



**Poojya Doddappa Appa**  
Founder President  
Sharnbasveshwar  
Vidya Vardhak Sangha

# Sharnbasva University

Kalaburagi-585 103  
Karnataka - India  
Estd.: 2017



**ಶರಣಬಸವ  
ವಿಶ್ವವಿದ್ಯಾಲಯ**

ಕಲಬುರಗಿ-೫೮೫ ೧೦೩  
ಕರ್ನಾಟಕ - ಭಾರತ  
ಸ್ಥಾಪನೆ : ೨೦೧೭



**Poojya Dr. Sharnbaswappa App**  
Chancellor, Sharnbasva University  
President, Sharnbasveshwar  
Vidya Vardhak Sangha

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

www.sharnbasvauniversity.edu.in

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Main Campus, Vidya Mandir, Sharana Sirasagi, Beside High Court, Kalaburagi

Email: sharnbasvauniversity@gmail.com

**Vice-Chancellor :**  
**Dr. Niranjana V. Nisty**  
M.D., Ph.D.

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

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

**Registrar :**  
**Anilkumar G. Bidve**  
M.Sc., Ph.D.

**Registrar (Evaluation)**  
**Dr. S. H. Honnalli**  
M.B.A., Ph.D.

**Dean :**  
**Dr. Lingraj Shastri**  
M.E., Ph.D.

**Finance Officer :**  
**Sri Shivalingappa K.N.**  
M.Com., M.Phil.

**List of PG Courses:**  
**Faculty of Engg. & Tech.**  
**M.Tech. Programmes**  
1. Computer Science & Engg.  
2. Computer Network & Engg.  
3. Digital Electronics  
4. VLSI & Embedded Systems  
5. Nano Technology  
6. Machine Design Engg.  
7. Structural Engg.  
**M.Tech. (Exclusively for Women)**  
1. Computer Science & Engg.  
2. Digital Comm. & Network  
**Faculty of Business Studies**  
1. MBA (Exclusively for Women)  
2. MBA (Co-Education)  
3. M.Com. (Co-Education)  
**Faculty of Tourism Adm.**  
1. Master of Travel &  
Tourism Management  
**Faculty of Social Science**  
1. M.A. Journalism  
(Exclusively for Women)  
1. M.A. Journalism  
**Faculty of Science & Tech.**  
1. M.Sc. Physics  
2. M.Sc. Mathematics  
3. M.Sc. Zoology  
4. M.Sc. Botany  
**Faculty of Computer App.**  
1. MCA  
**Faculty of Education**  
1. M.Ed.  
(Exclusively for Women)  
1. M.Ed.  
**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

Ref.No.

Date: 04-04-20

## FACULTY OF ENGINEERING AND TECHNOLOGY DEPARTMENT OF CHEMISTRY

### List of BOS Members

Sl. No.	Name	Designation
1	Dr. Nirdosh Patil Associate Professor and Chairman, Dept. of Chemistry, Appa Institute of Engg. and Technology, Kalaburagi.	Chairman
2	Dr. Vijayakumar Durg Professor, Department of Chemistry BKIT, Bhalki.	Member
3	Dr. Vijaykumar Hiremath Associate Professor, Department of Chemistry Poojya Doddappa Appa College of Engineering, Kalaburagi	Member
4	Dr. Konkallu Hanumae Gowd Assistant Professor, Dept. of Chemistry, CUK, Kalaburagi.	Member
5	Prof. Siddanagouda Patil Assistant Professor, Department of Chemistry Veerappa Nisty Engineering and Technology, Shorapur	Member
6	Prof. Parvati G Assistant Professor, Dept. of Chemistry, Appa Institute of Engg. and Technology, Kalaburagi.	Member
7	Prof. Shweta Patil Assistant Professor, Dept. of Chemistry, Appa Institute of Engg. and Technology, Kalaburagi.	Member
8	Prof. Ambika Busange Assistant Professor, Dept. of Chemistry Godutai Engg College for Women, Kalaburagi	Member

*S. S. Appa*  
Chancellor

Sharnbasva University, Kalaburagi

\* Dr. Nitrolosh patil

① Dr. Vijay. A. Haromati

~~Patil~~ Recived.

2) Dr. Vijayakumar Durg

Received Phony.

3) Siddanna Gowde patil

Received Patil 07/10/18

4) Dr. Konkallu Hanumanas Gowd

7p P

5) Shrueta patil

Patil

6) Parvati.

Parvati

Sharnbasva University, Kalaburagi										
Scheme of Teaching and Examination 2018-19										
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)										
(Effective from the academic year 2018-19)										
I / II SEMESTER B.Tech (Chemistry Group)										
Sl.No	Course Code	Course Title	Teaching Dept. & Paper Setting Board	Teaching Hours/week		Examination				Credits
				T	P	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	18MAT11/21	Engineering Mathematics	Mathematics	4		3	50	50	100	04
2	18CHE12/22	Engineering Chemistry	Chemistry	4		3	50	50	100	04
3	18ELN13/23	Basic Electronics Engineering	Electronics & Communication Engineering	3		3	50	50	100	03
4	18ELE14/24	Basic Electrical Engineering	Electrical & Electronics Engineering	3		3	50	50	100	03
5	18CEDL15/25	Computer Aided Engineering Drawing	Mechanical Engineering	1	4	3	50	50	100	03
6	18CHEL16/26	Engineering Chemistry Lab	Chemistry		3	3	50	50	100	01
7	18EECL17/27	Electronics & Electrical Lab	Electronics & Communication Engineering		3	3	50	50	100	01
8	18ES18/28	Environmental Studies	Civil Engineering	1		1	50	50	100	AC *
9	18PROJ19/29	Project I/II	--		2	2	50	50	100	01
Total				16	12	25	450	450	900	20

\*Audit Course

Dr. Hirdeesh Patil

① Dr. K. Hanuman Gowda ② Dr. Vijayakumar Dny

Ja

Alwals 9/10/18

③ Siddanna Gowda patil

Patil

④ Dr. Vijay. A. Horamath

⑤ Shrutika Patil  
⑥ Parvati Patil





# SHARNBASVA UNIVERSITY ENGINEERING CHEMISTRY

(Common to all branches)  
[As per Choice Based Credit System (CBCS) scheme]  
(Effective from the Academic Year 2018-19)

Course Code: 18CHE12/22

Contact Hours/Week: 04

Total Hours: 50

Semester: I/II

CIE Marks: 50

SEE Marks: 50

Exams. Hours: 03

Credits: 04

## Course Learning Objectives:

This course (18CHE12/22) will enable students to

- Master the basic knowledge of engineering chemistry for building technical competence in industries, research and development.
- To develop knowledge in the fields of use of free energy in chemical equilibrium, electrochemistry and energy storage systems, Corrosion and metal finishing.
- To understand the importance of Chemical fuel properties and applications and to understand the concept synthesis properties and applications of polymers
- To understand the importance of water chemistry and green chemistry
- To develop knowledge in the fields of Instrumental methods of analysis and Nanomaterials.

## MODULES

### MODULE- I: Electrochemistry and Energy storage systems

**Electrochemical Systems:** Derivation of Nernst equation for single electrode potential. Reference electrodes: Introduction, construction, working and applications of Calomel electrode. Ion-selective electrode – Definition, construction and principle of Glass electrode, and determination of pH using glass electrode. Electrolyte concentration cells, numerical problems.

**Fuel Cells:** Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with  $\text{H}_2\text{SO}_4$  electrolyte, and solid oxide fuel cell (SOFCs).

**Energy storage systems:** Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Ni-MH and Li-ion batteries, Ni-Cd cell.

- ① Dr. Vijay A. Hiramatt *flut* ⑤ Dr. Nivdesh *10+ Hours* *Patil*  
② Dr. Vijayakumar Durg *flway* ⑥ Shweta. Patil *Patil*  
③ Dr. K. Hanuman Gowd *flr* ⑦ Parvati *Patil*  
④ Siddannahwa patil *Patil*

## MODULE-II: Corrosion and Metal finishing

**Corrosion:** Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion - Differential metal and Differential aeration - pitting and water line). Corrosion control: Metal coatings - Galvanization and Tinning. Cathodic protection - sacrificial anode and impressed current methods.

**Metal finishing:** Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating-Polarization, decomposition potential and overvoltage. Electroplating of chromium (hard and decorative) and electroplating of nickel (Watt's method). Electroless plating: Introduction, electroless plating of copper, distinction between electroplating and electroless plating processes.

10 - Hours

*Chemical fuels*

## MODULE-III: ~~Energy Systems~~ and Polymers

**Chemical Fuels:** Introduction, classification, definitions of CV, LCV, and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine – Definition, mechanism, ill effects and prevention. Power alcohol, unleaded petrol and biodiesel.

**Polymers:** Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane, Adhesives: Introduction, synthesis, properties and applications of epoxy resin. Polymer composites: Introduction, synthesis, properties and applications of Kevlar. Conducting polymer: Introduction, synthesis of polyaniline and polyacetylene with applications.

10 - Hours

## MODULE IV: Water Chemistry & *green chemistry*.

**Water Chemistry:** Introduction, sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved  $O_2$ ,  $CO_2$  and  $MgCl_2$ ). Sources of water pollution, Sewage, Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. Chemical analysis of water: Sulphates (gravimetry) and Fluorides (colorimetry). Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.

**Green chemistry:** Principle and applications of green chemistry.

10 - Hours

- ① Dr. Vijay A. Horemat *Unit*
- ② Dr. Vijayakumar Durg *Always*
- ③ Dr. K. Hanuman Gowda *To*
- ④ Siddanna Gowda patil *Patil*
- ⑤ Dr. Nirodesh patil *Patil*
- ⑥ Shweta. patil *Patil*
- ⑦ Parvati *Patil*



## MODULE-V: Instrumental methods of analysis and Nanomaterials

**Instrumental methods of analysis:** Theory, Instrumentation and applications of UV Spectro photometer, Chromatography (TLC) Flame Photometry, Potentiometry and Conductometry (Strong acid with a strong base)

**Nanomaterials:** Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nanoscale materials: Fullerenes, Carbon nanotubes and Dendrimers – properties and applications.

10 - Hours

### Course Outcomes:

At the end of the course the students are able to understand

CO1: Basics of electrochemistry and its applications to batteries.

CO 2: Identify the nature of corrosion, its control and to develop resistance to corrosion by electroplating and electroless plating

CO3: Identify the importance of chemical fuel, basic concept of preparation of polymer and its applications.

CO4: Environmental pollution, waste management and water chemistry.

CO5: Different techniques of instrumental methods of analysis. Fundamental principles of nanomaterials.

### Question paper pattern:

**Note:-** The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20** marks.
- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

### Text Books:

1. P.C. Jain & Monica Jain. "Engineering Chemistry", Dhanpat Rai Publications, New Delhi (2015 Edition).
2. S. S. Dara, A textbook of Engineering Chemistry, 10<sup>th</sup> Edition, S Chand & Co., Ltd., New Delhi, 2014.

① Dr. Nijg. A. Hasmati  
② Dr. Vijayakumar Durg  
③ Dr. K. Hanumanth Gowd  
④ Siddanna Gensde patil  
⑤ Dr. Hirdesh Patil

⑥ Shweta patil  
⑦ Parvati

3. Physical Chemistry, by P. W. Atkins, Oxford Publications (Eighth edition-2006).

**Reference books:**

1. O.G. Palanna, "Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd, New Delhi, Fourth Reprint (2015- Edition).
2. R.V. Gadag & A. Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi (2015- Edition).
3. "Wiley Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.
4. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015- Edition).

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① Dr. Vijay. A. Hiremath

② Dr. Vijayakumar Durg

③ Dr. K. Hanumanth Goud

④ Siddanna Gowda patil

⑤ Dr. Nirdosh patil

⑥ Shweta. patil

⑦ Parvati

## ENGINEERING CHEMISTRY LAB

[As per Choice Based Credit System (CBCS) scheme]  
(Effective from the Academic Year 2018-19)

Course Code : 18CHEL16/26

Contact Hours/Week : 02

Total Hours: 38

Semester: I/II

CIE Marks : 50

SEE Marks: 50

Exams. Hours: 03

Credits: 01

Course objectives:

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 technical competence.

### 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 Copper.
5. Determination of  $P^{ka}$  of the given weak acid using pH meter.
6. Flame photometric estimation of sodium and potassium.
7. Determine the surface tension of a given liquid at room temp using stalgmeter by drop number method.

### 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 thiosulphate solution.
4. Determination of COD of waste water.
5. Estimation of Iron in haematite ore solution using standard  $K_2Cr_2O_7$  solution by external indicator method.
6. Determination of alkalinity of the given Water sample
7. Determination of percentage of chlorine in bleaching powder by Iodometric method

- ① Dr. Vijay A. Horreata *Uro*
- ② Dr. Vijayakumar Durg *Shwary*
- ③ Dr. K. Harinath Reddy *Fe*
- ④ Siddanna Gowda Patil *glt*
- ⑤ Dr. Nirdosh Patil *Bill*
- ⑥ Shweta Patil *Patil*  
Parvati *Parvati*



**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 of materials 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)

### Conduction of Practical Examination:

- Examination shall be conducted for 100 marks, later reduced to 50 marks.
- All experiments are to be included for practical examination.
- One instrumental and another volumetric experiment shall be set.
- Different experiments shall be set under instrumental and a common experiment under volumetric.

### Reference Books:

- G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, "Vogel's Text Book of Quantitative Chemical Analysis"
- O.P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age International Publishers.
- Gary D. Christian, "Analytical chemistry", 6<sup>th</sup> Edition, Wiley India.

① Dr. Vijay. A. Humblu \*\*\*\*\*

② Dr. Vijayakumare Durg Chawar

③ Dr. K. Hemunmae Gaud ~~Patil~~

④ Siddanna Gaud ~~patil~~

⑤ Dr. Nirdosh ~~patil~~

⑥ Shweta ~~patil~~

⑦ Parvati ~~Patil~~