100+ Years of Glorious history inscribed in the yeomen service to the field of education

Centenary Celebrated Sharnbasveshwar Vidya Vardhak Sangha's

Estd. 2017
ಸ್ಥಾಪನೆ : 2017

ಶರಣಬಸವ Sharnbasva ವಿಶ್ವವಿದ್ಯಾಲಯ University

Poojya Dr. Sharnbasappa Appaji — Poojya Matoshri Dr. Dakshayini S. Appa — Poojya Chiranjeevi Doddappa Appa — Poojya Matoshri Godutai Avvaji — Poojya Doddappa Appa

Kalaburagi - 585103, Karnataka - India
ಕಲಬುರಗಿ 585 103 ಕರ್ನಾಟಕ - ಭಾರತ

Phone / Fax No. 08472-277852, 277853, 277854, 277855 www.sharnbasvauniversity.edu.in - email : Sharnbasvauniversity@gmail.com

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Dr. Niranjan V. Nisty M.D.,Ph.D.
Vice-Chancellor

Sri N.S. Devarkal B.Sc.,M.A.,LL.B.
Pro Vice-Chancellor

Dr. V. D. Mytri M.Tech.,Ph.D.
Pro Vice-Chancellor

Dr. Anilkumar Bidve M.Sc.,Ph.D.
Registrar : Cell : 6362910165

Dr. Basavaraj S. Mathapati M.Tech.,Ph.D.
Registrar (Eval) : Cell : 9448650187

Dr. Lakshmi Patil M.Tech.,Ph.D.
Dean : Cell : 6362910168

Prof. Kiran Maka M.Tech.(Ph.D.)
Finance Officer : Cell : 9632294958

Faculty of Engg. & Tech.
B.Tech
1. Electronics & Comm. Engineering
2. Electrical & Elcetronics Engineering
3. Computer Science & Engineering
4. Civil Engineering
5. Mechanical Engineering
6. Energy Engineering
7. Artifical Intelligence (AI) & Data Science

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Faculty of Computer Application
1. MCA 2. BCA

(Exclusively for Women)
1. BCA

Faculty of Fine Art
1. M.A. Visual Arts

Faculty of Music
1. M.A. Music

Faculty of Languages
1. M.A. Kannada 2. M.A. English

Proposed Programes
1. M.Sc. Data Science
2. M.Sc./M.A. Yoga
3. M.A. Sanskrit

Date: 05-11-2022

CONSTITUTION OF BOARD OF STUDIES IN CHEMISTRY

Reference: 1. Hon. Vice Chancellor's approval dated 04/11/2022

With reference to the above cited subject and references, the Board of Studies in Mathematics for the period of two academic years i.e. 2022-2023 and 2023-2024 has been constituted as below.

Sl. No.	Name and address of the Member	Appointed As
1	Dr.Nirdosh Patil Professor and Chairman, B.Tech (Co-Ed) Dept. of Chemistry, Sharnbasva University. Kalaburagi	**Chairman**
	Internal Members	
2	Dr. Parvati S G Associate Professor, Department of Chemistry, B.Tech (Co-Ed) Sharnbasva University. Kalaburagi	Member
3	Dr. Shweta Patil Associate Professor, Department of Chemistry, B.Tech (Co-Ed) Sharnbasva University. Kalaburagi	Member
4	Prof Anita R H Assistant Professor, Dept. of Chemistry, B.Tech (Ex-Women) Sharnbasva University. Kalaburagi	Member
5	Prof Sangeeta Aland Assistant Professor, Dept. of Chemistry, B.Tech (Ex-Women) Sharnbasva University. Kalaburagi	Member
	External Members	
6	Dr. R S Malipatil Associate Professor, Department of Chemistry, Poojya Doddappa Appa College of Engineering, Kalaburagi.	Member

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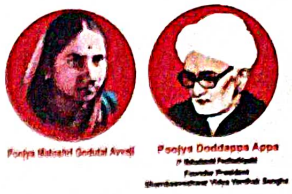

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Proposed Programes
1. M.Sc. Data Science
2. M.Sc./M.A. Yoga
3. M.A. Sanskrit

7	Dr. Kashinath K Professor, Department of Chemistry, K C T Engg. College Kalaburagi.	Member
8	Dr. Shivakumar R Assistant Professor, Department of Chemistry, Govt. Degree College, Kalaburagi, Gulbarga University, Kalaburagi.	Member
9	Prof. Siddangouda Patil Assistant Professor, Department of Chemistry, Veerappa Nisty Engineering College Shorapur,	Member

Term of the nominated Members shall be two years from the date of this order.

REGISTRAR

Copy to:

1. The Hon. Vice chancellor, for the information
2. Chairman, Board of Studies in Chemistry. Sharnbasva University, Kalaburagi.
3. All the Members of Board of Studies (BOS).
4. Dean Sharnbasva University, Kalaburagi.
5. Office copy

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Board of Studies Members Sub Committee-I in Chemistry
For Circuit Branches [ECE, EEE, CSE and AI&DS]

Sl. No.	Name and address of the Member	Appointed As
1	**Prof. Ambresh Reddy** Assistant Professor, Dept. of Chemistry, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member
2	**Prof. Earamma Patil** Assistant Professor, Department of Chemistyr, Faculty of Engineering and Technology (Co-ed) Sharnbasva University, Kalaburagi.	Member
3	**Dr. Nagabhushan Patil** Professor, Department of Electrical and Electronics Engineering, Faculty of Engineering and Technology (Co-ed)Sharnbasva University, Kalaburagi.	Member
4	**Dr. ShashidharSonnad** Professor & Chairman Deparment of Electronics & Communication Engg, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member
5	**Dr. SujataMallapur** Professor & Chairman, Dept. of Artificial Intelligence and Machine Learning , Faculty of Engineering and Technology (Exclusively for Women), Sharnbasva University, Kalaburagi	Member
6	**Dr. SachinVeershetty** Associate Professor, Dept. of Computer Science & Engineering, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member

Term of the nominated Members shall be two years from the date of this order.

Copy to:

1. Chairman, Board of Studies UG in Chemistry.
2. All the Members of Board of Studies (BOS).
3. Dean, Sharnbasva University, Kalaburagi.
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Board of Studies Members Sub Committee-II in Chemistry
For Non- Circuit Branches [Energy Engg, Mech and Civil]

Sl. No.	Name and address of the Member	Appointed As
1	**Prof. Neha B** Assistant Professor, Dept. of Chemistry, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member
2	**Prof. Earamma Patil** Assistant Professor, Department of Chemistyr, Faculty of Engineering and Technology (Co-ed) Sharnbasva University, Kalaburagi.	Member
3	**Dr. Basavaraj Srigiri** Professor & Chairman, Dept. of Energy Engineering, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member
4	**Dr. S. S. Awanti** Professor, Dept. of Civil Engineering, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member

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REGISTRAR

Sharnbasva University, Kalaburagi

Scheme for B.Tech., First Year Program from the Academic Year: 2022-23

All the B.Tech., branches offered by the University are grouped in to Four Streams (CES, MES, EES and CSS)

B.Tech., I Semester, Chemistry Group - (for streams MES & EES including Mech., Energy, EEE & ECE branches)

Sl. No.	Course	Course Code	Course Title	Teaching Department/ Paper Setting Board	Teaching hours/week				Examination				Credits
					Theory/ Lecture	Tutorial	Practical/ Drawing	Activities	Duration	CIE Marks	SEE Marks	Total Marks	
1	ASC (IC)	22MATM11	Mathematics for MES - I	Mathematics	3		2	0	3+2	50	50	100	4
		22MATE11	Mathematics for EES - I		3		2	0	3+2	50	50	100	4
2	ASC	22CHEM12	Chemistry for MES	Chemistry	3		0	0	3	50	50	100	3
		22CHEE12	Chemistry for EES		3		0	0	3	50	50	100	3
3	ESC	22CED13	CAED	Mech Engg	2		2	0	3 or 3+2	50	50	100	3
4	ESC-OE	22ESC14X	Engineering Science Course-I	Respective Dept.	2		0	0	3 or 3+2	50	50	100	2
5	ETC-OE / PLC-OE	22ETC15X/ 22PLC15X	Emerging Technology Course-I or Programming Language Course - I	Any Engg. Dept./ Any Dept.	3 or 2 (for integrated)			0	3 or 3+2	50	50	100	3
6	AEC-OE	22AEC16X	Ability Enhancement Course-I	Any Dept.	*1 hour theory or 2 hours tutorial /practice/activities or any other combinations of all of them.*				1 or 2	50	50	100	1
7	HSMC	22CIPE17	Indian Constitution	Respective Dept					1 or 2	50	50	100	1
8	ASC-L	22CHEL18	Chemistry Lab	Chemistry	0	0	2	0	2	50	50	100	1
9	ESC-L	22EECL19	Electronics and Electrical Lab	ECE or EEE	0	0	2	0	2	50	50	100	1
10	SDC - OE	22PROJ10	Project - I	*A batch of 4 to 5 students (same branch or different branches) with a guide, may udertake one project (1 hour of theory/tutorial or 2 hours of practice/activities)*					1 or 2	50	50	100	1
Total										**500**	**500**	**1000**	**20**

ASC (IC) - Applied Science Course - (IC - Integrated Course)	MES: Mechanical Engineering Stream (M)
ESC - Engineering Science Course	EES: Electrical & Electronics Engineering Stream (E)
ESC-OE : Engineering Science Course - Open Elective	CAED: Computer Aided Engineering Design
ETC-OE: Emerging Technology Course -Open Elective	SDC-OE: Skill Development Course - Open Elective
PLC-OE : Programming Language Course - Open Elective	HSMC: Humanities, Social Sciences and Management Course
AEC-OE: Ability Enhancement Course - Open Elective	

Sharnbasva University, Kalaburagi

Scheme for B.Tech., First Year Program from the Academic Year: 2022-23

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B.Tech., II Semester, Chemistry Group - (for streams CES & CSS including CIV, CSE, AI&ML, AI&DS branches)

Sl. No.	Course	Course Code	Course Title	Teaching Department/ Paper Setting Board	Teaching hours/week				Examination				Credits
					Theory/ Lecture	Tutorial	Practical/ Drawing	Activities	Duration	CIE Marks	SEE Marks	Total Marks	
1	ASC (IC)	22MATC21	Mathematics for CES - II	Mathematics	3		2	0	3+2	50	50	100	4
		22MATS21	Mathematics for CSS - II		3		2	0	3+2	50	50	100	4
2	ASC	22CHEC22	Chemistry for CES	Chemistry	3		0	0	3	50	50	100	3
		22CHES22	Chemistry for CSS		3		0	0	3	50	50	100	3
3	ESC	22CED23	CAED	Mech Engg	2		2	0	3 or 3+2	50	50	100	3
4	ESC-OE	22ESC24X	Engineering Science Course-II	Respective Dept.	2		0	0	3 or 3+2	50	50	100	2
5	ETC-OE / PLC-OE	22ETC25X/ 22PLC25X	Emerging Technology Course-II/ Programming Language Course-II	Any Engg. Dept./ Any Dept.	3 or 2 (for integrated)			0	3 or 3+2	50	50	100	3
6	AEC-OE	22AEC26X	Ability Enhancement Course-II	Any Dept.	*1 hour theory or 2 hours tutorial /practice/activities or any other combinations of all of them.*				1 or 2	50	50	100	1
7	HSMC	22CIPE27	Indian Constitution	Respective Dept					1 or 2	50	50	100	1
8	ASC-L	22CHEL28	Chemistry Lab	Chemistry	0	0	2	0	2	50	50	100	1
9	ESC-L	22EECL29	Electronics and Electrical Lab	ECE or EEE	0	0	2	0	2	50	50	100	1
10	SDC - OE	22PROJ20	Project - II	*A batch of 4 to 5 students (same branch or different branches) with a guide, may udertake one project (1 hour of theory/tutorial or 2 hours of practice/activities)*					1 or 2	50	50	100	1
				Total						**500**	**500**	**1000**	**20**

ASC (IC) - Applied Science Course - (IC - Integrated Course)	CES: Civil Engineering Stream (C)
ESC - Engineering Science Course	CSS: Computer Science & Engineering Stream (S)
ESC-OE : Engineering Science Course - Open Elective	CAED: Computer Aided Engineering Design
ETC-OE: Emerging Technology Course -Open Elective	SDC-OE: Skill Development Course - Open Elective
PLC-OE : Programming Language Course - Open Elective	HSMC: Humanities, Social Sciences and Management Course
AEC-OE: Ability Enhancement Course - Open Elective	

SHARNBASVA UNIVERSITY

Mechanical Engineering and Allied branches

(Chemistry group)

Course Title:	**Applied Chemistry for Mechanical Engineering stream**		
Course Code:	**22CHEM12/22**	CIE Marks	50
Course Type	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L/T)	3	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

Teaching-Learning Process

These are samples trategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching–Learning more effective

- Flipped class
- Smart class room
- Bended mode of leaning
- Interactive simulations and animation
- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non–conventional methods)
- Use of ICT – Online videos, online courses
- Daily learning through assignments

Module-1: Energy Sources and Batteries (8 hr)

Fuels: Introduction, calorific value, determination of calorific value using bomb calorimeter, numerical problems on GCV and NCV.

Green fuels: Introduction, power alcohol, synthesis and applications of biodiesel.

High energy fuels: Production of hydrogen by electrolysis of water and its advantages.

Energy devices: Introduction, construction, working, and applications of Photovoltaic cells, Li-ion battery and methanol-oxygen fuel cell.

Module-2: Corrosion Science and Metal Finishing(8 hr)

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement).

Corrosion control: Metal coating-galvanization, surface conversion coating-anodization and cathodic protection-sacrificial anode method. Corrosion testing by weight loss method. Corrosion penetration rate (CPR)-numerical problems.

Metal finishing: Introduction, technological importance. Electroplating: Introduction,

1. NOTE: Wherever the contact hours are not sufficient, tutorial hours can be converted to theory hours.

Electroplating of chromium (hard). Electroless plating: Introduction,electroless plating of nickel.

Module-3: Macromolecules for Engineering Applications (8 hr)

Polymers: Introduction, type of polymerization with examples (Addition and condensation), molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and polyvinyl chloride (PVC).
Fibers: Synthesis, properties and applications of Kevlar and nylon fibers.
Plastics: Introduction, synthesis, properties and industrial applications of poly(methyl methacrylate) (PMMA) and Teflon.
Polymer composites: Introduction, properties and applications of fiber reinforced polymers composites (FRPC),

Module-4: Phase Rule and Analytical Techniques (8 hr)

Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: One component (water system) .
Analytical techniques: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetry); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pH of beverages.

Module-5: Materials for Engineering Applications (8 hr)

Metals and Alloys: Introduction, Properties and application of Iron and its alloys,
Ceramics: Introduction, classification based on chemical composition, properties and applications of perovskites ($CaTiO_3$).
Nanochemistry: Introduction, size-dependent properties of nanomaterial (surface area and catalytical), synthesis of nanoparticles by sol-gel, and precipitation method.
Nanomaterials: Introduction, properties and engineering applications of carbon nanotubes and graphene.

Course outcome (Course Skill Set): At the end of the course, the student will be able to:	
CO1.	Identify the terms and Processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering Processes
CO3.	Solve the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and Processes
CO5.	Analyze properties and Processes associated with chemical substances in multidisciplinary situations

Assessment Details (both CIE and SEE)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum and total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are

The CIE marks for the theory component shall be 50 marks is as detailed below

- Three Tests each of 15 Marks; (Third test is improvement test).
- CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 15 minutes)
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

1. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject **(duration 03 hours)**
2. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
3. The question paper will have ten full questions carrying equal marks.
4. Each full question carries 20 marks.
5. There will be two full questions (with a maximum of three sub questions) from each module
6. Each full question will have sub questions covering all the topics under a module.
7. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
6. Engineering Chemistry – I, D. Grour Krishana, Vikas Publishing
7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.
8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin & A.C. Arsenault, RSC Publishing, 2005.
11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell , 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH; 1st edition, 2013.
15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIA PACIFIC BUSINESS PRESS Inc., 2017. Dr. H. Panda,
16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher,

Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan, Nirali Prakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3rd Edition 2014
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Web links and Video Lectures (e-Resources):

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- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- https://www.vlab.co.in/broad-area-chemical-sciences
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COs and POs Mapping (Individual teacher has to fill up)

	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

SHARNBASVA UNIVERSITY

Electrical & Electronics Engineering and Allied branches (Chemistry group)

Course Title:	Chemistry for Electrical and Electronics Engineering stream		
Course Code:	22CHEE12/22	CIE Marks	50
Course Type	(Theory)	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L/T)	3	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

Teaching-Learning Process

These are samples trategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching–Learning more effective

- Flipped class
- Smart class room
- Bended mode of leaning
- Interactive simulations and animation
- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non–conventional methods)
- Use of ICT – Online videos, online courses
- Daily learning through assignments

MODULE 1: Conducting Materials and polymers (8hr)

Conductors and Insulators: Introduction, principle with examples.

Semiconductors: Introduction, production of electronic grade silicon-Czochralski process (CZ) and Float Zone (FZ) methods.

Polymers: Introduction, Molecular weight - Number average, Weight average and numerical problems.Conducting polymers – synthesis and conducting mechanism of polyacetylene. Preparation, properties and commercial applications of graphene oxide.

PCB: Electroless plating – Introduction, Electroless plating of copper in the manufacture of double-sided PCB.

MODULE 2: Battery Technology and Sensors(8hr)

Batteries: Introduction to batteries, construction, working and applications of Ni-MH battery, Lithium ion and Sodium ion batteries.

Fuel Cells: Introduction, construction, working and applications of methanol–oxygen and

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

polymer electrolyte membrane (PEM) fuel cell. **Sensors:** Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors. Sensors for the measurement of dissolved oxygen (DO). Electrochemical gas sensors for SOx and NOx.
MODULE 3: Corrosion Science and Energy Conversion Systems(8hr)
Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem. **Electrode System:** Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems. **Solar Energy:** Introduction, importance of solar PV cell, construction and working of solar PV cell, advantages and disadvantages.
MODULE 4: Display and Memory Systems (8hr)
Display Systems: Photoactive and electroactive materials, Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's), Light emitting electrochemical cells. **Memory :** Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, Classification of electronic memory devices, types of organic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials).
MODULE 5: Nanomaterials, E-Waste Management and Analytical Techniques (8hr)
Nanomaterials : Introduction, size dependent properties of nanomaterials (surface area, catalytic and electrical), preparation of NPs by sol-gel and precipitation methods **E-Waste:** Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatment) **Analytical Techniques:** Introduction, principle and instrumentation of Colorimetric sensors; its application in the estimation of copper, Potentiometric sensors; its application in the estimation of iron.

Course outcome (Course Skill Set) At the end of the course the student will be able to:	
CO1.	Identify the terms and processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering Processes
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
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Assessment Details (both CIE and SEE)

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Web links and Video Lectures (e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

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COs and POs Mapping (Individual teacher has to fill up)

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CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

SHARNBASVA UNIVERSITY
Engineering Chemistry Lab

Course Title:	Engineering Chemistry Lab (Common for all Branches /Streams)		
Course Code:	22CHEL18/28	CIE Marks	50
Course Type	(Practical)	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (Practical)	2	Exam Hours	02
Total Hours of Pedagogy	38 hours	Credits	01

Course Objectives:

- To provide students with practical knowledge of
- Quantitative analysis of materials by classical methods of analysis.
- Instrumental methods for developing experimental skills in building technicalcompetence.

Instrumental Experiments

1. Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2. Conductometric estimation of acid mixture.
3. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
4. Colorimetric estimation of estimation of copper.
5. Determination of pKa of the given weak acid using pH meter.

Volumetric Experiments

1. Estimation of total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphatesolution.
4. Determination of COD of waste water.
5. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by externalindicator method.

Demonstration Experiments

1. Synthesis of nanomaterials by precipitation method.

2. Determination of percentage of chlorine in bleaching powder by lodometric method

Course outcomes:

On completion of this course, students will have the knowledge in,

CO1: Principles and procedure.(Knowledge)

CO2: Understanding the reactions.(Comprehension)

CO3: Applications

CO 4: Handling different types of instruments for analysis of materials using small quantities ofmaterials involved for quick and accurate results (Analysis)

CO5: Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results (Synthesis)

Assessment Details (both CIE and SEE)

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A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum and total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the practical component

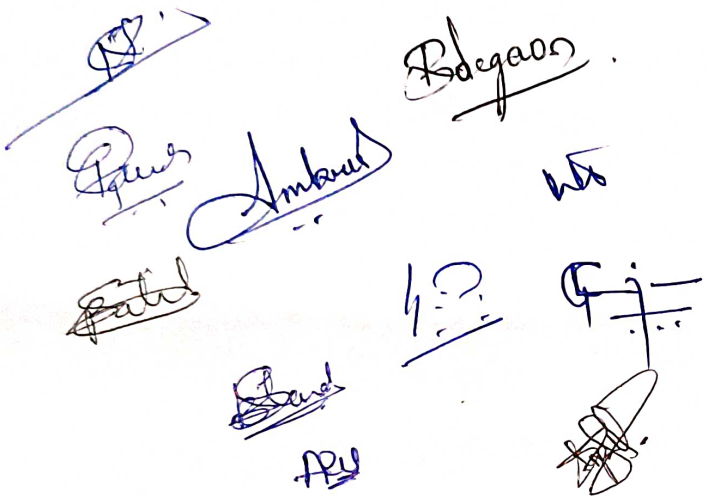
- On completion of every experiment in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
- The 25 marks are for conducting the experiment and preparation of the laboratory record,10 marks for individual evaluation (which includes viva voce), (the average of total experiments}
- The 15 marks shall be for the test conducted at the end of the semester, for the subject (duration of 1 hour 15 minutes)

SEE for the practical component

- SEE marks for the practical course is 50 marks
- All laboratory experiments are to be included for the practical exam
- Break up marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners
- Students can pick one question (experiment) from the questions lot prepared by the examiners
- General rubrics suggested for SEE are mentioned here write up 15%, conduction procedure and resulst is 70% and viva voce 10% of maximum marks.
- Practical SEE will be conducted by University as per the scheduled time table, for the subject **(duration 02 hours)**

Reference Books:

1. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, "Vogel's A I, Text Book ofQuantitative analysis, Dorling Kindersley (Idia) Pvt. Ltd. 35th Edition 2012.
2. O.P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age InternationalPublishers.
3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India.2015



SHARNBASVA UNIVERSITY

Civil Engineering and Allied branches
(Chemistry group)

Course Title:	Applied Chemistry for Civil Engineering Stream		
Course Code:	22CHEC12/22	CIE Marks	50
Course Type	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L/T)	3	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

Teaching-Learning Process

Teaching-Learning Process

These are samples trategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching–Learning more effective

- Flipped class
- Smart class room
- Bended mode of leaning
- Interactive simulations and animation
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- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non–conventional methods)
- Use of ICT – Online videos, online courses
- Daily learning through assignments

Module-1: Structural Materials (8 hr)

Metals and Alloys: Introduction, Properties and application of Iron and its alloys,

Cement: Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement.

Refractories: Introduction, classification based on chemical composition, properties and application of refractory materials (clay bricks. silicon bricks, casting materials)

Glass: Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of Soda-lime glass.

Module-2: Energy Conversion Systems and Corrosion (8 hr)

Energy conversion: Fuel Cells: Introduction, construction, working and applications of methanol–oxygen and polymer electrolyte membrane (PEM) fuel cell.

Storage devices: Introduction, construction and working of Li-ion battery.

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

Corrosion: Introduction, electrochemical corrosion of steel in concrete, types (differential metal and aeration), Stress corrosion in civil structures, corrosion control (design and selection of materials, galvanization, anodization and sacrificial anode method).
Module-3: Nanotechnology and Water Technology (8 hr)
Nanotechnology: Introduction, size dependent properties of nanomaterial (surface area and catalytic), Synthesis of nanomaterial by sol-gel method and precipitation method. **Nanomaterials:** Introduction, properties and engineering applications of carbon nanotubes, graphene and nanomaterials for water treatment (Metal oxide). **Water technology:** Introduction, water parameters, hardness of water, determination of temporary, permanent and total hardness by EDTA method, numerical problems, softening of water by ion exchange method, desalination of water by reverse osmosis, determination ofCOD, numerical problems.
Module-4:Polymer and Composites (8 hr)
Polymer: Introduction, type of polymerization with examples (Addition and condensation), molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and polyvinyl chloride (PVC). **Fibers and composites**: Synthesis, properties and applications of Kevlar and nylon fibers. **Adhesives**: Introduction, properties and applications of epoxy resin. **Biodegradable polymers**: Synthesis of polylactic acid (PLA) and their applications.
Module-5:Phase Rule and Analytical Techniques (8 hr)
Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: One component (water system) . **Analytical techniques**: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetry); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pH of beverages.

Course outcome (Course Skill Set)
At the end of the course the student will be able to:

CO1.	Identify the terms and Processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
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4. Each full question carries 20 marks.
5. There will be two full questions (with a maximum of three sub questions) from each module
6. Each full question will have sub questions covering all the topics under a module.
7. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

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- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

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COs and POs Mapping (Individual teacher has to fill up)

	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

SHARNBASVA UNIVERSITY

Computer Science and Engineering and allied branches (Chemistry group)

Course Title:	Applied Chemistry for Computer Science & Engineering stream		
Course Code:	22CHES12/22	CIE Marks	50
Course Type	(Theory)	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L/T)	3	Exam Hours	3
Total Hours of Pedagogy	40 hours	Credits	3

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

Teaching-Learning Process

These are samples trategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching–Learning more effective

- Flipped class
- Smart class room
- Bended mode of leaning
- Interactive simulations and animation
- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non–conventional methods)
- Use of ICT – Online videos, online courses
- Daily learning through assignments

MODULE 1: Energy Storage Systems and Sensors (8hr)

Energy Storage Systems: Introduction to batteries, construction, working and applications of Ni-MH battery, Lithium ion and Sodium ion batteries.

Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors. Sensors for the measurement of dissolved oxygen (DO). Electrochemical gas sensors for SOx and NOx.

MODULE 2: Display and Memory Systems (8hr)

Display Systems: Photoactive and electroactive materials, Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's), Light emitting electrochemical cells.

Memory : Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, Classification of electronic memory devices,

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

types of organic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials).
MODULE 3: Electrode System and Corrosion(8hr)
Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem. **Electrode System**: Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems.
MODULE 4: Green Fuels and Polymers (8hr)
Green Fuels: Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Generation of energy (green hydrogen) by electrolysis of water and its advantages. **Polymers:** Introduction, Molecular weight - Number average, weight average and numerical problems. Conducting polymers – synthesis and conducting mechanism of polyacetylene and commercial applications. Preparation, properties, and commercial applications of graphene oxide.
MODULE 5: Analytical Techniques and E-Waste Management (8hr)
Analytical Techniques: Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron. **E-Waste:** Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatment)

Course outcome (Course Skill Set) At the end of the course the student will be able to:	
CO1.	Identify the terms and processes involved in scientific and engineering Applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5.	Analyze properties and Processes associated with chemical substances in multidisciplinary situations

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum and total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are

The CIE marks for the theory component shall be 50 marks is as detailed below

- Three Tests each of 15 Marks; (Third test is improvement test).
- CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 15 minutes)
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

1. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject **(duration 03 hours)**
2. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
3. The question paper will have ten full questions carrying equal marks.
4. Each full question carries 20 marks.
5. There will be two full questions (with a maximum of three sub questions) from each module
6. Each full question will have sub questions covering all the topics under a module.
7. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

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- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
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Phone / Fax No. 08472-277852, 277853, 277854, 277855 www.sharnbasvauniversity.edu.in - email : Sharnbasvauniversity@gmail.com

UGC Status: Letter No. F.8-29/2017(CPP-I/PU), Dated 20 Dec. 2017. Enlisted by the University Grants Commission, New Delhi, in the list of Private Universities in India.
A Private University enacted by Govt. of Karnataka as "Sharnbasva University Act, 2012" Karnataka Act No. 17 of 2013. Notification No. ED 144 URC 2016 dated 29/07/2017

Ref No: **Date: 08-11-2022**

DEPARTMENT OF CHEMISTRY BOARD OF STUDIES(BOS) MEETING

Proceeding of BOS Department of Chemistry was held on 08.11.2022 at 11:00 am in the Department of Chemistry B.Tech (Co-ed) building, Sharnbasva University.

AGENDA OF THE MEETING

1. Approval of syllabus and Question paper pattern of B.Tech. Engineering Chemistry for CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24
2. Approval of syllabus and Question paper pattern of B.Tech. Engineering Chemistry Lab is common for all CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24

MINUTES OF THE MEETING

1. Proceeding of the meeting of the board of studies in chemistry held on 8th Nov 2022 at 11:00 am to prepare the syllabus and Question paper pattern of B.Tech. Engineering Chemistry, Choice Based Credit System (CBCS), Outcome Based Education (OBE) and as per National Education Policy (NEP) for the academic year 2022-23 and 2023-24

2. The syllabus and Question paper pattern of B.Tech. Engineering Chemistry was drafted after several deliberation and discussion during the meeting of the board of studies, it was decided and prepared the syllabus as chemistry for Civil Engineering stream(CES), chemistry for Computer Science stream(CSS), chemistry for Mechanical Engineering stream(MES) and chemistry for Electrical and Electronics Engineering stream(EES).

3. For Engineering Chemistry Lab, it was decided by all the BOS members that, all experiments should be common to all Streams/Branches. All laboratory experiments are to be included for the practical exam. Practical SEE will be conducted by University as per the scheduled time table, for the subject (duration 02 hours). Students can perform one experiment from the questions lot prepared by the examiners

RESOLUTIONS

1. The BOS Members approved scheme, syllabus and Question paper pattern of B.Tech. Engineering Chemistry for CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24.

2. The BOS Members approved scheme, syllabus and Question paper pattern of B.Tech. Engineering Chemistry Lab is common for all CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24,

The Following Members were attended the meeting approved the Scheme, Syllabus and Pattern of Question paper.

SI. NO.	NAME OF THE FACULTY	DESIGNATION	SIGNATURE
1	**Dr. Nirdosh Patil**	**Chairman**	
2	**Dr. Parvati G**	Member	
3	**Dr. Shweta Patil**	Member	
4	**Prof. Anita R H**	Member	
5.	**Prof. Sangeeta Aland**	Member	
6	**Dr. R. S Malipatil**	Member	
7	**Dr. Kashinath K**	Member	
8	**Dr. Shivakumar R**	Member	
9	**Prof. Siddangouda Patil**	Member	

CHAIRMAN