DR. B. C. ROY ENGINEERING COLLEGE

An Autonomous Institution
Approved by: All India Council for Technical Education (AICTE)

Affiliated to: Maulana Abul Kalam Azad University of Technology (MAKAUT), West Bengal (Formerly Known as -WBUT)

Jemua Road, Durgapur, West Bengal, India,713206

BACHELOR OF TECHNOLOGY (B. Tech.)

Common Syllabus of 1st Year

Group-B: CSE / IT / DS / CSD

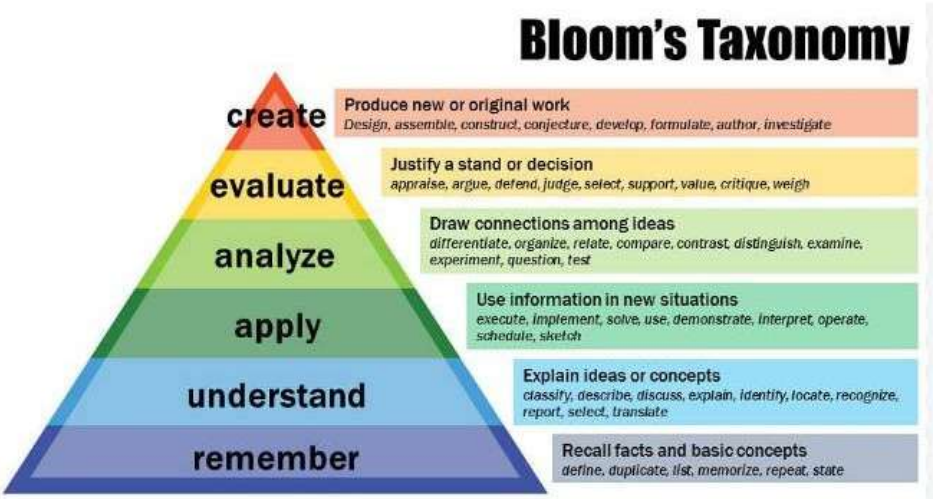
(Applicable from the academic session 2024-2025)



http://www.bcrec.ac.in

BLOOM'S TAXONOMY

Bloom's taxonomy is a framework for categorizing educational goals, developed by a committee of educators chaired by Benjamin Bloom in 1956. It was first introduced in the publication *Taxonomy of Educational Objectives: The Classification of Educational Goals*. The taxonomy divides learning objectives into three broad domains: cognitive (knowledge-based), affective (emotion-based), and psychomotor (action-based), each with a hierarchy of skills and abilities. These domains are used by educators to structure curricula, assessments, and teaching methods to foster different types of learning.



Revised Bloom's Taxonomy Action Verbs

Definitions	I.Remembering	II.Understanding	III.Applying	IV.Aanalyzing	V.Evaluating	VI.Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts and answers	Demonstrate understanding of facts and ideas by organizing, comparing, translating interpreting giving descriptions and stating main ideas	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way	Examine & break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations	Present & defend opinions by making judgements about information, validity of ideas or quality of work based on a set of criteria	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions
Verb's	Choose Define Find How Label List Match Name Omit Recall Relate Select Show Spell Tell What When Where Which Who Why	Classify Compare Contrast Demonstrate Explain Extend Illustrate Infer Interpret Outline Relate Rephrase Show Summarize Translate	Apply Build Choose Construct Develop Experiment with Identify Interview Make use of Model Organize Plan Select Solve Utilize	Analyze Assume Categorize Classify Compare Conclusion Contrast Discover Dissect Distinguish Divide Examine Function Inference Inspect List Motive Relationships Simplify Survey Take part in Test for Theme	Agree Appraie Asses Award Choose Compare Conclude Criteria Criticize Decide Deduct Defend Determine Disprove Estimate Evaluate Explain Importance Influence Interpret Judge Justify Mark Measure Opinion Perceive Prioritize Prove Rate Recommend Rule on Select Support Value	Adapt Build Change Choose Combine Compile Compose Construct Create Delete Design Develop Discuss Elaborate Estimate Formulate Happen Imagine Improve Invent Make up Maximize Minimize Modify Original Originate Plan Predict Propose Solution Solve Suppose Test Theory

Program Outcomes (Revised)

1. **PO1: Engineering Knowledge**: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

2. **PO2: Problem Analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

3. **PO3: Design/Development of Solutions**: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

4. **PO4: Conduct Investigations of Complex Problems**: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

5. **PO5: Engineering Tool Usage**: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

6. **PO6: The Engineer and The World**: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

7. **PO7: Ethics**: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

8. **PO8: Individual and Collaborative Teamwork**: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

9. **PO9: Communication**: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

10. **PO10: Project Management and Finance**: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

11. **PO11: Life-Long Learning**: Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

COURSE STRUCTURE: Group-B

B. Tech. 1st Year (1st Semester)

Theory							
Sl No	**Paper Name**	**Paper Code**	**Marks**	**L**	**T**	**P**	**Credit**
1	Chemistry	CH-101	100	3	0	0	3
2	Mathematics-I	M-101	100	3	0	0	3
3	Engineering Mechanics	ME-101	100	3	0	0	3
4	Basic Electronics Engineering	EC-101	100	3	0	0	3
5	Introduction to Computer Hardware and Software	CS-101	100	3	0	0	3
	Total Theory		500	15	0	0	15
Practical							
1	Chemistry Lab	CH-191	100	0	0	2	1
2	Basic Electronics Engineering Lab	EC-191	100	0	0	2	1
3	Introduction to Computer Hardware and Software Lab	CS-191	100	0	0	4	2
4	Engineering Graphics	ME-191	100	0	0	4	2
	Total Practical		400	0	0	12	6
	Total in 1st Semester		900	15	0	12	21
Mandatory Courses							
1	Environmental Science	ENV-101	100	1	0	0	0

1st SEMESTER SYLLABUS
Group-B

Course Name: Mathematics-I
Course Code: M-101
(Semester- I)
Course Broad Category: Basic Science

……

1. **Course Prerequisite:**
   Concept of Mathematics in 10+2 standard.

2. **Course Learning Objectives:**
   The objective of this courses to familiarize the prospective engineers with techniques in calculus multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advance level that will serve them well towards tackling more advance level of mathematics and applications that they would find useful in their disciplines.

3. **Teaching methodology and evaluation system for the course:**
   Teaching methodology – Lectures and Presentations, Interactive Discussions and Case Studies, Guest Lectures.

   Evaluation System –

   CIA-1 (Total: 40 Marks)
   - **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
   - **Assignment: 10 Marks**
   - **Attendance: 5 Marks**

   CIA-2 (Total: 40 Marks)
   - **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
   - **Assignment: 10 Marks**
   - **Attendance: 5 Marks**

- **End Semester Examination (ESE): Total: 60 Marks**
- **The minimum passing marks to be secured is 40 (40%) out of allotted total 100 marks (CIA: 40 marks and ESE: 60 marks).**

4. **Course Content:**
   Course Name: Mathematics-I
   Course Code: M-101
   Hours per Week: 3L: 0T: 0P
   Credits: 3

Module	Topics	45L
1.	**Sequence and Series:** Sequences: Limit of a Sequence, Boundedness, Convergence, Divergence and Oscillation of a Sequence. Infinite Series: Necessary Condition for Convergence, Tests for Convergence and Divergence, Comparison Test: Only for Series with Positive Terms, Cauchy's Integral Test, D Alembert's Ratio Test, Cauchy's Root Test, Raabe's Test (Higher Ratio Test), Logarithmic Test, Alternating Series Leibnitz's Theorem, Absolute Convergence and Conditional Convergence, Power Series.	8L
2.	**Differential Calculus (Single Variables):** Functions of single variable: Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's Series and Maclaurin's Series Expansions with Different forms of Remainders (Only statements and applications in all cases).	6L
3.	**Differential Calculus (Several Variables):** Functions of Several Variables: Limit and Continuity, Partial Differentiation, Total Derivative. Partial Differentiation of Composite Functions: Change of Variables, Differentiation of an Implicit Function, Euler's Theorem for Two variables (statement only), Jacobian, Taylor's Theorem for Function of Two Variables (statement only), Maxima and Minima of Functions of Two Variables: With and Without Constraints, Lagrange's Method of Undetermined Multipliers.	10L
4.	**Integral Calculus:** Improper Integrals: Different types of Improper Integrals and their Convergence, Beta and Gamma function and their properties. Double Integrals and Triple Integrals - Application of Double Integrals and Triple Integrals, Change of Order of Integration.	9L
5.	**Linear Algebra:** Real Matrices: Symmetric, Skew-Symmetric, and Orthogonal Matrices (examples and uses), Inverse of a Matrix, Rank of a Matrix, Diagonalization of a Matrix. Complex Matrices: Hermitian, Skew-Hermitian, Unitary Matrices (examples and uses). Determinants, Solutions of Linear System of Equations-- Existence, Uniqueness. Cramer's Rule, Gauss–Jordan Elimination., Gauss Elimination Method, LU-decomposition Method from Gaussian Elimination. Basics of Group Theory. Vector Spaces, Basis, Dimension and Nullity. Linear Dependence and Independence. Matrix Eigenvalue Problem - Determining Eigenvalues and Eigenvectors, Cayley-Hamilton Theorem (statement only and uses), Some Applications of Eigenvalue Problems, Linear Transformations.	12L

5. Suggested Learning Resources::

Text Book:

- B. S. Grewal-- Higher Engineering Mathematics; **Publisher.** Khanna **Publishers.**
- Ramana B. V. --- Higher Engineering Mathematics; **Publisher.** McGraw Hill Education**.**

Reference Books:

- G. B. Thomas & R.L. Finney--- Calculus and Analytic Geometry; **Publisher.** Penguin Random House Australia**.**
- E. Kreyszig--- Advanced Engineering Mathematics (9th Edition); **Publisher.** Wiley.
- Veerarajan T.--- Engineering Mathematics for 1st year (TMG); **Publisher.** McGraw Hill Education**.**
- D. Poole---- Linear Algebra: A Modern Introduction; **Publisher.** Cengage Learning India Private Limited.
- Bali & Goel--- Text Book of Engineering Mathematics; **Publisher**. Laxmi **Publications**
- H. K. Das -- Higher Engineering Mathematics; **Publisher**. Visionias.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
M 101.1	Remember to identify different tools in algebra and calculus which would enable them to devise engineering solutions to encounter in their profession life.	Identify	Remember
M 101.2	Understand the concept to explain applications of functions of single and several variables in applied sciences and engineering problems.	Explain	Understand
M 101.3	Apply to implement the concept of partial derivatives in finding the maxima and minima of a function of several variables in the area of real-life problems.	Implement	Apply
M 101.4	Analyze the ideas of mentioned mathematical tools to organize complex real-life problems.	Organize	Analyze
M 101.5	Evaluating the gradation of described mathematical tools in linear algebra to assess the right approach to solve multidisciplinary engineering problems.	Assess	Evaluate
M 101.6	Construct logical and analytical skills to create a new idea appreciated by academics, research & emerging trends in industry.	Construct	Create

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	2	-	1
2	2	3	-	1	-	1
3	2	3	3	2	-	1
4	3	-	-	2	-	1
5	2	-	-	1	3	1

8. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M 101.1	2	2	2	2	1	-	-	-	-	-	1
M 101.2	3	2	1	1	-	-	-	-	-	-	1
M 101.3	3	2	2	1	1	-	-	-	-	-	1
M 101.4	2	3	1	2	2	-	-	-	-	-	2
M 101.5	3	2	1	2	2	-	-	-	-	-	1
M 101.6	2	1	1	1	-	-	-	-	-	-	1

9. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
M101.CO1	1	—	—
M101.CO2	1	—	—
M101.CO3	2	—	—
M101.CO4	2	—	—
M101.CO5	2	—	—
M101.CO6	1	—	1

Course Name: CHEMISTRY
Course Code: CH-101
(Semester- I)
Course Broad Category: BASIC SCIENCE

……

1. Course Prerequisite:

Class-XII level knowledge of Chemistry, Mathematics, and Environmental Science.

2. Course Learning Objectives:

i. This course impart basic knowledge of chemistry, general awareness of environmental pollution aspects, their impact and the basic ideas about material science (structure property relationships) among the engineering students for the better foundation of technical education.
ii. To provide basic fundamentals among the upcoming young engineers and to carry out advanced research work in chemistry and allied domains.

3. Teaching methodology and evaluation system for the course:

Teaching methodology –Lectures and Presentations, Interactive Discussions and Case Studies and Guest Lectures.

Evaluation System –

CIA-1 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

CIA-2 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

- **End Semester Examination (ESE): Total: 60 Marks**
- **The minimum passing marks to be secured is 40 (40%) out of allotted total 100 marks (CIA: 40 marks and ESE: 60 marks).**

4. Course Content:

Course Name: Chemistry
Course Code: CH-101
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	42L
1.	**Chemical Bonding:** Molecular orbitals of homonuclear and heteronuclear diatomic molecules. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Organometallic compounds and their Industrial Applications. Band structure of solid sand the role of doping on band structure.	8L
	Thermodynamics & Electrochemistry: Introduction, thermodynamic functions: enthalpy, entropy and free energy. Estimations of entropy and free energies. Gibbs Helmholtz equation. Electrochemistry- conductance, Sp. Conductance, equivalent conductance, Ostwald dilution law, conductometric titration. Free energy and EMF. Cellpotentials, The Nernst equation and applications. Latium Ion Battery,H_2/O_2 fuel Cells. Water chemistry. Corrosion.	7L
2.	**Organic Reactions & Mechanism:** Introduction to reactions involving substitution,, addition, elimination, oxidation, reduction, Condensation.	6L
	Polymer: Properties & Applications: Concepts, classifications and industrial applications. Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Poly dispersity index (PDI). Polymerization processes (addition and condensation polymerization),degree of polymerization, Copolymerization, stereo-regularity ofpolymer, crystallinity (concept of T_m) and amorphicity (Concept of T_g) of polymer. Preparation, structure and use of some common polymers: plastic (PE:HDPE, LDPE, PVC, Bakelite, PP), rubber (natural rubber, SBR, NBR)and Vulcanization. Fibre (nylon 6.6, Nylon 6,Polyester).Conducting and semi-conducting polymers.	5L
3.	**Industrial Chemistry:** Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Coalanalysis: Proximate and ultimate analysis. Liquid fuel: Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number, Gaseousfuels: Naturalgas, watergas, coalgas, biogas. Cement and its classification, Chemical composition, Physical properties, Setting and hardening, Properties. ***Iron and steel manufacturing, Hardening and annealing, Alloy Steel***	6L
	Spectroscopic Techniques & Applications: Basic concepts of UV, IR, NMR spectroscopy and their applications.MRI and its structural elucidation.	3L

4	**Nanochemistry & Composite Materials:** Nanotechnology: Introduction, Synthesis, Properties, Nanomaterials, Nanostructure, Nanochemistry and environmental application like water purification. Composite materials: Introduction, Constituents, Fibrerein forced composites, Particle reinforced composites, Failure.	3L
	Green Chemistry: Introduction, Principles of green chemistry, Use of alternative feed stock, Use of Alternative Solvents, Design of safer chemicals, Bio-fuel for sustainable development using green chemistry. Atom economy.	3L

5. Suggested Learning Resources::

Text Book:

1. Engineering Chemistry, JainandJain ,Dhanpat Rai & Co Pvt Ltd
2. A Text book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co PvtLtd
3. Engineering Chemistry, Gourkrishna Dasmohapatra, Vikas Publishing House
4. Engineering Chemistry, K. L. Chugh, Kalyani Publishers.
5. Engineering Chemistry, Willey

Reference Books:

1. General & Inorganic Chemistry, R. P. Sarkar, New Central Book Agency P Ltd
2. I.L. Finar, Organic Chemistry, Addison Wesley Longman, Inc
3. Organic Chemistry, Morrison & Boyd, Prentice Hall of India
4. Physical Chemistry, K.L. Kapoor, McMillan
5. P. C. Rakshit, Physical Chemistry, Sarat Book House (7thEdition)
6. Green Chemistry Theory and Practice By Paul T. Anastas, John Charles Warner Oxford University Press

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CH 101.1	Correlate Structure and Properties of Solids and Coordination Compounds.	Identify, Select	Analyse
CH 101.2	Rationalise bulk properties and processes using thermodynamic and electrochemical concept	Explain	Understand
CH 101.3	Interaction of radiation with matter and structural elucidation.	Recognize	Understand
CH 101.4	Analysis of polymeric property and application of industrial materials.	Identify, Implement	Apply
CH 101.5	Importance of green chemistry and nanomaterial towards structural application and sustainable development.	Design	Apply
CH 101.6	Organic reaction mechanism and structural determination.	Implement	Apply

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	3	-	-	-	-
2	-	-	-	3	-	3
3	-	-	3	2	-	-
4	-	-	-	-	3	-

8. Mapping of the Course outcomes to Program Outcomes (PO)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CH 101.1	2	1	1	-	-	-	-	-	-	-	2
CH 101.2	1	2	1	-	-	-	-	-	-	-	2
CH 101.3	1	1	1	-	-	-	-	-	-	-	2
CH 101.4	1	2	1	-	-	-	-	-	-	-	2
CH 101.5	1	2	1	-	-	-	-	-	-	-	2
CH 101.6	1	1	2	-	-	-	-	-	-	-	2

9. Mapping to Program Specific Outcomes (PSO)

Course Outcome	PSO1	PSO2	PSO3
CH101.CO1	1	—	—
CH101.CO2	1	—	—
CH101.CO3	1	—	1
CH101.CO4	1	—	2
CH101.CO5	1	—	—

Course Name: BASIC ELECTRONICS ENGINEERING
Course Code: EC-101
(Semester– I)
Course Broad Category: ENGINEERING SCIENCE

……

1. Course Prerequisite:

Class-XII level knowledge of Physics and Mathematics

2. Course Learning Objectives:

i. This course introduces the concepts about solid-state electronic components and their applications.
ii. Students will also learn to design and analyze basic analog electronic and digital logic circuits.

3. Teaching methodology and evaluation system for the course:

Teaching methodology – Lectures and Presentations, Interactive Discussions and Case Studies.

Evaluation System –

CIA-1 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

CIA-2 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

- **End Semester Examination (ESE): Total: 60 Marks**
- **The minimum passing marks to be secured is 40 (40%) out of allotted total 100 marks (CIA: 40 marks and ESE: 60 marks).**

4. Course Content:

Course Name: BASIC ELECTRONICS ENGINEERING
Course Code: EC-101
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	36L
1.	**Semiconductor Diodes:** Semiconductor materials- intrinsic and extrinsic types • Ideal Diode, practical diode: open circuit, forward and reverse bias condition, V-I characteristics, knee voltage, junction breakdown: Avalanche and Zener • Peak Inverse Voltage (PIV), small signal model, Zener diode and its application • Half-wave, Full-wave (centre tapped) and bridge Rectifier: efficiency, ripple factor, PIV etc, Clipper: positive, negative and biased, Clamper: positive and negative, biased	11L
2.	**Bipolar Junction Transistors (BJTs):** Physical structure and operation• Operating region of BJT • D.C. analysis • Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias• load line, Bias stability, Basic BJT amplifier configuration: common emitter, common base and common collector • relation between α, β and γ, Transistor as a switch: cut-off and saturation modes.	10L
3.	**MOS Field Effect Transistor (MOSFET)**: Enhancement-type MOSFET: structure and physical operation, •Depletion, accumulation and inversion region, •threshold potential, Pass-characteristics •Drain and Transfer characteristics, •Cut-off, linear and saturation region, punch-through breakdown • drain resistance, trans-conductance, •channel length modulation, •Depletion-type MOSFET• CMOS Inverter, transient response, delay definition.	5L
4.	**Operation Amplifier (Op-amps):** Ideal Op-amp Characteristics: Common Mode Rejection Ratio (CMRR), input/output offset voltage and current, slew rate, PSRR etc• Op-amp circuits: comparator, unity gain buffer, inverting amplifier, non-inverting amplifier, adder, subtractor, integrator, differentiator etc.	5L

Module	Topics	36L
5.	**Digital Electronics:** Binary, octal and hexadecimal number systems, number conversion. Binary arithmetic: Addition, subtraction, multiplication and division, basic and universal Logic gates, Truth tables. Function Representation in SOP, POS form; Min-term, Max-term, Canonical Form, Boolean algebra, demorgan's theorem, k-map optimization, logic design.	5L

5. Suggested Learning Resources::

Text Book:

- Electronic Principles, by Sanjay Sharma, S.K.Kataria & Sons
- Integrated Electronics by Millman & Halkias

Reference Books:

- Electronics Devices & Circuits by Salivahanan
- Electronics Circuits by Schilling & Belove

6. Course Outcomes (CO):

After going through this course the Students will be able to:

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
EC 101.1	Understand and Explain the characteristics of P-N junction diode	Explain	Understand
EC 101.2	Identify and analyze the characteristics of Bipolar Junction Transistor	Identify	Analyze
EC 101.3	Identify the characteristics of MOSFET and apply for digital circuit design	Identify, Design	Apply
EC 101.4	Apply diode, BJT and MOSFET to design various electronic circuits	Design	Apply
EC 101.5	Understand and Implement op-amp circuit for different mathematical operations	Implement	Understand
EC 101.6	Design and analyze digital logic circuits	Design	Analyze

7. Mapping of Course Outcomes (CO) to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	2	-	-
2	-	3	-	2	-	-
3	-	-	3	2	-	-
4	-	-	-	2	3	-
5	-	-	-	2	-	3

8. Mapping of the Course Outcomes (CO) to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
EC 101.1	3	1	1	1	-	-	-	-	2	-	1
EC 101.2	3	1	1	1	-	-	-	-	2	-	1
EC 101.3	3	1	1	1	-	-	-	-	2	-	1
EC 101.4	3	1	1	1	-	-	-	-	2	-	1
EC 101.5	3	1	1	1	-	-	-	-	2	-	1
EC 101.6	2	1	1	1	-	-	-	-	2	-	1

9. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
EC101.CO1	1	—	—
EC101.CO2	1	—	—
EC101.CO3	2	1	—
EC101.CO4	2	2	—
EC101.CO5	2	1	—
EC101.CO6	2	2	—

Course Name: ENGINEERING MECHANICS
Course Code: ME-101
(Semester- I)
Course Broad Category: Engineering Science

……

1. **Course Prerequisite:**
Class XI and XII level knowledge of Mechanics, Mathematics (Vector Algebra and Coordinate Geometry, Differential and Integral Calculus)

2. **Course Learning Objectives:**
   iii. This course introduces Statics and Dynamics of Engineering Mechanics with elaborate concepts on equilibrium of forces and motion under forces.
   iv. Students will also get introduced to the subject of Mechanics of Deformable Bodies.

3. **Teaching methodology and evaluation system for the course:**
Teaching methodology –Lectures and Presentations, Interactive Discussions and real world problem discussion.

Evaluation System –

CIA-1 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

CIA-2 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

- **End Semester Examination (ESE): Total: 60 Marks**
- **The minimum passing marks to be secured is 40 (40%) out of allotted total 100 marks (CIA: 40 marks and ESE: 60 marks).**

4. **Course Content:**
Course Name: Engineering Mechanics
Course Code: ME-101
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	42L	CO
1.	**Introduction to Statics:** Importance of Mechanics in engineering; Fundamental idealization: Particle and Rigid body concept; Types of forces (collinear, concurrent, parallel, concentrated and distributed); Vector and scalar quantities; Transmissibility of a force (sliding vector); Lami's Theorem. **Introduction to Vector Algebra:** Parallelogram law; Addition and subtraction of vectors; Free vector, Bound Vector; Representation of Forces and Moments in terms of i, j, k; Cross product and Dot product and their applications. Two and Three Dimensional Force Systems: Moment and Couple; Varignon's theorem; Resolution of a coplanar force by its equivalent Force-couple system. Concept of Equilibrium in Two and Three dimensions; Free body concept; Equations of Equilibrium.	12L	CO1 and CO2
2.	**Concept of Friction:** Laws of Coulomb friction; Angle of Repose; Coefficient of friction; Types of friction. **Distributed Force:** Centroid and Centre of Gravity; Centroids of a triangle, circular arc, quadrilaterals, circular sector, triangular lamina, composite areas. **Moment of Inertia:** M.I of plane figure with respect to an axis in its plane; M.I of plane figure with respect to an axis perpendicular to the plane of the figure, Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. circular plate, ring, cylinder, sphere, rod.	12L	CO3 and CO4
3.	**Introduction to Dynamics:** Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non uniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs. **Plane Curvilinear Motion of Particles:** Rectangular components (Projectile motion); **Normal and Tangential components (Circular motion).**Kinetics of Particles and Rigid bodies: Newton's second law; Equation of motion; D. Alembert's principle and free body diagram; Principle of work and energy; Principle of conservation of energy; Principle of Linear Impulse and Momentum; Power and efficiency with simple examples.	16L	CO5
4.	**Concept of Simple Stresses and Strains:** Normal stress, Shear stress, Bearing stress, Normal strain, Shear strain; Hooke's law;	5L	CO6

Module	Topics	42L	CO
	Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Proportional limit; Elastic limit; Yielding; Ultimate stress; Modulus of elasticity; Working stress; Factor of safety; Definition of malleability, ductility, toughness and resilience; Basic concept of thermal stress and strain.		

5. Suggested Learning Resources::

Text Book:

1. Engineering Mechanics by S. S. Bhavikatti, New Age International Publishers, 9th Edition, 2023.
2. Engineering Mechanics by S. Rajasekaran & G. Sankarasubramanian, Vikas Publishing House Pvt Ltd., Noida.

Reference Books:

1. Engineering Mechanics: Statics & Dynamics by I. H. Shames, 4th ed. – PHI.
2. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed. – Pearson.
3. Engineering Mechanics by R.S. Khurmi, S. Chand Publications, Delhi.
4. A Text Book of Engineering Mechanics by Bansal R. K.(2010), Laxmi Publications.
5. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P.
6. Engineering Mechanics by M.P. Poonia & D.S. Bedi, Khanna Publishing House, 2019.
7. Mechanics for Engineering by Beer, F.P. and Johnston.
8. Fundamental Concepts In Engineering Mechanics by Suman Chakraborty, Everest PublishingHouse
9. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. – TMH.
10. Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press.
11. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda – ChhayaPrakashani
12. Engineering Mechanics [Vol-I & II] by Meriam & Kraige, 5th ed. – Wiley India.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
ME 101.1	Explain the fundamental principles of mechanics, including the importance of mechanics in engineering and the concepts of particles and rigid bodies.	Explain	Understand
ME 101.2	Determine analytically the forces and moments acting on statically determinate structure.	Identify, Select	Understand
ME 101.3	Understand the presence and effects of friction in statics and dynamics.	Implement	Understand
ME 101.4	Compute the centroid of lamina and centre of gravity of solids, area moment of inertia,mass moment inertia of solids.	Compute	Evaluate

ME 101.5	Apply the fundamental concept of kinematics and kinetics to determine displacement, velocity and acceleration of particle and rigid body during linear/ angular/ general plane motions and the extension of Newton's law of motion to work energy principle and Impulse momentum principle.	Apply	Apply
ME 101.6	Understand the deformation and mechanical behaviour of bodies under various load conditions.	Recognize	Understand

7. Mapping of course outcomes to module / course content (hrs)

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	6	6				
2			6	6		
3					16	
4						5

8. Mapping of the Course outcomes to Program Outcomes (PO)

COs	CO-PO Correlation Level											BT
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
ME 101.2	2	2	1	2	1	1	1	-	2	1	1	**U(L2)**
ME 101.3	2	2	2	2	2	2	1	-	1	1	1	**U(L2)**
ME 101.4	2	2	1	2	2	-	1	-	2	2	1	**P(L3)**
ME 101.5	2	2	1	1	1	1	1	-	1	1	1	**P(L3)**
ME 101.6	2	2	1	1	1	1	1	-	1	1	1	**A(L4)**
ME 101.2	2	2	2	2	2	1	2	-	2	2	1	**U(L2)**
AVERAGE	**2**	**1.6**	**2**	**1.6**	**1.6**	**1.2**	**1.2**	**-**	**1.3**	**1.1**	**1**	

9. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
ME101.CO1	1	—	—
ME101.CO2	1	—	—
ME101.CO3	1	—	—
ME101.CO4	1	—	—
ME101.CO5	1	—	—
ME101.CO6	1	—	—

Course Name: Introduction to Computer Hardware and Software
Course Code: CS-101
(Semester– I)
Course Broad Category: Engineering Science

……

1. Course Prerequisite:

Basic knowledge of computers and general mathematical operations.

2. Course Learning Objectives:

i. To introduce students to the fundamental concepts of computer hardware and software.
ii. To equip students with knowledge and practical skills essential for understanding modern computing systems and networks.
iii. To provide an overview of emerging computing technologies and their applications in various domains.

3. Teaching methodology and evaluation system for the course:

Teaching methodology –Lectures and Presentations, Interactive Discussions and Case Studies.

Evaluation System –

CIA-1 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

CIA-2 (Total: 40 Marks)

- **Class Test (Objective + Subjective): 25 Marks (Duration: 1 hour)**
- **Assignment: 10 Marks**
- **Attendance: 5 Marks**

- **End Semester Examination (ESE): Total: 60 Marks**
- **The minimum passing marks to be secured is 40 (40%) out of allotted total 100 marks (CIA: 40 marks and ESE: 60 marks).**

4. Course Content:

Course Name: Introduction to Computer Hardware and Software Course
Course Code: CS-101
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	Lectures
Unit 1: Computer Basics	Definition and Characteristics of Computers, Evolution of Computers, Generations of Computers, Classification of Computers, Applications of Computers, Computer System, its Components, and their Functions.	4L
Unit 2: Number Systems and Data Representation	Basic Concepts of Number Systems, Binary, Octal, Decimal, and Hexadecimal Number Systems, Conversion Between Different Number Systems (Base 2 to Base 10), Shortcut Methods for Conversion among Binary, Octal, and Hexadecimal, Arithmetic Operations in Different Number Systems, Signed and Unsigned Number Systems, Data Representation: Bits, Bytes, and Words, ASCII and Unicode Character Sets, Boolean Algebra and Logic Gates	10L
Unit 3: Memory	Introduction to Computer Memory, Understanding Data Representation in Computer Memory, Speed, Capacity, and Memory Hierarchy, Primary Memory and its Types, Secondary Memory and Classification of Secondary Memory, Various Secondary Storage Devices and Their Utilities.	4L
Unit 4: Computer Software and its Types	Classification of Computer Software, System Software and Application Software, Utility Software, Operating System (OS): Role and Types (CLI-based OS, GUI-based OS), Mobile OS and Network OS.	4L
Unit 5: Data Communication, Computer Network, and Internet Basics	Fundamental Concepts of Data Communication, Transmission Media, Multiplexing and Switching, Computer Networks (LAN, WAN, MAN, PAN), Network Topologies (Bus, Star, Ring, Mesh, and Hybrid), Network Devices: Router, Switch, Hub, Bridge, Gateway, Basics of the Internet and Protocols (TCP/IP, HTTP, FTP, etc.), Email and Client-Server Architecture.	6L
Unit 6: Basics of Programming	Problem-Solving: From Algorithms (Pseudo code and Flowcharts) to Program, Concept of Variables and Constants, Operators, Naming Rules for Variables. Decision Making and Iteration, Concept of Compilers and Interpreters.	6L
Unit 7: Emerging Processing and Computing Technologies	Multi-core processor, Graphics Processing Unit (GPU), Tensor Processing Unit (TPU), Neural Processing Unit (NPU), Quantum Processor, Artificial Intelligence and Machine Learning (AI/ML), Cloud Computing, Cybersecurity, Internet of Things (IoT), Augmented Reality (AR) and Virtual Reality (VR), Big Data and Data Analytics.	4L

5. Suggested Learning Resources::

Text & Suggested Learning Resources: Books:

- Introduction to Computer Science; Pearson publication
- Fundamentals Of Computers by V. Rajaraman, PHI Learning
- Fundamentals of Computers by E Balagurusamy, McGraw Hill Education (India)

6. Course Outcomes (CO):

After going through this course the Students will be able to:

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CS 101.1	Define, describe, and classify computers, their evolution, and their components. Explain the role of computer systems and their applications in real-world scenarios.	**Define, describe, classify &Explain**	Remember, Understand
CS 101.2	**Apply** arithmetic operations and conversion techniques between binary, octal, decimal, and hexadecimal number systems. **Analyze** Boolean algebra expressions and **evaluate** logic gate operations to **solve** problems in data representation.	**Apply, Analyze, Evaluate & Solve**	Apply, Analyze
CS 101.3	**Analyze** different memory types (primary and secondary) and their characteristics such as speed, capacity, and usage. **Compare** and **evaluate** the performance impact of memory hierarchy on computer systems.	**Analyze, Compare & Evaluate**	Analyze, Evaluate
CS 101.4	**Classify** various types of software (system software, application software, utility software) and **describe** their roles in the functioning of computer systems. **Examine** operating systems, mobile OS, and network OS and **assess** their impact on the environment and user experience.	**Classify, Describe, Examine &Assess**	Understand, Classify, Examine
CS 101.5	Apply principles of data communication and network design, including the use of routers, switches, and other networking devices. Analyze network topologies, internet protocols (TCP/IP, HTTP, FTP), and demonstrate the use of networking tools to establish basic computer networks.	Apply, Analyze, & Demonstrate	Apply, Analyze, Demonstrate
CS 101.6	Explore emerging technologies such as multi-core processors, GPUs, and quantum processors. Evaluate the applications of Artificial Intelligence, Cloud Computing, IoT, AR/VR, and Big Data in modern computing. Students will demonstrate the ability to adapt to new technologies and collaborate in interdisciplinary teams.	Explore, Evaluate, Demonstrate, Adapt & Collaborate	Evaluate, Explore, Collaborate

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	-	-	-
2	-	3	-	-	-	-
3	-	-	3	-	-	-
4	-	-	-	3	-	-
5	-	-	-	-	3	-
6	-	-	-	-	-	3
7	-	-	-	-	-	3

8. Mapping of the Course outcomes to Program Outcomes (PO)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CS 101.1	3	2	1		2	1	-	-	-	2	-
CS 101.2	3	3	2	2	2	-	-	-	-	1	-
CS 101.3	3	2	2	1	2	-	-	-	-	1	-
CS 101.4	2	2	2	1	3	-	-	-	-	1	-
CS 101.5	2	3	2	1	2	1	1	-	-	2	-
CS 101.6	3	2	3	2	3	-	-	1		2	-

9. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
CS101.CO1	2	1	—
CS101.CO2	3	1	—
CS101.CO3	2	2	—
CS101.CO4	2	2	—
CS101.CO5	3	2	1
CS101.CO6	2	2	3

Course Name: Environmental Science
Course Code: ENV-181
(Semester- I)
Course Broad Category: Mandatory Course

……

1. Course Prerequisite:

Class-XII level knowledge of Environmental Science, Chemistry and Mathematics.

2. Course Learning Objectives:

i. This course impart basic knowledge of environment, general awareness of environmental pollution aspects, their impact and the basic ideas about material science (structure property relationships) among the engineering students for the better foundation of technical education.

ii. To provide basic fundamentals among the upcoming young engineers and to carry out advanced research work in environmental science and allied domains.

3. Teaching methodology and evaluation system for the course:

Teaching methodology –Lectures and Presentations, Interactive Discussions and Case Studies and Guest Lectures.

Evaluation System–

A. Report Writing: 50 Marks

B. Student Seminar at End Semester: 50 Marks

4. Course Content:

Course Name: Environmental Science
Course Code: ENV-181
Hours per Week: 1L:0T:0P
Credits: 0

Module	Topics	42L
1.	Basic Concepts of Environment: Basic ideas of environment and its component, Renewable and nonrenewable resources and reserves. Air pollution and control: Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere and their temperature variations. Lapse rate: Ambient lapse rate, adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). Green House Effects: Definition, impact of greenhouse gases Green house effects: Definition, impact of green house gases on the global climate and consequently on sea water level, agriculture and marine food. Global warming and its consequence, Control of Global warming. Acid rain: causes, effects and control. Earth's heat budget, carbon capture, carbon footprint Definition of pollutants and contaminants, Primary and secondary pollutants, criteria pollutant. Sources and effect of different air	8L

Module	Topics	42L
	pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. Photochemical Smog. Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP, cyclone separator, bag house, catalytic converter, scrubber Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green house gases, effect of ozone modification	
2.	Water Pollution and Control Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides. River/Lake/groundwaterpollution:River:DO,5dayBODtest, Unseeded and Seeded BOD test, BOD reaction rate constants, COD. Aquifers, hydraulic gradient, ground water flow (Definition only)	4L
6.	Noise Pollution Definition of noise, effect of noise pollution, noise classification [Transportnoise, occupational noise, neighborhood noise]. Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, L_{10} (18hr Index), effective perceived noise level. Noise pollution control.	2L
4.	Land Pollution Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes, electronic waste Recovery and disposal method- Open dumping, Land filling, incineration, composting. Recycling, Reduce, Reuse, Refuse.	2L

5. Suggested Learning Resources::

Text Book:

1. Gour Krishna Das Mahapatra, Basic Environmental Engineering and Elementary Biology, Vikas Publishing House P. Ltd.

Reference Books:

1. Masters, G. M., "Introduction to Environmental Engineering and Science", Prentice-Hal lof India Pvt. Ltd., 1991.
2. De, A. K., "Environmental Chemistry", New Age International.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
ENV 181.1	To understand the natural environment and its relationships with human activities.	Identify, Select	Understand
ENV 181.2	To apply the fundamental knowledge of science and engineering to assess environmental and health risk.	Apply, Explain	Evaluate

ENV 181.3	To develop guidelines and procedures for health and safety issues obeying the environmental energy aspects.	Recognize	Create
ENV 181.4	To acquire skills for scientific problem-solving related to air, water, land and noise pollution.	Identify, Implement	Analyze
ENV 181.5	To acquire knowledge about various Waste Management aspects.	Design	Analyze

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5
1	3	3	2	3	2
2	-	1	2	3	1
3	-	1	-	3	1
4	-	1	-	3	1

8. Mapping of the Course outcomes to Program Outcomes (PO)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ENV 181.1	1	1	1	-	-	2	-	-	-	-	2
ENV 181.2	1	1	1	-	-	2	-	-	-	-	2
ENV 181.3	1	1	1	-	-	2	-	-	-	-	2
ENV 181.4	1	1	1	-	-	2	-	-	-	-	2
ENV 181.5	1	1	1	-	-	2	-	-	-	-	2

9. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
ENV101.CO1	1	—	1
ENV101.CO2	2	—	1
ENV101.CO3	1	—	2
ENV101.CO4	2	—	1
ENV101.CO5	1	—	2

Course Name: CHEMISTRY LAB
Course Code: CH-191
(Semester – I)
Course Broad Category: BASIC SCIENCE

……

1. **Course Prerequisite:**
   Class-XII level knowledge of Chemistry Practical.

2. **Course Learning Objectives:**

i. Expose students to various experimental skills and tools

ii. Togainpracticalknowledgebyapplyingexperimentalmethodstocorrelatewiththe theory. Apply the analytical techniques and graphical analysis to the experimental data.

3. **Teaching methodology and evaluation system for the course:**

Teaching methodology: Instruction: This method recognizes that students have different learning styles, abilities, and backgrounds, and aims to create a learning environment that accommodates these differences.

Evaluation System–

A. **Internal Assessment (PCIA): (60 Marks)-** Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
B. **End-Semester Examination: (40 Marks)-** Summative Assessment.

- **The minimum passing marks to be secured is 50 (50%) out of allotted total 100 marks (PCIA: 60 marks and ESE: 40 marks).**

4. **Course Content:**
   Course Name: CHEMISTRY LAB
   Course Code: CH-191
   Hours per Week: 0L: 0T: 2P
   Credits: 1

Module	Topics	10P
1.	**Instrumental Analysis:** 1. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution. 2. pH-metric titration for determination of strength of a given HCl solution against a standard NaOH solution	2P

Module	Topics	10P
2.	**Estimation through Titrimetric Methods:** 1. To determine chloride ion in a given water sample by Argentometric method. 2. Removal and estimation of hardness of water by Complex ometric titration.	2P
3.	**Determination of Specific Property of a Solution:** 1. Determination of viscosity of Sugar Solution. 2. Determination of surface tension of a sugar solution by drop count method. 3. Determination of partition coefficient of a substance between two immiscible liquids.	3P
4.	**Verification of Law & Equations:** 1. Verification of Lambert Beer's Law using visible colorimeter Determination of Stefan's radiation constant. 2. Study the adsorption of oxalic acid fromsolutiononactivatedcharcoalandexaminethevalid ityofFreundlich isotherm. 3. Determination of dissolved oxygen present in a water sample	3P

Minimum of eight experiments to be performed taking at least one from each module mentioned above.

Textbooks

- Experiments in Applied ChemistryBy Dr. SunitaRatan.
- Quantitative Chemical Analysis By Arthur Vogel.

Reference Books

- Practical Chemistry by Dr. R. C. Bhattacharya.
- Practical Chemistry By S. Chand .

5. Course Outcomes (CO):

After going through this course the Students will be able to:

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CH 191.1	Implement Instrumental analytical procedure for the enrichment of modern technical skill.	Evaluate	Analyze
CH 191.2	Rationalize inter molecular phenomena using thermodynamic considerations.	Identify, Select	Evaluate
CH 191.3	Understand titrimetric methods of water analysis required for environmental context	Implement	Apply
CH 191.4	Concept of radiation matter interaction and its application.	Design	Create
CH 191.5	Evaluate different surface phenomena by adsorption technique.	Identify, Implement	Apply
CH 191.6	Estimate essential parameter like oxygen in water by titrimetric method.	Recognize	Understand

6. Mapping of course outcomes to module/course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	-	-	-
2	-	-	3	-	-	-
3	-	2	-	-	1	-
4	-	-	-	1	1	1

7. Mapping of the Course outcomes to Program Outcomes (PO)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CH 191.1	2	1				1					2
CH 191.2	2	1				1					2
CH 191.3	2	1				1					2
CH 191.4	2	1				1					2
CH 191.5	2	1				1					2
CH 191.6	2	1				1					2

8. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
CH191.CO1	1	—	—
CH191.CO2	1	—	—
CH191.CO3	1	—	1
CH191.CO4	1	—	—
CH191.CO5	1	—	—
CH191.CO6	1	—	1

Course Name: BASIC ELECTRONICS ENGINEERING LAB
Course Code: EC-191
(Semester – I)
Course Broad Category: ENGINEERING SCIENCE
……

1. Course Prerequisite:

Class-XII level knowledge of Physics Practical.

2. Course Learning Objectives:

i. Expose students to experimental skills on electronic circuit design and analysis
ii. To gain practical knowledge by applying experimental methods to correlate with the basic electronic theory.
iii. To apply the analytical techniques and graphical analysis to the experimental data.

3. Teaching methodology and evaluation system for the course:
Teaching methodology: Instruction: This method recognizes that students have different learning styles, abilities, and backgrounds, and aims to create a learning environment that accommodates these differences.

Evaluation System –

A. Internal Assessment (PCIA): (60 Marks)- Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
B. End-Semester Examination: (40 Marks)- Summative Assessment.

- **The minimum passing marks to be secured is 50 (50%) out of allotted total 100 marks (PCIA: 60 marks and ESE: 40 marks).**

4. Course Content:

Course Name: BASICELECTRONICS ENGINEERING LAB
Course Code: EC-191
Hours per Week: 0L: 0T: 2P
Credits: 1

Module	Topics	13P
1.	**Familiarization with electronic component and measuring instruments:** 1. Familiarization with Electronic components such as Resistors, Capacitors, Diodes, Transistors etc. 2. Familiarization with measuring equipment like Multimeter, Trainer-kit, CRO, Signal Generator etc.	2P
2.	**Experiment on Diode and Diode Circuits:** 1. Study on V-I characteristics of Junction Diode.	5P

Module	Topics	13P
	2. Realization of positive and negative Clippers circuit using Diode. 3. Realization of Clamper circuit using Diode 4. Realization of Bridge Rectifier using Diode 5. Realization of Voltage regulator using Zener Diode.	
3.	**Experiment on BJT and MOSFET:** 1. Study of V-I Characteristics of Bipolar Junction Transistors (BJT). 2. Study on V-I Characteristics of MOS-Field Effect Transistors (MOSFET).	2P
4.	**Experiments on OP-AMP circuit:** 1. Realization of Inverting and non-inverting Op-amp amplifier 2. Realization of Op-amp Adder	2P
5.	**Experiment on Digital Logic:** 1. Truth table verification of basic and universal logic gates 2. Logic verification and design of XOR using NAND-Gate	2P

5. Suggested Learning Resources:

Textbooks

- Electronic Principles, by Sanjay Sharma, S.K.Kataria & Sons
- Integrated Electronics by Millman & Halkias

Reference Books

- Electronics Devices & Circuits by Salivahanan
- Electronics Circuits by Schilling & Belove

6. Course Outcomes (CO):

After going through this course the Students will be able to:

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
EC 191.1	Understand different electronic components and measuring equipments	Explain	Understand
EC 191.2	Select and Examine the characteristics of P-N Junction Diode, BJT and MOSFET	Identify, Select	Examine
EC 191.3	Apply and execute diode clipper, clamper and rectifier circuit	execute	Apply
EC 191.4	Apply and implement Zener-diode Circuit	Implement	Apply
EC 191.5	Implement and examine op-amp circuit	Implement	examine
EC 191.6	Implement and analyze digital circuit using logic gate	Implement	Analyze

7. Mapping of Course Outcomes (CO) to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	-	-	-
2	-	2	3	2	-	-
3	-	3	-	-	-	-
4	-	-	-	-	3	-
5	-	-	-	-	-	3

8. Mapping of the Course Outcomes (CO) to Program Outcomes (PO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1
EC 191.1	2	2	1	2	2	-	-	-	-	-	-
EC 191.2	3	3	1	2	2	-	-	-	-	-	-
EC 191.3	3	3	1	2	2	-	-	-	-	-	-
EC 191.4	3	3	1	2	2	-	-	-	-	-	-
EC 191.5	3	3	1	2	2	-	-	-	-	-	-
EC 191.6	3	3	1	2	2	-	-	-	-	-	-

9. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
EC191.CO1	1	—	—
EC191.CO2	2	1	—
EC191.CO3	2	2	—
EC191.CO4	2	2	—
EC191.CO5	2	2	—
EC191.CO6	3	2	—

Course Name: Introduction to Computer Hardware and Software Lab
Course Code: CS-191
(Semester– I)
Course Broad Category: Engineering Science

……

1. Course Prerequisite:

Basic knowledge of computers and general mathematical operations.

2. Course Learning Objectives:

i. To introduce students to the fundamental concepts of computer hardware and software.
ii. To equip students with knowledge and practical skills essential for understanding modern computing systems and networks.
iii. To provide an overview of emerging computing technologies and their applications in various domains.

3. Teaching methodology and evaluation system for the course:

Teaching methodology –Lectures and Presentations, Interactive Discussions and Case Studies.

Evaluation System –

A. Internal Assessment (PCIA): (60 Marks)- Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
B. End-Semester Examination: (40 Marks)- Summative Assessment.

- **The minimum passing marks to be secured is 50 (50%) out of allotted total 100 marks (PCIA: 60 marks and ESE: 40 marks).**

4. Course Content:

Course Name: Introduction to Computer Hardware and Software Lab
Course Code: CS-191
Hours per Week: 0L: 0T: 4P
Credits: 2

Unit	Content
Unit 1: Experiments on Dismantling PCs (1P)	- Dismantling the System Unit: Recognize all major components inside a PC, describe the function of each component, and define the relationship of internal components. - Networking Hardware: Familiarize with the basic hardware required for networking.
Unit 2: Basics of CLI and GUI (3P)	- **a) Command Line Interface (CLI)**: - Learn the main set of commands, shortcut keys, switches, path, current directory, and parent directory. - Understand the power and flexibility of CLIs, especially for

	network and system administrators. - Perform tasks such as: 1. Making a list of all files in a photo folder and saving it in a text document. 2. Copying all files changed in the last week to a flash drive. 3. Deleting all files ending in ".doc". 4. Renaming every file ending in ".txt" to ".doc". 5. Other similar tasks. - **b) Graphical User Interface (GUI) and Google Drive**: - Perform similar tasks using a GUI and compare them with CLI operations. - Execute tasks using Google Drive.
Unit 3: Report Formatting using MS Word and Google Docs (2P)	- **a) Basic Document Creation**: - Learn all shortcut keys. - Design and create a Bio-Data or a technical report, including mathematical functions. - **b) Project Report Formatting**: - Given a project report in PDF format, transfer it to word processor software (MS Word or Google Docs). - Format the document to include: - Title page - Specified paragraph and page formatting (page size, orientation, line spacing, font type, font size, indent, bullets, paragraph formatting) - Acknowledgement page - Table of contents page - List of figures page - List of tables page - Bibliography and Suggested Learning Resources: - Distinct headers for each chapter - Page numbering in Roman numerals for initial pages and standard numbering from the first chapter - Check for spelling errors and make corrections.
Unit 4: Content Presentation using Presentation Software (MS PowerPoint and Google Slides) (2P)	- **a) Creating Presentations**: - Prepare presentations on topics such as "Impact of Social Media on Youth" and "Emerging Trends in Mobile Technology". - Include slide animations, slide transitions, sound recordings, slide timings, and customer feedback videos. - Export the presentation as a video or save it as a slideshow. - Prepare handouts for the audience. - **b) Wild-Life Presentation**: - Make a presentation on "Wild-Life" and apply the

	following: - Add audio and video effects. - Apply various color schemes. - Apply various animation schemes. - Apply slide show settings. - **c) Using Google Slides**: - Perform similar tasks using Google Slides.
Unit 5: MS Excel and Google Sheets (3P)	- **a) Basic Operations in MS Excel and Google Sheets**: - Create a worksheet containing roll numbers and marks in 2 subjects for 50 students. - Calculate results and grades: - A student is declared as PASS if they score 40 or more in both subjects, otherwise FAIL. - All FAILED students are given Grade IV. - For PASSED students, the grade is assigned as follows: - Average >= 60 → Grade I - <60 but >=50 → Grade II - <50 but >=40 → Grade III - **b) Similar Tasks Using Google Sheets**: - Perform the same tasks using Google Sheets.
Unit 6: Data Capture using Google Forms (1P)	- **a) Creating a Quiz**: - Design and create a quiz using Google Forms. - **b) Data Forms**: - Create data forms for: - Event registration - Event feedback - Customer feedback/satisfaction on a product or service - Order requests
Unit 7: Fundamentals of C Programming (4P) (Optional for Group A)	- **a) Understanding C Programs**: - Learn the structure of a C program, the necessity of preprocessor directives, and how to compile and execute simple C programs. - **b) Debugging C Programs**: - Debug one or two C programs line by line. - Understand and explain the effect of the execution of individual lines at the memory level.

5. Suggested Learning Resources::

Text & Suggested Learning Resources: Books:

- Introduction to Computer Science; Pearson publication
- Fundamentals Of Computers byV. Rajaraman, PHI Learning
- Fundamentals of Computersby E Balagurusamy, McGraw Hill Education (India)

6. Course Outcomes (CO):

After going through this course the Students will be able to:

Course Outcomes	Details	Action Verb	Knowledge Level
CS 191.1	Identify and describe the major components of a computer system and understand their interrelationships..	Identify, Describe	Knowledge, Comprehension
CS 191.2	Demonstrate proficiency in using both CLI and GUI to perform various tasks.	Demonstrate, Perform	Application, Analysis
CS 191.3	Design, format, and create professional documents and presentations, including project and technical reports, using MS Word, Google Docs, MS PowerPoint, and Google Slides.	Design, Format, Create, Integrate	Application, Synthesis, Evaluation
CS 191.4	Perform basic operations in MS Excel and Google Sheets for data analysis and grade calculation.	Perform, Calculate	Application, Analysis
CS 191.5	Perform basic operations in MS Excel and Google Sheets for data analysis and grade calculation.	Perform, Calculate	Application, Analysis
CS 191.6	Understand and debug simple C programs, demonstrating the knowledge of program structure, preprocessor directives, and memory-level execution.	Understand, Debug	Knowledge, Application, Comprehension

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	-	-	-
2	-	3	-	-	-	-
3	-	-	3	-	-	-
4	-	-	3	-	-	-
5	-	-	-	3	-	-
6	-	-	-	-	3	
7	-	-	-	-	-	3

8. Mapping of the Course outcomes to Program Outcomes (PO)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CS191.1	3	3	2	2	3	-	-	-	-	1	-
CS191.2	2	2	2	1	3	1	-	-	-	1	-
CS191.3	3	3	3	2	3	-	-	-	1	2	
CS191.4	3	3	3	2	3	-	-	-	1	2	-
CS191.5	2	2	2	2	3	1	1	-	-	2	1
CS191.6	1	2	2	1	2	-	-	1	3	3	2

9. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
CS191.CO1	2	1	—
CS191.CO2	2	2	—
CS191.CO3	1	2	—
CS191.CO4	2	1	—
CS191.CO5	2	1	—
CS191.CO6	3	2	—

Course Name: ENGINEERING GRAPHICS
Course Code: ME-191
(Semester- I)
Course Broad Category: Engineering Science

……

1. Course Prerequisite: Understanding of basic geometric concepts, such as points, lines, angles, and planes.

2. Course Learning Objectives:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

3. Teaching methodology and evaluation system for the course:

Teaching methodology – Lectures and Presentations, Interactive Discussions and Case Studies, Guest Lectures and Field Visits.

Theoretical Instruction, Hands-on Practice, Assessment & Feedback, Interactive Learning Methods, Documentation & Reporting.

Evaluation System –

A. Internal Assessment (PCIA): (60 Marks)- Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
B. End-Semester Examination: (40 Marks)- Summative Assessment.

- **The minimum passing marks to be secured is 50 (50%) out of allotted total 100 marks (PCIA: 60 marks and ESE: 40 marks).**

4. Course Content:

Course Name: Engineering Graphics
Course Code: ME-191
Hours per Week: 0L: 0T: 4P
Credits: 2

Module	Topics	Practical (P)
1	**INTRODUCTIONTOENGINEERINGDRAWING** Principles of Engineering Graphics and their significance, usage of Drawing in struments, lettering, Different types of line sand theiruse, Dimensioning.	4
2	**SCALES** Plain scale, Diagonal scale and Vernier Scales.	4

3	**GEOMETRICAL CONSTRUCTION AND CURVES** Construction of polygons, Conic sections including the Rectangular Hyperbola(General method only); Cycloid, Epicycloid, Hypocycloid, Involute, Archemedian Spiral.	4
4	**PROJECTION OF POINTS, LINES, SURFACES** Principles of Orthographic Projections-Conventions - 1st and 3rd angle projection, Projections of Points and lines inclined to both planes; Projections of planes (Rectangle, pentagon, Hexagon etc.) inclined Planes -Auxiliary Planes.	8
5	**PROJECTION OF REGULAR SOLIDS** Projection of simple regular solids, viz. prisms, cubes, cylinders, pyramids, cones, tetrahedrons, spheres, hemi-spheres etc.	4
6	**SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS** Section of solids; section by perpendicular planes; sectional views; true shapes of sections.	4
7	**DEVELOPMENT OF SURFACES** Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone.	4
8	**ISOMETRIC PROJECTIONS** Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.	4
9	**OVER VIEW OF COMPUTER GRAPHICS** Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];	4

5. Suggested Learning Resources::

1. Pradeep Jain, Ankita Maheswari, A.P. Gautam, Engineering Graphics & Design, Khanna Publishing House
2. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
6. Corresponding set of CAD Software Theory and User Manuals
7. Pal & Bhattacharya (2006), Engineering Drawing, 6/e, Viva Books Private Limited,

6. Course Outcomes (CO):

At the end of the course, the students will be able to-

COs	Description	Action Verb	Knowledge level
ME 191.1	UNDERSTAND the basic concept of lines and dimension for engineering drawing.	UNDERSTAND	Understand
ME 191.2	INTERPRET and construct scales (plain, vernier & diagonal) and curves (ellipse, parabola, hyperbola, cycloids, involute, spiral).	INTERPRET	Understand
ME 191.3	CONSTRUCT orthographic projections of points, lines, planes, solids.	CONSTRUCT	Apply
ME 191.4	ILLUSTRATE surface development and section of solids.	ILLUSTRATE	Apply
ME 191.5	APPLY the concept of isometric projection.	APPLY	Apply
ME 191.6	UNDERSTAND the basic concept of Auto CAD in engineering drawing.	UNDERSTAND	Understand

7. Mapping of the Course Outcomes (CO) to Program Outcomes (PO)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ME191.1	3	1	1	-	-	-	-	-	-	-	-
ME191.2	3	1	1	-	1	1	-	1	1	1	-
ME191.3	3	1	1	-	1	1	-	1	1	1	-
ME191.4	3	1	1	-	-	-	-	-	-	-	-
ME 191.5	3	1	1	-	1	1	-	1	1	1	-
ME 191.6	3	1	-	-	1	1	-	-	-	-	-
Avg.	3	1	1	-	1	1	-	1	1	1	-

8. Mapping to Program Specific Outcome (PSO)

Course Outcome	PSO1	PSO2	PSO3
ME191.CO1	1	—	—
ME191.CO2	1	—	—
ME191.CO3	2	—	—
ME191.CO4	1	—	—
ME191.CO5	2	—	—
ME191.CO6	1	1	—

Following is the list of drawing instruments that required for Engineering Drawing:

1. Drawing Board
2. Mini drafter/Set-squares(45°–45°&60°–90°),T-square
3. Protractor(180°,360°)
4. Scales(Plain, Diagonal)
5. Compass(Small and Large)
6. Divider (Small and Large)