ICT Curriculum – Dept of ICT, MBSTU

Program Title: Bachelor of Engineering (B.Sc. – Engg) in Information and Communication Technology.

Program Description:

The Bachelor of Science (B.Sc.) in Information and Communication Technology (ICT) is a rigorous 4-year undergraduate program offered by the Department of ICT, Mawlana Bhashani Science and Technology University, Bangladesh. This program is designed under the Outcome-Based Education (OBE) framework to align graduate capabilities with national development goals, global industry demands, and societal needs.

Students are equipped with both theoretical foundations and practical competencies in computing, electronics, communication systems, software engineering, and emerging technologies such as Artificial Intelligence, Internet of Things (IoT), Cloud Computing, and Cybersecurity. The curriculum ensures a balance between analytical thinking, creative design, ethical awareness, and social responsibility.

Learning Framework:

The curriculum is structured based on Bloom's Taxonomy, progressively developing students' cognitive skills from:

- Remembering & Understanding fundamental concepts,
- To Applying & Analyzing complex problems,
- To Evaluating solutions and Creating innovative ICT systems.

Each course is developed with clearly defined Course Outcomes (COs) that are mapped to broader Program Outcomes (POs), ensuring measurable and meaningful student achievement.

Global and Sustainable Orientation:

This program supports the vision of the United Nations Sustainable Development Goals (SDGs), particularly:

- SDG 4 – Quality Education: Promoting inclusive, equitable, and industry-relevant ICT education.

- SDG 9 – Industry, Innovation, and Infrastructure: Empowering students with digital skills for resilient and sustainable innovation.

- SDG 11 – Sustainable Cities and Communities: Designing technology-driven solutions that improve urban and rural quality of life.

- SDG 12 – Responsible Consumption and Production: Emphasizing eco-efficient systems, green computing, and ethical data use.

- SDG 13 – Climate Action: Encouraging energy-conscious system design and ICT solutions for environmental monitoring.

- SDG 16 & 17 – Ethics and Partnerships: Embedding professional integrity, teamwork, and global collaboration across projects and learning.

Program Highlights:

- Integrated Learning: Core courses in computer science, electronics, mathematics, and communications.

- Applied Skills: Extensive hands-on labs, software projects, hardware interfacing, and simulations.

- Innovation & Research: Emphasis on final-year thesis, industry internships, and research methodology.

- Soft Skills & Ethics: Courses on professional ethics, communication, economics, and teamwork.

- Global Relevance: Curriculum reviewed against global ICT standards and aligned with national ICT policy.

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Graduate Attributes:

Graduates of this program will be:

- Technologically Competent in solving real-world ICT problems.
- Socially Responsible, contributing to sustainable and ethical technology use.
- Critical Thinkers and Innovators in designing future-ready solutions.
- Effective Communicators and Leaders in diverse and interdisciplinary teams.
- Lifelong Learners committed to continuous self-improvement and societal betterment.

Program Outcomes (POs)

(Aligned with Bloom's Taxonomy & UN SDGs)

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PO No.	Program Outcome	Bloom Level	Mapped SDG
PO1	Knowledge and Comprehension: Demonstrate a solid foundation in mathematics, computing, science, and engineering principles to understand and solve ICT-related problems.	Understand	SDG 4
PO2	Problem Solving: Identify, analyze, and formulate ICT problems and apply algorithmic and engineering principles to develop effective solutions.	Analyze, Apply	SDG 9
PO3	Design & Innovation: Design reliable, sustainable, and user-centric ICT systems and solutions considering global, cultural, societal, environmental, and economic constraints.	Create	SDG 9, SDG 11
PO4	Scientific Inquiry: Conduct experiments and research, interpret and analyze data using scientific methods to support decision-making and innovation.	Evaluate, Analyze	SDG 4, SDG 9
PO5	Modern Tools & Emerging Technologies: Select and apply appropriate ICT tools, platforms, and techniques including AI, IoT, data analytics, and simulation tools with awareness of their limitations.	Apply, Evaluate	SDG 9
PO6	Social, Legal & Ethical Responsibility: Understand and evaluate the legal, ethical, social, and cultural impacts of ICT, including privacy, data security, and inclusiveness in the digital era.	Evaluate	SDG 16
PO7	Sustainability & Environmental Impact: Understand and evaluate the role of ICT in promoting sustainable development, energy-efficient design, and climate-conscious innovation.	Evaluate	SDG 12, SDG 13

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PO No.	Program Outcome	Bloom Level	Mapped SDG
PO8	Ethical Values: Apply ethical reasoning and commit to professional integrity, responsibilities, and standards in ICT practice.	Apply	SDG 16
PO9	Teamwork & Collaboration: Function effectively in multidisciplinary teams and diverse environments, with the ability to lead and adapt in collaborative ICT projects.	Apply, Create	SDG 17
PO10	Communication Skills: Communicate effectively with peers, professionals, and society at large through technical writing, reports, presentations, and digital tools.	Apply	SDG 4
PO11	Entrepreneurship & Project Management: Demonstrate managerial and entrepreneurial skills to lead ICT projects responsibly in diverse professional settings.	Apply, Evaluate	SDG 8, SDG 9
PO12	Lifelong Learning and Adaptability: Recognize the necessity for continuous self-improvement and knowledge updating in ICT amidst rapidly changing technologies.	Create	SDG 4, SDG 9

Notes on Integration with SDGs:

- SDG 4 (Quality Education): Emphasized through learning outcomes, pedagogy, and inclusion of research methods and ethics.

- SDG 9 (Industry, Innovation, and Infrastructure): Embedded through system design, emerging technology, project-based learning.

- SDG 13 (Climate Action) & SDG 12 (Responsible Consumption): Reflected in outcomes addressing sustainability and energy-efficient design.

- SDG 16 & 17: Promote peace, justice, ethics, and teamwork in global partnerships.

ICT Curriculum – Dept of ICT, MBSTU

Pedagogical Framework for B.Sc./B.Eng. in Information and Communication Technology

Program Duration: 4 Years (8 Semesters)

Total Credits: 155

Institution: Mawlana Bhashani Science and Technology University, Bangladesh

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1. Pedagogical Vision

The pedagogy for the B.Sc./B.Eng. in ICT program is designed to cultivate:

- Critical thinkers and ethical engineers
- Skilled technologists with global and sustainable awareness
- Adaptive lifelong learners equipped to thrive in a digitally transformed world

The approach blends academic rigor, hands-on practice, interdisciplinary integration, and reflective learning, preparing students for careers in research, innovation, development, and entrepreneurship.

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2. Pedagogical Pillars

Pillar	Description
Outcome-Based Education (OBE)	All courses defined with COs mapped to POs and PEOs with measurable targets
Bloom's Taxonomy Alignment	Learning progresses from *Remember* → *Create* across program years
SDG Integration	Embedded awareness of sustainable, ethical, and inclusive technology design
Industry-Readiness	Labs, projects, internships, and case studies simulate real-world ICT problems
Digital-AI Literacy	Responsibly integrated use of tools like AI assistants, simulation platforms

3. Curriculum-Level Pedagogical Strategy

Year	Focus Area	Bloom's Level Focus	Pedagogical Focus
1st	Foundation in Mathematics, Physics, Programming	Remember → Understand	Conceptual clarity, basic problem solving
2nd	Core computing, algorithms, architecture	Understand → Apply	Algorithmic thinking, lab immersion
3rd	Networking, databases, AI, software engineering	Apply → Analyze	Project-based learning, collaborative skills
4th	Advanced electives, thesis, internship	Analyze → Create	Research, innovation, leadership

4. Pedagogical Tools and Techniques

Dimension	Strategy / Tool
Lecture Delivery	Interactive whiteboard + multimedia + flipped classroom
Labs & Practicals	Guided experiments, simulators (Proteus, Tinkercad, Cisco Packet Tracer)
Projects	Capstone project, domain-specific mini projects
Tutorials	Problem-solving workshops, math and programming clinics
Case-based Learning	Ethical hacking, AI bias, sustainable computing scenarios
Collaborative Learning	Group reports, peer instruction, code review sessions
Blended Learning	Moodle, Google Classroom, YouTube series
AI Integration	Critically supervised use of AI tools like ChatGPT, GitHub Copilot

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5. SDG-Linked Learning Examples

SDG Goal	Curriculum Example
SDG 4: Quality Education	ICT 1211 – English & Communication, inclusive access tools
SDG 9: Industry, Innovation	ICT 4101 – Cybersecurity, ICT 4213 – Wireless Communication
SDG 12: Sustainable Production	ICT 2205 – Energy-efficient communication circuits
SDG 13: Climate Action	ICT 3205 – Signal Processing for environmental sensors
SDG 16/17: Ethics & Partnerships	ICT 3208 – Research Methodology and Professional Ethics

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6. Assessment Pedagogy

Level	Method	Purpose
Formative	Weekly quizzes, lab tasks	Identify misconceptions, track learning pace
Summative	Mid/final exams, projects	Evaluate knowledge depth and application
Continuous	Presentations, participation	Encourage engagement and soft skill growth
Reflective	Learning journals, peer feedback	Foster self-awareness and lifelong learning

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7. Program-Wide Skills Integration

Skill Area	Integration Method
Problem Solving	Algorithms, circuit analysis, debugging tasks
Teamwork	Collaborative projects, group reports
Communication	Technical writing, poster presentations, viva voce
Leadership & Ethics	Professional ethics, capstone leadership roles
Lifelong Learning	Research assignments, tech trend analysis, elective exploration

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8. Pedagogical Responsiveness to Generative AI

Challenge (AI Age)	Pedagogical Response
Over-reliance on AI tools	Manual + AI cross-validation in assignments
Surface-level understanding	Emphasis on "explain in your own words" & viva justification
Critical evaluation gaps	Compare AI vs human-generated solutions
Plagiarism risks	Promote integrity with citation training + originality checks

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9. Example Pedagogical Techniques by Course Type

Course Type	Techniques Used
Theory (3.0 Cr)	Problem-solving sessions, flipped videos, think-pair-share
Lab (1.0 Cr)	Pre-lab quizzes, live demos, peer circuit evaluation
Project/Thesis	Agile methodology, weekly standups, progress defense
Humanities	Case studies, open discussions, role plays (e.g., ICT policy debates)

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10. Program Learning Cycle

Learn → Apply → Reflect → Communicate → Create

This learning cycle is embedded across years and courses using diverse pedagogical assessments, tools, and delivery methods.

List of Courses at a glance

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First Year First Semester

Course Code	Course Title	Credit
ICT 1101	Basic Electrical Circuits	3
ICT 1102	Basic Electrical Circuits Lab	1
ICT 1103	Computer Programming	3
ICT 1104	Computer Programming Lab	1
ICT 1105	Physics	3
ICT 1107	Differential and Integral Calculus	3
ICT 1109	Chemistry	3
ICT 1111	History of the Emergence of Bangladesh	3

Total Credits: 20

First Year Second Semester

Course Code	Course Title	Credit
ICT 1201	Electronic Devices and Circuit Theory	3
ICT 1202	Electronic Devices and Circuit Theory Lab	1
ICT 1203	Data Structure	3
ICT 1204	Data Structure Lab	1
ICT 1205	Discrete Mathematics	3
ICT 1207	Matrices and Coordinate Geometry	3
ICT 1209	Information Theory	3
ICT 1211	English Language and Literature	3
ICT 1200	Project - I	1

Total Credits: 21

Second Year First Semester

Course Code	Course Title	Credit
ICT 2101	Computer Organization and Architecture	3
ICT 2102	Computer Based Numerical Methods Lab	1.5
ICT 2103	Digital Logic Design	3
ICT 2104	Digital Logic Design Lab	1
ICT 2106	Object Oriented Programming Lab	1.5
ICT 2107	Algorithms Analysis and Design	3
ICT 2108	Algorithms Analysis and Design Lab	1
ICT 2109	Differential Equations and Vector Calculus	3
ICT 2111	Statistics for Engineers	3

Total Credits: 20

Second Year Second Semester

Course Code	Course Title	Credit
ICT 2201	Operating System	3

ICT 2202	Operating System Lab	1
ICT 2203	Microprocessor and Embedded Systems	3
ICT 2204	Microprocessor and Embedded Systems Lab	1
ICT 2205	Communication Engineering	3
ICT 2206	Communication Engineering Lab	1
ICT 2207	Object Oriented Pattern and Design	3
ICT 2208	Object Oriented Pattern and Design Lab	1
ICT 2211	Complex Variables and Fourier Analysis	3
ICT 2213	Economics and Managerial Accounting	3
ICT 2200	Project - II	1

Total Credits: 23

Third Year First Semester

Course Code	Course Title	Credit
ICT 3101	Data Communication	3
ICT 3102	Data Communication Lab	1
ICT 3103	Database Management System	3
ICT 3104	Database Management System Lab	1
ICT 3105	Artificial Intelligence and Expert Systems	3
ICT 3106	Artificial Intelligence and Expert Systems Lab	1
ICT 3107	Software Engineering	3
ICT 3108	Software Engineering Lab	1
ICT 3109	Theory of Computation	3
ICT 3100	Project - III	1

Total Credits: 20

Third Year Second Semester

Course Code	Course Title	Credit
ICT 3200	Industrial Visit / Tour	1
ICT 3201	Computer Networks	3
ICT 3202	Computer Networks Lab	1
ICT 3203	Web Application Development	3
ICT 3204	Web Application Development Lab	1
ICT 3205	Digital Signal Processing	3
ICT 3206	Digital Signal Processing Lab	1
ICT 3207	Statistics and Data Science	3
ICT 3208	Research Methodology and Professional Ethics	2
ICT 3211	Comprehensive Oral Examination	1

Total Credits: 18

Fourth Year First Semester

Course Code	Course Title	Credit
ICT 4000	Project / Thesis	3
ICT 4101	Cryptography and Cyber Security	3
ELECTIVE I	3 × Elective I (Theory + Lab)	12

Total Credits: 18

Fourth Year Second Semester

Course Code	Course Title	Credit
ICT 4000	Project / Thesis	3
ICT 4200	Internship / 3 × Elective - II Courses	12

Total Credits: 15

ICT 1101 – Basic Electrical Circuits and Lab (ICT-1102)

Credit: 4.0 (Theory: 3.0 and Practical: 1.0)
Level: Undergraduate – First Year, First Semester
Contact Hours: 3 hours/week
Duration: 12 Weeks (1st Semester)

Course Description

This foundational course introduces undergraduate students to the core principles of electrical circuits—a critical pillar for advancing in information and communication technologies. Students will explore essential concepts such as voltage, current, resistance, energy, Ohm's Law, Kirchhoff's Laws, circuit simplification techniques, and basic circuit theorems (Thevenin, Norton, Superposition).

Structured under the Outcome-Based Education (OBE) model, this course emphasizes learning outcomes that guide students through progressively complex cognitive levels as defined by Bloom's Taxonomy: starting from remembering fundamental laws, understanding circuit behavior, applying analysis techniques, to evaluating circuit responses and ultimately designing efficient systems.

In the context of the United Nations Sustainable Development Goals (SDGs), particularly:

- SDG 4: Quality Education
- SDG 9: Industry, Innovation and Infrastructure, and
- SDG 12: Responsible Consumption and Production,
  this course nurtures responsible and sustainable thinking through energy-efficient design and ethical application of electrical knowledge in ICT systems.

This course introduces the fundamental concepts of electrical circuits. Students will learn about electric charge, voltage, current, resistance, Ohm's Law, Kirchhoff's Laws, and network theorems. The course covers both DC and AC circuit analysis techniques and emphasizes problem-solving and circuit behavior analysis.

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Course Outcomes (COs)

Aligned with Bloom's Taxonomy levels and designed to assess knowledge, application, and analysis skills.

CO No.	Course Outcome Statement	Bloom's Level
CO1	Explain basic concepts of electric charge, current, voltage, resistance, power, and energy	Understand
CO2	Apply Ohm's Law and Kirchhoff's Laws to analyze resistive circuits	Apply
CO3	Analyze DC circuits using mesh current and nodal voltage techniques	Analyze
CO4	Simplify circuits using Superposition, Thevenin, Norton, and Source Transformation methods	Analyze
CO5	Explain and interpret the behavior of capacitors, inductors, transient responses, and AC sinusoidal circuits	Understand, Analyze

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12-Week Course Content & Completion Plan

Each week includes:

- 3 Lectures (T1, T2, T3)
- 2 Practical Sessions (P1, P2) for 2 sections

Week 1

- T1-T3: Introduction to electric circuits, basic quantities (charge, current, voltage, power, energy), circuit symbols
- P1-P2: Lab intro, safety, component ID, multimeter and breadboard basics

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Week 2

- T1-T3: Ohm's Law, Resistance combinations, voltage and current division
- P1-P2: Measure resistance and voltage in series/parallel circuits

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Week 3

- T1-T3: Kirchhoff's Current Law (KCL) and Voltage Law (KVL)
- P1-P2: Verification of KCL & KVL using resistor networks

Week 4

- T1-T3: Node Voltage and Mesh Current Methods

- P1-P2: Circuit analysis using mesh and nodal methods
- Class Test/Quiz 1

Week 5

- T1-T3: Star-Delta conversion, practical application of analysis techniques
- P1-P2: Star-Delta conversion and equivalent resistance verification

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Week 6

- T1-T3: Superposition Theorem, Source Transformation
- P1-P2: Practical demonstration of superposition principle

Week 7

- T1-T3: Thevenin and Norton's Theorems
- P1-P2: Find Thevenin/Norton equivalents in circuits

Week 8

- T1-T3: Maximum Power Transfer Theorem and applications
- P1-P2: Max power transfer lab experiment
- Class Test/Quiz 2

Week 9

- T1-T3: Introduction to capacitors and inductors, charging/discharging
- P1-P2: Measure time constants of RC and RL circuits

Week 10

- T1-T3: Transient response in first-order RL and RC circuits
- P1-P2: Plot and analyze transient graphs using oscilloscope

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Week 11

- T1-T3: Sinusoidal sources, phasors, impedance, and reactance
- P1-P2: Use signal generators and measure AC waveforms

Week 12

- T1-T3: Series and parallel RLC circuits, resonance
- P1-P2: Resonance experiments (frequency response curves)
- Class Test/Quiz 3

Summary Structure

Week	Theory Topics	Practical Topics	Assessment
1	Basic quantities, units	Lab intro, measurements	–
2	Ohm's Law, series-parallel	Resistance measurements	–
3	KCL, KVL	Verification of laws	–
4	Mesh & Nodal Analysis	Application of methods	Quiz 1
5	Star-Delta, equivalent circuits	Circuit simplification	–
6	Superposition, Source Transform	Lab verification	–
7	Thevenin & Norton	Equivalent circuits	–
8	Max Power Transfer	Application in lab	Quiz 2
9	Capacitors, Inductors	Time constant behavior	–
10	Transients	RC/RL circuit response	–
11	Phasors, AC circuits	Oscilloscope, AC lab	–
12	Resonance	Frequency response curves	Quiz 3

CO-PO Mapping Table

(✓ indicates alignment of Course Outcome (CO) with Program Outcome (PO))

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											✓
CO2	✓	✓			✓							✓
CO3	✓	✓	✓		✓							✓
CO4	✓	✓	✓	✓	✓			✓		✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓		✓		✓

ICT 1101 – Basic Electrical Circuits (Theory – 100 Marks)

Assessment Breakdown

Assessment Item	Marks	Weight (%)	Target COs	Assessment Methods
Class Tests / Quizzes (3)	30	30%	CO2, CO3, CO4	Short problems, MCQs, numerical analysis, circuit sketching

Assessment Item	Marks	Weight (%)	Target COs	Assessment Methods
Attendance	10	10%	All COs indirectly	Based on regularity, engagement, participation
Final Exam	60	60%	CO1–CO5	Conceptual, analytical, and problem-solving questions
Total	100	100%	—	—

Rubrics for ICT 1101 (Theory)

Component	**Excellent (80–100%)**	**Good (60–79%)**	**Satisfactory (40–59%)**	**Needs Improvement (<40%)**
Class Tests / Quizzes	Accurately solves and explains multi-step circuit problems	Solves correctly but may miss interpretation	Solves basic circuits with guidance	Fails to apply laws, lacks basic understanding
Attendance	Present in >90% of classes with active participation	Present in 80–89%, minor lapses	Present in 70–79%	Poor attendance (<70%)
Final Exam	Demonstrates full conceptual and analytical understanding	Understands core ideas but with small errors	Partial understanding, relies on memorization	Misapplies theory, unable to solve key problems

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ICT 1102 – Basic Electrical Circuits Lab (100 Marks)

Assessment Breakdown

Part A (50 Marks) – Continuous & Reflective Learning

Assessment Item	Marks	Weight (%)	Target COs	Methods
Attendance	10	10%	CO1, CO2	Based on lab presence and punctuality
Quiz (Lab-focused)	20	20%	CO2, CO4	Basic calculations, observation-based
Report Submission	20	20%	CO3, CO5	Lab journals, circuit diagrams, analysis

Part B (50 Marks) – Competency and Technical Evaluation

Assessment Item	Marks	Weight (%)	Target COs	Methods
Lab Final Exam	20	20%	CO2, CO4	Breadboard tasks, instrument setup, measurements
Continuous Assessment	20	20%	CO1–CO5	Lab tasks, peer interaction, weekly preparation

Assessment Item	Marks	Weight (%)	Target COs	Methods
Viva Voce	10	10%	CO1–CO5	Oral questioning, circuit reasoning

Rubrics for ICT 1102 (Lab)

Component	**Excellent (80–100%)**	**Good (60–79%)**	**Satisfactory (40–59%)**	**Needs Improvement (<40%)**
Report	Complete, accurate, well-organized, uses correct terminology	Minor errors in values/formatting	Incomplete analysis or unclear diagrams	Missing steps, careless or plagiarized work
Lab Performance	Works independently, accurate measurements, handles instruments well	Few minor errors, needs minor instructor support	Needs guidance for setup, low confidence	Unsafe handling or no meaningful output
Viva	Clear understanding and reasoning behind circuits	Answers basic questions, some struggle with reasoning	Limited answers, guesses, lacks reasoning	Cannot respond or explain circuits

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Rubrics for Each CO (Performance Criteria)

CO1: Explain fundamental electrical quantities

- Excellent (80–100%): Can clearly define and relate all basic concepts with correct units.
- Good (60–79%): Mostly accurate with minor conceptual errors.
- Satisfactory (40–59%): Basic terms remembered but confused in application.
- Below (0–39%): Cannot define terms or relate them correctly.

CO2: Apply Ohm's and Kirchhoff's Laws

- Excellent: Accurately applies laws to multi-branch circuits.
- Good: Correctly applies laws with some algebraic or unit mistakes.
- Satisfactory: Can solve only simple circuits with assistance.
- Below: Unable to formulate or solve circuit equations.

CO3: Analyze using mesh/nodal methods

- Excellent: Can set up and solve complex systems of equations independently.
- Good: Sets up equations but makes calculation errors.
- Satisfactory: Needs guided steps or formula sheet.
- Below: Cannot perform analysis or identify elements.

CO4: Evaluate using circuit theorems

- Excellent: Applies all three theorems to simplify and solve.
- Good: Applies one or two correctly.
- Satisfactory: Understands conceptually but struggles with formulation.
- Below: Does not recognize when to use theorems.

CO5: Interpret reactive elements and AC behavior

- Excellent: Understands phasor relationships and frequency impact.
- Good: Knows reactance but struggles with circuit behavior.
- Satisfactory: Understands time domain effects.
- Below: No clear idea of capacitive or inductive effects.

Final Exam SAMPLE Questions with CO-PO Mapping

Question 1: Circuit Analysis using Mesh and Nodal Techniques

Q1. For the circuit shown below, apply mesh analysis to determine the current through each branch. Then, use nodal analysis to calculate the voltage at all essential nodes.
(Provide both hand-sketched or printed circuit if in paper exam)

[12 Marks]

- Mapped CO: CO3 – Analyze DC circuits using mesh current and nodal voltage techniques
- Mapped PO(s): PO1 (Knowledge), PO2 (Problem Analysis), PO3 (Design/Development), PO5 (Modern Tools)
- Bloom Level: Analyze

Question 2: Application of Theorems in Circuit Simplification

Q2. Given a multi-source resistive circuit,
a) Apply the Superposition Theorem to find the voltage across a 4Ω resistor.
b) Find the Thevenin equivalent circuit as seen from terminals A–B and compute the load current through a 6Ω resistor connected across A–B.

[12 Marks]

- Mapped CO: CO4 – Simplify circuits using Thevenin, Norton, and Superposition theorems
- Mapped PO(s): PO1, PO2, PO4 (Investigation), PO10 (Communication, if presentation is required)
- Bloom Level: Analyze, Evaluate

Question 3: Transient and AC Circuit Interpretation

Q3.
a) A 10 μF capacitor is charged to 5V and discharged through a 1kΩ resistor. Derive the equation for voltage across the capacitor over time and sketch the response.
b) A sinusoidal AC source is applied to an RLC series circuit. Derive the expression for total impedance and find the resonance frequency.

[12 Marks]

- Mapped CO: CO5 – Interpret capacitive, inductive, transient, and AC responses
- Mapped PO(s): PO1, PO2, PO5, PO7 (Sustainability), PO12 (Lifelong Learning)
- Bloom Level: Understand, Analyze, Evaluate

Summary Table

Question	CO	PO(s)	Bloom Level	Marks
Q1 – Mesh & Nodal Analysis	CO3	PO1, PO2, PO3, PO5	Analyze	12
Q2 – Superposition & Thevenin	CO4	PO1, PO2, PO4, PO10	Analyze, Evaluate	12
Q3 – Transients & AC	CO5	PO1, PO2, PO5, PO7, PO12	Understand, Analyze	12