuide.
TheCIEmarksawardedfortheprojectwork,shallbebasedontheevaluationoftheprojectworkReport,projectpresentationskill,andquestionandanswersessionintheratio50:25:25.Themarks awardedfortheprojectreportshall bethesamefor allthe batchmates.
(2) Interdisciplinary: ContinuousInternalEvaluationshallbegroup-wiseatthecollegelevelwiththeparticipationofallguidesofthecollege.Participationofexternal guide/s,ifany,isdesirable.TheCIEmarks awardedfortheprojectwork,shallbe basedon theevaluationofprojectworkReport,projectpresentationskill,andquestionandanswer sessionintheratio50:25:25.Themarksawardedfor theprojectreport shallbe the sameforallthe batchmates.

SEEprocedureforProjectWork:SEEforprojectwork willbeconductedbythetwoexaminersappointedbytheUniversity.TheSEEmarksawardedfortheprojectwork shallbebasedontheevaluationofprojectworkReport, projectpresentationskill, andquestionandanswersessionintheratio50:25:25.

Course Title: Advanced Refractories and applications		
Subject Code	22CC71 (IPCC)	CIE: 50
Number of Lecture Hours/Week	3(Theory)	SEE: 50
Total Number of Lecture Hours	35+7=42 hrs(7hrs self study component)	SEE Hours: 03

Modules	Teaching Hours
Module-1 Factors governing selection of refractories for application .high temperature industrial processes and their range of temperature. Industry wise global refractory production .major refractories producing countries .classification of refractories based on manufacturing methods , physical form or shape, porosity .raw materials and sources of refractories action of minelizers on refractories. Effect of impurities on phase diagram of refractories. Silicosis. Effect of lime-silica ratio on magnesia refractories. Hazards with chromite containing refractories. **Refractory Oxides**: Alumina, baria, berillia, calcia, ceria, chromium oxide , lanthana , gallium oxide , hafnia ,lanthana, magnesia, manganese dioxide ,nickel oxide , niobium oxide , silica ,strontium oxide ,tantalum oxide , thoria, tin oxide , titanium oxide ,uranium oxide , vanadium oxide , yitriumoxide ,zinc oxide , zirconia , mullite , spinel.	8
Module-2 **Non oxide refractories** –Boron carbide, tungsten carbide, silicon nitride, aluminium nitride, boron nitride , metal borides. Silicides , Sulfides . **Types of fused cast refractories**: Fused cast alumina Fused cast AZS, Fused cast zirconia .Fused cast alumina –silica. **Ceramic Fibe**rs: Preparation ,properties and applications of glass fiber , boron fiber , alumina fiber , silicon carbide fiber , boron carbide fiber , silicon nitride fiber, boron nitride fiber. Magnesia –carbon refractories: Raw materials, binders and additives , manufacturing technique , classification and properties, degradation of magnesia –carbon refractories .	8
Module-3 Unshaped refractories –Introduction ,advantages ,classification Special raw materials and additives-Fines of major constituents. Binder-high alumina cement, colloidal silica, hydratable alumina, phosphates, silica fume dispersants and anti setting agents. Fibers: organic fibers, metallic fibers. **Refractory castables**: Introduction, types of refractory castables, preparation methods. Compositions-components, classification of alumina and alumino silicate refractory castables, aggregate and particle sizing, bonding mechanisms, flow characteristics and placement methods. Applications. **Main application areas of** ramming mass, gunning mass, plastic mass, spray mass and shortcrete, mortar, dry vertable mass. **Types of alumina**: Preparation, properties and applications of tabular alumina, fused alumina, and sintered alumina.	10
Module-4 **Preparation, properties and applications of –**Alumina, Zircon, olivine and Forsterite, Spinel based refractories Cordiertite based kiln furnitures.. Silicon carbide and silicon nitride heat exchangers ,estimation of heat loss due to mass of setters and kiln furntures ,lithium aluminum silicate (LAS) Kiln furnitures for heating chambers ,kiln furnitures and miscellaneous refractories .reuperator ad regenerator tubes of silicon carbide and silicon nitride. **Microstructure of refractories**: Fire clay refractories, silica refratories, basic refractories. **Abrasives** : Definition , classification , Natural abrasives –Examples , properties and applications , synthetic abrasives- Examples , synthesis , properties and applications .Refractory coatings . Corrosion of refectories.	8

Module-5 **Main application areas of** silica, alumina, fireclay, magnesia, dolomite, chrome-mag . mag-chrome , magnesia-carbon refratories Means of achieving high temperature and some of their limitations .resistance and induction heated furnaces. Arc furnaces .Other Methods of achieving High temperatures. Novel refractory ceramics for energy production and utilization of long life refractories for steel plant ,economy of use of refractories for steel and allied plants Recent trends in applications of refractories in glass tank furnace –Regenerator structure, rider arch, checker work and chimney block models, regenarotor system. Refractory Filters used in steel plants, addition of metal ingredients to increase life of refractories. **Properties of refractories**; Physical, Mechanical, thermal, thermo mechanical, abrasion, corrosion. **Methods of installation of un shaped refractories** –Concrete wok, ramming mass, gunning processes .refractory lining and design.	8

Question paper pattern:
Student has to answer any five full questions, selecting one from each module.

Reference Books: Reference books

1. .Introduction to ceramics –W.D. Kingery
2.Refractories –F.H. Nortan
3.Steel plant refractories –F.H. Nortan 11
4.Refractories –Kenneth Shaw
5.Refractories –Nandi
6.Refractories –Budnikov
7.Refractories - Chesters
8.Refractory Technology ,Fundamentals and Applications :Ritwik Sarkar
9 Over View of Refractory Materials .-PDH Online
10 An Introduction to Ceamics and Refractories ; A.O Surendranathan .
11 Refractories HAND BOOK : Charles A Schacht.
12High Temperature Techology :I.E .CAMPBELL

E books and online course materials:

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	**CO #**	Course Outcome (CO)	Blooms Level
	CO1	Identification of raw material sources of refractories, factors governing selection of refractories, refractory oxides.	C1
	CO2	Identification of non oxide, fused cast, refractories and ceramic fibers.	C2
	CO3	Understanding about types alumina and unshaped refractories	C3
	CO4	Understanding of Refractories castables , kiln furniture's ,microstructure of refractories	C4
	CO5	Understanding of properties applications installations of refractories.,	C5

THEORY COURSE TITLE: Glass Technology-II(IPCC)	
Course Code: 22CC72	CIE: 50
Number of Lectures Hours/Week: 04	SEE: 50
Total Number of Lecture Hours: 42	SEE Hours: 03

Modules	**Teaching Hours**
Module-I Fundamental concepts of glassy state, glass formation, structure of glass, annealing - introduction, generation and release of strain, temporary and permanent strain, dependence of strain on cooling rate, detection and measurement of strain, special problems in annealing of glass wares, stress optical coefficient, the lehr, toughened glass, strengthening of glass.	09
Module-II Phase diagrams of glass forming systems, water glass, attack of water on glass, tests for resistance to chemical attack, composition and durability of glass, acid attack, alkali attack, significance of durability, strength of glass, forms of fracture, elastic properties of glass, liquidus temperature of glass.	08
Module-III Viscosity variation with temperature and composition, characteristics point on viscosity curves, relation between viscosity and crystallization, viscosity and plaining, viscosity and strain, viscosity and working processes, measurement of viscosity of glass, surface tension of glass, heat transmission in glass, measurement of refractive index and optical properties of glass, electrical properties of glass	09
Module-IV Density and specific gravity of glass, thermal expansion of glass, hardness, thermal endurance, thermal conductivity, heat capacity and specific heat of glass, theory of colorization, and decolorization of glass, control of degree of oxidation and decolorizing agents, acid base concept of glass, decorative processes and surface coatings.	08
Module-V Manufacture of laminated safety glass, photosensitive glass, photosensitive opal, photo-form glass, photoceram glass, opal and alabaster glasses, photo chromic glass, foam glass, hubbed glass, patterned glass, glass metal seals, defects and testing of glass wares, general idea about glass house refractories, testing of glass wares, plant lay out and elementary idea of manufacturing scheme.	08

Question paper pattern:
Question paper shall contain five modules, each module containing two questions. Students shall answer any one question from each module.

Text books:
1. Modern Glass Practice – S.R. Scholes, Industrial Publications, 1952
2. Handbook of Glass Manufacture – Vol 1,2, F.V. Tooley, Ogden Publication
3 Glass – Amol Paul, Mac Millan India Ltd., Bangalore

Reference Books:
1. Technical Glasses – N.B. Volf, Pitman Publishing.
2.Glass Research Methods – R.K. Day
3. Encyclopedia of Glass, Ceramic and Cement, Ed. Martin Grayson, John Wiley 4.. Properties of Glasses – G.W. Moorey
5. Glass Engineering Handbook – E.B. Shand, McGraw Hill Pub.

6. Glass Technology – Charan
7. Glass Science – Robert H. Doremus, John Wiley & Sons.
8. Physical properties of glass - J.E. Stanworth

E-books and online course materials:

1. https://sgt.org/page/books
2.https://books.google.co.in/books/about/Introduction_to_Glass_Science_and_Techno.html?id=ZeF_QLW6-xsC
3/ https://go.koppglass.com/properties-of-glass-ebook
4.https://www.koppglass.com/blog/definitive-ebook-thermal-optical-and-mechanical-properties-glass
5.https://onlinelibrary.wiley.com/doi/book/10.1002/9781119506003
6. https://www.springer.com/gp/book/9780387733616
7/https://www.elsevier.com/books/handbook-of-glass-properties/bansal/978-0-08-052376-7
8. https://onlinecourses.nptel.ac.in/noc20_ce46/preview
9.https://ocw.mit.edu/courses/materials-science-and-engineering/3-091sc-introduction-to-solid-state-chemistry-fall-2010/amorphous-materials/21-introduction-to-glasses/
10.https://freevideolectures.com/course/4452/nptel-glass-processing-technology
11. http://www.glass-academy.com/
12. https://www.collegechalo.com/news/course-on-glass-science-and-technology/
13. https://www.classcentral.com/course/swayam-glass-processing-technology-14099
14.https://www.elantechnology.com/about-us/glass-science-course/
15.https://www.elantechnology.com/about-us/glass-science-course/

Course outcomes:

On completion of the course, the student will have the ability to:

CO #	Course Outcome (CO)
CO1	Describe glassy state annealing of glass, strengthening of glass.
CO2	Explain phase diagram, liquidus temperature of glass, chemical durability, strength and elastic properties of glass.
CO3	Asses properties of glass
CO4	Outline properties, colorizing, decolorizing, surface coating and decoration of glass.
CO5	Explain glass house refractories, testing of glass ware, glass plant layout and manufacture of glass.

Lab component of the subject
1. Detection of strain occurring in glass by polaroscopy
2. synthesis of toughened glass
3. preparation of water glass
4. Determination of Chemical durability of glass
5. Determination of electrical properties of glass
6. Determination of specific gravity of glass by pycnometer
7. Determination of hardness of glass
8. preparation of foam glass
9. Study of glass defects –stones, blistes, seeds.
10. Glass decoration by etching
11. Glass decoration by sand blasting.

Course Title: **Structural Ceramics**		
Course Code	22CC73	CIE: 50
Number of Lecture Hours/Week	3	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03

Prerequisite

Course Objectives: To impart knowledge and enable students to understand

1. Enable students to define and classify structural ceramics and explore theirapplication.
2. Enable to apply theoretical aspects to explain the toughness and toughheningmechanism.
3. Enable to understand the properties and applications of composites, oxide andnon- oxide materials
4. Describe methods of synthesis and explain fabrication of oxide and non-oxideceramics for structural ceramics

Modules	**Teaching Hours**
Module I Introduction & Classification of structural ceramics. Applications of structural ceramic materials in space technology, power generation, automobile and biological Application.	10
Module II Ceramic films and coating (CVD/PVD) for structural applications,thermal barrier coatings, bio-compatible Coating.	06
Module III Fracture mechanics of Ceramics, Griffith criteria, definition of fracturetoughness, methods of measurement of fracturetoughness, toughening mechanisms: modulus Transfer, Crack deflection, crack bridging, pull out transformation toughening.	10
Module IV Properties and applications of structural ceramics and composites: Alumina, zirconia, forsterite, And cordierite. Polymorphism of ZrO_2, martinsitic transformation and transformation, toughening of ZrO_2, ZrO_2 based composites. Calcium Phosphate based composites	08
Module V Processing and fabrication of composites: Processing techniques of Composite, preparation of fiber from oxide, non-oxide ceramics and glasses, Metal matrix composites, ceramic–ceramic composites,Glass ceramics, polymer matrix composites. Study of fibers, particulars & whisker, reinforced composites	08

Question paper pattern: Question paper shall contain FIVE modules, each module Containing TWO questions. Students shall answer any ONE full question from eachmodule.

Text books:

1. Barsoum, M., & Barsoum, W. (2002). Fundamentals of Ceramics. Taylor &Francis.
2. Basu, B., & Balani, K. (2011). Advanced Structural Ceramics. Americanceramic society: Wiley.
3. Kingery, W. D., Bowen, H. K., & Uhlmann, D. R. (1976). Introduction toceramics. (Second edition). John-Wiley and Sons,
4. Richerson, D. (1992). Modern Ceramic Engineering: Properties, Processing, andUse in Design (Third Edition.). Marcel Dekker Inc.

Singer, F., & Singer, S. S. (1963). Industrial ceramics. The University ofMichigan: Chemical Publishing Co.

Reference Books:		
E books and online course materials:		
Course outcomes: **On completion of the course, the student will have the ability to:**		
Course Code	**CO #**	**Course Outcome (CO)**
	CO1	Apply theoretical aspects to explain the applications of ceramics for structuralapplications (load bearing Application).
	CO2	Explain various coating methods used for coating ceramics
	CO3	Apply knowledge of toughening mechanisms to calculate parameters fracture toughness, modulus of rupture modulus of elasticity, stress and strength of ceramics
	CO4	Explain the properties of oxide andnon-oxide ceramics and composites to recognize there appropriate applications
	CO5	Illustrate methods of synthesis,processing and fabrication of various oxide and non-oxide ceramics forstructural ceramics

Subject	NON DESTRUCTIVE TESTING	
Subject Code	22CC7411	
Credits	3	
Hrs / week	42	
CIE: 50 Marks	SEE: 50 Marks	SEE: 3 Hrs duration
Course Objectives: To impart knowledge and enable students to understand		
1. Basic differences between destructive and non destructive testing. how to handle visual, leak and liquid penetration NDT methods		
2. Magnetic particle and Eddy current inspection methods , their advantages and limitations		
3. Ultrasonic NDT working methodology, their advantages and limitations		
4. Radiographic, Neutron and Thermal NDT methods, their applications and limitations		
5. Optical, Acoustic and Microwave NDT working methodology their applications and limitations		
Etc.		

SYLLABUS

Module	**Contents**	**No. of hrs.**
Module 1	Introduction to NDT**:** Selection of NDT methods. Visual inspection, leak testing, Liquid penetration inspection-advantages and limitations.	O6
Module 2	Magnetic particle inspection**:** Methods of generating magnetic field, types of magnetic particles and suspension liquids, steps in inspection, applications and limitations of the test.	08

	Eddy current inspection**:** principle of operation, process variables , inspection coils- applications and limitations the test	
Module 3	Ultrasonic inspection**:** Basic equipment, characteristics of ultrasonic waves, variables during ultrasonic inspections. Inspection methods, normal incident pulse echo, angle beam pulse echo and transmission type. Method of display- A, B and C scan mode. Transducer elements, couplets, search units, contact type and immersion types inspection methods, inspection of products like casting, extrusions, rolled product, weld set- applications and limitations of the test	10
Module 4	Radiography inspection**:** Principles, radiation sources. X-Rays and their generation, gamma rays and their generation. Radio graphic films. X-ray filters image intensifiers. Industrial radiography. Image quality indicators, radiography sensitivity- applications and limitations of the test. Neutron radiography: working methodology its application and limitations. Thermal NDT**:** principle, inspection methods, applications and limitations of the test	10
Module 5	Optical Holography**:** Basics of Holography, recording and reconstruction-info metric techniques of inspection, procedures of inspection, typical applications. Acoustical Holography: working principle, applications and limitations. Microwave NDT: Working principle, applications and limitations. Indian Standard for NDT.	08

CO No.	**Course Outcome** **Course Outcomes:** At the end of the course, students will be able to:	**Bloom's Domain**
CO1	Understand the importance of non destructive testing in comparison with destructive testing.	L2
CO2	Operate different types of non destructive tools.	L2
CO3	Analyze/Identify surface and volumetric flaws existing in any engineering materials components.	L2, L4
CO4	Identify inclusion(unwanted material) in a material system	L4
CO5	Analyze and interpret 3D flaws in a component	L3, L5

Text books:

1. Non Destructive Test and Evaluation of Materials- J Prasad and C. G. Krishnadas Nair, Tata McGraw Hill Education
2. Non Destructive Testing- Nagesh S.N and Jyothilakshmi R., Subhas Stores

Reference books:

1. Non Destructive Testing - Mc Gonnagle JJ – Garden and reach New York.
2. Non Destructive Evolution and Quality Control - volume 17 of metals hand book 9 edition Asia internal 1989.
3. The Testing instruction of Engineering materials - Davis H.E Troxel G.E wiskovil C.T - McGraw hill

Question paper pattern:

Question paper shall contain FIVE modules, each module containing TWO questions. Students shall answer any ONE full question from each module.

Course Title: Ceramic Technology		
Subject Code	22CC7511OE (Open Elective)	CIE: 50
Number of Lecture Hours/Week	3(Theory)	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03

Modules	**Teaching Hours**
Module-1 Introduction to Materials- Classification, properties and importance of engineering materials. Study on bonds in materials and their properties. Ceramics- Definition, properties and classification of ceramic materials. Comparison of properties of ceramics with metals and polymers.	8
Module-2 Triaxial compositions- clay, quartz and feldspar. Classification and properties of Clays and feldspars. Properties and polymorphism of quartz. Shaping of ceramic articles: dry and semi dry, uniaxial pressing, extrusion, jiggering and jollying, slip casting, isostatic pressing, tape casting.	8
Module-3 Study on conventional ceramics: Manufacture, properties and applications of Refractories, Glass, White wares and Portland cement	8
Module-4 Advanced ceramics: manufacture, properties and applications of Cermets, Abrasives - Alumina, silicon carbide, zirconia. Piezoelectric Ceramics- Lead zirconate, Titanate and Barium titanate. Ceramic insulators. Study on Bio-ceramics - Calcium phosphate, Hydroxyapatite. Automotive ceramics – Ceramic sparkplug, ceramic insulators and ceramic catalysts.	10
Module-5 Testing of ceramics: Water of plasticity, Adsorbed moisture, Bulk density, Apparent porosity, Loss on ignition, Drying shrinkage and Firing shrinkage.	8

Course outcomes:

Question paper pattern:
Student has to answer any five full questions, selecting one from each module.

Reference Books:
1. Industrials ceramics-F Singer and Singer S.S.
2. Elements of ceramics –F.H. Norton
3. Ceramic White wares. - Ryan.
4. Ceramic White wares – New comb.
5. Principal of Ceramic Processing –James Reid

E books and online course materials:
1. Ceramic Engg and Science Proceedings Am.Cer.Socisty

https://ceramicsonlinelibrary.Wiley.com
2. Ceramics Engg Books-Alibris

https://m.alibris.com

Course outcomes:
On completion of the course, the student will have the ability to understand:

Course Code	CO #	Course Outcome (CO)	Blooms Level
	CO1	Classification made on engineering materials, nature of bonds existing in materials and comparison of engineering materials	L2
	CO2	Clays and their types, Feldspar and their types, polymerization of Quartz. The fabrication methods used in ceramic shaping	L1, L2
	CO3	Manufacture process, properties and applications of Refractories, Glass, White wares and Portland cement	L5
	CO4	The applications of ceramic components in engineering as well as biomedical field	L3, L5
	CO5	Importance and significance of testing ceramic raw materials and ceramic components	L3

P D A College of Engineering

B.E. in Respective branch Name

Scheme of TeachingandExaminations2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year2023-24)

VIIISEMESTER(Swappable VII and VIII SEMESTER)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD)and Question Paper Setting Board (PSB)	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PEC	22CC811	Professional Elective-IV(Online Courses) –NPTEL	TD-Respective Dept. PSB- Respective Dept.	3	0	0		03	50	50	100	3
2	OEC	22CCOE821	Open Elective-III(Online Courses)/ OR Structural Ceramics	TD-Respective Dept. PSB- Respective Dept.	3	0	0		03	50	50	100	3
3	INT	22CCINT83	Internship(Industry/Research)(14-20weeks)	TD-Respective Dept. PSB- Respective Dept.	0	0	12		03	50	50	100	10
										150	**150**	**300**	**16**

Professional Elective Course (Online courses)

22XX811		22XX813	
22XX812		22XX814	

Open Elective Courses (Online Courses)

22XXOE821		22XXOE823	
22XXOE822		22XXOE824	

L:Lecture,**T**:Tutorial,**P**:Practical**S=SDA**:SkillDevelopmentActivity,**CIE**:ContinuousInternal Evaluation, **SEE**: Semester End Evaluation.**TD-**Teaching Department, **PSB**: PaperSettingdepartment,**OEC**:OpenElectiveCourse,**PEC**:ProfessionalElectiveCourse.**PROJ**:Projectwork,**INT**:IndustryInternship/ResearchInternship/RuralInternship

Note: VII and VIII semesters of IV years of the program Swapping Facility

- InstitutioncanswapVIIandVIIISemesterSchemeofTeachingandExaminationstoaccommodate
    - **Research internships/industry internships/Rural Internship** after The VI semester**.**

- CreditsearnedforthecoursesofVIIandVIIISemesterSchemeofTeachingandExaminationsshall be countedagainst corresponding semesters either VIIorVIIIsemester that iscompletedduringthebeginningofIVyearorlater part ofIVyearoftheprogram.

Elucidation:

At the beginning of IV years of the program i.e., after VI semester, VII semester classwork and VIII semester

Research Internship /Industrial Internship / Rural Internshipshall be permitted to be operated simultaneously by the University so that students have ample opportunity for an internship. In other words, a good percentage of theclassshall attendVIIsemester classwork andasimilarpercentageofothersshallattendto ResearchInternshipor Industrial Internshipor Rural Internship.

Research/Industrial /Rural Internship shall be carried out at an Industry, NGO, MSME, Innovation centre, Incubation centre, Start-up, centre of Excellence (CoE), StudyCentreestablishedin the parent institute and/or at reputedresearchorganizations/institutes.

The mandatory Research internship /Industry internship / Rural Internship is for 14 to 20 weeks. The internship shall be considered as a head of passing and shall beconsidered for the award of a degree. Those, who do not take up/complete the internship shall be declared to fail and shall have to complete it during the subsequentUniversityexaminationafter satisfyingtheinternshiprequirements.

Research internship: A research internship is intended to offer the flavour of current research going on in the research field. It helps students get familiarized with thefieldandimpartstheskill requiredforcarryingout research.

Industry internship: Is an extended period ofworkexperienceundertakenbystudents to supplementtheirdegreeforprofessional development. It also helpsthem learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize,appreciate,andadapt toorganizational realities bytemperingtheirknowledgewithpractical constraints.

Rural Internship: Rural development internship is an initiative of Unnat Bharat Abhiyan Cell, RGIT in association with AICTE to involve students of all departmentsstudyingindifferentacademicyearsforexploringvariousopportunities intechno-socialfields,to connectandworkwithRuralIndiafor their upliftment.

The faculty coordinator or mentor has to monitor the student's internship progress and interact with them to guide for the successful completion of the internship.Thestudentsarepermittedtocarryouttheinternshipanywhere inIndiaorabroad.Universityshallnotbearanyexpensesincurredinrespectoftheinternship.

With the consent of the internal guide and Principal of the Institution, students shall be allowed to carry out the internship at their hometown (**within or outside thestate or abroad**), provided favorable facilities are available for the internship and the student remains regularly in contact with the internal guide. **University shall notbearany costinvolvedincarryingout theinternshipbystudents.**However,students canreceiveany financialassistanceextended bytheorganization.

ProfessionalElective/OpenElectiveCourse:

Theseare the ONLINEcoursessuggested bythe respectiveBoardofStudies

Online Professional Course: The students need to register (anywhere between VI to VIII Semesters) NPTEL Course of 12 weeks duration (3 Credits course) and should pass the examination. The NPTEL Courses relevant to the program and need to be identified by the department and same is to be informed to the students.

Online Open Elective Course: The students need to register (anywhere between VI to VIII Semesters) NPTEL Course of 12 weeks duration (3 Credits course) and should pass the examination. The NPTEL Courses that enables skill enhancements and job opportunities need to be suggested by the department and same is to be informed to the students.

S.No	Semester	22-23
01	I	20
02	II	20
03	III	20
04	IV	20
05	V	22
06	VI	18
07	VII	24
08	VIII	16
	Total	160

Credit Compliance for The B.E/B.Tech. Degree Curriculum 2022-23			
Course category	VTU	AICTE	PDACEK
Humanities, Social Sciences and Management (HSMC)	10	12	10
Basic Sciences (BSC)	24	25	24
Engineering Sciences (ESC)	24	24	24
Ability Enhancement Course	07		07
Professional Courses (PCC)-Courses	54	48	54
Professional Courses (PEC) - Elective	12	18	12
Other Open Elective Courses (OEC)	09	18	09
Project Work(PROJ)/Seminar/Internship	20	15	20
Total	160	160	160