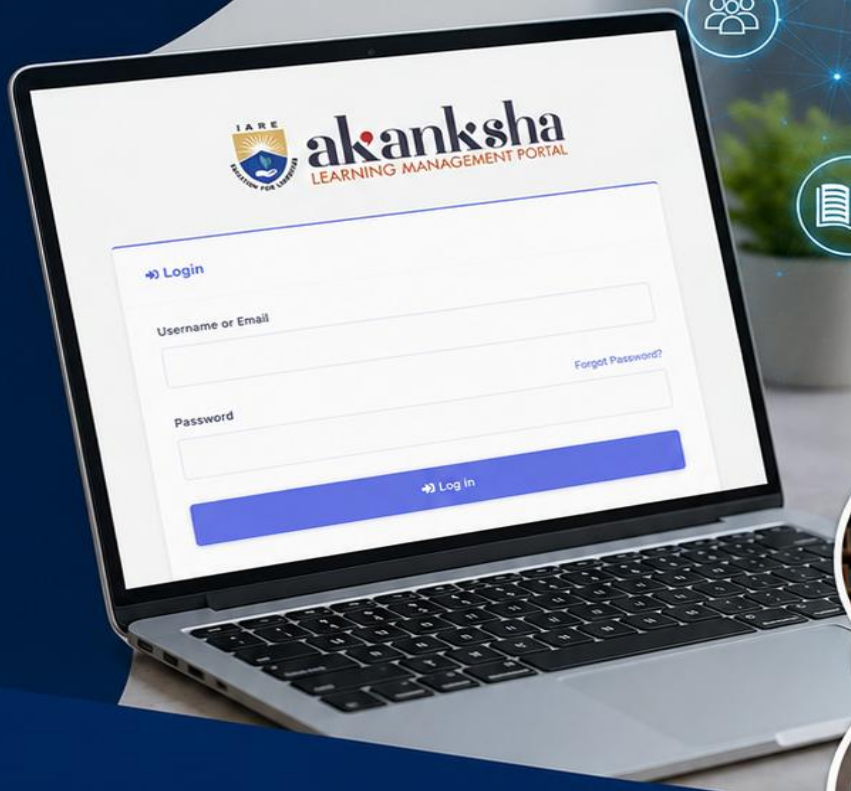
DEFINING TOMORROW
THROUGH DIGITAL LEARNING

- ANYTIME LEARNING
- ANYWHERE LEARNING
- SELF-PACED LEARNING
- LEARNING ANALYTICS
- SKILL DEVELOPMENT
- DIGITAL RESOURCES



IARE

e-LEARNING FACILITIES

LEARNING BEYOND BOUNDARIES

- QUALITY CONTENT
- VIDEO LEARNING
- CLOUD ACCESS
- ENGAGING PLATFORM
- SECURE & RELIABLE


DIGITAL LIBRARY


ICT STUDIO


HYFLEX LEARNING


LEARNING ANALYTICS

ACADEMIC YEAR 2026-27

IARE
EDUCATION FOR LIBERATION

IARE
INSTITUTE OF AERONAUTICAL ENGINEERING

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DIGITAL e-LEARNING FACILITIES

The rapid advancement of digital technologies has fundamentally transformed the way knowledge is created, shared, and acquired. Traditional classroom-based instruction is no longer the sole medium through which students learn. Modern learners demand flexible, personalized, technology-enabled, and engaging educational experiences that allow them to learn anytime, anywhere, and at their own pace. Recognizing these evolving educational needs, the Institute of Aeronautical Engineering (IARE) has established a comprehensive e-Learning ecosystem that integrates advanced educational technologies, digital resources, intelligent learning platforms, and innovative pedagogical practices.

IARE's e-Learning ecosystem is designed to complement classroom teaching by providing students with continuous access to high-quality learning resources. Through a combination of Learning Management Systems (LMS), digital libraries, video learning repositories, career development platforms, and ICT-enabled learning environments, the institute ensures that students receive a holistic educational experience that extends beyond the physical classroom.

The primary objective of IARE's digital learning initiative is to empower students with knowledge, skills, and competencies required to excel in the rapidly changing global technological landscape. By leveraging technology-driven learning methodologies, the institute promotes self-learning, critical thinking, problem-solving abilities, innovation, and lifelong learning habits among students.

The Need for Digital Learning

The twenty-first century has witnessed unprecedented changes in education due to the emergence of technologies such as cloud computing, artificial intelligence, machine learning, big data analytics, virtual learning environments, and mobile computing. These technologies have enabled educational institutions worldwide to move towards flexible and student-centric learning models.

Digital learning has become an essential component of higher education because it offers numerous advantages:

1. **Accessibility**
   Students can access learning resources from any location and at any time, eliminating geographical and temporal constraints.
2. **Flexibility**
   Learners can study according to their schedules, learning preferences, and individual pace.
3. **Personalization**
   Digital platforms enable customized learning experiences tailored to individual learning needs.
4. **Continuous Learning**
   Students can revisit course materials, recorded lectures, and learning resources multiple times to strengthen understanding.
5. **Industry Readiness**
   Exposure to digital tools and online learning environments prepares students for modern workplace expectations.

IARE has successfully embraced these opportunities by developing a robust digital infrastructure that supports academic excellence and professional development.

IARE's Commitment to Digital Education

The institute believes that technology should not merely be used as a support tool but should serve as a catalyst for transforming the teaching-learning process. To achieve this objective, IARE has invested significantly in creating a technology-enabled educational ecosystem that facilitates:

- Outcome-Based Education (OBE)
- Hybrid Learning
- Self-Paced Learning
- Experiential Learning
- Project-Based Learning
- Research-Oriented Learning
- Industry-Aligned Skill Development

The institute continuously upgrades its digital infrastructure to meet emerging educational requirements and global best practices.

Components of the IARE e-Learning Ecosystem

The digital learning ecosystem at IARE consists of several integrated components that collectively enhance the student learning experience.

1. **Akanksha Learning Management Portal**
   Akanksha Learning Management System (LMS) is IARE's comprehensive digital learning portal that enables students to access course resources anytime, anywhere. The platform provides a rich repository of learning materials, including course full-stack resources, ELRV video lectures, project-based learning models, internship opportunities, career development resources, laboratory manuals, interview experiences, and digital library e-resources, supporting flexible and self-paced learning.

2. **Early Learning Readiness Videos (ELRV)**
   Our e-learning readiness video lectures cover a wide range of engineering branches - Mechanical, Electrical and Electronic, Electronics and Communications, Civil, Aeronautical, Information Technology, Computer Science and Engineering (including AI&ML, Data Science and Cyber Security). Also, Physics, Chemistry, Mathematics and English. Our online engineering courses are designed to be flexible and convenient, allowing students to study at their own pace and on their own schedule. There are no exams, no deadlines and no schedules. You are in control of your own learning. We offer a range of resources and support services from experienced engineering faculty to help our students succeed. The platform encourages independent learning and improves overall academic performance.

3. **Classroom Lecture Recording Videos (CLRV)**
   Classroom Lecture Recording Videos (CLRV) provide students with access to recorded classroom sessions delivered by faculty members. These recordings help students revisit lectures, clarify difficult concepts, and recover missed learning opportunities due to unavoidable circumstances. By enabling repeated viewing and self-paced revision, CLRV strengthens understanding, improves knowledge retention, and supports examination preparation. It serves as an important academic resource that extends learning beyond the classroom.

4. **HyFlex Learning**
   As part of IARE's HyFlex Learning initiative, selected courses are integrated into the E-Learning Readiness Videos platform to provide students with a flexible and interactive learning experience. The initiative combines structured video lectures, embedded assessments, and continuous progress tracking to enhance conceptual understanding and academic

performance. Students are expected to actively participate, complete all assigned sessions within the stipulated timeline, and monitor their learning progress through the platform.

5. **AKSHA – Library Information Service Portal**
   AKSHA is the Library Information Service Portal of the Institute of Aeronautical Engineering (IARE), developed to provide seamless digital access to the institute's extensive library resources. The portal enables students and faculty to search, reserve, and access books, e-books, e-journals, and other academic resources anytime and from anywhere. It serves as a centralized gateway to the institute's digital library services, supporting learning, teaching, research, and innovation.

6. **BuildIT – IARE's Intelligent Coding and Assessment Platform**
   BuildIT is IARE's comprehensive online coding, assessment, and technical skill development platform designed to enhance students' programming proficiency and industry readiness. The platform provides a secure environment for coding practice, online examinations, competitive programming contests, and automated evaluation. It enables students to strengthen their problem-solving abilities while preparing for campus recruitment and technical interviews.

Benefits to Students
Through the implementation of digital learning technologies, students gain access to:

- High-quality educational resources
- Continuous academic support
- Improved conceptual understanding
- Flexible learning opportunities
- Enhanced employability skills
- Research and innovation resources
- Personalized learning experiences
- Global knowledge repositories

The integration of these resources ensures that every learner receives comprehensive academic and professional support throughout their educational journey.

1.AKANKSHA LEARNING MANAGEMENT PORTAL

Keeping students engaged and connected to course content is one of the most important goals of modern education. To support this vision, IARE launched Akanksha – Learning Management Portal in 2021 as a centralized digital learning platform.

Akanksha provides a unique, flexible, and student-centric learning environment that enables learners to access educational resources anytime and anywhere. The portal serves as the digital backbone of IARE's teaching-learning process and supports both academic learning and professional development.

Students can enroll in courses and gain access to a wide range of digital resources, including course materials, recorded lectures, project resources, internship opportunities, placement preparation materials, and e-resources.

Key Features
- 24×7 Learning Access
- Self-Paced Learning
- Mobile-Friendly Platform
- Centralized Resource Repository
- Faculty-Curated Content
- Personalized Learning Experience
- Career Development Support
- Research Resources

Major Learning Components

- Industry Readiness and Career Development Resources
- Student Learning Models - Projects / Products
- AI Engineering
- Skill Enhancement Courses
- Mini Courses for Continuous Improvement (MICC)
- Course Full Stack – Learning Materials
- Teaching Laboratory Exercises and Manuals
- Early Learning Readiness Videos (ELRV)
- Professional Practice Internship Projects
- Job Interview Experiences
- e-Resources

Through these integrated resources, Akanksha supports holistic student development and lifelong learning. Akanksha allows students to learn according to their own schedules, revisit concepts whenever required, and continuously improve their knowledge and skills throughout their academic journey. Akanksha hosts multiple learning modules designed to support students academically and professionally.

1.1. Industry Readiness Resources

The transition from student life to professional employment requires a combination of technical knowledge, problem-solving ability, communication skills, and interview readiness. To support this transition, IARE provides a dedicated learning section known as Industry Readiness Resources. These self-paced learning resources allow students to strengthen competencies required for placements, internships, higher education, and professional careers.

Available Learning Handbooks

1.1.1 Competitive Programming Handbook

The Competitive Programming Handbook is to strengthen students' algorithmic and analytical problem-solving abilities through structured practice in competitive programming. It aims to cultivate speed, accuracy, and optimization skills necessary for solving real-world computational problems under constraints. Students will explore advanced data structures, algorithmic paradigms (divide and conquer, greedy, dynamic programming, backtracking, graph and string algorithms), and complexity optimization.

It enhances logical reasoning, debugging skills, and code performance awareness, preparing students for global programming contests and technical interviews. Students will be able to analyze, design, and implement efficient algorithmic solutions independently and collaboratively.

Access the Handbook:

or

https://akanksha.iare.ac.in/index?route=course/details&course_id=1781

Click the above link or scan the QR code or to access the latest version of the Competitive Programming Handbook.

1.1.2 JAVA Full Stack Handbook

The JAVA Full Stack Handbook is to equip students with the technical and analytical skills required to design, develop, and deploy end-to-end web applications using Java technologies. It emphasizes both the front-end and back-end development aspects of full-stack engineering, enabling students to integrate user interfaces, server-side logic, and databases into cohesive, scalable applications.

Students will learn core Java, advanced Java (JDBC, Servlets, JSP, Spring, Spring Boot), front-end technologies (HTML, CSS, JavaScript, React/Angular), and database management (MySQL, MongoDB). It also focuses on RESTful APIs, version control (Git), testing frameworks, and deployment techniques using cloud and DevOps tools. By the end of this course, students will be capable of building, testing, and deploying full-fledged web applications while adhering to professional software engineering practices, teamwork, and industry standards.

or

https://akanksha.iare.ac.in/index?route=course/details&course_id=1782

Click the above link or scan the QR code or to access the latest version of the JAVA Full Stack Handbook.

1.1.3 Computer Networking Handbook

The Computer Networking Handbook is to equip students with a comprehensive understanding of computer network architectures, communication protocols, and networked systems. It emphasizes both theoretical foundations and practical implementation of networking concepts such as OSI and TCP/IP models, routing and switching, congestion control, error detection, and network security.

Students will gain the ability to analyze, design, and troubleshoot computer networks, evaluate performance metrics, and apply networking tools for simulation and configuration. It also enhances collaborative skills for managing real-world network projects and prepares students for professional certifications and roles in networking and cybersecurity domains.

or

https://akanksha.iare.ac.in/index?route=course/details&course_id=1783

Click the above link or scan the QR code or to access the latest version of the Computer Networking Handbook.

1.1.4 DevOps Handbook

The DevOps Handbook is to enable students to integrate software development and IT operations for continuous delivery of high-quality software systems. The course focuses on the principles of automation, collaboration, integration, deployment, and monitoring using modern DevOps tools and technologies.

Students will learn to apply CI/CD pipelines, containerization, infrastructure as code, configuration management, and cloud deployment practices. They will gain practical experience in orchestrating environments, automating builds, testing, and deployments while ensuring system reliability, scalability, and security. It also prepares students for industry roles such as DevOps Engineer, Cloud Engineer, and Site Reliability Engineer (SRE) by developing the ability to bridge the gap between development and operations through automation, collaboration, and continuous improvement.

or

https://akanksha.iare.ac.in/index?route=course/details&course_id=1789

Click the above link or scan the QR code or to access the latest version of the DevOps Handbook.

1.1.5 Database Design Handbook

The Database Design Handbook is to equip students with the knowledge and skills required to design, implement, and manage efficient and scalable database systems. The course emphasizes both theoretical concepts and practical applications in relational and non-relational databases, including data modeling, normalization, SQL querying, transaction management, indexing, and database optimization.

Students will learn how to design logical and physical database schemas, ensure data integrity and security, and optimize performance for enterprise applications. It also covers database design tools, cloud-based database systems, and practical case studies to prepare students for industry roles such as Database Developer, Database Administrator, or Data Engineer.

or

https://akanksha.iare.ac.in/index?route=course/details&course_id=1790

Click the above link or scan the QR code or to access the latest version of the Database Design Handbook.

1.1.6 Verbal English Handbook

The Verbal English Handbook is to enhance students' proficiency in English communication, focusing on speaking, listening, reading, and writing skills in professional and academic contexts. The course emphasizes vocabulary development, grammar accuracy, comprehension, articulation, and presentation skills.

Students will learn techniques for effective interpersonal communication, group discussions, presentations, technical writing, and professional correspondence. It prepares students to communicate confidently and clearly in diverse environments, improving employability and professional readiness.

or
https://akanksha.iare.ac.in/index?route=course/details&course_id=1791

Click the above link or scan the QR code or to access the latest version of the Verbal English Handbook.

1.1.7 Aptitude Handbook

The Aptitude Handbook is to enhance students' quantitative, logical, and analytical reasoning skills for academic, professional, and competitive contexts. It focuses on developing abilities in numerical reasoning, logical problem solving, data interpretation, quantitative analysis, and critical thinking.

Students will learn to apply mathematical techniques, logical deduction, and analytical strategies to solve complex problems efficiently. It also prepares students for placement tests, competitive exams, and real-world problem-solving scenarios, improving speed, accuracy, and decision-making under time constraints.

or
https://akanksha.iare.ac.in/index?route=course/details&course_id=1792

Click the above link or scan the QR code or to access the latest version of the Aptitude Handbook.

1.1.8. Reasoning Handbook

The aim of Reasoning Handbook is to enhance students' quantitative, logical, and analytical reasoning skills for academic, professional, and competitive contexts. It focuses on developing abilities in numerical reasoning, logical problem solving, data interpretation, quantitative analysis, and critical thinking.

Students will learn to apply mathematical techniques, logical deduction, and analytical strategies to solve complex problems efficiently. It also prepares students for placement tests, competitive exams, and real-world problem-solving scenarios, improving speed, accuracy, and decision-making under time constraints.

or
https://akanksha.iare.ac.in/index?route=course/details&course_id=1793

Click the above link or scan the QR code or to access the latest version of the Reasoning Handbook.

1.1.9. Puzzle Programming Handbook

The Puzzle Programming Handbook is to strengthen students' analytical thinking, logical reasoning, and algorithmic problem-solving skills through structured engagement with puzzles and computational challenges. It emphasizes pattern recognition, combinatorial logic, backtracking, recursion, and optimization techniques.

Students will learn to approach complex problems creatively, develop algorithms for puzzle-solving, and evaluate solutions efficiently. It prepares students for competitive programming, technical interviews, and problem-solving tasks in professional software development.

or

https://akanksha.iare.ac.in/index?route=course/details&course_id=1799

Click the above link or scan the QR code or to access the latest version of the Puzzle Programming Handbook.

1.1.10. Aptitude and Reasoning - Video Resources

The Aptitude and Reasoning - Video Resources is to enhance students' quantitative, analytical, and logical reasoning skills to tackle complex problems in academic, professional, and competitive contexts. It focuses on numerical reasoning, data interpretation, problem-solving, logical deduction, pattern recognition, critical thinking, and decision-making.

Students will learn to apply structured approaches, mathematical techniques, and analytical strategies to analyze problems, optimize solutions, and improve speed and accuracy. It prepares students for placement tests, competitive exams, technical interviews, and real-world problem-solving scenarios.

or

https://akanksha.iare.ac.in/index?route=course/details&course_id=1967

Click the above link or scan the QR code or to access the latest version of the Aptitude and Reasoning - Video Resources.

1.1.11. Complex Practical Problem-Solving Tasks- Java Programming

The Complex Practical Problem-Solving Tasks- Java Programming is to develop students' programming skills, computational thinking, and creative problem-solving abilities through engaging and innovative coding projects. It emphasizes algorithmic thinking, graphics programming, interactive applications, generative art, simulations, and creative use of libraries and frameworks.

Students will learn to design visually appealing and interactive programs, apply algorithms in creative contexts, and develop problem-solving strategies. This help students to prepare

for software development, game design, digital media applications, and innovation-focused technical roles.

or
https://akanksha.iare.ac.in/index?route=course/details&course_id=2186

Click the above link or scan the QR code or to access the latest version of the Complex Practical Problem-Solving Tasks- Java Programming.

1.1.12. Creative Coding Handbook

Creative Coding Exercises strengthen student's problem-solving ability, computational thinking, innovation mindset and confidence in applying programming concepts to real world scenarios.

Students can use AI–assisted coding platforms to understand programming concepts, decompose complex problems into manageable components, generate and examine simple code snippets, diagnose and debug errors, and iteratively improve their solutions.

or
https://akanksha.iare.ac.in/index?route=course/details&course_id=2311

Click the above link or scan the QR code or to access the latest version of the Creative Coding Handbook.

1.1.13. Complex Practical Problem-Solving Tasks – Front-End Web Development

The Complex Practical Problem-Solving Tasks – Front-End Web Development is designed to develop students' web design, user interface development, and creative problem-solving skills through engaging and real-world web application projects. It emphasizes responsive web design, interactive user interfaces, modern front-end technologies, client-side scripting, and effective use of HTML5, CSS3, JavaScript, and contemporary frameworks and libraries.

Students will learn to design visually appealing, accessible, and responsive websites, implement dynamic web functionalities, and apply industry best practices in front-end development. This helps students prepare for careers in web development, UI/UX engineering, full-stack development, and other innovation-driven software development roles.

or
https://akanksha.iare.ac.in/index?route=course/details&course_id=2311

Click the above link or scan the QR code or to access the latest version of the Complex Practical Problem-Solving Tasks.
These resources help students become placement-ready and industry-ready.

1.2 STUDENT LEARNING ASSESMENT MODELS – PROJECTS / PRODUCTS

At IARE, learning extends beyond textbooks and classroom instruction. The institution adopts innovative Student Learning Models that enable learners to apply theoretical concepts to real-world engineering challenges. These high-impact educational practices help students develop critical thinking, creativity, teamwork, leadership, communication, and problem-solving skills.
Student Learning Models provide opportunities for experiential learning, innovation, and professional growth. They are carefully designed to prepare students for advanced engineering roles and improve their employability prospects.

Project-Based Learning Pathways:

Cornerstone Projects (CoPs)
Cornerstone projects designed for a single semester with a small team upto 2 students in the second or third year of their studies. Faculty can choose the students of their choice.

Cornerstone projects in each department are as follows:

1. Computer Science and Engineering
2. AI&ML
3. Data Science
4. Information Technology
5. Aeronautical Engineering
6. Electronics and Communication
7. Electrical and Electronics
8. Mechanical
9. Civil

Computer Science and Engineering (CSE)
CSE cornerstone projects address contemporary issues in domains like software development, data science, artificial intelligence, cybersecurity, or web/mobile applications. By working on a cornerstone project, students gain practical exposure to the software development life cycle, project management, version control, and documentation. These projects form a vital part of a student's academic portfolio and lay the groundwork for more advanced capstone or industry-based projects in later semesters.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	CSE Information Packet

CSE (Artificial Intelligence & Machine Learning)
AI&ML cornerstone projects allow students to apply the mathematical and statistical knowledge as well as principles of algorithms and data structures to solve real-world problems. ML project develops a range of skills, from data preprocessing and feature engineering to model building, evaluation, and tuning. These projects help students to understand how machine learning can be applied to various fields, such as healthcare, finance, and robotics. It involves working with large datasets, complex models, and intricate problem-solving processes. These projects often involve using modern libraries, frameworks, and technologies, such as TensorFlow, Keras, Matplotlib, PyTorch, and Scikit-learn.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	AI&ML Information Packet

CSE (Data Science)

Data Science cornerstone projects typically involve using data analysis techniques, machine learning, and statistical methods to solve a real-world problem or gain insights from data. Projects can range from basic exploratory data analysis to complex predictive modelling.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	DS Information Packet

Information Technology

Cornerstone projects in Information Technology (IT) are foundational, hands-on experiences that expose students to real-world IT challenges and practices. These projects, often undertaken in the early stages of a degree program, help students develop practical skills, project management capabilities, and a deeper understanding of the software development lifecycle. Examples include projects in Cloud, Databases and web/mobile applications.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	IT Information Packet

Aeronautical Engineering

Aeronautical Engineering cornerstone projects in Aerodynamics and Propulsion blend core aerospace principles with modern technologies like AI, ML, IoT, and digital twins. Students work on advanced aircraft and UAV design using CAD/CAE and CFD simulations with AI-driven optimization to enhance lift, drag, and stability. On the propulsion side, projects focus on efficient engine systems through smart sensor monitoring, ML-based predictive maintenance, and digital twin analysis. Emerging themes include hybrid propulsion, sustainable fuels, and AI-assisted combustion modeling, preparing learners to tackle real-world challenges in next-generation aerospace systems.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	AERO Information Packet

Electronics and Communication Engineering

The Cornerstone Projects (CoPs) for Electronics and Communication Engineering span across key domains such as analog electronics, embedded systems, IoT, and FPGA-based digital design. Projects include the design of multi-output regulated DC power supplies with protection features, automatic LDR-based street lighting, and low-distortion audio amplifiers using BJT-MOSFET stages. Embedded applications involve thermistor-based temperature control systems, infrared burglar alarms, handheld metal detectors, and sound-responsive switching circuits. Digital system design projects emphasize FPGA implementations such as multifunctional clocks, traffic control systems using FSMs, and 4-bit synchronous up-down counters using VHDL/Verilog, bridging real-time control with hardware-level programming.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	ECE Information Packet

Electrical and Electronics

Cornerstone projects in Electrical and Electronics Engineering provide students and professionals with essential hands-on experiences, allowing them to apply theoretical knowledge to practical challenges across various engineering domains. These projects enhance technical proficiency, problem-solving skills, and innovation in areas like power systems, power electronics, control systems, embedded systems, and electrical machines. Power electronics projects emphasize efficient energy conversion and control techniques, particularly in electric vehicles and renewable energy applications. Control system projects involve the design and simulation of automation strategies, while embedded systems projects leverage microcontrollers and real-time operating systems for IoT applications.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	EEE Information Packet

Mechanical Engineering

Mechanical Engineering cornerstone projects blend core principles with emerging technologies like AI, ML, IoT, and automation to address real-world issues across domains. Design and Manufacturing projects utilize CAD/CAM, generative design, and predictive maintenance systems powered by ML. Mechatronics and Robotics involve smart systems, autonomous robots, and IoT devices using Arduino and AI control. Industrial Engineering and Thermal Engineering projects employ simulation, sensor-based IoT monitoring, and ML for efficient thermal management and energy systems.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	MECH Information Packet

Civil Engineering

Civil cornerstone projects apply engineering concepts with AI, IoT, and simulations to address real-world challenges in construction, transport, water systems, and structural monitoring.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Conference Paper	CIVIL Information Packet

Side Projects (SP)

A Side Project (SP) is an independent project that a student work on outside of your primary responsibilities. Side projects are often started to explore personal interests, build skills, or work on something creatively fulfilling without the constraints of routine academic settings. These projects provide an opportunity for hands-on learning, creativity, and personal growth, and they often become valuable additions to a portfolio or resume. It covers multiple areas of technologies from hardware to software and client-side apps to backend cloud services.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	Skill enhancement, Portfolio Building, Career Advancement	Side Project Information Packet

Software Engineering Projects

The Software Engineering / Software Design allow the students to apply engineering principles, design practices, and technical skills to create well-structured, functional, and reliable software solutions. These projects are valuable in both academic and professional contexts, as they develop competencies needed for real-world software development.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / IV	Up to 2 Members	1 Semester	In-depth understanding of Software Development life Cycle (SDLC) process	SEP Information Packet

Technology Innovation and Product Support (TIPS)

At the forefront of technology IARE foster innovation, entrepreneurial thinking and develop future-ready students capable of adapting to a rapidly changing world across a range of digital and engineering careers. Will help the students to design, play, code and build our country for tomorrow.

Innovation, Invention, Creativity and Entrepreneurship, connected in theory separated in practice: Innovation is the process of turning a new concept into commercial success or widespread use. Invention is the creation of a new idea or concept. Creativity is the act of turning new and imaginative ideas into reality. Entrepreneurship is the creation of new organizations.
Predicting future innovation and its impact on society is always difficult, but here are some potential areas of innovation and their possible impact:

AT - Assistive Technologies

Assistive Technologies (AT) focuses creating smart devices and tools that help people with physical or mental challenges to live better and more independently. These can include talking apps for those with speech problems, smart glasses for the visually impaired, or robotic arms for people with limb disabilities. The goal is to improve daily life and independence.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	AT-Assistive Technologies Information Packet

IIST - IoT, Imaging and Sensing Technologies

IoT, Imaging and Sensing Technologies (IIST) focus on using sensors and connected devices (IoT – Internet of Things) to gather and send useful information. These technologies are used in areas like health monitoring, smart farming, or industrial machines that alert when they need repair. Imaging (like thermal or medical imaging) adds more detail to decision-making.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	**IIST Information Packet**

PCAI - People-centred Artificial Intelligence (AI) in cities

Developing AI tools that improve city life while focusing on fairness, transparency, and human needs. These systems can be used to manage traffic better, make public services faster, or keep the city clean and safe while ensuring privacy and avoiding bias.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	PCAT Information Packet

HMT - Healthcare and Medical Technologies

Healthcare and Medical Technologies (HMT) focuses on designing smart tools for hospitals, clinics, and personal health. This includes wearable fitness trackers, AI-based systems that help doctors detect diseases like cancer, telemedicine platforms for remote check-ups, and portable devices for testing blood or temperature. The focus is on better, faster, and cheaper healthcare.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	HMT Information Packet

SCDT - Smart Cities and Digital Transformation

Using technology to make cities smarter and more connected. Examples include smart traffic lights that reduce jams, energy-saving smart streetlights, digital payment systems for transport, and apps for public services. These technologies aim to make cities efficient, sustainable, and user-friendly.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	SCDT Information Packet

GET - Geospatial Enabling Technologies

Using maps, satellite images, and GPS tools to understand and solve problems related to land, environment, and planning. This can help in disaster response (e.g., tracking floods), planning roads and cities, or monitoring forests and agriculture.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	GET Information Packet

URS - Urban and Rural Sustainability

Developing eco-friendly technologies that help both cities and villages grow in a healthy way. This includes renewable energy (like solar panels), water purification systems, smart farming tools, and eco-construction methods. The aim is to protect nature while improving life for people.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	**URS Information Packet**

AM - Additive Manufacturing

Using 3D printing to create objects layer by layer. It's useful for making custom items like medical implants, car parts, or quick prototypes for testing new ideas. It saves materials, reduces waste, and allows fast and flexible manufacturing.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	AM Information Packet

AV - Autonomous Vehicles

Creating self-driving cars, buses, and delivery robots that can operate without human drivers. These vehicles use sensors, cameras, and AI to navigate roads safely. They can help reduce accidents, improve transport for people with disabilities, and lower traffic problems.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	AV Information Packet

UAV - Unmanned Aerial Vehicles

Building flying machines that work without pilots onboard. Drones can take photos, deliver packages, monitor crops, or help during disasters (like finding people in floods or earthquakes). They are fast, flexible, and useful in many fields like agriculture, defense, and healthcare.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Prototype Product Development	**UAV Information Packet**

MMVR – Multimedia and Virtual Reality Solutions

Multimedia and Virtual Reality (VR) technologies deliver immersive, engaging experiences by integrating audio, video, 3D graphics, and interactive environments. VR provides realistic simulations for training, education, and entertainment, while multimedia tools enrich content delivery across platforms. Together, these solutions drive innovation in healthcare, smart education, industrial design, and digital urban development.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Conference	**MMVR Information Packet**

ITE - Infrastructure and Technology Engineering

Infrastructure and Technology Engineering (ITE) focuses on designing, building, and maintaining the essential systems that support modern society. This includes roads, bridges, tunnels, water supply networks, sanitation systems, and sustainable urban spaces. With the integration of smart technologies, ITE also explores digital tools like Building Information Modeling (BIM), IoT-based monitoring, and AI-powered construction management to create safer, greener, and more resilient infrastructure. The goal is to develop innovative engineering solutions that improve connectivity, sustainability, and the quality of life for communities.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Conference	**ITE Information Packet**

SSI – Structural Systems Information

Structural Systems Information (SSI) focuses on the analysis, design, and optimization of load-bearing systems that form the backbone of infrastructure and buildings. This includes beams, columns, slabs, trusses, and frames, as well as advanced structural forms like shells, cable-supported structures, and high-rise systems. With the integration of modern computational tools, SSI explores technologies such as Finite Element Modeling (FEM), structural health monitoring, digital twins, and AI-based predictive maintenance to ensure safety, durability, and efficiency. The aim is to create innovative, cost-effective, and resilient structural solutions that meet sustainability standards while enhancing performance and longevity.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Conference	SSI Information Packet

Vertically Integrated Projects (VIPs)

Vertically Integrated Projects (VIP) involve design/discovery efforts involving students, researchers and faculty in their areas of expertise. VIP projects ambitious and long-term. Working together productively in a diverse team to find creative solutions to the problems or to make progress on a project is a key employability skill in the 21st century.

VIP teams are:

Multidisciplinary – drawing students from all disciplines on campus. Vertically integrated – a mix of B.Tech students starting from III semester, M.Tech students and Ph.D research scholars. Long Term – each student may participate in a project for up to two / three years.

It allows students to gain unique, real-world experience that enhances their CVs, learn skills associated with interdisciplinary and multidisciplinary group work, and emerge with an increased awareness of global problems and their role in tackling them, making them more engaged and informed global citizens.

The continuity, technical depth, and disciplinary breadth of these teams are intended to:
Learn and practice diverse skill-sets, make substantial technical contributions to the team project(s), and experience many different roles on a large, multidisciplinary design/discovery team. Enable the completion of large-scale design/discovery projects that are of significant benefit to faculty members' research programs.

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Conference	VIP Information Packet

Projects in Community Services (PICS)

The engineering projects in Community Services, is a social entrepreneurship program. Students design, build and deploy systems to solve engineering-based problems for charities, schools and other not-for-profit organizations. IARE students while, studying make a difference—they are tackling real-world problems today. These projects focus on four themes: Community Development, Education, Health and Sustainability

Offered Semester	Team Size	Duration	Project Outcome	Current Projects
III / V	Up to 2 Members	1 Semester	Conference	CS Information Packet

Capstone Projects

Engineering Design and Development Projects is the high point of degree studies in engineering. The transition of students to industry is still not optimal, and there is a disparity between the needs of industry and the actual ability of academia to meet these needs. The capstone project bridge between academia and industry. Each project is carried out under the supervision of academic faculty and where appropriate an industry partner.

The emphasis of the project can be associated with either:

A well-defined project description, often based on a task required by an external, industrial client. Students will be tutored in the synthesis of practical solutions to complex engineering / technical problems; orA project description that will require an explorative approach, where students will pursue outcomes associated with new knowledge or understanding, within the engineering / science disciplines, often as an adjunct to existing academic research initiatives.

Engineering Design and Development Projects are completed over two semesters, extended to next two semesters, allowing greater depth and longer-term engagement with research and industry / client. Small teams of 2-3 students in their third / fourth year will work on complicated, multi-faceted projects that require thorough analysis and design work.

Characteristics of ideal Engineering Design and Development Projects include:

Can be addressed/solved in a structured, two-semester program (extended to next two semesters).Can engage any of the following in a multi-disciplinary team: civil, mechanical, electronics, electrical and computer engineering. A team of 2-3 students provides approximately 450-900 person-hours dedicated to design study and execution. Capstone projects include: Engineering Design & Development (EDDPs), Technology Innovation and Product Support (TIPS), Projects In Community Services (PICS) and Vertically Integrated Projects (VIPs). Students are guided by teaching faculty, as well as project advisors with industry expertise. Additionally, students have access to advanced laboratory, makerspace, Research laboratories, workshops, design equipment and technical specialists.

1.3 AI Engineering

AI Engineering learning pathways are high-impact practices designed to enable students to deepen their understanding of Artificial Intelligence, develop practical and industry-relevant skills, and prepare for advanced roles in technology and engineering. These pathways provide a structured progression from foundational AI concepts and software development practices to machine learning, generative AI, agentic AI, deep learning, and AI-driven software engineering.

The AI Engineering learning pathways significantly enhance the career readiness and placement prospects of engineering students by combining conceptual knowledge, hands-on project development, problem-solving, experimentation, industry use cases, and AI-assisted software development. Students gain opportunities to apply AI technologies to real-world problems, develop intelligent applications, explore emerging AI tools, and build solutions aligned with current industry requirements.

The following pathways provide a comprehensive learning journey for students:

1. AI in Software Development Life Cycle – Enables students to understand and apply AI across different phases of the software development life cycle, including requirements analysis, design, coding, testing, deployment, and maintenance.
2. Fundamental AI Projects (FunAI) – Provides students with hands-on exposure to fundamental AI concepts through practical projects, helping them transform theoretical knowledge into working AI solutions.
3. AI Specialist – Develops advanced AI competencies by exposing students to specialized AI technologies, tools, methodologies, and problem-solving approaches required for AI-focused careers.
4. Industrial AI Use Cases and Projects – Connects AI concepts with real-world industrial applications and enables students to analyze industry problems and develop AI-based solutions.
5. Neural Networks for Machine Learning – Builds a strong foundation in neural-network-based machine learning, enabling students to understand, implement, train, and evaluate intelligent models for different applications.
6. Agentic AI Projects – Introduces students to AI agents capable of reasoning, planning, decision-making, tool usage, and autonomous task execution through practical project development.

7. AI System Development – Generative AI – Enables students to design and develop AI systems using generative AI technologies, including large language models and other generative approaches.
8. Generative AI Projects – Provides project-based learning opportunities in which students apply generative AI to develop innovative applications, automation solutions, content-generation systems, and intelligent assistants.
9. Neural Networks for Deep Learning – Advances students' understanding of deep learning architectures and applications, including neural networks, convolutional neural networks, recurrent networks, and transformer-based models.
10. AI in Software Engineering – Explores the integration of AI into software engineering practices to improve productivity, quality, automation, testing, code analysis, maintenance, and software development processes.
11. AI Pair Programming – Develops students' ability to effectively collaborate with AI coding assistants for code generation, debugging, refactoring, testing, documentation, and software development.

Together, these pathways create a progressive AI Engineering ecosystem in which students move from fundamental concepts to advanced AI technologies and real-world project development. The learning model emphasizes Learn → Practice → Build → Apply → Innovate, enabling students to develop technical competence, creativity, collaboration, critical thinking, and industry readiness. Through these pathways, students can build a strong portfolio of AI projects, gain experience with contemporary AI tools and technologies, and develop the confidence required to pursue careers as AI Engineers, Machine Learning Engineers, Generative AI Developers, AI Software Engineers, AI Application Developers, and AI Specialists.

1.4 Skill Enhancement Courses

Skill Enhancement Courses are high-impact learning practices designed to strengthen students' quantitative aptitude, logical reasoning, communication, technical proficiency, problem-solving abilities, and professional skills, thereby preparing them for successful academic progression, competitive examinations, internships, placements, and future careers. These courses complement the core engineering curriculum by providing students with opportunities to develop practical competencies that are essential for succeeding in industry and higher education.

The Skill Enhancement learning pathways integrate quantitative ability, analytical thinking, communication skills, coding proficiency, database knowledge, employability skills, experiential learning, optimization techniques, and placement-oriented preparation. Through continuous practice, structured learning activities, problem-solving exercises, coding challenges, mock assessments, and industry-oriented training, students develop the confidence and competence required to perform effectively in recruitment processes and professional environments.

1.5 MINI COURSES FOR CONTINUOUS IMPROVEMENT (MICC)

Mini Courses for Continuous Improvement are short-duration, focused learning modules designed to complement the regular curriculum by addressing emerging technologies, industry requirements, professional competencies, and advanced academic concepts. It provides students with opportunities to acquire specialized knowledge and practical skills beyond conventional classroom learning.

These courses are developed to bridge the gap between academic education and industry expectations while promoting innovation, self-learning, interdisciplinary exposure, and lifelong learning. Through a flexible and outcome-based approach, it enhances students' employability, technical proficiency, and readiness to meet future professional challenges.

Each department offers MICC courses that focus on emerging technologies, advanced technical concepts, professional competencies, and practical applications. These courses enable students to enhance domain-specific knowledge, develop industry-relevant skills, and strengthen their readiness for higher education and professional careers. T

The following departments offer MICC courses:

1. Aeronautical Engineering
2. Mechanical Engineering
3. Civil Engineering
4. Electrical and Electronics Engineering

1.6 COURSE FULL STACK – LEARNING MATERIALS

Recognizing that every student learns differently, IARE provides a comprehensive collection of learning resources for every course through Akanksha LMS. No two students are the same: they vary in academic backgrounds, learning styles, motivation levels, personalities, and cultures.

To support teachers' efforts to teach content and develop essential learning skills, we're offering a collection of resources that teachers can share with students. The Course Full Stack framework ensures that every learner receives comprehensive academic support throughout the semester.

The course materials that are shared for student learning are:

1. Course Outline Description (COD)
2. Lecture Notes
3. PowerPoint Presentation
4. Definitions and Terminology
5. Tutorial Question Bank
6. Case Studies
7. Real-Life Examples
8. Complex Engineering Problems
9. Tech Talk Topics
10. Concept Video Topics
11. Open-Ended Experiments
12. Assignments
13. Model Question Paper – I
14. Model Question Paper – II
15. GATE Question Bank
16. Previous Question Papers and Solutions

1.6.1 Course Outline Description (COD)

A Course Outline Description (COD) document is a comprehensive academic document prepared before the start of a course. It serves as an official reference for students, faculty, accreditation bodies (NBA/NAAC), and academic administrators. It aligns the course with Outcome-Based Education (OBE) principles and clearly defines what students are expected to learn, how they will learn, and how they will be assessed.

1.6.2 Lecture Notes

Large syllabi are condensed efficiently into written summaries, highlighting the most important information and omitting unnecessary details. Lecture notes provide key opportunities for students to learn about the subject they have chosen to study in an efficient way. Highly useful and efficient type of online learning resource for students is digital lecture notes. This will help students familiarise themselves with the lecture material ahead of the class, provide an opportunity for preparatory background reading and prepare any questions that they may have. It

also facilitates note-taking during the lectures by removing the need for students to copy down content from slides.

1.6.3 PowerPoint Presentation

PowerPoint Presentation (PPT) The use of PowerPoint technology by faculty convey information contribute to students' learning more effectively compared with classes taught with chalk and board. PowerPoint is an effective tool for presenting study materials. The use of PowerPoint technology by faculty conveys information contribute to students' learning more effectively compared with classes taught with chalk and board. Hence, it will help in the classroom and strengthen students' learning capacities. The use of supporting visuals like images, graphs, data-driven charts, and tables may pass better idea. Such visuals will help the viewer to get the idea effortlessly.

1.6.4 Definitions and Terminology

A definition is a statement giving the meaning of a word or term. In academic work students are often expected to give definitions of key term, word, concept, theory or in fact, any key issue/thing, where the meaning is uncommon or not really understood, just by reading it. Hence definition is needed. Terminology is a necessity for all professionals involved in the representation, expression, communication and teaching of specialized knowledge. Scientists, technicians or professionals in any field require terms to represent and express their knowledge to inform, transfer or buy and sell their products. Terminology plays an important role in the understanding of contexts and specialized texts.

1.6.5 Tutorial Question Bank

Question Bank is suitable for end-of-lesson tests, revision activities or homework. Providing question banks and sample model question papers help students understand the test format and assess their strengths and weaknesses. Question Bank is a kind of resource on each course in which a set of questions can be taken in any examination. Tutorial question bank comprises of three sections:

Section - A: Critical Thinking and Problem Solving

These questions demonstrate decision making skills through critical thinking and problem-solving skills using appropriate analytical framework, processes & quantitative techniques. The questions related to critical thinking and problem-solving skills, need demonstrate decision making skills through using appropriate analytical framework, processes and quantitative techniques.

Section - B: Long Answer Questions

Long Answer (LA) questions also known as Written Response questions require respondents to write using multiple sentences, paragraph answers, or mathematical explanations and calculations. A long answer is supposed to be detailed, so make sure to create questions that allow students to write more.

Section - C: Short Answer Questions

Short answer questions (SA) tend to be open-ended questions (in contrast to MCQ) and are designed to extract a direct response from students. SA can be used to check knowledge and understanding, support engagement with academic literature or a particular case study and to encourage a progressive form of learning. They can be used in both formative and summative assessment. SA may take a range of different forms such as short descriptive or qualitative single sentence answers, diagrams or graphs with explanations, filling in missing words in a sentence, list of answers. As the name suggests, the answer is usually short.

1.6.6 Case Studies

A kind of problem-based learning, case studies are normally stories of engineering problems and challenges that are taken from the real world. They are frequently open-ended with no right

answer. They might, for example, give an account of a problem or design challenge with multiple ethical or technical issues. The case provides a close to real-world opportunity for students to apply the knowledge they are learning on their engineering course.

1.6.7 Real-Life Examples

Faculty incorporate into lessons, the real-life examples and connections. Incorporated into lessons, students understand why they are learning is useful beyond the walls of their classroom. They can see how they can use learning in real life, and how it impacts their true world. Connecting classroom learning with real-life examples builds engagement, fosters critical thinking, and encourages outside-of-the-box ideas. It connects lessons with other subjects to create a holistic way of thinking that deviates from the routine linear way that teaching is typically done. This approach, motivates the students for better engagement, learning, and therefore success. Such environment increases students' attention and promotes meaningful learning experiences.

1.6.8 Complex Engineering Problems

Our world is no longer one of simple problems. In times of increasing globalization and technological advances, many problems humans have to face in everyday life are quite complex, involving multiple goals as well as many possible actions that could be considered, each associated with several different and uncertain consequences, in environments that may change dynamically and independent of the problem solvers' actions. The complex problems of today, however, require knowledge and skills well beyond the typical domains of design, concerning the systems structure and dynamics.

1.6.9 Tech Talk Topics

Engineering is considered a complex field. Due to this reason, course teacher plan presentations for the progressive learning of students. It is suggested to decide good presentation topics for engineering students in the course of study. A pre-decided topic can help improve confidence and develop enriched understanding. Moreover, students can pre-practice and keep track of their presentation time and progress. Presentations are a way to research and learn from a topic. Good topic, content, and delivery are essential to communicate ideas better.

1.6.10 Concept Video Topics

For an engineering student, research and presentation become an integral part. Selecting for presentation by identifying concept-oriented topics in the course of study by bringing the best, searching for something new, and presenting the same, is especially important. During the presentation, graphical communication of content is as important as physical or verbal.

1.6.11 Open-Ended Experiments

Open Ended Experiments Open-Ended Experiments (OEE) is a suitable method to measure student achievement in the practical skills and the psychomotor ability. It is also closely related to students' perception of their communication achievement throughout the course. Integration of open-ended experiments in teaching and learning approach is required, due to increasing use of emergent technologies in research and industry. As a result, students could relate and use the knowledge learnt in each laboratory to complete the task. Performing open ended experiments for laboratory courses gives freedom to develop their own experiments, instead of merely following the already set guidelines from a laboratory manual or elsewhere. It will create the students to think critically and also out of the box. The students here have to devise their own strategies and back them with explanations, theory and logical justification. Implementing open ended experiments, increase the independent learning amongst students by giving them a platform to be innovative and creative in designing and executing their own experiments. Open-ended experiments are exploratory research activities designed without a predetermined conclusion or specific hypothesis to be tested. Unlike traditional experiments, where the goal is to confirm or disprove a hypothesis, open-ended experiments aim to explore possibilities, generate new ideas, or understand phenomena more broadly.

1.6.12 Assignments

Assignments are structured academic activities designed to reinforce classroom learning by encouraging students to apply theoretical concepts, analytical skills, and practical knowledge to solve engineering problems independently. Assignments promote active learning by requiring students to explore concepts beyond the classroom, analyse real-world scenarios, and develop innovative solutions using appropriate engineering principles and modern tools.

1.6.13 Model Question Papers

Model Question Papers are a structured assessment resource designed to familiarize students with the examination pattern, question formats, marking scheme, and expected learning outcomes of the course. It serves as a practice examination that closely reflects the structure and standards of the Continuous Internal Examination (CIE) and Semester End Examination (SEE), enabling students to assess their level of preparation and identify areas requiring further improvement.

1.6.14 GATE Question Bank

The Graduate Aptitude Test in Engineering (GATE) Question Bank is a comprehensive academic resource designed to help students prepare for the GATE by providing a curated collection of topic-wise and module-wise practice questions aligned with the course syllabus. It bridges the gap between undergraduate coursework and competitive examination requirements by emphasizing conceptual understanding, analytical reasoning, mathematical aptitude, and problem-solving skills.

1.6.15 Previous Question Papers and Solutions

The Previous Question Papers and Solutions document is a valuable academic resource that provides students with a collection of question papers from previous examinations along with detailed solutions and explanations. It is designed to familiarize students with the examination pattern, question formats, marking scheme, and the level of difficulty expected in internal and semester-end examinations. By practicing previous examination questions, students gain a deeper understanding of the syllabus, identify frequently tested topics, and improve their problem-solving techniques and examination readiness.

1.7 Teaching Laboratory Exercises and Manuals

Laboratory education plays a critical role in engineering learning by transforming theoretical knowledge into practical skills. To support effective laboratory instruction, IARE provides comprehensive Teaching Laboratory Manuals and Detailed Laboratory Exercises through Akanksha LMS.

These resources are designed to enhance students' understanding of engineering concepts through experimentation, simulation, observation, and analysis.

The components of Laboratory resources are:

1.7.1 Course Outline Description (COD)

The Course Outline Description serves as a comprehensive guide for each laboratory course. It provides information about the course objectives, course outcomes, laboratory schedule, assessment methods, experiment details, and expected learning outcomes. The COD helps students understand the purpose of the laboratory course and align their practical activities with the academic objectives of the program.

1.7.2 Laboratory Exercises

Laboratory Exercises are structured activities that enable students to apply theoretical concepts in practical situations. These exercises are carefully designed to develop technical skills, analytical thinking, problem-solving abilities, and experimental competencies. Each exercise

focuses on specific learning outcomes and provides opportunities for students to observe, analyze, interpret, and validate engineering principles through experimentation.

1.7.3 Laboratory Manuals

Laboratory Manuals provide detailed instructions and guidelines for conducting experiments in a systematic and organized manner. Each manual includes experiment objectives, theoretical background, apparatus required, experimental procedures, observation tables, calculations, result analysis, precautions, and viva-voce questions. These manuals help students perform experiments effectively while ensuring accuracy**,** safety, and adherence to standard laboratory practices. Laboratory learning forms a vital component of engineering education and supports the development of industry-ready graduates.

1.8 ELRV – Early Learning Readiness Videos

Learn Anytime, Learn Anywhere

Video-based learning has become one of the most effective methods for enhancing student engagement and conceptual understanding. The ELRV initiative at IARE provides high-quality recorded instructional content developed by experienced faculty members.

ELRV resources are available across the following departments for all the courses.

- Computer Science and Engineering
- Artificial Intelligence & Machine Learning
- Data Science
- Cyber Security
- Information Technology
- Aeronautical Engineering
- Mechanical Engineering
- Civil Engineering
- Electrical Engineering
- Electronics and Communication Engineering

The E-Learning Readiness Videos (ELRV) initiative offers numerous benefits that enhance the learning experience of students. It provides flexibility, allowing learners to study according to their own schedules and learning preferences. The video resources are highly accessible, enabling students to access course content anytime and from any location using digital devices. ELRV supports repetitive learning, allowing students to revisit difficult concepts and review important topics multiple times until they achieve a clear understanding.

The platform promotes personalized learning, as each student can control the pace of learning based on individual needs and capabilities. Furthermore, ELRV encourages continuous learning by removing dependence on classroom schedules and enabling uninterrupted access to academic content. Through these features, ELRV strengthens self-learning, improves conceptual understanding, and supports IARE's commitment to delivering learner-centered and technology-enabled education.

1.9 Professional Practice – Internship Projects

Internships are short periods of professional experience. These are generally shorter typically lasts between one and four months, but the exact duration depends on the organization involved. Most internship opportunities advertised by multinational organisations are aimed at pre-final year students.

Student Interns Expect:
To gain real work experience and provide meaningful assistance to the company. To gain experience and skills in a particular field. To develop professional contacts. To gain exposure to upper management. To receive an orientation to the company.

Types of Internships:

- **Paid internships** – Students do these internships usually during their second / third year of engineering. Unpaid internships – Students do these internships as volunteer positions through non-profit organizations and think tanks.
- **Partial paid internships** – Students are paid in the form of a stipend. Stipends are typically a fixed amount of money that is paid out on a regular basis.
- **Virtual internships** – Students do internships remotely on email, phone, and web communication. International internships – Students do internships in a country other than their country of residence.

IARE encourages students to actively participate in internships across industry, research organizations, startups, and academic institutions.
The Internship Resources section within Akanksha LMS provides guidance, internship descriptions, and opportunities aligned with students' academic backgrounds and career aspirations.

1.9.1. Student Internship Project (SIP)

Industry Exposure • Research Experience • Professional Growth
The Student Internship Program (SIP) at IARE provides students with valuable opportunities to gain practical experience, industry exposure, and research expertise beyond the classroom. Internships may be industry-oriented, research-focused, or a combination of both, enabling students to apply theoretical knowledge to real-world challenges and emerging technologies.
Students can explore internship opportunities through the Akanksha Learning Management System, where a variety of internship domains and project areas are available. These experiences often complement academic learning and may contribute directly to Capstone Projects, research activities, and professional skill development.

1.9.2. Summer Research Internship Project (SRI)

Research • Innovation • Discovery
The Summer Research Internship (SRI) program provides students with opportunities to engage in research and innovation activities at IARE's Research Laboratories, Technology Innovation and Incubation Centre, and Start-Up Enclave.

Students work under the guidance of faculty mentors on research projects, product development initiatives, and emerging technology applications. The program encourages scientific inquiry, critical thinking, experimentation, and innovation.

Through SIP and SRI programs, students develop technical expertise, research competencies, innovation skills, teamwork abilities, and professional confidence, preparing them for successful careers, higher studies, entrepreneurship, and lifelong learning.

1.10 Job Interview Experiences

Learning from Success Stories

Campus placements play a significant role in shaping students' professional careers. To support placement preparation, Akanksha LMS provides a dedicated section featuring Job Interview Experiences shared by successful students.

These experiences offer valuable insights into recruitment processes, technical interviews, aptitude tests, group discussions, and HR interactions.
Students often face uncertainty regarding placement processes. Learning from peers who have successfully secured employment helps reduce anxiety and improve preparation strategies.

Benefits:

1. **Improved Confidence**
   Understanding the recruitment process reduces uncertainty.
2. **Better Preparation**
   Students gain awareness of employer expectations.
3. **Enhanced Communication Skills**
   Exposure to interview scenarios improves professional communication.
4. **Strategic Learning**
   Students can focus on relevant technical and aptitude preparation.
5. **Placement Success Culture**
   The Interview Experiences section fosters a culture of peer learning where successful students contribute to the growth and development of future batches.

1.11 Integrated Library Management System

Gateway to Global Knowledge

In the digital era, access to quality information resources is essential for academic excellence, research productivity, innovation, and lifelong learning. To support students and faculty in their academic pursuits, IARE provides a rich collection of electronic resources through its Digital Library Ecosystem.

The Digital Library serves as a centralized platform for accessing scholarly journals, research databases, e-books, conference proceedings, standards, patents, technical reports, and educational resources from leading publishers and professional organizations across the world.

The objective is to ensure that every learner has access to authentic, up-to-date, and globally recognized knowledge resources required for learning, research, and professional development. The Digital Library Ecosystem empowers students to become independent learners and knowledge seekers.

Available e-Resources:

- **Knimbus Digital Library**
  Provides a unified search platform for accessing subscribed and open-access resources.
- **Springer Journals**
  Access to high-quality journals and books covering engineering, science, technology, and management disciplines.
- **ScienceDirect**
  One of the world's largest scientific research repositories offering peer-reviewed journals and technical publications.

- **IEEE Xplore Digital Library**
  Provides access to cutting-edge research in:
  - ✓ Computer Science
  - ✓ Artificial Intelligence
  - ✓ Electronics
  - ✓ Electrical Engineering
  - ✓ Communication Technologies
  - ✓ Robotics
  - ✓ Cyber Security

- **American Society of Civil Engineers (ASCE)**
  Provides research resources for Civil Engineering students and researchers.
- **American Society of Mechanical Engineers (ASME)**
  Offers journals, standards, and technical publications in Mechanical Engineering.
- **World eBook Library**
  Provides access to thousands of academic and reference books.
- **e-Shodh Sindhu**
  A national initiative providing scholarly content to higher education institutions.
- **DELNET**
  Supports resource sharing and inter-library access among academic institutions.
- **National Digital Library of India (NDLI)**
  A vast repository of educational resources across multiple disciplines.

2. CLASSROOM LECTURE RECORDING VIDEOS (CLRV)

Classroom Lecture Recording Videos (CLRV) are an important component of the IARE e-Learning ecosystem, designed to provide students with continuous access to classroom teaching beyond regular academic hours. Through CLRV, lectures delivered by faculty members are recorded and made available through the Akanksha Learning Management System, enabling students to revisit classroom sessions whenever required.

The initiative supports a flexible and student-centered learning environment where learning is no longer restricted to the physical classroom. Students can review lectures, reinforce concepts, clarify doubts, and improve their understanding at their own pace. CLRV acts as a powerful academic support tool that complements traditional teaching methods and strengthens the overall learning experience.

Benefits of CLRV:

1. **Missed Class Recovery**
   Students may occasionally miss classes due to medical reasons, participation in co-curricular activities, internships, placement drives, sports events, or other academic commitments. CLRV ensures that such students do not miss important learning opportunities. Recorded lectures allow them to catch up on missed topics and remain aligned with the course progression.
2. **Exam Preparation**
   Recorded lectures serve as an excellent revision resource during internal assessments, semester examinations, competitive examinations, and placement preparation. Students can revisit important concepts, faculty explanations, and problem-solving techniques

discussed in the classroom, helping them prepare more effectively and confidently for examinations.

3. **Concept Clarification**
   Engineering and technology courses often involve complex concepts that may require repeated exposure for complete understanding. CLRV enables students to replay difficult sections of lectures, review explanations, and revisit examples multiple times until they gain conceptual clarity. This promotes deeper understanding and long-term retention of knowledge.

4. **Continuous Learning**
   Learning should not stop when the classroom session ends. CLRV extends the learning process by allowing students to engage with academic content anytime and anywhere. Whether at home, in the hostel, during internships, or while preparing for examinations, students can continue learning without interruption.

5. **Enhancing Academic Success**
   The Classroom Lecture Recording Video initiative plays a significant role in improving academic performance, student engagement, and learning outcomes. By combining classroom instruction with digital access to recorded lectures, IARE creates a hybrid learning environment that promotes flexibility, accessibility, and continuous improvement.

CLRV empowers students to take ownership of their learning journey by providing unrestricted access to classroom knowledge. It supports active learning, encourages independent study, and ensures that every student has the opportunity to succeed regardless of learning style or schedule.

"Watch. Learn. Revise. Succeed."
Classroom Learning Available Anytime, anywhere.

3. HYFLEX LEARNING AND ELRV INTERACTIVE VIDEO LEARNING

IARE has adopted a modern HyFlex (Hybrid Flexible Learning) model that combines classroom instruction, online learning, recorded learning resources, and interactive assessments.
This approach enables students to engage with learning materials according to their individual schedules and learning preferences while maintaining academic rigor and accountability.

To improve student engagement and learning effectiveness, ELRV video lectures are integrated with interactive learning platforms such as Edpuzzle.

Guidelines
Students are required to:

- Watch the complete video lecture.
- Avoid skipping any sections.
- Attempt all in-video Multiple Choice Questions (MCQs).
- Use their official IARE Email ID (RollNumber@iare.ac.in).
- Complete assigned activities within specified timelines.

Learning Analytics
One of the most powerful features of HyFlex Learning is the availability of detailed analytics.
Faculty members can monitor:

- Video Completion Rates
- Student Engagement Levels
- Quiz Performance
- Learning Progress

- Concept Understanding
- Participation Statistics

These insights enable timely academic interventions and personalized support.

4. ICT STUDIO & DIGITAL CONTENT CREATION

The ICT Studio at IARE plays a vital role in the development of high-quality digital learning resources. It enables faculty members to create engaging educational content that supports self-paced and blended learning.

The studio serves as the foundation for video lectures, concept demonstrations laboratory demonstrations, and digital learning modules available through Akanksha LMS.

Infrastructure Facilities:

Professional Recording Equipment

- High-Definition Cameras
- Professional Microphones
- Audio Recording Systems
- Digital Lighting Systems

Video Production Facilities

- Video Editing Workstations
- Audio Processing Tools
- Graphic Design Software
- Animation Support Systems

Content Publishing Systems

- LMS Integration
- Video Streaming Support
- Cloud Storage
- Digital Distribution Platforms

The Future of Digital Learning at IARE

As technology continues to reshape education, IARE remains committed to adopting innovative solutions that enhance learning experiences and improve student success.

The institution is actively exploring next-generation educational technologies that will further strengthen its digital learning ecosystem.

Future Initiatives:

- **Artificial Intelligence Learning Assistants**
  AI-powered virtual assistants for personalized academic support.
- **Adaptive Learning Platforms**
  Learning systems that adjust content based on student performance.
- **Personalized Learning Pathways**
  Customized learning experiences aligned with individual goals.
- **Virtual Laboratories**
  Remote experimentation and simulation-based learning.
- **Intelligent Assessment Systems**
  AI-supported evaluation and feedback mechanisms.
- **Advanced Learning Analytics**
  Predictive analytics for improving student success.
- **Digital Twin Educational Models**
  Simulation of real-world engineering systems for learning and experimentation.