Jagadguru Kripalu University

उद्धरेत् विद्यया आत्मानम्

Bachelor of Technology in CSE with Specialization AI & Product Engineering

B. Tech -CSE (AI & PE)

(Aligned with NEP 2020 & with the guidelines of UGC/ AICTE)

Academic Batch: 2026–2030

JK Institute of Technology (JKIT)

Programme Overview

About the Programme

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The **Bachelor of Technology in Computer Science and Engineering with Specialization in AI & Product Engineering (B.Tech. CSE – AI & Product Engineering)** is a four-year undergraduate programme that combines core Computer Science and Engineering with **Artificial Intelligence, Product Design, Product Management, User Experience (UX), and Innovation**. Aligned with **NEP 2020** and **AICTE guidelines**, the programme prepares students to design, develop, and scale intelligent digital products for the modern technology-driven economy.

The curriculum provides a strong foundation in programming, algorithms, software engineering, databases, cloud computing, and cybersecurity, while offering specialized training in AI, Machine Learning, Product Engineering, Product Analytics, Generative AI, and digital innovation. Through hands-on projects, hackathons, internships, product development labs, and industry collaborations, students gain practical experience in building user-centric and AI-powered solutions.

Graduates are prepared for careers in **AI Product Engineering, Product Management, Software Development, Machine Learning, Product Analytics, UX Design, Technology Consulting, and Entrepreneurship**, while also building a strong foundation for higher studies and research.

Programme Highlights

NEP 2020 Aligned

Flexible, multidisciplinary curriculum integrating Computer Science, Artificial Intelligence, Product Design, and Innovation.

AI & Product Engineering Specialization

Focused learning in AI-powered product development, product strategy, design, and lifecycle management.

Industry-Oriented Curriculum

Learning through product labs, prototypes, hackathons, live projects, and industry challenges.

Value Education and Holistic Development

Focus on ethics, leadership, communication, teamwork, and professional excellence.

Career Readiness

Dedicated training in coding, product thinking, problem-solving, communication, and placement preparation.

Semester I — Foundations of Product Engineering and Intelligent Software Development

Total Credits: 28 | The first semester builds strong foundations in programming, web development, computational thinking, and product design while developing the technical and problem-solving skills required for AI-driven product engineering and digital innovation.

Sl. No.	Course Code	Subject	Category	L	T	P	Credits
1	CSCC001	Programming Logic & Technique	BRC	2	0	1	3
2	ELIX101	Digital Logic Design	BRC	2	0	1	3
Commencement of First Semester							
3	CSCC106	Programming Foundations & Algorithmic Problem Solving	MAJ	2	0	1	3
4	PRDE101	Web Development Foundations: HTML, CSS, JavaScript and Deployment	MAJ	3	0	1	4
5	CSCC107	Computer Organization and Operating System & Shell Engineering	MAJ	2	0	1	3
6	RISE101	Computational Thinking and Problem-Solving Technique	MIN	3	0	1	4
7	MATH104	Discrete Mathematics and Computational Logic	MD	3	0	0	3
8	PHYS101/ ELIX102	Modern Physics/ Basic Electronics	MD	2	0	1	3
9	ABLE101	Communicative English - I	AEC	1	0	1	2
10	PRDE102	Product Thinking, PRD Writing and Engineering Craft	SEC	1	0	2	3
11	JKVA101	Science of Mind Management	VAC	1	0	1	2
12	JKGP101	General Proficiency-1	GP	-	-	1	1

BRC- Bridge Course | MAJ – Major | MIN – Minor | MD – Multi Disciplinary | AEC – Ability Enhancement Course | SEC – Skill Enhancement Course | VAL – Value Added Course | GP – General Proficiency

Semester II — Full-Stack Product Development and AI Foundations

Total Credits: 28 | The second semester develops expertise in full-stack product development, advanced algorithms, Artificial Intelligence, and backend engineering while strengthening the technical, analytical, and innovation skills required for AI-powered product creation.

Sl. No.	Course Code	Subject	Category	L	T	P	Cr
1	CSCC108	Advanced Data Structures and Algorithm Design	MAJ	2	0	1	3
2	PRDE103	Product Sprint I: Full-Stack Product Development Studio	MAJ	2	0	1	3
3	AIML101	Introduction to AI	MAJ	3	0	1	4
4	RISE102	Design Thinking	MIN	3	0	1	4
5	MATH105	Probability, Statistics and Data-Driven Decision Making	MD	3	0	0	3
6	PHYS101/ ELIX102	Modern Physics/ Basic Electronics	MD	2	0	1	3
7	ABLE102	Communicative English - II	AEC	1	0	1	2
8	PRDE104	Backend Engineering with Node.js and REST APIs	SEC	1	0	2	3
9	JKVA102	Art & Science of Happiness	VAC	1	0	1	2
10	JKGP102	General Proficiency - II	GP	-	-	1	1

MAJ – Major | MIN – Minor | MD – Multi Disciplinary | AEC – Ability Enhancement Course | SEC – Skill Enhancement Course | VAL – Value Added Course | GP – General Proficiency

Semester III — Building Scalable Products and Cloud-Native Applications

Total Credits: 23 | The third semester develops expertise in cloud computing, databases, networking, big data, and Linux system administration while building the analytical and technical skills required for modern cloud and AI-driven environments.

Sl. No.	Code	Subject	Category	L	T	P	Cr.
1	CSCC206	Computer Networks and Distributed Systems	MAJ	2	0	1	3
2	CSCC208	Database Systems and Schema Design	MAJ	2	0	1	3
3	PRDE201	Modern Frontend Engineering with React and Design Systems	MAJ	3	0	1	4
4	AIML211	Data Centric	MIN	3	0	1	4
5	PRDE202	Product Sprint II: Enterprise SaaS Product Development	MD	3	0	0	3
6	PRDE203	Cloud Infrastructure, DevOps and Platform Engineering	SEC	1	0	2	3
7	JKVA201	Golden Rules for Living Your Best Life	VAC	2	0	0	2
8	JKGP201	General Proficiency 3	GP	-	-	1	1

Semester IV — Secure Software Engineering and AI-Powered Product Development

Total Credits: 23 |The fourth semester develops expertise in secure software engineering, API development, machine learning, and AI-powered product creation while strengthening leadership, agile development, and product innovation skills.

Sl. No.	Course Code	Subject	Category	L	T	P	Cr.
1	CYBR204	Application Security, Cryptography and Secure Engineering	MAJ	2	0	1	3
2	PRDE204	API Architecture, Integrations and Event-Driven Systems	MAJ	2	0	1	3
3	CSCC207	Software Engineering, Design Patterns and Test-Driven Development	MAJ	2	0	1	3
4	AIML215	Machine Learning Foundations for Product Engineers	MIN	3	0	1	4
5	PRDE205	Product Sprint III: AI-Powered Product Development Studio	SEC	3	0	1	4
6	RISE202	Engineering Leadership, Agile Delivery and Team Culture	AEC	1	0	1	3
7	JKVA202	The Power of Thoughts	VAC	1	0	1	2
8	JKGP202	General Proficiency 4	GP	-	-	-	1

Semester V — AI Product Engineering and Scalable Platform Development

Total Credits: 21 | The fifth semester develops expertise in Deep Learning, Large Language Models, system design, platform engineering, and data pipelines while preparing students to build scalable AI-powered products and enterprise software platforms.

Sl. No.	Code	Subject	Category	L	T	P	Cr.
1	AIML309	Deep Learning and Large Language Model Engineering	MAJ	3	0	1	4
2	PRDE303	System Design at Scale and Reliability Engineering	MAJ	2	0	1	3
3	PRDE304	Platform Engineering and Kubernetes	MAJ	3	0	1	4
4	PRDE301	Product Sprint IV: Enterprise Product Development Studio	MIN	3	0	1	4
5	DTSC304	Data Engineering and Analytics Pipelines	SEC	1	0	2	3
6	RISE303	Employability Planning I	AEC	1	0	1	2
7	JKGP301	General Proficiency 5	GP	-	-	-	1

Semester VI — Product Leadership, Responsible AI, and Startup Innovation

Total Credits: 22 | The sixth semester develops expertise in product reliability, responsible AI, startup innovation, and production-scale engineering while preparing students to lead the development, growth, and commercialization of AI-powered digital products.

Sl. No.	Course Code	Subject	Category	L	T	P	Credit
1	PRDE305	Observability, Site Reliability Engineering and Production Excellence	MAJ	2	0	1	3
2	AIML310	AI Ethics, Privacy Law and Responsible Engineering	MAJ	2	0	1	3
3	RISE305	Technology Entrepreneurship and Startup Finance	MAJ	3	0	1	4
4	PRDE302	Product Sprint V: Acquisition-Ready Systems Development	MIN	3	0	1	4
5	PRDE307	Open Source Engineering, Personal Branding and Global Technical Visibility	SEC	1	0	2	3
6	RISE302	Employability Planning II	AEC	1	0	1	2
7		Minor Project	Minor Project	0	0	2	2
8	JKGP302	General Proficiency 6	GP	-	-	-	1

Semesters VII & VIII — Product Commercialization, Industry Immersion, and Venture Creation

For Honours Students:

PRDE401 – Production Systems Ownership and Product Operations | Honours Degree | 4 Credits

PRDE402 – Enterprise Product Engagement and Strategic Partnerships | Honours Degree | 4 Credits

DTSC402 – Growth Engineering and Revenue Analytics | Honours Degree | 4 Credits

For Non-Honours Students:

Elective I | MAJ | 4 Credits

Elective II | MAJ | 4 Credits

Elective III | MAJ | 4 Credits

RISE401 – Innovation Management, Patent Drafting and Intellectual Property Rights | MIN | 4 Credits

AIML405 – Generative AI & Agentic AI | SEC | 4 Credits

Total Credits: 20

Semester VIII — Total Credits: 20

Project

Product Engineering Capstone Project: Build for Acquisition & Seminar Presentation / OJT | Research Track / Industrial Track | **16 Credits**

Minor

RISE403 – Technical Leadership and Product Commercialization | MIN | **4 Credits**

The final semester is dedicated to **research, innovation, and professional practice**, enabling students to apply Artificial Intelligence and Machine Learning concepts to real-world challenges. Students undertake a **Research Project, Live Industry Project, or Capstone Project**, demonstrating their ability to design, develop, deploy, and evaluate intelligent solutions while showcasing their technical, analytical, and problem-solving capabilities through a seminar presentation. This semester prepares graduates for professional careers, higher studies, entrepreneurship, and research in emerging AI technologies.

Features of National Education Policy (NEP-2020)

For UG Programs

The UGC has formulated a new student-centric **Curriculum and Credit Framework for Undergraduate Programmes (CCFUP)** in accordance with NEP 2020, incorporating a flexible choice-based credit system, multidisciplinary approach, and multiple entry and exit options — empowering students to pursue their career path by choosing subjects and fields of their interest.

Core Features of the NEP Framework

The NEP 2020 framework introduces transformative changes to undergraduate education, designed to give students greater freedom, flexibility, and holistic development.

Flexible Curricular Structures

Creative combinations of disciplinary areas enabling multidisciplinary study alongside rigorous specialisation in chosen subjects.

Multiple Entry & Exit Options

3 or 4-year UG degree programmes with UG Certificate, UG Diploma, or Degree depending on credits secured.

4-Year Honours Degree

Eight-semester programme with an option for Honours with Research upon completion of a rigorous research project in the major area.

Holistic & Multidisciplinary Education

The 4-year programme is the preferred option, offering the full range of holistic education alongside chosen major and minor disciplines.

Global Citizenship Education

Education for sustainable development integrated into the curriculum to empower learners as active promoters of peaceful, inclusive, and sustainable societies.

Internships & Apprenticeships

Opportunities with industries, businesses, premier institutions, and research organisations to actively engage with the practical side of learning.

Cutting-Edge Curriculum

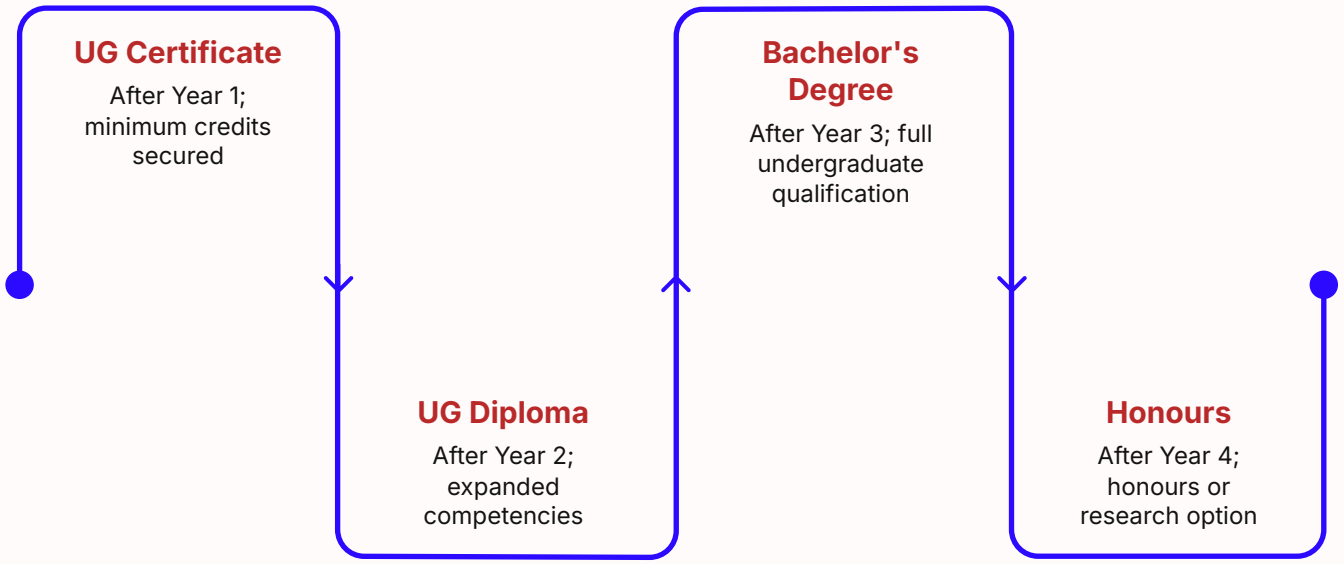
Preparation in AI, Agentic AI, Big Data, Machine Learning, FinTech, Cyber Security, Quantum Computing, Robotics, VLSI, Genomics, and more.

Alternative Learning Modes

Flexibility to switch between offline, ODL, online, and hybrid modes of learning as per student needs.

Multiple Entry & Exit Options

One of the most student-friendly features of NEP 2020 is the structured pathway that allows students to enter, exit, and re-enter the UG programme at defined milestones — ensuring no year of study is wasted.



Students who exit with a UG Certificate or UG Diploma are permitted to **re-enter within three years** and complete the degree programme. Students may also take a break during the period of study, but the total duration for completing the programme shall not exceed **7 years**.

ⓘ The Academic Bank of Credit (ABC) and guidelines for Multiple Entry and Exit are already in place to facilitate the implementation of CCFUP.

Minimum Credit Requirements

A student must fulfil the following minimum credit requirements for the award of a degree under each category. The framework ensures a balanced distribution across major, minor, multidisciplinary, and skill-based components.

Category	3-Year UG (120 Credits)	4-Year UG (160 Credits)	Remarks
Major with Specialisation	Min. 60 Credits (50%)	Min. 80 Credits (50%)	Core discipline focus
Minor Discipline	Min. 32 Credits	Min. 32 Credits	Broader understanding
Multidisciplinary Courses	Min. 9 Credits	Min. 9 Credits	Liberal arts & science
Ability Enhancement (AEC)	Min. 8 Credits	Min. 8 Credits	Language & communication
Skill Enhancement (SEC)	Min. 9 Credits	Min. 9 Credits	Practical & soft skills
Value-Added Courses (VAC)	Min. 6 Credits	Min. 6 Credits	Understanding India, community
Summer Internship	Min. 2–4 Credits	Min. 4 Credits	Work-based learning
Research Project / Dissertation	—	Min. 12 Credits	Honours with Research only
Total Minimum Credits	**120 Credits**	**160 Credits**	20 credits per semester

40% of the credits in any category may be earned through online courses approved by the Department and Institution as per existing UGC regulations.

Course Level Numbering System

The NEP framework introduces a standardised course numbering system to indicate the level and complexity of each course offered across all UG and PG programmes.

1	**0–99: Pre-requisite / Bridge Courses** Pass or fail courses with no credits. Replaces the existing informal bridge courses conducted in colleges and universities.
2	**100–199: Foundation / Introductory Courses** Entry-level courses designed to introduce students to the fundamentals of a discipline.
3	**200–299: Intermediate-Level Courses** Courses that build upon foundational knowledge and develop deeper understanding.
4	**300–399: Higher-Level Courses** Advanced undergraduate courses requiring prior foundational and intermediate knowledge.
5	**400–499: Advanced Courses** Specialised courses at the upper undergraduate level, often linked to research and industry applications.
6	**500–699: Master's Level Courses** 500–599 for first-year Master's; 600–699 for second-year of 2-year Master's or 1-year Master's degree programmes.
7	**700+: Doctoral Level Courses** Courses limited to doctoral students pursuing advanced research and specialisation.

Major, Minor & Multidisciplinary Disciplines

Major Discipline (Min. 80 Credits)

The primary discipline of focus. Students must secure ~50% of total credits through core courses in the major with specialisation. A student with 80 credits in Physics out of 160 total credits is awarded B.Sc. (Hons.) in Physics.

Eligibility for Honours with Research: CGPA of 7.5 (75%) after completion of 3rd year (6th semester).

Students can opt for a **Double Major** by securing a minimum of 40% credits (64 out of 160) from a second major discipline.

Minor Discipline (Min. 32 Credits)

Helps students gain broader understanding beyond the major. For example, a student in Computer Science & Engineering (AI&ML) may choose Cyber Security or Data Engineering as a minor.

Minor stream courses must be from the 300-level or above. 50% of minor credits must be in the relevant subject; the remaining 50% can be from any discipline of the student's choice.

Multidisciplinary Courses (Min. 9 Credits)

All UG students must complete 3 introductory-level courses from broad disciplines such as Natural Sciences, Mathematics & Statistics, or Humanities. Students cannot repeat courses already studied at the 12th class level.

ⓘ Students may change their major within the broad discipline at the end of the first year. HEIs may create **10% additional seats** over and above sanctioned strength to accommodate change-of-major requests, with preference given to students with the highest CGPA and no arrears.

Ability Enhancement, Skill Enhancement & Value-Added Courses

These course categories ensure that every UG student develops well-rounded competencies — from language and communication to practical skills and civic awareness.

Ability Enhancement Courses (AEC) — Min. 8 Credits

Focused on **Modern Indian Language (MIL) & English** with emphasis on language and communication skills. Develops critical reading, expository writing, academic writing, and the ability to participate in discussions and debates. Helps students appreciate the cultural and intellectual heritage of their chosen MIL.

Skill Enhancement Courses (SEC) — Min. 9 Credits

Aimed at imparting **practical skills, hands-on training, and soft skills** to enhance employability. Institutions may design courses as per students' needs and available resources. Vocational Education and Training forms an integral part, with a minimum of 12 credits allotted to the Minor stream for vocational courses.

Value-Added Courses (VAC) — Min. 6–8 Credits

Understanding India: Knowledge of contemporary India, its historical perspective, national development goals, constitutional values, fundamental rights and duties, India's freedom struggle, and Indian knowledge systems. **Community Engagement & Service:** Exposes students to socio-economic issues and supplements theoretical learning with real-life experiences. **Field-Based Learning / Minor Project:** Provides exposure to development-related issues in rural and urban settings.

Internships, Projects & Research

Summer Internship / Apprenticeship / OJT (Min. 2–4 Credits)

All students undergo internships or apprenticeships in firms, industries, organisations, or research labs during the summer term. Opportunities span local industry, business organisations, health sectors, local governments (panchayats, municipalities), Parliament, media organisations, artists, and crafts persons. Students exiting after the first two semesters must complete a **4-credit work-based learning/internship** to receive a UG Certificate.

Minor Project (Min. 2 Credits)

A practical, hands-on project applying concepts from programming, data analytics, or AI. Students design and develop a small software application, AI model, or data-driven solution to solve a real-world problem. May be carried out individually or in a small team under faculty supervision. Requires a project report and presentation/demonstration at the end of the semester. Objective: enhance problem-solving ability, coding skills, and technical confidence before the major project.

Major / Captioned Project (Min. 12 Credits)

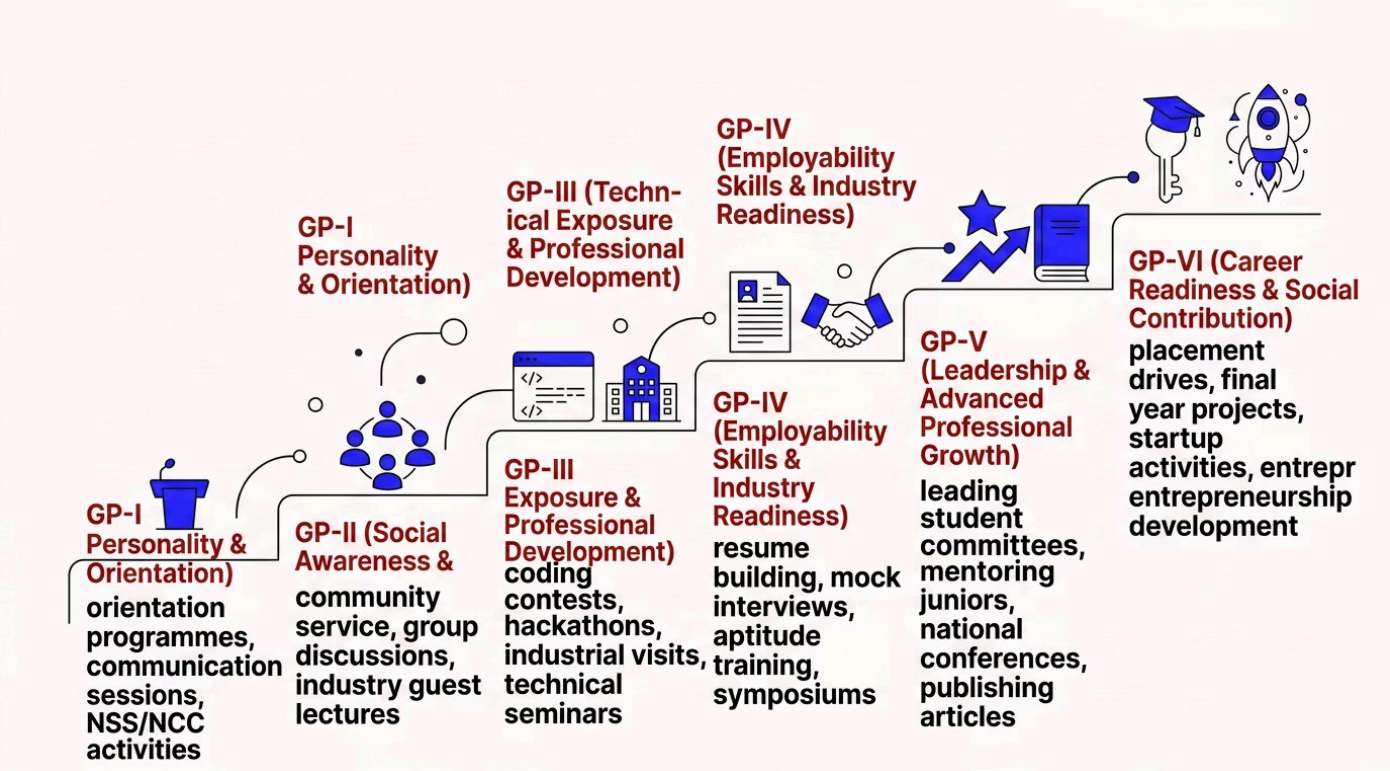
Applies knowledge and skills acquired throughout the programme to address a significant real-world problem. Develops research aptitude, critical thinking, innovation, and professional competencies. Involves problem identification, literature review, methodology development, analysis, implementation, testing, and documentation. May be carried out in collaboration with industry, research organisations, government agencies, or community stakeholders. Culminates in a project report, presentation, demonstration, and viva-voce — serving as a capstone experience reflecting NEP 2020 graduate attributes.

Research Project / Dissertation (Min. 12 Credits — Honours with Research)

Students choosing a 4-Year Bachelor's degree (Honours with Research) must take up a research project under faculty guidance, to be completed in the **eighth semester**. Research outcomes may be published in peer-reviewed journals, presented at conferences/seminars, or patented. Eligibility: CGPA ≥ 7.5 after the 6th semester. Honours students not undertaking research will complete 3 courses for 12 credits in lieu of the dissertation.

General Proficiency — Semester-wise Development

General Proficiency is a co-curricular component that tracks the holistic development of students across all six semesters, from orientation and personality building to career readiness and community contribution.



Stage	Focus Area	Key Objective
GP-I	Personality & Orientation	Build confidence and communication skills at entry level
GP-II	Social Awareness	Improve teamwork, social responsibility, and leadership basics
GP-III	Technical Exposure	Enhance technical confidence and presentation skills
GP-IV	Employability Skills	Develop employability skills and professional grooming
GP-V	Leadership & Mentorship	Develop leadership, mentoring ability, and professional maturity
GP-VI	Career Readiness	Ensure career readiness, ethical responsibility, and community contribution

Modular Teaching & Evaluation Pattern

The NEP 2020 framework introduces a modular, continuous evaluation system that balances internal assessments, practical work, and end-term examinations to provide a comprehensive and fair assessment of student learning.

Internal Assessment Breakdown (60 Marks)

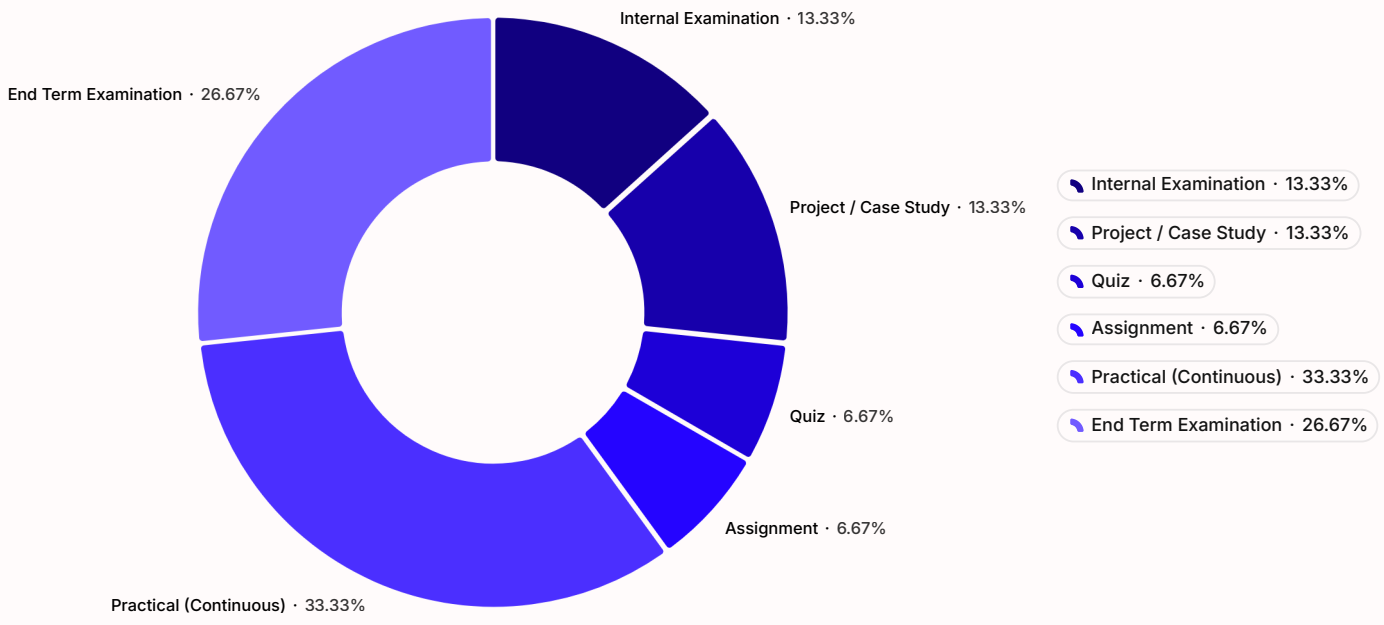
Component	Marks
One Internal Examination	20 Marks
Project / Case Study (2 × 10 Marks)	20 Marks
Quiz (1 Number)	10 Marks
Assignment (1 Number)	10 Marks
Total Internal	**60 Marks**

External Assessment

Component	Marks
Practical (Continuous Evaluation)	50 Marks
Final Examination (End Term)	40 Marks

Key Highlights of the Evaluation System

- Continuous and comprehensive assessment throughout the semester
- Project and case study-based evaluation promotes applied learning
- Quizzes and assignments ensure regular engagement with course content
- Practical evaluation rewards hands-on skills and lab performance
- End-term examination tests conceptual depth and analytical ability
- VIII Semester core major may be seminar-based with student presentations and discussions



The modular evaluation pattern ensures that students are assessed continuously and holistically, reducing dependence on a single high-stakes examination and encouraging consistent academic engagement throughout the programme.