



**CURRICULUM
2023
(Autonomous)
Version 1.0**

**B. TECH
ELECTRONICS AND COMMUNICATION ENGINEERING**

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015

June 2023



CURRICULUM and SYLLABI

FOR

B. TECH DEGREE PROGRAMME

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTERS I & II

**2023 SCHEME
(AUTONOMOUS)**



MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, Autonomous Institution Affiliated to APJ Abdul Kalam Technological University)
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MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B. TECH DEGREE PROGRAMME

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM and SYLLABI

for

SEMESTERS I & II

| Items | Board of Studies (BoS) | Academic Council (AC) |
|-------------------------|-------------------------------|------------------------------|
| Date of Approval | 11.07.2023 | 09.08.2023 |
| | 04-04-2024 | 19.06.2024 |

Sd/-

**Head of Department
Chairman, Board of Studies**

Sd/-

**Principal
Chairman, Academic Council**



MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

Vision and Mission of the Institution

Vision:

To be an Institution moulding globally competent professionals as epitomes of Noble Values.

Mission:

To transform the Youth as technically competent, ethically sound and socially committed professionals, by providing a vibrant learning ambience for the welfare of humanity.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Vision and Mission of the Department

Vision:

To be a Centre of Excellence in Electronics and Communication Engineering Education and Research for the service of humanity.

Mission:

To provide quality Engineering Education and to carry out Research in the field of Electronics and Communication Engineering addressing the challenges faced by the society.



PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: The graduates of the Programme will have a successful career as Professionals in Industry or as Entrepreneurs, encompassing a broad spectrum of areas related to Electronics and Communication Engineering.

PEO2: They will be able to adapt to the changing needs of Industry and Academia through continuous learning and professional upgrading.

PEO3: They will exhibit social responsibility in their pursuit of technical excellence.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will have the ability to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design Electronic Circuits and Systems for Communication, Monitoring and Control Applications.

PSO2: Demonstrate the knowledge, in Electronics, Signal processing, Embedded Systems and Communication Engineering, required for providing technical solutions to real world problems



| SEMESTER I | | | | | | |
|-------------------|-----------------|--------------------|--------------------------------------|----------------|--------------|---------------|
| Slot | Category | Course Code | Courses | L-T-P-J | Hours | Credit |
| A | BSC | 23MAL10A | Linear Algebra and Calculus | 3-1-0-0 | 4 | 4 |
| B | BSC | 23PYL10A | Engineering Physics | 3-1-0-0 | 4 | 4 |
| D | ESC | 23ESB10D | Problem Solving and Programming in C | 2-1-2-0 | 5 | 4 |
| E | ESC | 23ESL10J | Basics of Electrical Engineering A | 2-0-0-0 | 4 | 2 |
| | | 23ESL10L | Basics of Electronics Engineering | 2-0-0-0 | | 2 |
| G | ESC | 23ESL1NA | Environmental Science | 2-0-0-0 | 2 | 1* |
| S | BSC | 23PYP10A | Engineering Physics Lab | 0-0-2-0 | 2 | 1 |
| T | ESC | 23ESP10B | Electrical and Electronics Workshop | 0-0-2-0 | 2 | 1 |
| TOTAL | | | | | 23 | 19 |

**Not to be considered for Grade/GPA/CGPA. Pass or Fail Only*

| SEMESTER II | | | | | | |
|--------------------|-----------------|--------------------|--|----------------|--------------|---------------|
| Slot | Category | Course Code | Courses | L-T-P-J | Hours | Credit |
| A | BSC | 23MAL10B | Vector Calculus, Differential Equations and Transforms | 3-1-0-0 | 4 | 4 |
| B | BSC | 23CYL10A | Engineering Chemistry | 3-1-0-0 | 4 | 4 |
| C | ESC | 23ESB10A | Engineering Graphics | 2-0-2-0 | 4 | 3 |
| D | ESC | 23ESB10G | Python Programming | 2-0-2-0 | 4 | 3 |
| E | PCC | 23ECL10A | Network Theory | 3-1-0-0 | 4 | 4 |
| G | HSC | 23HSJ1NB | Professional Communication | 2-0-0-2 | 4 | 1* |
| S | BSC | 23CYP10A | Engineering Chemistry Lab | 0-0-2-0 | 2 | 1 |
| T | ESC | 23ESB10P | Manufacturing and Construction Practices B | 1-0-2-0 | 3 | 2 |
| TOTAL | | | | | 29 | 22 |

**Not to be considered for Grade/GPA/CGPA. Pass or Fail Only*



SEMESTER I



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|-----------------------------|----------|---|---|---|---|--------|----------------------|
| 23MAL10A | LINEAR ALGEBRA AND CALCULUS | BSC | 3 | 1 | 0 | 0 | 4 | 2023 |

PRE-REQUISITE : NIL

i. COURSE OVERVIEW

This course introduces students to some basic mathematical ideas and tools which are at the core of any engineering course. A brief course in Linear Algebra familiarizes students with some basic techniques in matrix theory which are essential for analyzing linear systems. The calculus of functions of one or more variables taught in this course are useful in modelling and analyzing physical phenomena involving continuous change of variables or parameters and have applications across all branches of engineering.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|-------|
| CO 1 | Solve systems of linear equations. | Apply |
| CO 2 | Compute maxima and minima using partial derivatives. | Apply |
| CO 3 | Compute areas and volumes of geometrical shapes using multiple integrals. | Apply |
| CO 4 | Identify the convergence or divergence of an infinite series. | Apply |
| CO 5 | Determine the Taylor and Fourier series expansion of functions and learn their applications. | Apply |

iii. SYLLABUS

Basics of Linear Algebra – Solution of systems of linear equations, row echelon form, rank, eigen values and eigen vectors, diagonalization of matrices, orthogonal transformation, quadratic forms.

Partial Differentiation and Applications – Limit and continuity of functions of two or more variables, partial derivatives, chain rule, total derivatives, maxima and minima

Multiple Integrals – Double and triple integrals, double integrals over rectangular and non-rectangular regions, changing the order of integration, finding areas and volume, mass and centre of gravity.

Infinite series – Convergence and divergence of Infinite series, geometric series and p-series, test of convergence, Alternating series, absolute and conditional convergence.



Taylor series, Binomial series and series representation of exponential, trigonometric, logarithmic functions –Fourier Series– Euler's formulas, Fourier sine and cosine series, Half range expansions

Iv (a) TEXT BOOKS

1. H. Anton, I. Biven, S. Davis, "Calculus", Wiley, 10th Edition, 2015.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2016.

(b) REFERENCES

1. J. Stewart, Essential Calculus, Cengage, 2nd Edition, 2017
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Peter V. O'Neil, Advanced Engineering Mathematics, Cengage, 7th Edition 2012.

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Total | : 40 Marks |

vi. End Semester Examination

There will be an end semester examination for 60 marks with a duration of 3 hours.



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|---------------------|----------|---|---|---|---|--------|----------------------|
| 23PYL10A | ENGINEERING PHYSICS | BSC | 3 | 1 | 0 | 0 | 4 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

The aim of the course is to develop scientific attitude in students and offer them an understanding of physical concepts behind various engineering applications. It creates an urge in students to think creatively in emerging areas of Physics.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|------------|
| CO 1 | Describe the characteristics of different types of oscillations and waves. | Understand |
| CO 2 | Explain natural physical processes and related technological advances using principles of optics | Understand |
| CO 3 | Generalise the principles of quantum mechanics to explain the behaviour of matter in the atomic and subatomic level | Understand |
| CO 4 | Describe the fundamentals of lasers and the principles behind various solid state lighting devices and fibre optic communication system. | Understand |
| CO 5 | Explain the fundamental ideas of Ultrasonics and facilitate technological advancement. | Understand |

iii. SYLLABUS

Oscillations and Waves: Harmonic oscillations – Damped harmonic oscillations, Forced harmonic oscillations, Q- factor, Amplitude resonance, comparison of electrical and mechanical oscillator. Wave motion – Longitudinal waves and Transverse waves, One dimensional wave equation and solution, three-dimensional wave equations, Transverse vibrations along a stretched string.

Wave Optics: Interference of light – Cosine law, Wedge shaped films - Air wedge, Newton's rings, Antireflection coating. Diffraction- comparison of Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to double slit, grating equation, Rayleigh's criterion, resolving power and dispersive power of grating.

Quantum Mechanics & Nano technology: Wave function, Uncertainty principle, Time dependent and time independent Schrodinger wave equations, Applications of Schrodinger wave equation - particle in one-dimensional potential well, quantum



mechanical tunneling. Introduction to nanoscience and technology, significance of surface to volume ratio, Quantum confinement, Characterization techniques – XRD, UV-Visible Spectroscopy, Applications of nanomaterials.

Laser and Photonics: Principles of Laser, Properties of laser, Ruby laser and Helium neon laser, Applications of Laser. Holography-construction of hologram, reconstruction of hologram, Applications. Introduction to photonics - photonic devices - Light Emitting Diode, Solar cells, Optical fibre – Principle of OFC, Numerical aperture, Types of fibers – step index fibre, Graded index fibre, Fibre Optic Communication System, Applications of Optical fibre, Fibre optic sensors.

Acoustics & Ultrasonic: Acoustics - characteristics of musical sounds, absorption coefficient, reverberation time- Sabine's formula (no derivation), significance, factors affecting architectural acoustics and their remedies.

Ultrasonics - production by magnetostriction oscillator and piezoelectric oscillator, detection of ultrasonic waves - thermal and piezoelectric methods, ultrasonic diffractometer-, applications of ultrasonic waves -SONAR, NDT, medical applications.

Iv (a) TEXT BOOKS

1. M.N. Avadhanulu, P.G. Kshirsagar, T.V.S Arun Murthy, A Text book of Engineering Physics, S. Chand &Co., Revised Edition, 2014
2. H.K. Malik, A.K. Singh, Engineering Physics, McGraw Hill Education, 2nd Edition, 2017

(b) REFERENCES

1. Arthur Beiser, Concepts of Modern Physics, Tata McGraw Hill Publications, 6thEdition, 2003.
2. Aruldas G., Engineering Physics, Prentice Hall of India Pvt Ltd., 2015
3. Ajoy Ghatak, Optics, Mc Graw Hill Education, 6th Edition, 2017
4. David J. Griffiths, Introduction to Electrodynamics, Addison-Wesley publishing, 4th Edition, 1999.
5. Choudhary, Nityanand, K. R. Deepak, S. H. Abdi, Perspective of Engineering: Physics: I, Acme Learning Pvt Ltd, first edition, 2009.
6. A. S. Vasudeva, A Text Book of Engineering Physics, S. Chand &Co., first edition: 2008.
7. Premlet B., Advanced Engineering Physics, Phasor Books,10thEdition, 2017.



v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Total | : 40 marks |

vi. End Semester Examination

There will be an end semester examination for 60 marks with a duration of 3 hours.



| Course Code | Course Name | Category | L | T | P | J | Credit | | Year of Introduction |
|-------------|--------------------------------------|----------|---|---|---|---|--------|--|----------------------|
| 23ESB10D | PROBLEM SOLVING AND PROGRAMMING IN C | ESC | 2 | 1 | 2 | 0 | 4 | | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

This course aims to introduce the concepts of structured programming. It covers basic concepts of C programming language including arrays, functions, pointers and files. This course involves a lab component which equips the learner to solve computational problems through programming.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|------------|
| CO 1 | Explain the fundamentals of computer architecture and types of software. | Understand |
| CO 2 | Develop a solution using algorithm / flowchart to a computational problem. | Apply |
| CO 3 | Construct programs with control statements and arrays. | Apply |
| CO 4 | Make use of user defined data types or functions to solve computational problems. | Apply |
| CO 5 | Develop programs using files and pointers. | Apply |

iii. SYLLABUS

Computer architecture & Programming Languages Basics of Computer architecture, Types of Programming Languages, System Software, Application Software, Introduction to structured programming, Algorithms, Flowcharts

C Programming Language Data Types, variables, keywords, Constants, Operators and Expressions, Control Flow Statements- Conditional statements, Iterative statements, programs Arrays and Strings Multidimensional arrays and matrices, String processing, searching and sorting in 1D array.

Functions Scope of variable, Pass by reference and value methods, Recursive functions. Structures and union, Storage Classes

Pointers and Files- File Operations, Sequential access and random access, programs covering pointers and files

iv (a) TEXT BOOKS



1. Byron Gottfried, Programming with C (Schaum's Outlines Series), McGraw Hill Education, 3rd Edition, 2017.
2. H. M. Deitel, P. J. Deitel, C: How to program, 7th Edition, Pearson Education, 2010.
3. Anita Goel, Computer Fundamentals, Pearson, 1st Edition, 2010.
Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Fundamentals of Data Structures in C, 2nd Edition, 2008.

(b) REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, C Programming Language, Pearson, 2nd Edition, 2015.
2. Rajaraman V, PHI, Computer Basics and Programming in C, 1st Edition, 2007.
3. Anita Goel and Ajay Mittal, Computer fundamentals and Programming in C, 1st Edition, 2013.

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Lab Work | : 10 marks |
| Lab Exam | : 10 marks |
| Total | : 60 marks |

vi. End Semester Examination

There will be an end semester examination for 40 marks with a duration of 2 hours.



C PROGRAMMING LAB

1. Familiarization of console I/O and operators in C
 - i) Display "Hello World"
 - ii) Read two numbers, add them and display their sum
 - iii) Read the radius of a circle, calculate its area and display it
 - iv) Area of triangle after reading its sides
2. Read 3 integer values and find largest of three numbers.
3. Check whether given year is leap year.
4. Display the grade of a student after reading his mark for a subject. (Use switch)
5. Read a Natural Number and check whether the number is prime or not
6. Read a Natural Number and check whether the number is Armstrong or not
7. Display second largest number after reading n numbers from user. (Without array).
8. Read n integers, store them in an array and find their sum and average
9. Read n integers, store them in an array and search for an element in the array using an algorithm for Linear Search
10. Read n integers, store them in an array and sort the elements in the array using Bubble Sort algorithm
11. Write a program for performing matrix addition, multiplication and finding the transpose.
12. Display sum of diagonal elements of a matrix
13. Read a string (word), store it in an array and check whether it is a palindrome word or not.
14. Read a string (ending with a \$ symbol), store it in an array and count the number of vowels, consonants and spaces in it.
15. Display first n prime numbers using Function.
16. Program to find the sum of digits of a number using recursion
17. Using structure, read and print data of n employees (Name, Employee Id and Salary)



18. Read the marks of three subjects for n students of a class and display their names in the order of rank. (Use array of structure)
19. Input and Print the sum of elements of an array using pointers
20. Create a file and perform the following
 - i) Write data to the file
 - ii) Read the data in a given file & display the file content on console



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|---|----------|---|---|---|---|--------|----------------------|
| 23ESL10J | BASICS OF ELECTRICAL ENGINEERING A (Fractal Course) | ESC | 4 | 0 | 0 | 0 | 2 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

This course aims to equip the students with an understanding of the fundamental principles of electrical engineering.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|------------|
| CO 1 | Apply fundamental circuit laws and principles of electromagnetism to solve simple DC electric circuits and magnetic circuits respectively. | Apply |
| CO 2 | Solve simple AC circuits using the alternating current fundamentals. | Apply |
| CO 3 | Explain the various conventional and non-conventional methods of power generation. | Understand |

iii. SYLLABUS

Basic concepts of DC circuits: Ohm's Law and Kirchhoff's laws, Star-delta conversion, Analysis of DC circuits, Mesh analysis, Node analysis.

Magnetic Circuits: Basic Terminology, Simple Magnetic circuits, Electromagnetic Induction, Faraday's laws, Lenz's law, Self-inductance and mutual inductance.

Alternating Current fundamentals: Basic definitions, Average, RMS values, AC Circuits, Phasor representation, Analysis of simple AC circuits (R, L, C, RL, RC, RLC Series circuits) Three phase AC systems, Generation of three phase voltages, star and delta connections.

Iv (a) TEXT BOOKS

1. William H. Hayt., Jr., Jack E. Kemmerly, Steven M. Durbin., Engineering Circuit Analysis, McGraw-Hill, 8th Edition, 2012.
2. Kothari D. P. and Nagrath I. J., Basic Electrical Engineering, Tata McGraw



Hill, 2010.

3. Fitzgerald A.E., David Higginbotham E., Arvin Grabel, Basic Electrical Engineering, Tata McGraw Hill, 5th Edition, 2009.

(b) REFERENCES

1. Paul Breeze, Power Generation Technologies, Newnes, 3rd Edition, 2019.
2. Allan Hambley R., Electrical Engineering: Principles & Applications, Pearson Education, 7th Edition, 2018.
3. Mittle V. N. and Arvind Mittal, Basic Electrical Engineering, McGraw Hill, 2nd Edition, 2006.

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Total | : 40 marks |

vi. End Semester Examination

There will be an end semester examination for 60 marks with a duration of 3 hours.



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|--|----------|---|---|---|---|--------|----------------------|
| 23ESL10L | BASICS OF ELECTRONICS ENGINEERING (Fractal Course) | ESC | 4 | 0 | 0 | 0 | 2 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

This course aims to equip the students with an understanding of the fundamental principles of electronics and communication engineering.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|------------|
| CO 1 | Describe the principles of semiconductor devices, its characteristics and various electronic circuits | Understand |
| CO 2 | Explain the basic working of Op-Amp, logic gates, radio and cellular communication systems. | Understand |

iii. SYLLABUS

PN Junction diode: Principle of operation, V-I characteristics, breakdown mechanisms, Zener diode and its characteristics.

Rectifiers and Power supplies: Block diagram of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.

Bipolar Junction Transistors: structure, principle of operation, relation between current gains in Common Emitter (CE), Common Base (CB) and Common Collector (CC) configurations, input and output characteristics of CE configuration.

Amplifiers: Concept of voltage divider biasing, circuit diagram and working of CE (RC coupled) amplifier with its frequency response. Integrated Circuits: Analog IC; Operational Amplifier, block diagram, ideal characteristics, inverting and non-inverting Amplifier.

Digital IC: Logic Gates AND, OR, NOT, Universal Gates; truth table, De-Morgans law, Realization of simple Boolean functions.

Radio communication: Modulation, need for modulation, Principle of AM, mathematical expression, waveform, frequency spectrum and bandwidth of AM, Principle of FM, mathematical expression, waveform.

Radio Receivers: block diagram of super heterodyne receiver (AM & FM).



Mobile communication: Basic principles of cellular communications, concept of cells, frequency reuse, hand off.

Iv (a) TEXT BOOKS

1. Boylested, R. L. and Nashelsky, L., *Electronic Devices and Circuit Theory*, Pearson Education, 10thEdition, 2009.
2. Thomas I Floyd, *Digital Fundamentals*, Pearson Education, 11thEdition, 2018.
3. Ramakant A Gaykwad, *Op-Amps and Linear Integrated Circuits*, Pearson Education, 4thEdition, 2015.
Wayne Tomasi and Neil Storey, *A Textbook on Basic Communication and*
4. *Information Engineering*, Pearson, 5thEdition, 2010.

(b) REFERENCES

1. N.N. Bhargava , D.C. Kulshreshtha , S.C. Gupta, *Basic Electronics and Linear Circuits*, Tata McGraw - Hill Education, New Delhi, 2nd Edition, 2014.

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Total | : 40 marks |

vi. End Semester Examination

There will be an end semester examination for 60 marks with a duration of 3 hours.



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|-----------------------|----------|---|---|---|---|--------|----------------------|
| 23ESL1NA | ENVIRONMENTAL SCIENCE | ESC | 2 | 0 | 0 | 0 | 1 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

Goal of this course is to expose students to the significance of natural resource management, ecosystem restoration and biodiversity conservation. The course details the various problems related to environmental pollution and the legal provisions for environmental protection. The course also introduces the concept of sustainability, sustainable practices and the role of engineering in attaining sustainable development.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|------------|
| CO 1 | Identify the problems associated with the overutilization of natural resources and the role of engineers in natural resource management. | Apply |
| CO 2 | Explain the concepts related to the ecosystem and the significance of ecosystem restoration and biodiversity conservation. | Understand |
| CO 3 | Explain the causes, impacts and control measures of various types of environmental pollution. | Understand |
| CO 4 | Summarise the various legal provisions for environmental protection. | Understand |
| CO 5 | Discuss the concepts of sustainability and sustainable practices by utilizing engineering knowledge and principles. | Apply |

iii. SYLLABUS

Interdisciplinary nature of environmental science: Scope and importance

Natural resources and associated problems: Water resources, Energy resources, Food resources, Land resources

Ecosystems: concept, Types, Functions, Productivity, Energy flow and Food chains of ecosystems. Characteristic features and functions of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem, Ecosystem Services.

Biodiversity and its conservation: Species and ecosystem diversity, Value of biodiversity, Hotspots of biodiversity, Threats to biodiversity, Conservation of biodiversity.



Environmental Pollution: Air, Water and Soil pollution. Solid and Hazardous Waste Management, Role of individuals in prevention of pollution.

Social issues and the environment: Environmental ethics, Contemporary Environmental issues, Water conservation- rainwater harvesting, watershed management, conservation of wetlands, Legal provisions for environmental protection.

Sustainability: Concept, Sustainable Development Goals. Sustainability Practices- Green engineering, Sustainable habitat-green buildings, Sustainable Urbanization, Industrial Ecology, Circular Economy- Case studies.

Iv (a) TEXT BOOKS

1. Erach Bharucha, Textbook for Environmental Studies, UGC, New Delhi, 3rd edition, 2021.
2. D. D. Mishra, Fundamental Concepts in Environmental Studies, S. Chand & Co. Ltd, 4th edition, 2014.
3. Kurian Joseph and R. Nagendran, Essentials of Environmental Studies, Pearson Education (Singapore) Pvt. Ltd, India, 2017.
4. David Allen and David R. Shonnard, Sustainable Engineering: Concepts, Design and Case Studies, 2011.

(b) REFERENCES

1. Suresh K.Dhameja, Environmental Engineering and Management, S.K. Kataria & Sons, 2013.
2. Bradley Striebig, Adebayo A. Ogundipe and Maria Papadakis, Engineering Applications in Sustainable Design and Development, 2015.

v. Continuous Assessment

| | |
|-----------------------------|--------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 80 marks |
| Assignment | : 15 marks |
| Total | : 100 marks |



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|-------------------------|----------|---|---|---|---|--------|----------------------|
| 23PYP10A | ENGINEERING PHYSICS LAB | BSC | 0 | 0 | 2 | 0 | 1 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

The aim of this course is to enable the students to gain practical knowledge in Physics to correlate with the theoretical studies. It equips the students to utilize the acquired skills in an appropriate way to explore the prospects of modern technology. It brings more confidence in students and develop the ability to fabricate engineering and technical tools

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|-------|
| CO 1 | Determine the frequency of tuning fork using a Melde's string apparatus by setting up wave pattern in a stretched string. | Apply |
| CO 2 | Determine the Numerical aperture and acceptance angle of Optical fiber. | Apply |
| CO 3 | Determine the wavelength of a monochromatic beam of light and thickness of thin wire using principle of interference | Apply |
| CO 4 | Demonstrate diffraction of light using plane transmission grating. | Apply |
| CO 5 | Draw the I-V characteristics of non ohmic devices. | Apply |

iii. SYLLABUS

1. Melde's string apparatus- Measurement of frequency in the transverse mode.
2. Wavelength measurement of a monochromatic source of light using Newton's Rings method
3. Determination of diameter of a thin wire or thickness of a thin strip of paper using air wedge method.
4. Measurement of wavelength of a source of light using grating.
5. Determination of dispersive power and resolving power of a plane transmission grating.
6. Determination of the wavelength of any standard laser using diffraction grating
7. I-V characteristics of solar cell



8. To measure the Numerical aperture and acceptance angle of an optical fibre

iv. REFERENCES

1. S.L. Gupta and V. Kumar, *Practical physics with viva voce*, Pragati Prakashan Publishers, Revised Edition, 2009..
2. M.N. Avadhanulu, A.A. Dani and Pokely P.M., *Experiments in Engineering Physics*, S.Chand &Co, 2008.
3. S. K. Gupta, *Engineering Physics practicals*, Krishna Prakashan Pvt. Ltd., 2014 4) P. R. Sasikumar, *Practical Physics*, PHI Ltd., 2011.

v. Continuous Assessment

| | |
|------------------------------------|--------------------|
| Attendance | : 5 marks |
| Class work/ Assessment /Viva- voce | : 55 marks |
| Written Examination | : 40 marks |
| Total | : 100 marks |



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|-------------------------------------|----------|---|---|---|---|--------|----------------------|
| 23ESP10B | ELECTRICAL AND ELECTRONICS WORKSHOP | ESC | 0 | 0 | 2 | 0 | 1 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

To expose the students to the commonly used accessories and components in electrical installations and to provide hands on experience of wiring of electrical circuits.

To enable the students to familiarize, identify, construct, and debug the electronic components, devices and circuits. It also enables the student's engineering skills by soldering practices of electronic circuits.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|----------|
| CO 1 | Choose the appropriate tools, electrical accessories, protective elements for electrical wiring and study the different types of earthing and safety measures. | Remember |
| CO 2 | Build a simple lighting circuit for domestic buildings using suitable accessories and materials. | Apply |
| CO 3 | Identify the faults in electric circuits and batteries using appropriate devices. | Apply |
| CO 4 | Make use of a solar powered circuit and obtain its VI characteristics. | Apply |
| CO 5 | Test various electronic components. | Apply |
| CO 6 | Implement basic electronic circuits on breadboard . | Apply |
| CO 7 | Implement basic electronic circuits on general purpose PCB . | Apply |

iii. SYLLABUS

Part A: Electrical Workshop

Familiarization/Identification of electrical components with specification (Functionality, type, size, colour coding, symbol, cost etc. of Wires, Cables, Connectors, Fuses, MCB, ELCB, Switches and other electrical installation equipments with ratings).

Understand the safety precautions to be observed in the workshop.

Demonstration of usage of fire extinguishers and learn about basic first aid procedures.



Wiring of one lamp controlled by one SPST switch and a plug socket (PVC conduit wiring).

Wiring of light/fan circuit controlled by two SPDT switches (Staircase wiring). Wiring of a light circuit and a power circuit for domestic applications.

Wiring of simple solar chargeable circuit and determination of its characteristics.

a) Demonstration of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.

b) Application of tester and test lamp for identifying simple faults in electrical systems.

a) Video demonstration of Pipe and Plate Earthing Schemes.

b) Testing of batteries using hydrometer.

Part B: Electronics Workshop

Familiarization of electronic equipment and commonly used tools

Familiarization and testing of electronic components Interconnection using bread board

a. Diode Characteristics

b. Single stage RC coupled Amplifier

c. Truth table verification of Logic Gates

Soldering Practice

a. DC Power Supply

b. Inverting and Non Inverting amplifier using Op-amp

iv. REFERENCES

1. Singh R. P., Electrical Workshop: Safety, Commissioning, Maintenance & Testing of Electrical Equipment, Dream tech Press, 3rd Edition, 2019.
2. John H. Watt, Terrell Croft American Electricians' Handbook: A Reference Book for the Practical Electrical Manual, McGraw-Hill, 9th Edition, 2002.
3. Navas K A, Electronics Lab Manual, , Volume 1, PHI Learning Private Limited, 5th Edition, 2015.



v. Continuous Assessment

| | |
|------------------------------------|--------------------|
| Attendance | : 5 marks |
| Class work/ Assessment /Viva- voce | : 55 marks |
| Written Examination | : 40 marks |
| Total | : 100 marks |



SEMESTER- II



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|--|----------|---|---|---|---|--------|----------------------|
| 23MAL10B | VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS | BSC | 3 | 1 | 0 | 0 | 4 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

The objective of this course is to familiarize the prospective engineers with some advanced concepts and methods in Mathematics which include the Calculus of vector valued functions, ordinary differential equations and basic transforms such as Laplace and Fourier Transforms which are invaluable for any engineer's mathematical tool box. The topics treated in this course have applications in all branches of engineering

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|-------|
| CO 1 | Compute the derivatives and line integrals of vector functions and learn their applications. | Apply |
| CO 2 | Evaluate surface and volume integrals and learn their inter-relations and applications. | Apply |
| CO 3 | Solve linear ordinary differential equations. | Apply |
| CO 4 | Apply Laplace transform to solve ODEs arising in engineering. | Apply |
| CO 5 | Apply Fourier transforms of functions to solve problems arising in engineering. | Apply |

iii. SYLLABUS

Vector Calculus – Derivative of vector function, Gradient, Divergence, Curl, Line integral, conservative fields.

Green's theorem, surface integral, Gauss divergence theorem, Stokes' theorem.

Ordinary Differential Equations – Homogeneous and Non-Homogeneous linear differential Equations, Euler-Cauchy equations. Method of undetermined coefficients and Method of variation of parameters.

Laplace transforms – Laplace Transform and its inverse, shifting theorems, Laplace



transform of derivatives and integrals, solution of differential equations using Laplace transform, Unit step function. Dirac delta function. Convolution theorem and its applications.

Fourier Transforms – Fourier integral representation, Fourier sine and cosine integrals. Fourier transform and inverse Fourier transform. Fourier sine and cosine transforms, inverse sine and cosine transform. Convolution theorem

Iv (a) TEXT BOOKS

1. H. Anton, I. Biven S.Davis, “Calculus”, Wiley, 10th edition, 2015.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2016.

(b) REFERENCES

1. George F Simmons: Differential Equation with Applications and its historical Notes,2e McGraw Hill Education India 2002.
2. Hemen Datta, Mathematical Methods for Science and Engineering, CengageLearning,1st. ed .
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2018.

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Total | : 40 marks |

vi. End Semester Examination

There will be an end semester examination for 60 marks with a duration of 3 hours.



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|-----------------------|----------|---|---|---|---|--------|----------------------|
| 23CYL10A | ENGINEERING CHEMISTRY | BSC | 3 | 1 | 0 | 0 | 4 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

The aim of the Engineering Chemistry program is to expose the students to basic concepts of chemistry and its Industrial as well as Engineering applications. It also let the students to familiarize with different topics such as new-generation engineering materials, storage devices, different instrumental methods etc.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|------------|
| CO 1 | Apply the basic concepts of Electrochemistry in various Engineering problems. | Apply |
| CO 2 | Apply the basic concepts of UV-Visible, IR and NMR spectroscopic techniques to analyze organic compounds. | Apply |
| CO 3 | Explain the significance of conducting polymers, Nanomaterials, Alloys and composite materials in Engineering. | Understand |
| CO 4 | Explain relevant techniques used for the identification and separation of chemical compounds and mixtures. | Understand |
| CO 5 | Explain the principles of Green chemistry and various water treatment methods used for sustainability. | Understand |

iii. SYLLABUS

Electrochemistry: Cell prototype- Daniel cell, Nernst equation and its uses, Primary and secondary electrodes- construction and working, applications of electrochemical series. Potentiometric titration – Acid Base titration, Fundamentals of corrosion, Galvanic series, Wet and dry corrosion – types, mechanism and its prevention.

Electrochemical power sources: different types of cells, construction, working and applications– Dry cell, Electrolytic cells, Galvanic cells, Lead-acid cell, accumulator, Lithium ion cell- different electrode materials, Fuel cells, H₂-O₂ fuel cell.

Basics of Spectroscopy: Beer Lambert's law, Principles and applications of UV-Visible spectroscopy, Fluorescence and its applications, Woodward-Feiser rule, instrumentation of UV- Visible spectroscope, colorimetry, Principles and applications of IR spectroscopy, Number of vibrational modes – CO₂ and H₂O, Determination of force constant of diatomic molecules, Principles and applications of NMR spectroscopy, Shielding,



Deshielding, Chemical shift, spin- spin splitting, MRI technique.

Engineering Materials: Basics of Polymer chemistry, Types of copolymers, Preparation, properties and applications- Butadiene Styrene, Acrylonitrile Butadiene Styrene, Kevlar, conducting polymers- Polyaniline and Polypyrrole - preparation properties and applications, Organic Light Emitting Diode

Nanomaterials: Origin of nanomaterials, Classifications, Chemical synthesis- hydrolysis and reduction, Carbon Nano Tubes, Graphene, Quantum dots-applications.

Alloys and Composites: Cast iron, Principal non-ferrous alloys, need, properties and applications of composites, super alloys, Ceramics- structure and applications.

Instrumental methods in chemistry: Thermal methods, Thermo Gravimetric Analysis, Differential Thermal Analysis, Chromatography techniques- Thin Layer Chromatography, Column Chromatography, Gas Chromatography, High Performance Liquid Chromatography, Surface characterization using Scanning Electron Microscopy (SEM), X-ray Photoelectron Spectroscopy(XPS), Auger Electron Spectroscopy(AES).

Green Chemistry and Sustainability: Green chemistry – Principles, Matrices to express greenness- E-Factor, Atom Economy, Environmental Quotient, Green chemistry and Catalysis, R4M4 Models-Econoburette, Survismeter, E-waste disposal, Life Cycle Analysis, Benefits and limitations of conducting Life Cycle Analysis.

Water Technology: Water characteristics, hardness, disadvantages of hard water, Estimation of hardness- EDTA method, Ion exchange process for water softening, Dissolved Oxygen, Biological Oxygen Demand and Chemical Oxygen Demand, its estimation and significance, Municipal water treatment, disinfection of water, Reverse Osmosis, Sewage water treatment.

Iv (a) TEXT BOOKS

D. Harvey, N. Rutledge, *Industrial Chemistry*, ETP, first edition, 2018. ISBN:

1. 9781788820554

M. Arif, A. Fernandez, K. P. Nair, *Engineering Chemistry*, first edition, Owl

2. Books,2019.

3. S. Chawla, *A text book of Engineering Chemistry*, second edition, Dhanpat Rai & Co.2017.

4. Roy Varghese., *Engineering Chemistry*, Second Edition, Crown Pubs., 2019.

5. Prasanta Rath., *Engineering Chemistry*, First Edition, Cenage Learning, 2015.

(b) REFERENCES

1. C. N. Banwell, E. M. Mc Cash, *Fundamentals of Molecular Spectroscopy*, McGraw-Hill, 4th edition, 2017.

2. H. H. Willard, L. L. Merritt, *Instrumental Methods of Analysis*, CBS Publishers, 7th edition, 2023.



3. A. J. Peacock, A. Calhoun, C. Hanser, *Polymer Chemistry: Properties and Application*, Verlag GmbH and Company KG, 2012.
4. C. Binns, *Introduction to Nanoscience and Nanotechnology*, Wiley, 2010.
5. Callister William.D., *Material Science and Engineering*, John Wiley, 2014.
6. Jurgen Garche, Tom Smolinka, *Electrochemical Power Sources- Fundamentals, Systems, and Applications*, Elsevier Science, Second edition, 2021.

v. Continuous Assessment

| | |
|-----------------------------|--------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Total | : 100 Marks |

vi. End Semester Examination

There will be an end semester examination for 60 marks with a duration of 3 hours.



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|----------------------|----------|---|---|---|---|--------|----------------------|
| 23ESB10A | ENGINEERING GRAPHICS | ESC | 2 | 0 | 2 | 0 | 3 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

Aim of the course is to enable the student to effectively perform technical communication through graphical representation as per global standards. The student will be able to apply the principles of projection and will be introduced to the fundamentals of Computer Aided Drawing (CAD)..

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|-------|
| CO 1 | Construct the orthographic projection of points and lines located in different quadrants. | Apply |
| CO 2 | Prepare orthographic projection of solids by visualizing them in different positions. | Apply |
| CO 3 | Prepare multiview projection and solid models of objects using CAD tools. | Apply |
| CO 4 | Prepare assembly drawing of standard machine components using CAD tools. | Apply |
| CO 5 | Construct drawings of engineering systems with CAD tools. | Apply |

iii. SYLLABUS

Introduction: Relevance of technical drawing, basic principles of engineering drawing, BIS code of practice for technical drawing, types of lines, planes of projection, orthographic projection of points in different quadrants. Projection of straight lines.

Orthographic projection of regular solids. Introduction to section, development, isometric and perspective projection

Introduction to Computer Aided Drawing, sketching of simple 2D geometries, editing and dimensioning of 2D geometries, creating 3D model using suitable software.

Plan and elevation of simple building with dimensions, electrical drawing and circuit drawings using suitable CAD software.

Iv (a) TEXT BOOKS

1. Bhatt N.D, Engineering Drawing, Charotar Publishing House Pvt. Ltd, 53rd Edition, 2019.
2. John K.C., Engineering Graphics, Prentice Hall India Publishers, 1st Edition, 2009.
3. C. M.Agrawal, BasantAgrawal, Engineering Graphics, Tata McGraw-Hill, 1stEdition, 2012.

(b) REFERENCES

1. G. S. Phull, H. S.Sandhu, Engineering Graphics, John Wiley & Sons IncPvt. Ltd, 1st Edition, 2014.
2. P. I. Varghese, Engineering Graphics, V.I.P. Publishers,21st Edition, 2010.
3. Jolhe Dhananjay, Engineering Drawing with an Introduction to AutoCAD, (1e), McGraw Hill Education, 2017

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Lab Work | : 10 marks |
| Lab Exam | : 10 marks |
| Total | : 60 Marks |

vi. End Semester Examination

There will be an end semester examination for 40 marks with a duration of 2 hours.

| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|--------------------|----------|---|---|---|---|--------|----------------------|
| 23ESB10G | Python Programming | ESC | 2 | 0 | 2 | 0 | 3 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

The objective of the course is to introduce Python programming and develop programming skills to manage the development of software systems. It covers data processing in Python and introduces Machine Learning and Artificial Intelligence- based applications and tools, Data Science and Data Visualization applications

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|------------|
| CO 1 | Explain the fundamental concepts in Python | Understand |
| CO 2 | Illustrate uses of conditional statements and iterative statements in Python | Apply |
| CO 3 | Develop programs by utilizing the modules Lists, Tuples, Sets and Dictionaries in Python | Apply |
| CO 4 | Develop programs by using user defined functions | Apply |
| CO 5 | Implement programs in Python to process data stored in files by utilizing the modules NumPy, Matplotlib, and Pandas | Apply |

iii. SYLLABUS

Basics of Python- Getting Started with Python Programming, Basic coding skills- Working with data types, Control statements, Selection structure , Iteration structure ,Functions, Python data structures: Lists , Work with tuples, Sets, Dictionaries, Strings and lists, Object Oriented Programming: Design with classes, Exceptions, Visualization and File handling modules in python -NumPy, matplotlib, pandas.

Iv (a) TEXT BOOKS

- Kenneth A Lambert., Fundamentals of Python : First Programs, 2/e, Cengage Publishing, 2016
- Rajaraman, V., Computer Basics and C Programming, Prentice-Hall India
 - David J. Pine, Introduction to Python for Science and Engineering, CRC Press,

2021

(b) REFERENCES

1. Wes McKinney, Python for Data Analysis, 2/e, Shroff / O'Reilly Publishers, 2017
2. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2/e, Schroff, 2016
3. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
4. David M.Baezly, Python Essential Reference. Addison-Wesley Professional; 4/e, 2009.Charles Severance. Python for Informatics: Exploring Information.

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Lab Work | : 10 marks |
| Lab Exam | : 10 marks |
| Total | : 61 Marks |

vi. End Semester Examination

There will be an end semester examination for 40 marks with a duration of 2 hours.

| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|----------------|----------|---|---|---|---|--------|----------------------|
| 23ECL10A | NETWORK THEORY | PCC | 3 | 1 | 0 | 0 | 4 | 2023 |

PRE-REQUISITE : 23ESL10J - Basics of Electrical Engineering
23ESL10L - Basics of Electronics Engineering

i. COURSE OVERVIEW

The goal of this course is to enable the students in solving dc and ac circuits using network theorems, to apply Laplace transform to determine the transient response of networks subjected to test signals and to analyse single and two ports network functions

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|--|-------|
| CO 1 | Use loop/nodal analysis and/or network theorems to solve dc and ac circuits. | Apply |
| CO 2 | Use Laplace Transforms to determine the transient behaviour of RLC networks. | Apply |
| CO 3 | Analyse two port network parameters. | Apply |
| CO 4 | Use pole-zero plot to study the time domain response of a network. | Apply |

iii. SYLLABUS

Mesh and Node Analysis

Mesh and node analysis of network containing independent and dependent sources for dc and ac sources. Super mesh and super node analysis.

Network Theorems

Network theorems applied to dc and ac circuits: Thevenin's theorem, Norton's theorem, Superposition theorem, Reciprocity theorem, Maximum power transfer theorem.

Application of Laplace Transforms

Laplace Transforms and inverse Laplace transform. Transformation of basic signals and circuits into s-domain using Laplace transforms. Analysis of RL, RC, and RLC networks for determining the transient response.

Network functions

Network functions for single port and two port networks. Properties of driving point and transfer functions. Impedance (Z), admittance (Y), transmission (T) and hybrid (h) parameters of two port network.

Pole zero plots and network parameters

Time domain response from pole zero plot. Interrelationship among Z and Y parameters.

Reciprocal and Symmetrical two port networks.

Iv (a) TEXT BOOKS

1. Valkenburg V., "Network Analysis", Pearson, 3/e, 2019.
2. Sudhakar A, Shyammohan S. P., "Circuits and Networks- Analysis and Synthesis", McGraw Hill, 5/e, 2015.
Charles K. Alexander, Matthew N.O. Sadiku, "Fundamentals of Electric Circuits",
3. McGraw Hill Education, 5/e, 2013.

(b) REFERENCES

1. Edminister, "Electric Circuits – Schaum's Outline Series", McGraw-Hill, 2009.
2. Ravish R., "Network Analysis and Synthesis", 2/e, McGraw-Hill, 2015.
3. William D. Stanley, "Network Analysis with Applications", 4/e, Pearson, 2006.
4. K. S. Suresh Kumar, "Electric Circuits and Networks", Pearson, 2008.

v. Continuous Assessment

| | |
|-----------------------------|-------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 20 marks |
| Assignment | : 15 marks |
| Total | : 40 Marks |

vi. End Semester Examination

There will be an end semester examination for 60 marks with a duration of 3 hours.



| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|----------------------------|----------|---|---|---|---|--------|----------------------|
| 23HSJ1NB | Professional Communication | HSC | 2 | 0 | 0 | 2 | 1 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

The objective of this course is to equip students with the necessary skills to listen, read, write, and speak so as to comprehend and successfully convey any idea, technical or otherwise, as well as give them the necessary polish to become persuasive communicators. The course aims to enhance the employability and career Skills of students and orient the students towards grooming as a professional.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|----------|
| CO 1 | Demonstrate effective language skills relevant to Engineering through writing and making presentations. | Apply |
| CO 2 | Analyze a variety of textual and audio content for specific needs | Analyze |
| CO 3 | Evaluate a given technical/non-technical topic. | Evaluate |
| CO 4 | Create professional and technical documents. | Create |
| CO 5 | Communicate proficiently in interviews and exam situations and all social situations. | Apply |

iii. SYLLABUS

Communication Skills: Introducing yourself and others professionally, elevator pitch, recommendation letter, e-mails, netiquettes, telephone etiquettes, demi-official letters

Business Communication and Technical writing: Product description, narrating an incident, report writing, agenda and minutes, memo, Asking for information and giving information, explaining processes and products, giving instructions, planning a course of action.

Creative Thinking, Critical Thinking Skills and problem solving: Expressing opinion, GD, Arguing, Reading critical texts (general and academic) and summarizing, listening and responding, Negotiation strategies and decision making skills.

Presentation Skills: Oral Presentation Skills (Proposal presentation), Power point presentation (Projects).

Interviews: CVs and Resumes LinkedIN, Job application, Types of interviews, successful interviews, interview etiquette, dress code, body language, telephone/online

interviews, one-to-one interview & panel interview, FAQs related to job interviews.

Iv (a) TEXT BOOKS

1. Meenakshi Raman and Sangeetha Sharma (2018). "Professional Communication", 3rd Edition, Oxford University Press, 2018
2. Meenakshi Raman and Sangeetha Sharma, "Technical Communication: Principles and Practice", 2nd Edition, Oxford University Press, 2011
3. M. Ashraf Rizvi, "Effective Technical Communication". New Delhi: Tata McGraw Hill Publications, 2007.

(b) REFERENCES

1. English for Engineers and Technologists (Combined edition, Vol. 1 and 2), Orient Blackswan 2010.
2. Stephen E. Lucas, "The Art of Public Speaking", 10th Edition; McGraw Hill Education, 2012.
3. William Strunk Jr. & E.B. White, "The Elements of Style", 4th Edition, Pearson, 1999.
4. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004.
5. Goodheart-Willcox, "Professional Communication", First Edition, 2017.
6. Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India, 6 edition, 2015.
7. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1 edition, 2013.
8. Anand Ganguly, "Success in Interview", RPH, 5th Edition, 2016.
9. Raman Sharma, "Technical Communications", Oxford Publication, London, 2004.

v. Continuous Assessment

| | |
|-----------------------------|--------------------|
| Attendance | : 5 marks |
| Continuous Assessment Tests | : 80 marks |
| Assignment | : 15 marks |
| Total | : 100 marks |

| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|---------------------------|----------|---|---|---|---|--------|----------------------|
| 23CYP10A | ENGINEERING CHEMISTRY LAB | BSC | 0 | 0 | 2 | 0 | 1 | 2023 |

PRE-REQUISITE :NIL

i. COURSE OVERVIEW

This course is designed to familiarize with the basic experiments in industrial chemistry and to accustom the students with the handling and analyzing chemicals and standard laboratory equipments.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|---------|
| CO 1 | Use volumetric titration techniques for quantitative analysis of water. | Apply |
| CO 2 | Use spectroscopic techniques for analyzing and interpreting the IR spectra and NMR spectra of some organic compounds. | Apply |
| CO 3 | Use instrumental techniques for quantitative chemical analysis. | Apply |
| CO 4 | Organize scientific experiments as a team to analyze the results of such experiments. | Analyze |
| CO 5 | Interpret experimental data by themselves to apply them to real world problems. | Analyze |

iii. SYLLABUS

1. Estimation of total hardness of water by EDTA method.
2. Analysis of IR and ¹H NMR spectra of organic compounds.
3. Determination of wavelength of absorption maximum and colorimetric estimation of Fe³⁺ in solution.
4. Determination of molar absorptivity of a compound.
5. Estimation of chloride in water by argentometric method
6. Calibration of pH meter and determination of pH of a solution.
7. Potentiometric titration: Acid – base titration
8. Estimation of dissolved oxygen in water by Winkler's method..

iv. REFERENCES

1. R. K. Mohapatra, *Engineering Chemistry with Laboratory Experiments*, 2015,

First edition, PHI Learning, New Delhi.

2. S. C. George, R. Jose, *Lab Manual of Engineering Chemistry*, 2019, First edition, S.Chand & Company Pvt Ltd, New Delhi.
3. E. Slowinski, W. C. Wolsey, *Chemical Principles in the Laboratory*, 2008, Cengage Learning, 11th edition, New Delhi.

v. Continuous Assessment

| | |
|----------------------------------|--------------------|
| Attendance | : 5 marks |
| Class work/ Assessment/viva voce | : 55 marks |
| Written Examination | : 40 marks |
| Total | : 100 marks |

| Course Code | Course Name | Category | L | T | P | J | Credit | Year of Introduction |
|-------------|--|----------|---|---|---|---|--------|----------------------|
| 23ESB10P | Manufacturing and Construction Practices B | ESC | 1 | 0 | 2 | 0 | 2 | 2023 |

PRE-REQUISITE: NIL

i. COURSE OVERVIEW

- This subject for exposing the students to the various theoretical and practical aspects of, manufacturing processes and familiarize various tools, measuring device, practices and machines used in workshop section.
- The goal of this course is to introduce the students to the field of Civil Engineering and its importance in the development of the Country. The course is designed to have lecture sessions on an introduction to the various fields of Civil Engineering and different aspects of construction. The workshop session will provide hands-on experience in certain construction-related activities including surveying and levelling.

ii. COURSE OUTCOMES

After the completion of the course, the student will be able to:

| Course Outcomes | Description | Level |
|-----------------|---|------------|
| CO 1 | Explain the basic manufacturing, metal joining and machining processes | Understand |
| CO 2 | Demonstrate general safety precautions in different mechanical workshop trades. | Understand |
| CO 3 | Prepare simple models using fitting, carpentry, sheet metal, welding and 3D printing techniques. | Apply |
| CO 4 | Identify the tools and equipment used in fitting, carpentry, sheet metal, welding and various machine tools. | Apply |
| CO 5 | Explain the various disciplines of Civil Engineering and its relevance in the development of the nation. | Understand |
| CO 6 | Explain the different structural elements of a building and the building rules and regulations. | Understand |
| CO 7 | Apply engineering principles and tools to set-out a plan, estimate the area and profile of plots, and construct masonry wall. | Apply |
| CO 8 | Examine the quality of different building blocks. | Apply |
| CO 9 | Make use of plumbing tools to install fixtures like tap, T-Joint, elbow, bend etc. | Apply |

iii. SYLLABUS

Introduction to Workshop practice: Workshop practice, shop floor precautions, ethics and First Aid knowledge. Studies of mechanical tools, components and their applications: Tools: Screw drivers, spanners, Allen keys, cutting pliers etc. and Accessories

Sheet Metal–Sheet metal forming, Sheet metal cutting, Forging, Rolling, Extrusion. Welding– Elementary ideas of joining process-welding, soldering and brazing. Fitting– Study of tools, Practice in filing, cutting. Male and female joints. Carpentry– Study of tools and joints. Practice in planning, chiseling, marking and sawing.

Machine Tools (Basic elements, Working principle and types of operations), Lathe, Drilling Machine, Shaper, planer, slotter, Milling Machine, Grinding machine Machining processes: turning, taper turning, thread cutting, shaping, drilling, grinding, milling. Introduction to CNC and 3D Printing.

General Introduction to Civil Engineering: Relevance of Civil Engineering in the development of the nation. Brief introduction to major disciplines of Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management, GIS.

Structural elements of a building: Foundation, plinth, lintel, masonry wall, column, beam, slab, sunshade, parapet, staircase. Plinth area, built up area, carpet area, floor area ratio. Permission plan of a building – Demonstration. Building rules and regulations: NBC, KBR & CRZ norms.

Module 5: Surveying: Principles, instruments used. Levelling: Principles of levelling using dumpy level - simple levelling, differential levelling. Demonstration of Total Station. Brick masonry – Types of bonds, Masonry arches, number of bricks for construction, other types of building blocks. Construction materials – cement, mortar, concrete. Plumbing tools. Types of roofs, Flooring materials

Practicals:

1. Machine shop
2. Fitting shop
3. Carpentry
4. Welding shop (Arc welding + Gas welding)
5. Sheet Metal
6. CNC
7. 3D Printing
8. Compute area of a given plot using tape, EDM etc.
9. Levelling – Plot the longitudinal section of a road.
10. Setting out of a building: Set out a building as per the given building plan. Each group can set out one or two rooms of the building.
11. Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) – corner portion – length of side walls 60 cm

12. Cast paver blocks using mortar and test for strength (Include sustainable materials also)
13. Tests for strength of various types of building blocks
14. Study on plumbing and install plumbing fixtures like Tap, T-Joint, Elbow, Bend, Threading etc.
15. Plan a rainwater harvesting system

Iv (a) TEXTBOOKS

1. AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual) ISBN: 978-93-91505-332
Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of
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v. Continuous Assessment

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|------------------------------------|--------------------|
| Attendance | : 5 marks |
| Class work/ Assessment /Viva- voce | : 55 marks |
| Written Examination | : 40 marks |
| Total | : 100 marks |

Note: Detailed evaluation and grading policy will be provided by the faculty concerned at the beginning of the course.