

Cummins College of Engineering for Women
(An autonomous institute affiliated to Savitribai Phule pune university)
Karve Nagar, Pune - 411 052.



Vision

To be globally renowned engineering institute for imparting holistic education
and developing professional women leaders in engineering and technology

Structure and Syllabus

of

F. Y. BTech

2023 Pattern [R1]

List of Abbreviations

Abbreviation	Title
PCC	Programme Core Course
BSC	Basic Science Course
ESC	Engineering Science Course
PE	Programme Elective Course
OE	Open Elective
VSEC	Vocational and Skill Enhancement Course
CC	Co-curricular Courses / Liberal Learning Course
IKS	Indian Knowledge System
VEC	Value Education Course
RM	Research Methodology
INTR	Internship
PROJ	Project
CEP	Community Engagement Project
RM	Research Methodology
Mm	Multidisciplinary Minor
AEC	Ability Enhancement course

First Year

**Curriculum for UG Degree Course in BTech. Computer Engineering and
Information Technology Programs
(Academic Year: 2026-27 Onwards)**

Semester-I

Course Code	Course Title	Teaching Scheme Hours / Week			Cr	Examination Scheme			Total Marks
		L	T	P		ISE	ESE	Pr/Or	
BSC102	Chemistry	3	0	0	3	50	50	0	100
BSC103	Linear Algebra and Univariate Calculus	3	1	0	4	50	50	0	100
ESC102	Basics of Electrical & Electronics Engineering	3	0	0	3	50	50	0	100
ESC103	Sustainable Renewable Energy	3	1	0	4	50	50	0	100
CC102	Liberal Learning	1	0	2	2	50	0	0	50
VSEC101L	Programming Skills in C Language Lab	0	0	4	2	25	0	25	50
BSC102L	Chemistry Lab	0	0	2	1	25	0	0	25
ESC102L	Basics of Electrical & Electronics Engineering Lab	0	0	2	1	25	0	0	25
Total =		13	02	10	20	325	200	25	550

L=Lecture, T=Tutorial, P= Practical, Cr= Credits, ISE =In Semester Evaluation, ESE =End Semester Examination, Pr/Or = Practical/Oral.


APPROVED BY
Secretary Academic Council
MKSSS's Cummins College of Engineering
For Women, Pune-411052




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Chairman Academic Council
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BSC102 Chemistry

Teaching scheme:

Lectures: 3hrs/week
Credits: 3

Examination scheme:

In-Sem Exam: **50** Marks
End-Sem Exam: **50** Marks

Course Objectives

The Chemistry course is designed such that the students will:

1. To understand chemical and electrochemical principles relevant in the engineering context.
2. To assimilate chemical processes at lab and industrial scale of synthesis.
3. To get familiar with methods of chemical analysis.
4. To correlate structure-property relationship.
5. To inculcate basic problem-solving skills involving chemistry fundamentals.

Course Outcomes

1. To apply electrochemical principles in battery technology and fuel cells.
2. To analyze the types & factors related to corrosion and solve problems related to its control.
3. To outline the processes of synthesis of fuels, Si-semiconductors and nanomaterials.
4. To analyze the quality of water and fuels using analytical techniques.
5. To determine pollutants, present in wastewater and extract metals from E-waste.

UNIT I: Electrochemical Applications in Engineering

- A. Electrochemical cells, Electrode potential, Nernst equation, reference electrodes, battery characteristics, secondary batteries, Lead-acid, Lithium-ion battery, Fuel cell technology.
- B. Electrochemical theory of corrosion, causes and factors affecting corrosion, types, Cathodic and anodic protection, corrosion control methods such as protective coatings- organic using epoxy, PU, polyurea etc., metal coatings like hot dipping, electroplating and metal cladding.

UNIT II: Industrially relevant materials

- A. H₂: Properties and applications such as fuel, synthesis, storage and transport, Si chemistry and Processing Si for semiconductor applications such as chip/ photovoltaic devices.
- B. Nanomaterials: Introduction, classification, properties, approaches to synthesis, Carbon based nanomaterials such as CNT, graphene and quantum dots, (properties and applications for electronics).

UNIT III: Water analysis and sustainable chemistry

- A. Sources, Impurities in water, hardness determination and metals in water by volumetry and flame photometry, pH, TDS, BOD, COD. Water softening by ion exchange method, desalination of brackish water by membrane filtration techniques-reverse osmosis, electrodialysis.



B. Detection of pollutants in wastewater and extraction of precious metals from E-Waste.

UNIT IV: Carbon based energy materials

- A. Coal types, GCV, NCV and proximate, ultimate analysis for quality determination.
- B. Biodiesel and Power alcohol: Preparation, properties and applications.

Textbooks:

1. S.S. Dara 'Engineering Chemistry' S. Chand Publications
2. B.S. Chauhan 'Engineering Chemistry': Univ Sc Press. (Third edition)
3. 'A Textbook of Engineering Chemistry' by Shashi Chawla: Dhanpat Rai & Co. (2015)
4. 'A Textbook of Engineering Chemistry' Jain and Jain: Dhanpat Rai & Co.
5. G. Chatwal 'Instrumental methods of Chemical Analysis' Himalaya publication house.
6. A Basic course in Environmental Studies by S. Deswal and A. Deswal.
7. A textbook of Environmental studies by Shashi Chawla.

Reference books:

1. Ram D. Gupta, 'Hydrogen fuel 'C.R.C. Publications.
2. Robert Braun; Instrumental methods of analysis Pharma med press.
3. J.D. Lee, Concise Inorganic Chemistry, 4 th edition, Wiley Publication (2019)
4. M.G. Fontana, "Corrosion Engineering", Mac-Graw Hill Publications.



BSC103 Linear Algebra and Univariate Calculus

Teaching scheme

Lectures: 3hrs/week

Tutorial: 1hr/week

Credits: 4

Examination scheme

In-Sem Exam: **50** Marks

End-Sem Exam: **50** Marks

Course Objectives:

1. To familiarize the prospective engineers with techniques in linear algebra and calculus of one variable.
2. To equip the students with standard concepts and tools in linear algebra and calculus of one variable which they will find useful in their disciplines.

Course Outcomes:

After completion of this course a student should be able to

CO1: Use matrix method to solve linear system of equations, Linear Transformations.

CO2: Calculate eigenvalues, eigenvectors and apply them to decompose the matrix.

CO3: Apply knowledge of linear algebra to solve simple real-life problems.

CO4: Compute differentiation, series expansion, integration of function of one variable.

Unit-I: Matrices

Rank of a matrix, Echelon form, System of linear equations, Euclidean vector spaces and Linear Transformations

Unit-II: Decomposition of a Matrix

Eigenvalues, Eigenvectors, Properties of Eigenvalues, Matrix Factorization Techniques: Singular Value Decomposition (SVD), Eigenvalue decomposition.

Unit-III: Applications of Linear Algebra

Introduction to Modular Arithmetic, Euclid's algorithm, Encrypt and decrypt the statement using matrix, Applications to simple real-life problems

Unit-IV: Differential Calculus

Successive differentiation, nth order derivatives of some standard functions, Taylor's and Maclaurin's theorem, Standard series expansions

Unit-V: Integral Calculus

Reduction formulae, Beta Function, Gamma function, Differentiation under integral sign, Error function

Textbooks:

1. B. V. Ramana, 'Higher Engineering Mathematics', *Tata McGraw-Hill Publications*, (2007).
2. B.S. Grewal, 'Higher Engineering Mathematics', *Khanna publishers*, Delhi (40th edition), (2008).
3. Erwin Kreyszig, 'Advanced Engineering Mathematics', *Wiley Eastern Ltd* (10th Edition), (2017)



Reference Books:

1. C.R. Wylie, L. C. Barrette, Advanced Engineering Mathematics', *McGraw-Hill Publications, New Delhi* (6 th edition), (2006)
2. Maurice Weir, Joel Hass, Thomas 'Calculus', 12th edition, *Pearson India* (2016)
3. George Thomas, Jr., Ross Finney, Late, Calculus, 9th edition, *Pearsons India*
4. Sudhir Ghorpade, Balmohan Limaye, A Course in Calculus and Real Analysis', (Undergraduate Text in Mathematics), *Springer* (2006).
5. David Poole, Linear Algebra: A Modern Introduction', 2nd Edition, Brooks/Cole (2005).



ESC102 Basic Electrical and Electronics Engineering

Teaching Scheme:

Lectures: 3 Hrs./Week

Credits: 3

Examination Scheme

In-Semester: 50 Marks

End-Semester: 50 Marks

Course objective:

1. To understand the working principles of diodes, transistors, and single-phase transformers.
2. To learn AC circuit parameters and electrical safety and grounding practices.
3. To apply diodes and transistors to build basic circuits like rectifiers, regulators, switches, and amplifiers
4. To understand number systems, logic gates, and combinational digital circuits.
5. To apply network theorems to analyze DC circuits.

Course outcomes:

After completion of course, students will be able to

1. Explain construction and working principle of diodes, transistors, single phase transformers.
2. Explain basic parameters of AC circuits and electrical safety
3. Apply diodes, transistors to build basic electrical circuits.
4. Explain number system and logic gates in digital electronics.
5. Apply network theorems to calculate parameters of DC circuit.

Unit – I: Diodes and its applications:

Construction and characteristic of p-n junction diode, Half wave, full wave and bridge rectifiers, need of capacitor filter, Zener diode as voltage regulator.

Unit – II: Junction Transistor Amplifiers:

Bipolar junction transistor, Construction and working of BJT, modes of operation, CE,CB,CC configurations, CE input output characteristics, application of transistor as a switch and amplifier.

Unit – III: Digital Electronics:

Numbering system (decimal, binary, hexadecimal), Conversions from one type to another, Basic gates, implementation of basic gates using universal gates, Boolean algebra, DeMorgan's Theorem, standard representation of logic functions (SOP and POS forms), Introduction of Combinational logic circuits half adder and full adder, Introduction of Sequential logic (block diagram).



Unit – IV: DC Circuits:

Kirchhoff's laws, Mesh Analysis, Thevenin and Superposition Theorems, maximum power transfer theorem, Source Transformations, Network Simplifications using star-delta / delta-star transformations.

Unit – V: AC Circuits

Single phase Transformer: Construction, principle of working, EMF equations, voltage and current ratio. AC voltage, RMS value, Average value, Form factor and frequency. RLC Series and parallel circuits. Electrical Safety, Protection and Earthing Systems: protective devices, basics of Earthing, importance of grounding, safety standards (introduction)

Text Books:

1. V. K. Mehta and R. Mehta, *Basic Electrical Engineering*. New Delhi: S. Chand Publishing, 2006.)
2. V. K. Mehta and R. Mehta, *Principles of Electronics*. New Delhi: S. Chand Publishing, 2010.
3. S. K. Bhattacharya, *Basic Electrical and Electronics Engineering*, Pearson Education, (2nd edition), (2016).

Reference Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', McGraw-Hill, (3rd edition), (2010)
2. Floyd, 'Electronic Devices and Circuits', Pearson Education, (7th edition), (2008).
3. R. P. Jain, Modern Digital Electronics, 4th Edition, McGraw-Hill, 2012
4. N. Shanmugam, *Basic Electrical and Electronics Engineering*, McGraw-Hill Education, (1st edition), (2011).

Online resource:

1. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou20_cs08



ESC103 SUSTAINABLE RENEWABLE ENERGY

Teaching Scheme

Lecture: 3 Hrs/week

Tutorial: 1Hr/week

Credits: 4

Examination Scheme

In semester: 50 marks

End Semester: 50 Marks

Course Objective:

1. To acquire knowledge, skills, values & attitudes that empower us to contribute to a sustainable energy future.
2. Understanding how renewable energy systems work, their efficiency, and their limitations.

Course Outcomes:

After completion of this course a student should be able to

CO1: Explain the importance of renewable energy for sustainability.

CO2: Differentiate between various solar energy systems (thermal and PV)

CO3: Compare different wind energy systems based on feasibility and efficiency.

CO4: Compare different types of biofuels and waste-to-energy technologies.

CO5: Explain the challenges and opportunities in integrating ocean & geothermal energy into existing systems.

Unit 1: Introduction to Energy and Sustainability

Introduction & types of conventional & non-conventional energy resources, Energy scenario:

Global and Indian, Limitations of conventional energy, Basics of sustainable development, Linkage with SDGs (esp. SDG 7)

Unit 2: Solar Energy

Solar radiation fundamentals, Solar thermal systems: collectors, water heaters, dryers, Solar PV systems: working, types, applications., Advantages & disadvantages of solar photovoltaic systems, Solar energy storage and recent developments.

Unit 3: Wind Energy

Basics of wind energy and wind formation, Wind turbine types and working principles, Site selection and wind farm layout, Environmental impacts, and hybrid systems

Unit 4: Bioenergy

Biomass resources and classification, Biogas production: process and applications, Types- Biodiesel, bioethanol, and biohydrogen, Waste-to-energy technology



Unit 5: Energy from Oceans and Geothermal

Tidal and wave energy principles, Ocean Thermal Energy Conversion (OTEC), Geothermal resources and power generation, Limitations and challenges, Future of renewable energy — AI and smart systems

Recommended Textbooks & Resources

1. Non-Conventional Energy Sources by *G.D. Rai*
2. Renewable Energy Engineering and Technology – *VVN Kishore (TERI Press)*
3. Renewable Energy Resources by *JOHN Twidell- Routledge publisher*
4. MNRE website, UN SDG Reports, IPCC Reports
5. NPTEL video lectures on Renewable Energy

Renewable Energy Resources



CC-102 Liberal Learning

Teaching Scheme:

Lecture : 1 Hrs/week
Practicals: 2 Hr/week
Credits : 2

Examination Scheme:

In semester : 50 marks

Course Objectives:

1. To encourage the holistic development of students through art forms.
2. To develop life skills of the students through individual and group activities.

Note: Students will opt for any one of the following eleven modules. Each module is conducted for 12 sessions per semester.

Course Outcome For Module 1 to Module 9:

After completion of this course the students will be able to

CO1: Present the creative work through art

forms. **CO2 :** Demonstrate the ability to

participate in teams. **Module 1: Culinary**

Arts

Planning a meal, Pre-cooking preparation, ingredients measurements, cleaning of vegetables, chopping and actual cooking.

Preparation and cooking continental dishes, sandwiches, donuts, mocktails, cookies, salads, wheat brownies etc.

Module 2: Dance

Warm up sessions, basic dance steps on Bollywood music, Zumba, folk dance, choreography.



Module 3: Gardening

Fundamentals of gardening, projects like terrarium, kokedama, etc. knowledge of soil, fertilizers and seeds. Fundamentals of landscape designing.

Module 4: Painting

Indian art forms, viz. Warli, Madhubani, Mandala, and Dot Painting. Familiarity with a variety of materials, viz. acrylic, pencil, and watercolour paints.

Module 5: Theatre

Variety of exercises and activities such as improvisation, character development, scene work, vocal and physical warm-ups, script analysis, and feedback sessions. Technical aspects of theatre production such as lighting, sound, and set design.

Module 6: Film Appreciation

Introduction to film history and evolution of cinema, cinematic techniques: camera angles, lighting, and editing, film genres, role of directors in shaping cinematic vision, symbolism and motifs in cinema, the cultural and societal influences, Case studies of landmark films

Module 7: Mobile Movie Making

Introduction to Mobile Movie Making, Scripting, shooting, Five shot, Ten shot theory, Editing on Mobile, Dubbing on Mobile

Module 8: Creativity with LASERs

Introduction to basic LASER, Designing and editing text, Merging Shapes, Free hand design, Cutouts, Image processing and effects, various materials to be used on LASER machine, product costing



Module 9: Anchoring and Public Speaking

Introduction to Public Speaking, 5 P's of speech, Introduction to Human Voice & Voice Modulations, Introduction and use of Microphone, Anchoring, Camera Facing, Event and discussion anchoring, Voice over techniques, Genres of anchoring.

Textbooks:

Culinary arts: “Theory of Cookery” by Krishna Arora, Macmillan Publishers

Dance: “Text book of Dance” by Gyanendra Dutt Bajpai, Kanishka Publisher

Gardening: “Gardening in India” 2nd Edition, by T K Bose, D Mukharjee, Oxford and IBH Publishers

Painting: “Panoramic Indian Painting” by R C Luthera, C K Luthera, Nidhi Sekhon Vishal Publishing Co.

Theatre: “Indian Theatre: Drama, Music and Dance” by Shovana Narayan, Shubhi Publishers.

Film Appreciation:

The Film Appreciation Book, by Jim Piper, Allworth Press, New York (2014)

Creativity with LASERs:

1. Solid State Engineering Vol-I – W. Koechner Springer Verlag (1976)
2. Lasers Fundamentals – W.T. Silfvast
3. Principles Of Lasers – O. Svelto – Plenum, 1982
4. Laser Parameters -- Heard
5. Laser and Non-Linear Optics – B.B. Laud (2nd Edition)
6. Lasers : Principles, Types and Applications -- K.R. Nambiar
7. Introduction to Fiber Optics – A.Ghatak, K.Thyagarajan- Cambridge University Press
8. Principles of Laser And Their Applications – Callen O'Shea, Rhodes



Anchoring and Public Speaking:

1. "The Art of Public Speaking- Stephen E Luchas, Thirteen Edition, McGraw-Hill Education.
2. "Introductory Text Book of Linguistics and Phonetics"- Dr. S.K. Verma- Eighteenth Edition -Student Store Rampur Garden Bareilly.
3. "Effective Listening Skills" - Denis M Kratz, Abby Robinson Kratz- TATA McGraw-Hill Edition -2005

References: Online resources:

Culinary arts:

Kai Sean Lee, "Culinary aesthetics: World-traveling with culinary arts", Annals of Tourism research, 97 (23301) Nov 2022

Dance:

Malathi B, "Development of Dance in India", International Educational Applied Scientific Research Journal, Volume : 5 | Issue : 1 | Jan 2020

Gardening: Selma Lunde Fjaestad , Jessica L Mackelprang , Takemi Sugiyama "Mental health outcomes associated with gardening" July 2023, Book: Cultivated Therapeutic Landscapes (pp.104-130)

Painting: Maarit Anna Maleka, Tero Heinkkinen, Nithikul Nimkulrat "Drawing as a research tool: Making and understanding in art and design practice" article, February 2014, ResearchGate

Theatre: 1. Heli Aaltonen, Ellen Foyn Bruun, "Practice as research in drama and theatre: Introducing narrative supervision methodology:", July 2014, Nordic Journal of Art and Research

I. Dr.C.M.Vinay Kumar, Romesh Chaturvedi "Art of the Theatre on New Media Platform & Audience viewing experience", Global Media Journal-Indian Edition, Winter Issue December 2013



Online Material:

Theatre:

Theatre and Stage Crafting, by Vinod Verma

Link for reference book: <https://www.igntu.ac.in/eContent/BVoc-Media-06Sem-VinodVerma-%20Theatre%20and%20Stage%20Crafting.pdf>

Film Appreciation:

Link for reference book: https://nibmehub.com/opac-service/pdf/read/The%20Film%20Appreciation%20Book%20_%20the%20film%20course%20you%20always%20wanted%20to%20take.pdf

Mobile Movie Making:

Online Material: Smartphone filmmaking Guide, by Bessie Young, MFA, MS

Link for Online Material : <https://www.amwa-doc.org/wp-content/uploads/2020/05/Smartphone-Filmmaking-Guide.pdf>

Module 10: Yogasana

Course Objectives:

- I. To enable the student to have good health.
- II. To practice mental hygiene.
- III. To possess emotional stability.

Course Outcomes:

After completion of the course, students will be able to

CO1: Demonstrate Flexibility and Mobility & Lung capacity through Practice of Asanas.

CO2: Practice Stress Management through Meditation & Mental wellbeing

CO3: Explain common Health Problems and their Remedies.



Unit-I : Introduction – Yoga

Introduction - Preparatory Movements/ Loosening Exercise, Suryanamaskar

Science of Yoga and Breathing Techniques, Dwipad Uttanasana, Setubandhasana, Markatasana, Pawanmuktasana Kriya, Markatasana Variation,, Sarvangasana (Shoulder Stand), Bhujangasan, Salabhasana, Adho Mukha Svanasana, Naukasana, Padmasana Yog Mudra, Vajrasana Yog Mudra, Naukasana, Paschimottanasana, Akarna Dhanurasana, Vakrasana, Ardha Matsyendrasana, Tadasana , Vrikshasana , Virasana, Ugrasana , Trikonasana, Garudasana, Nataraj Asana.

Unit-II: Pranayam and Meditation

Preparation For Pranayam, Experience of Relaxation, Shuddhi Kriya- Kapalbhati, Deep Breathing, Fast Breathing (6 Types), Pranayam and Meditation, Anulom Vilom, Brahmari, Ujjayi, Meditation / Omkar, Dhyan

Reference Books:

1. Yoga Pravesh – Yogacharya Dr. Vishwas Mandlik.
2. Yoga Parichay – Yogacharya Dr. Vishwas Mandlik.



Module 11 : German

Course Objectives:

- 1.To introduce the students to German language.
- 2.To make them aware of fundamental grammar concepts and basic vocabulary in German.

Course Outcomes:

After completion of the course, students will be

able to CO1: write short sentences in German

CO2: speak in short about themselves

CO3: answer comprehension questions by reading simple German texts

Unit-I : Initiation to the language

Alphabets, Numbers, Greetings, Exchanging name and place of stay & origine, contact information , Telling age

Unit-II: Self-introduction-I

Professions, Nationalities, Months & days , Telling birthday, Personal pronouns , Verbs – sein & haben

Unit-III: Self-introduction-II

Vocabulary related to family, Hobbies , Stationary objects , Definite & indefinite articles , Forming plural forms in German.

Textbook:

Tangram A1 (Einheiten 1 & 2)

Reference books:

Hilfe – A Unique Study Aid, *Inamdar Smita*

VSEC101L Programming Skills in C Language Lab

Teaching Scheme:

Practical: 4 hrs/week
Credits: 2
25 Marks

Examination Scheme:

In-Sem: 25 Marks
Practical/oral:

Course Objectives:

To facilitate the learners:

1. To learn the fundamentals of C programming for logic building.
2. To implement a solution of given problem using appropriate data type, operators of C language.
3. To understand the decision and iteration interpretation in a programming language.
4. To implement the logic using arrays, strings, functions, pointers and structures of C programming language.

Course Outcomes:

After completion of course, students will be able to

CO1: Develop the logic for a given problem using flowchart/ algorithm/ pseudo code.

CO2: Apply appropriate basic language constructs, decision and iterative constructs for solving the given problem.

CO3: Implement the solution for a given problem using Arrays, String, Structures and functions.

CO4: Apply C programming skills to simulate real life problems/scenarios/applications.

Intent of this laboratory is to build the logic development and problem solving skills of students and build proficiency and competency in C language. For this purpose a sample list of assignments are grouped into Group A, Group B and Group C with increasing levels of difficulty and understanding. Group A assignments are based on real life problems using language constructs such as constant, variable, data type, operator, array, string, expressions, decision, iteration etc.

Group B assignments are based on the applications of language constructs and combination of language constructs, control structures, String, Arrays, Pointers, Structures, Functions.

Group C assignments are a little more challenging. Assignments will be open ended which can either be a mini project or simulation of real life problems/scenarios/applications. It can also include Debugging and Feature enhancement / Alternative solution/ testing / Code-refactoring of given problem statements or Analyze the given code and comment on the output.

Instructors can conduct a total of 10 assignments, six from Group A, three from Group B, one from Group C. Other assignments can be considered as extra assignments.

Instructors must enhance assignment by coming up with new application domains, by combining multiple constructs in one assignment or more complex logic.

Suggestive List of Assignments

Assignment 0: Get acquainted with Windows/Linux Platform, C environment, IDE installation, structure of basic C program, compilation, debugging and execution of C program.

Group A - Language constructs

For Group A problem statements, students should draw flowchart/ algorithm/ pseudo code and convert it into a C program. Problems are based on constructs such as concepts of constant, variable, data type, operator and expressions, arrays, strings, iteration, decision making and others.

- 1) Convert measurement units such as feet to inches, inches to centimeters, and centimeters to meters, Kilograms to grams, grams to milligrams, Dollar to Rupees, Euro to Rupees, temperature conversion Degree to Fahrenheit, days into years, weeks and days and vice versa.
- 2) Basic problems of Engineering Mathematics and Physics like area calculation, sine wave calculation, speed calculation, determining type of triangle, verify pythagoras theorem etc.
- 3) Obtain the first 25 numbers of a Fibonacci sequence/prime numbers with and without recursion etc.
- 4) Search the data from an array of numbers/ characters/ string.
- 5) Calculate the total number of characters in the string and the total number of vowels in the string with the number of occurrences in the string.
- 6) Operations on matrices.
- 7) Find the maximum/minimum of given numbers.
- 8) Order the numbers in sequence.
- 9) Swap two data elements using pass by value, pass by reference and without using a third variable.
- 10) Number conversion (decimal to binary, binary to decimal, binary to octal, octal to binary)
- 11) Reverse a string without using a third variable.

Group B - Applications of Language Constructs

Group B problem statements address the applications of language constructs such as Loops for iteration, Arrays, Strings, Structures, Functions for modularity wherever required. They should implement the application using a function (call by reference/ call by value) wherever appropriate. Problems are based on real life applications/ scenarios.

- 1) Perform employee operations such as accept, display, search by name, search by number, update a record. Explore the possibility of modularity for implementation.
- 2) For a class an examination is conducted and the results for the students of all the 5 subjects are recorded. Write a C program to display the record of students. On the basis of the record compute:
 - i. The average score of class



- ii. Highest score and lowest score of class
- iii. Marks scored by most of the students
- iv. List of students who were absent for the test

3) Write a menu-based modular program in C to perform following operations for complex numbers:

- i. reading a complex number
- ii. writing a complex number
- iii. addition of two complex numbers
- iv. subtraction of two complex numbers
- v. multiplication of two complex numbers

4) Two friends issued 5 books each from the library, Write a program in C to compute operations

- i. List of all books with them
- ii. List common titles with them
- iii. List of books with friend 1 but not with friend 2

5) A list of names of users of a product of a company is provided. Write a modular C program to calculate the total number of characters in the name and the total number of vowels in the name with the number of occurrences in the name, search set of characters in name, and sort names.

6) Create a structure to specify data of customers in a bank. The data to be stored is: Account number, Name, Balance in account. Assume a maximum of 200 customers in the bank. (a) Write a function to print the Account number and name of each customer with balance below Rs. 100. (b) If a customer requests for withdrawal or deposit, it is given in the form: Acct. no, amount, code (1 for deposit, 0 for withdrawal) Write a program to give a message, "The balance is insufficient for the specified withdrawal"

7) Find Permutations in which n people can occupy r seats in a theatre.

8) In a secret language DOG is written as HSK, CAT is written as GEX. Write a program to accept a string from a user and convert it into the secret language and accept a string in the secret language and convert it back to English.

Group C

Group C problem statements address big real life problem solving. Students are expected to apply the learnt concepts to solve these problems. Students should choose any one of the following:-

- 1) Mini Project - Small games like - tic-tac-toe, Create Crossword, Solving sudoku, Information system projects

Students should implement a mini project/ game which simulates real life problems/scenarios/applications. They are expected to make use of the appropriate constructs of C language.



2) Debugging and Feature enhancement / Alternative solution / testing / Code-refactoring of given problem statement.

Students will be given a large and ready code. Students are expected to read and understand the code, be able to debug the code, be able to enhance the feature in given code, to be able to find alternative solutions, or refactor the given code.

Text Books:-

- 1) Kernighan and Ritchie, “The C programming language” (2nd edition), Prentice Hall of India, 1988.
- 2) G.Dromey, “How to Solve it by Computer”, Prentice-Hall Inc., Upper Saddle River, NJ, 1982.
- 3) Yashwant Kanetkar, “Let's C”, Allied Publishers, 1998.

Reference books:-

- 1) Reema Thareja, “Introduction to C programming”, Oxford University press (2nd edition), 2015.
- 2) Alan R. Feuer, “The C Puzzle book”, Pearson, 1999
- 3) E Balagurusamy, “Computing Fundamentals and C Programming”, (2nd edition), TMH,



BSC 102L Chemistry Lab

Teaching scheme:

Lab: 2hrs/week

Credits: 1

Examination Scheme:

In Sem: 25marks

Course outcomes:

After completion of this course a student should be able to

CO1: Apply chemistry principles for quantitative analysis.

CO2: Make use of an instrument for chemical analysis.

CO3: Calculate chemical parameter based on recorded observations.

CO4: Evaluate the quality of coal based on its chemical properties.

CO5: Apply principles of electrochemistry for corrosion protection and mitigation

LIST OF EXPERIMENTS:

1. Determination of total hardness of sample water by EDTA Method.
2. Determination of total alkalinity of sample water.
3. Measuring EMF of electrochemical cells to predict spontaneity as well as to calculate Gibb's free energy and equilibrium constant.
4. Estimation of sodium from given solution using flame photometry.
5. Colorimetric estimation of Ferric ions in water.
6. Proximate analysis of coal samples.
7. Study the effect of temperature, pH and concentration of electrolyte on rate of corrosion for different metals.
8. Preparation of metallic coating on iron plate using electroplating principle.



ESC102L Basics of Electrical and Electronics Engineering Lab

Teaching Scheme:

Practical: 2 Hrs./Week
Credits: 1

Examination Scheme:

Term Work: 25 marks

Course Outcomes:

After completion of course, students will be able to

CO1: Identify and use basic electrical and electronic components and instruments.

CO2: Analyze rectifier circuits and measure output and ripple voltages.

CO3: Design, assemble, and test basic analog and digital electronic circuits such as CE amplifiers, half adders, full adders, and regulated power supplies.

CO4: Apply network theorems in electrical circuit .

CO5: Perform basic electrical wiring and lamp control circuits safely.

List of experiments:

1. Introduction of different electrical and electronics components and instruments.
2. To determine output voltage and ripple voltage of half wave, full wave rectifier with center tap transformer and bridge rectifier with and without filter.
3. To determine frequency response of CE amplifier.
4. Assemble and build half adder & full adder circuits.
5. Assemble and build simple DC regulated power supply with auto transformer I/P. (Line & Load Regulation).
6. To verify Thevenin's theorem & superposition theorem.
7. To perform electrical wiring to control lamps using one way and two-way switches.
8. Design Basic project using diodes and transistors.