COURSE CURRICULUM

for

B.TECH. DEGREE

in

MECHANICAL ENGINEERING

(Applicable from the academic session 2024-2025)

Approved by BOS(BSH) dt 25.10.2024, Adopted by BOS(ME) dt 5.11.2024, Approved by Academic Council, Agenda-01.02, dt 21.11.2024

DR. B.C. ROY SOCIETY ENGINEERING
AN AUTONOMOUS INSTITUTE

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, West Bengal (Formerly Known as -WBUT)

Jemua Road, Durgapur, West Bengal, India,713206

DR. B.C. ROY SOCIETY ENGINEERING
AN AUTONOMOUS INSTITUTE

Course Name: Mathematics-II
Course Code: BSC-M 201
(Semester II)
Course Broad Category: Basic Science

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

2. **Course Learning Objectives:**
   The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equations and complex variables. It also aims to familiarize the prospective engineers to get the knowledge to apply the concept of transform calculus in various engineering field. It aims to equip the students to deal with advanced level applied mathematics and applications that would be essential for 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 –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. **Course Content:**
Course Name: Mathematics-II
Course Code: BSC-M 201
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	45L
1.	**Ordinary differential equations (ODE)- First order:** Exact equations, Necessary and sufficient condition of exactness of a first order and first-degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation, Euler's equations. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation).	10L
2.	**Ordinary differential equations (ODE)- Higher order:** General linear ODE of order two with constant coefficients, Method of variation of parameters, Cauchy-Euler equations, Solution of simultaneous linear differential equations. Power	10L

Module	Topics	45L
	series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.	
3.	**Transform calculus:** Laplace Transform, General Properties of Laplace Transform, Inverse Laplace Transform, Convolution, Application of Laplace Transform to Differential Equations with Constant Coefficients. Fourier Integral Theorem, Fourier Transform, Convolution, Fourier Sine and Cosine Transforms, Parseval's Identity for Fourier Transforms.	9L
4.	**Complex Analysis-I:** Functions of Complex variable, Limit and Continuity, Differentiation of complex functions, Cauchy-Riemann equations, Analytic functions, Harmonic functions, determination of harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithmic) and their properties; Conformal mappings, Mobius transformations and their properties.	8L
5.	**Complex Analysis-II:** Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy's integral formula (without proof), Cauchy's integral formula for Derivative, Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, Zeros of analytic functions, Singularities, Laurent's series; Residues, Cauchy residue theorem (without proof), Evaluation of definite integral involving sine and cosine. Evaluation of certain improper integrals.	8L

5. References:

Text Book:

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

Reference Books:

- Brown J.W and Churchill R.V: Complex Variables and Applications, McGraw-Hill.
- Brown J.W and Churchill R.V: Complex Variables and Applications, McGraw-Hill.
- Kreyzig E.: Advanced Engineering Mathematics, John Wiley and Sons.
- Potter M.C, Goldberg J.L and Aboufadel E.F.: Advanced Engineering Mathematics, OUP.
- James G.: Advanced Modern Engineering Mathematics, Pearson Education.
- Spiegel M. R., Lipschutz S., John J.S., and Spellman D.: Complex Variables, TMH.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
BSC-M 201.1	Remember to recognize various methods of ordinary differential equations which would enable to solve different engineering problems to encounter in their profession life.	Recognize	Remember
BSC-M 201.2	Understand to explain the uses and applications of complex variables in applied sciences and engineering problems.	Explain	Understand
BSC-M 201.3	Applythe concept of conformal mapping, its relation to analytic functions, their properties, and the Cauchy-Riemann equations to illustrate problems in applied mathematics.	Illustrate	Apply
BSC-M 201.4	Analyze the basic properties of complex integration and having the ability to organize such integrals.	Organize	Analyze
BSC-M 201.5	Evaluate the Laplace transforms and inverse Laplace transforms to determine the solutions of differential and integral equations in engineering fields like network analysis and control systems.	Determine	Evaluate
BSC-M 201.6	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	-	-	-	-	1
2	3	-	-	-	-	1
3	-	-	-	-	3	1
4	-	3	2	-	-	1
5	-	-	-	3	-	1
6	-	-	-	-	-	-

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

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	1	2	2	1	1	-	-	-	-	-	-	1
CO2	1	2	3	1	1	-	-	-	-	-	-	1
CO3	1	2	1	1	1	-	-	-	-	-	-	1
CO4	1	2	2	1	1	-	-	-	-	-	-	1
CO5	1	2	2	2	3	-	-	-	-	-	-	1
CO6	1	2	1	1	-	-	-	-	-	-	-	1

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

Course Name: CHEMISTRY
Course Code: BSC-CH 201
(Semester II)
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 –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. Course Content:

Course Name: Chemistry
Course Code: BSC-CH 201
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,	7L

Module	Topics	42L
	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.	
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 Tm) and amorphicity (Concept of Tg) 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. References:

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.

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
: **9788126543205**

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
BSCH101.1	Correlate Structure and Properties of Solids and Coordination Compounds.	Identify, Select	Analyse
BSCH101.2	Rationalisebulkpropertiesandprocessesusing thermodynamicandelectrochemicalconcept	Explain	Understand
BSCH101.3	Interaction of radiation with matter and structural elucidation.	Recognize	Understand
BSCH101.4	Analysis of polymeric property and application of industrial materials.	Identify, Implement	Apply
BSCH101.5	Importance of green chemistry and nanomaterial towards structural application and sustainable development.	Design	Apply
BSCH101.6	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)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	-	-	1	-	2	1	-	3
CO2	3	3	-	1	-	-	1	-	2	1	-	3
CO3	3	2	-	2	-	-	1	-	2	1	-	3
CO4	3	2	-	1	-	-	1	-	2	1	-	3
CO5	3	2	-	1	-	-	2	-	2	1	-	3
CO6	3	2	-	1	-	-	1	-	2	1	-	3

9. Mapping to Program Specific Outcomes (PSO)

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

*** End of Syllabus***

Course Name: BASIC ELECTRONICS ENGINEERING
Course Code: ESC-EC 201
(Semester – II)
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 –

D. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
E. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment (CIA-2)]
F. End-Semester Exam (60 Marks)- Summative Assessment.

4. Course Content:

Course Name: BASIC ELECTRONICS ENGINEERING
Course Code: ESC-EC 201
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

Module	Topics	36L
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
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. References:

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
ESC-EC101.1	Understand and Explain the characteristics of P-N junction diode	Explain	Understand
ESC-EC101.2	Identify and analyze the characteristics of Bipolar Junction Transistor	Identify	Analyze
ESC-EC101.3	Identify the characteristics of MOSFET and apply for digital circuit design	Identify, Design	Apply
ESC-EC101.4	Apply diode, BJT and MOSFET to design various electronic circuits	Design	Apply
ESC-EC101.5	Understand and Implement op-amp circuit for different mathematical operations	Implement	Understand
ESC-EC101.6	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	PO12
CO1	3	1	1	1	-	-	-	-	-	2	-	1
CO2	3	1	1	1	-	-	-	-	-	2	-	1
CO3	3	1	1	1	-	-	-	-	-	2	-	1
CO4	3	1	1	1	-	-	-	-	-	2	-	1
CO5	3	1	1	1	-	-	-	-	-	2	-	1
CO6	2	1	1	1	-	-	-	-	-	2	-	1

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

Course Name: Introduction to Computer Hardware and Software
Course Code: ESC-CS 201
(Semester – II)
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. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. Course Content:

Course Name: Introduction to Computer Hardware and Software Course
Course Code: ESC-CS 201
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. References:

Text & References 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
ESC-CS101.1	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
ESC-CS101.2	**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

ESC-CS101.3	**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
ESC-CS101.4	**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
ESC-CS101.5	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
ESC-CS101.6	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)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	2	-	-	-	-	-	-	-	-
CO3	3	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	2	2	-	-	-	-	-
CO5	-	3	-	-	3	-	-	-	-	-	-	-

CO6	-	-	-	-	-	-	-	-	3	-	-	3
AVG.	**1.0**	**1.33**	**0.33**	**0.33**	**0.5**	**0.33**	**0.33**	**0.0**	**0.5**	**0.0**	**0.0**	**0.5**

9. Mapping to Program Specific Outcome (PSO)

	PSO1	**PSO 2**
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

DR. B.C. ROY SOCIETY ENGINEERING
AN AUTONOMOUS INSTITUTE

Course Name: Programming for problem solving
Course Code: ESC-CS 202
(Semester –II)
Course Broad Category: Engineering Science

---

1. Course Prerequisite:

- Basic knowledge of computers and general mathematical operations.

2. Course Learning Objectives:

I. Fundamentals of C Programming & Algorithmic Thinking – Understand the basics of programming, C language syntax, compilation process, and develop algorithmic problem-solving skills using flowcharts and pseudocode.

II. Control Structures, Functions & Data Handling – Implement decision-making constructs (if-else, switch), loops (for, while), functions (including recursion), pointers, arrays (1D, 2D), and string manipulation.

III. Advanced Concepts & Preprocessing – Utilize structures, unions, file handling, and C preprocessor directives (macros, file inclusion) for efficient programming and modular code development.

IV. Application in Problem-Solving – Apply programming concepts to solve real-world problems like factorial computation, Fibonacci series, GCD, exponentiation, and file-based operations.

3. Teaching methodology and evaluation system for the course:

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

Evaluation System –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)

B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]

C. End-Semester Exam (60 Marks)- Summative Assessment.

4. Course Content:

Course Name: Programming for Problem Solving using C

Course Code: ESC-CS 202

Hours per Week: 3L: 0T: 0P

Credits: 3

Module	Topics	Lectures
1	**Introduction to C Programming:** Introduction to programming language. Introduction to C language. Life cycle of C-program. Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples (Sequential, Selectional and Iterational algorithm). From algorithms to programs; source code, variables (with data types), constant, Syntax and Logical Errors in compilation, Header file and standard library file and executable code.	6
2	**Arithmetic expressions and precedence:** Operators (Assignment, Arithmetic [Type casting], Relational, Logical, Increment / Decrement, Address of Operator, sizeof operator, Unaray, Binary, Ternary, Bitwise operator.	6
3	**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching [if, if-else, nested if, else if, switch, Iteration [while, do-while, for] and nested for loop.	8
4	**Pointers and Arrays**: Introduction to pointer, Arrays (1-D, 2-D), Character arrays (Strings).	7
5	**Function and C Preprocessor:** Functions (including using built in libraries), Parameter passing in functions, call by value, call by address, Passing arrays to functions, Recursion and Implementation Recursive functions (Factorial, GCD, Fibonacci Series, X^n, Tower of Hanoi, etc.), C Preprocessor [Macro Expansion, Macros with Arguments, File inclusion, Macros versus Function], Different String library functions and its use, Implement string library functions (strlen(), strcpy(), strcmp(), strrev(), etc.)	10
6	**Structure and Union**: Structures, Defining structures and Array of Structures, Union.	5
7	**File handling:** File open operation using its different mode, close operation, and basic programs related to file.	3

5. References:

Text & References Books:

- R. S. Salaria, Computer Concepts and Programming in C, Khanna Publishers
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India(India)
- Reema Thareja, Programming in C, Oxford

6. Course Outcomes (CO):

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

Course Outcomes	Details	Action Verb	Knowledge Level
ESC-CS201.CO1	**Explain** the basics of C programming, including program structure, compilation process, syntax errors,	Understand	L-2

	and the concept of algorithms with flowcharts and pseudocode.		
ESC-CS201.CO2	**Demonstrate** the ability to use different types of operators (arithmetic, relational, logical, bitwise, etc.) and **evaluate** expressions while understanding operator precedence and type casting.	Apply	L-3
ESC-CS201.CO3	**Develop** C programs using conditional statements (if, if-else, switch) and loop constructs (for, while, do-while), including nested loops for solving iterative problems efficiently.	Apply	L-3
ESC-CS201.CO4	**Illustrate** the use of pointers and arrays (1-D and 2-D) in programming, including string handling using character arrays and pointer-based memory access.	Analyze	L-4
ESC-CS201.CO5	**Design** and **implement** modular programs using functions, parameter passing techniques, recursion, and C preprocessor directives such as macros, file inclusion, and string manipulation functions.	Create	L-6
ESC-CS201.CO6	**Construct** programs using structures, unions, and file handling concepts, enabling efficient data management and persistent storage in C programs.	Create	L-6

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)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	1
CO3	3	3	3	3	2	-	-	-	-	-	-	2
CO4	3	3	3	3	2	-	-	-	-	-	-	2
CO5	3	3	3	3	3	2	-	-	2	-	-	2
CO6	3	3	3	3	3	2	-	-	-	-	-	3
AVG.	3	3	3	3	3	2	-	-	2	-	-	2

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

Course Name: Environmental Science
Course Code: MC-ES 201
(Semester- II)
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. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. Course Content:

Course Name: Environmental Science
Course Code: MCES- 101 / MCES- 201
Hours per Week: 1L:0T:0P
Credits: 0

Module	Topics	42 L
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	8L

Module	Topics	42 L
	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 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. 2L River/Lake/groundwaterpollution:River:DO,5dayBODtest, Unseeded and Seeded BOD test, BOD reaction rate constants, COD.1L Lake:Eutrophication[Definition,sourceandeffect].Groundwater : 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. References:

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
MCES-101.1MCES-201.1	To understand the natural environment and its relationships with human activities.	Identify, Select	Understand
MCES-101.2MCES-201.2	To apply the fundamental knowledge of science and engineering to assess environmental and health risk.	Apply, Explain	Evaluate
MCES-101.3MCES-201.3	To develop guidelines and procedures for health and safety issues obeying the environmental energy aspects.	Recognize	Create
MCES-101.4MCES-201.4	To acquire skills for scientific problem-solving related to air, water, land and noise pollution.	Identify, Implement	Analyze
MCES-101.5MCES-201.5	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)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	1	-	-	-	-	2	2	2	-	1	-	2
CO2	1	-	-	-	-	2	2	2	-	1	-	2
CO3	1	-	-	-	-	2	2	2	-	1	-	2
CO4	1	-	-	-	-	2	2	2	-	1	-	2
CO5	1	-	-	-	-	2	2	2	-	1	-	2

10. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

DR. B.C. ROY SOCIETY ENGINEERING
AN AUTONOMOUS INSTITUTE

Course Name: CHEMISTRY LAB
Course Code: BSC-CH 291
(Semester – II)
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–
Internal Assessment (60Marks)-Formative Continuous Assessment
[Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
End-Semester Exam (40 Marks)- Summative Assessment.

4. **Course Content:**
   Course Name: CHEMISTRY LAB
   Course Code: BSC-CH191/BSC-CH291
   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
BSC-CH291.1	ImplementInstrumentalanalyticalprocedurefortheenrichmentofmoderntechnical skill.	Evaluate	Analyze
BSC-CH291.2	Rationalize inter molecular phenomena using thermodynamic considerations.	Identify, Select	Evaluate
BSC-CH291.3	Understandtitrimetricmethodsofwateranalysis requiredforenvironmentalcontext	Implement	Apply
BSC-CH291.4	Concept of radiation matter interaction and its application.	Design	Create
BSC-CH291.5	Evaluate different surface phenomena by adsorption technique.	Identify, Implement	Apply
BSC-CH291.6	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)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		1	-	-	1	-	2	1	-	3
CO2	3	2		1	-	-	1	-	2	1	-	3
CO3	3	2		1	-	-	1	-	2	1	-	3
CO4	3	2		1	-	-	1	-	2	1	-	3
CO5	3	2		1	-	-	1	-	2	1	-	3
CO6	3	2		1	-	-	1	-	2	1	-	3

8. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

DR. B.C. ROY SOCIETY ENGINEERING
AN AUTONOMOUS INSTITUTE

Course Name: BASICELECTRONICS ENGINEERING LAB
Course Code: ESC-EC 291
(Semester – II)
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 (60 Marks)**- Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
B. **End-Semester Exam (40 Marks)**- Summative Assessment.

4. Course Content:

Course Name: BASICELECTRONICS ENGINEERING LAB
Course Code: ESC-EC 291
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

Module	Topics	13P
2.	**Experiment on Diode and Diode Circuits:** 1. Study on V-I characteristics of Junction Diode. 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.	5P
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. References

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
ESC-EC 291.1	Understand different electronic components and measuring equipments	Explain	Understand
ESC-EC 291.2	Select and Examine the characteristics of P-N Junction Diode, BJT and MOSFET	Identify, Select	Examine
ESC-EC 291.3	Apply and execute diode clipper, clamper and rectifier circuit	execute	Apply
ESC-EC 291.4	Apply and implement Zener-diode Circuit	Implement	Apply
ESC-EC 291.5	Implement and examine op-amp circuit	Implement	examine
ESC-EC 291.6	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

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

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	2	2	1	2	2	-	-	-	-	-	-	2
CO2	3	3	1	2	2	-	-	-	-	-	-	2
CO3	3	3	1	2	2	-	-	-	-	-	-	2
CO4	3	3	1	2	2	-	-	-	-	-	-	2
CO5	3	3	1	2	2	-	-	-	-	-	-	2
CO6	3	3	1	2	2	-	-	-	-	-	-	2

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

Course Name: ENGINEERING GRAPHICS
Course Code: ESC-ME 291
(Semester: II)
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 –

Section 1: Practical Continuous Internal Assessment (PCIA) - **60 Marks**
Includes practical performance, reports, and viva voce after each experiment. Throughout the Semester
Section 2: Practical End Semester Examination (PESE) - **40 Marks**
Final comprehensive practical examination covering the entire syllabus, at the end of the semester

4. Course Content:

Course Name: Engineering Graphics
Course Code: ESC-ME191/ ESC-ME 291
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	**GEOMETRICALCONSTRUCTIONANDCURVES** Construction of polygons, Conic sections including the Rectangular Hyperbola(General method only); Cycloid, Epicycloid, Hypocycloid, Involute, Archemedian Spiral.	4
4	**PROJECTIONOFPOINTS,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	**PROJECTIONOFREGULARSOLIDS** Projectionofsimpleregularsolids,viz.prisms,cubes,cylinders,pyramids , cones, tetrahedrons, spheres, hemi-spheres etc.	4
6	**SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS** Sectionofsolids;sectionbyperpendicularplanes;sectionalviews;true shapes of sections.	4
7	**DEVELOPMENTOFSURFACES** 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	**OVERVIEWOFCOMPUTER 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	4

	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];	

5. References:

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**
ESC- ME 291.1	UNDERSTAND the basic concept of lines and dimension for engineering drawing.	UNDERSTAND	Understand
ESC- ME 291.2	INTERPRET and construct scales (plain, vernier & diagonal) and curves (ellipse, parabola, hyperbola, cycloids, involute, spiral).	INTERPRET	Understand
ESC-ME 291.3	CONSTRUCT orthographic projections of points, lines, planes, solids.	CONSTRUCT	Apply
ESC-ME191.4	ILLUSTRATE surface development and section of solids.	ILLUSTRATE	Apply
ESC-ME191.5	APPLY the concept of isometric projection.	APPLY	Apply
ESC-ME191.6	UNDERSTAND the basic concept of Auto CAD in engineering drawing.	UNDERSTAND	Understand

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
ESC-ME 291.1	3	1	1	-	-	-	-	-	-	-	-	1
ESC-ME 291.2	3	1	1	-	1	1	-	1	1	1	-	1
ESC-ME 291.3	3	1	1	-	1	1	-	1	1	1	-	1
ESC-ME 291.4	3	1	1	-	-	-	-	-	-	-	-	1
ESC-ME 291.5	3	1	1	-	1	1	-	1	1	1	-	1
ESC-ME 291.6	3	1	-	-	1	1	-	-	-	-	-	1
AVG.	3	1	1	-	1	1	-	1	1	1	-	1

8. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO 2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-
CO6	1	-

List of drawing instruments required for this lab.:

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)

***** End of Syllabus*****

Course Name: Introduction to Computer Hardware and Software Lab
Course Code: ESC-CS 291
(Semester –II)
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 (60 Marks)- Formative Continuous Assessment

G. End-Semester Exam (40 Marks)- Summative Assessment.

4. Course Content:

Course Name: Introduction to Computer Hardware and Software Lab
Course Code: ESC-CS 291
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 references - 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. References:

Text & References 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
ESC-CS 291.CO1	Identify and describe the major components of a computer system and understand their interrelationships..	Identify, Describe	Knowledge, Comprehension
ESC-CS 291.CO2	Demonstrate proficiency in using both CLI and GUI to perform various tasks.	Demonstrate, Perform	Application, Analysis
ESC-CS 291.CO3	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
ESC-CS 291.CO4	Perform basic operations in MS Excel and Google Sheets for data analysis and grade calculation.	Perform, Calculate	Application, Analysis
ESC-CS 291.CO5	Perform basic operations in MS Excel and Google Sheets for data analysis and grade calculation.	Perform, Calculate	Application, Analysis
ESC-CS 291.CO6	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)

	PO1	PO2s	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		1	2	-	-	1	-	2	2	2
CO2	3	3	2		3	-	-	-	2	-	2	-
CO3	-	-	3	-	-	-	-	1	-	3		3
CO4	1	3	-	2	3	-	-	1	2	3	2	2
CO5		3	3		3	-	-	-	-	-	2	2
CO6	1	-	3	2	-	-	-	1	2	2	3	3

9. Mapping to Program Specific Outcomes (PSO)

	PSO1	**PSO2**
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****

Course Name: Programming for Problem Solving Lab
Course Code: ESC-CS 292
(Semester –II)
Course Broad Category: Engineering Science

.....

1. Course Prerequisite:

- Basic knowledge of computers and general mathematical operations.
- And/ Or ESC-CS 191

2. Course Learning Objectives:

i. Students will gain an understanding of core programming concepts, including the basic components of a computer system, algorithms, and program execution.

ii. They will develop problem-solving skills by translating algorithms into code using control structures such as conditionals, loops, and functions.

iii. Students will also learn to implement and optimize basic data structures like arrays and strings, as well as algorithms for searching and sorting.

iv. Additionally, they will work with advanced programming features like recursion, structures, pointers, and file handling to solve more complex problems.

3. Teaching methodology and evaluation system for the course:

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

Evaluation System –

A. Internal Assessment (60 Marks)- Formative Continuous Assessment

B. End-Semester Exam (40 Marks)- Summative Assessment.

4. Course Content:

Course Name: Programming for Problem Solving Lab
Course Code: ESC-CS 292
Hours per Week: 0L: 0T: 4P
Credits: 2

Unit	Content
1	Problem solving using computers: Familiarization with programming environment
2	Variabletypesandtypeconversions:Simplecomputationalproblemsusingarithmeticexpressions
3	Branching and logical expressions: Problems involving if- then -else structures
4	Loops, while and for loops: Iterative problems e.g., sum of series
5	1DArrays:searching,sorting: 1DArray manipulation
6	2DarraysandStrings:Matrixproblems, String operations

7	Functions, call by value: Simple functions
8	Numericalmethods(Rootfinding,numericaldifferentiation,numericalintegration): Programming for solving Numerical methods problems
9	Recursion, structure of recursive calls: Recursive functions
10	Pointers, structures and dynamic memory allocation: Pointers and structures
11	File handling: File operations

5. References:

Text & References Books:

- R. S. Salaria, Computer Concepts and Programming in C, Khanna Publishers
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India(India)

6. Course Outcomes (CO):

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

Course Outcomes	Details	ActionVerb	Knowledge Level
ESC-CS 292.CO1	Familiarize with the programming environment and use computers for problem-solving.	Familiarize, Solve	Knowledge, Application
ESC-CS 292.CO2	Solve simple computational problems using arithmetic expressions, understanding variable types and type conversions.	Solve, Understand	Comprehension, Application
ESC-CS 292.CO3	Implement branching and logical expressions for problems involving if-then-else structures.	Implement, Solve	Application, Analysis
ESC-CS 292.CO4	Solve iterative problems using loops, such as calculating the sum of series.	Solve, Calculate	Application, Analysis
ESC-CS 292.CO5	Manipulate 1D and 2D arrays, perform searching, sorting, matrix problems, and string operations.	Manipulate, Perform	Application, Synthesis
ESC-CS 292.CO6	Understand and implement numerical methods (root finding, numerical differentiation, and numerical integration) to solve problems using programming.	Understand, Implement	Application, Analysis
ESC-CS 292.CO7	Apply pointers, structures, and dynamic memory allocation concepts for efficient data management and implement file operations for real-world applications.	Apply, Implement	Application, Synthesis

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6	CO7
1	3	-	-	-	-	-	
2	-	3	-	-	-	-	
3	-	-	3	-	-	-	
4	-	-	-	3	-	-	
5,6	-	-	-	-	3	-	
7,8	-	-	-	-	-	3	
9,10,11							3

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	2
CO2	2	2	2	2	-	-	-	-	-	-	-	2
CO3	2	2	2	2	-	-	-	-	-	-	-	2
CO4	2	2	2	2	-	-	-	-	-	-	-	2
CO5	2	2	2	2	-	-	-	-	-	-	-	2
CO6	2	2	2	2	-	-	-	-	-	-	-	2
AVG.	2	2	2	2	0	0	0	0	0	0	0	2

9. Mapping to Program Specific Outcomes (PSO)

	PSO1	PSO 2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

***** End of Syllabus*****