SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

Bachelor of Technology
in
Computer Science and Information Technology

AI-Application Development– B25CIS503
Project Report

(Gate Compass)

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CERTIFICATE

This is to certify that the Project titled **"GATE COMPASS"** is carried out by **Kavitha (R23EJ062), Anushka Roy(R23EJ014),Ankana Roy(R23EJ015),Mohit Kumar(R23EJ080),Nihar Thopur(R23EJ087),Chaithra M(R23EJ024),Pooja S Malipatil(R23EJ092),Himanshu P Dev(R23EJ049),Mallamma B Hullalli(R23EJ071)** are Bonafide students of Bachelor of Technology in **Information Science and Engineering** at the School of Computing and Information Technology, REVA University, Bangalore in partial fulfillment for the award of degree in Bachelor of Technology in **Computer Science and Information Technology,** during the year **2025-2026**.

Signature

Mir Wajahat Hussain
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DECLARATION

We, **Kavitha (R23EJ062), Anushka Roy(R23EJ014),Ankana Roy(R23EJ015),Mohit Kumar(R23EJ080),Nihar Thopur(R23EJ087),Chaithra M(R23EJ024),Pooja S Malipatil(R23EJ092),Himanshu P Dev(R23EJ049),Mallamma B Hullalli(R23EJ071)** are students of fifth semester B.Tech in **Computer Science and Information Technology** at the **School of Computing and Information Technology, REVA University, Bangalore**, hereby declare that the Project titled **"GATE COMPASS"** has been carried out by us and submitted in partial fulfilment for the award of degree in **Bachelor of Technology in Information Science and Engineering** during the academic year **2025-2026**.

Students: **Signature**

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Nihar Thopur

Anuska Roy

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Himanshu P Dev

Mohit Kumar

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Place : REVA University, Bangalore

Date :

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We would like to thank one and all who directly or indirectly helped us in the Project work.

Signature of Students

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ABSTRACT

GATE COMPASS is a web-based intelligent exam preparation platform designed specifically for GATE Computer Science Engineering (CSE) aspirants. The platform aims to simplify and optimize the preparation process by automatically analyzing previous years' GATE CSE question papers, identifying important topics, and generating high-quality mock tests aligned with the latest exam trends.

Using statistical methods and machine learning techniques, the system performs historical trend analysis to determine topic-wise and subject-wise weightage, difficulty patterns, and conceptual importance. Based on these insights, GATE COMPASS produces balanced mock tests sourced from standard CSE textbooks, ensuring comprehensive coverage and realistic exam-level difficulty.

The platform also simulates the actual GATE exam environment through a dedicated test engine featuring a 3-hour countdown timer, question navigation controls, mark-for-review options, and per-question time tracking. After each test attempt, students receive detailed analytics including accuracy breakdowns, time management insights, topic-wise strengths and weaknesses, and personalized study recommendations.

To ensure seamless and secure access, the system incorporates Google OAuth login. Its modular architecture allows continuous updates as new GATE data becomes available, ensuring the predictions, question weightage, and mock tests remain relevant for future aspirants. Overall, GATE COMPASS serves as a smart, data-driven preparation assistant for GATE CSE students, helping them practice efficiently, focus on high-weightage topics, and improve their overall exam performance.

CHAPTER 1
INTRODUCTION

GATE COMPASS is an intelligent web-based platform designed to support GATE Computer Science Engineering (CSE) aspirants in preparing more effectively. Instead of manually analyzing previous GATE papers or guessing important topics, the system uses automated trend analysis and predictive algorithms to identify high-weightage concepts. It then generates balanced mock tests from standard CSE textbooks based on these trends, helping students practice with relevant and exam-oriented questions.

The platform simulates the real GATE exam through a 3-hour timer, question navigation, and per-question time tracking. After every test, students receive detailed analytics—including topic-wise performance, difficulty analysis, and personalized improvement suggestions. With secure Google login and continuously updated insights, GATE COMPASS aims to make GATE preparation smarter, more structured, and data-driven for CSE aspirants.

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1.1 OBJECTIVE OF THE PROJECT

The objectives of the project are:

1. To provide a data-driven preparation tool for GATE CSE students.
2. To analyze previous GATE CSE question papers and identify high-weightage topics.
3. To predict important topics for the upcoming exam using statistical and machine learning techniques.
4. To generate mock tests from standard CSE textbooks based on trend analysis.
5. To simulate a real GATE exam environment with a 3-hour timer and navigation panel.
6. To track time spent on each question and analyze time management patterns.
7. To provide detailed performance analytics and personalized recommendations.
8. To offer secure and seamless user access through Google OAuth login

CHAPTER 2
PROJECT OVERVIEW

GATE COMPASS is a data-driven web platform created for GATE CSE aspirants to simplify and enhance their exam preparation. The system automatically analyzes previous years' GATE CSE question papers to identify frequently asked topics, difficulty levels, and subject-wise trends. Using this analysis, it predicts the most important concepts for upcoming exams and generates balanced mock tests using a curated question bank from standard textbooks.

The platform features a realistic exam simulator with a 3-hour timer, question navigation, and per-question time tracking to help students improve time management. After each test, users receive detailed performance analytics, including accuracy, weak topics, difficulty analysis, and personalized recommendations. The system is secured through Google OAuth login and designed with modular components to support continuous updates as new GATE exam data becomes available.

Overall, GATE COMPASS serves as a smart preparation assistant, combining trend analysis, predictive insights, and exam simulation to help CSE aspirants study more effectively and strategically.

2.1 MACHINE LEARNING ALGORITHMS USED

This project uses **Logistic Regression** as the main machine learning algorithm for predicting GATE CSE exam trends. Logistic Regression is a supervised classification algorithm that models the probability of an event occurring, such as whether a topic will have high or low weightage in the upcoming GATE exam. It is widely used for trend prediction because of its simplicity, interpretability and strong performance on structured data.

It is well-suited for the GATE Compass system because it:

1. **Handles exam trend classification effectively**, such as predicting high-weightage or frequently asked topics.
2. **Works well with numerical and categorical features**, including year-wise data, difficulty levels, and topic frequency.
3. **Produces interpretable results**, allowing users to understand which features (topics or subjects) influence exam patterns.
4. **Trains quickly and performs accurately**, making it ideal for large datasets created from multiple years of GATE papers.
5. **Avoids overfitting** when proper regularization is used, ensuring stable and reliable predictions.

CHAPTER 3
SYSTEM REQUIREMENTS

3.1 Functional Requirements

1. User Authentication: Secure Google OAuth login, maintain sessions, handle login errors.

2. Trend Analysis: Categorize questions by concept, rank concepts, update dynamically,visualize trends.

3. Mock Test Generation: Generate tests based on concept trends; prioritize important topics,balance difficulty; assign unique test IDs.

4. Timed Test Session: 3-hour timer, auto-submit on expiry, maintain timer during navigation, stop on manual submission.

5. Question Navigation: Forward/backward navigation,jump to questions, mark for review, show status palette.

6. Results & Feedback: Score calculation, show correct answers with explanations,concept-wise performance, weak-topic suggestions, historical trends.

3.2 Non-Functional Requirements

1. Performance: Support 500+ concurrent users, fast test generation

2. Scalability: Handle growing data and users, easy feature addition

3.Reliability: Accurate data and timer, prevent data loss

4. Security: Google OAuth, HTTPS, role-based access

5. Usability: Responsive UI, clear navigation and analytics

6. Maintainability: Easy question and trend updates, error logs

CHAPTER 4
PROJECT DESCRIPTION

GATE COMPASS is a web-based platform developed to assist GATE CSIT aspirants in systematic and effective exam preparation. The system leverages **trend analysis** of previous years GATE questions to identify high-priority concepts and generate **intelligent mock tests** from a curated question bank. Users can take **timed mock tests**, track time spent per question, navigate freely between questions, and receive **detailed performance analytics** with personalized feedback. The platform also supports **secure Google OAuth login** for seamless access and provides administrators with tools to manage the question bank and update trend data. Overall, GATE COMPASS combines adaptive learning, performance tracking, and usability to enhance exam readiness.

4.1 PROPOSED DESIGN
The The proposed design of **GATE COMPASS** is a **modular web-based system** with a focus on scalability, usability, and performance. The system consists of the following core components:

1. **User Interface (UI):**

   o Responsive web interface for desktop and mobile devices.

   o Provides login, test navigation, timer display, question palette, and results visualization.

2. **Authentication Module:**

   o Implements **Google OAuth** for secure login and session management.

   o Ensures role-based access for users and administrators.

3. **Trend Analysis Engine:**

   o Processes previous years' GATE questions.

   o Categorizes questions by concept and calculates concept frequency and importance.

4. **Mock Test Engine:**

   o Generates mock tests based on concept trends.

   o Ensures balanced coverage of difficulty levels and concepts..

5. **Results & Analytics Module:**

   o Calculates scores and generates detailed feedback.

6. **Administrator Module:**

   o Manages the question bank, validates question metadata, and imports previous years' questions.

CHAPTER 5
METHODOLOGY

The development of **GATE COMPASS** follows a structured and systematic approach to ensure a reliable, efficient, and user-friendly platform. The methodology combines **software development best practices** with an **iterative approach** to design and implementation.

1. Requirement Analysis
- Gathered detailed requirements from GATE CSIT aspirants and educators.
- Identified key functionalities such as mock test generation, trend analysis, timer management, and performance feedback.
- Documented both functional and non-functional requirements to guide system design.

2. System Design
- Designed a modular, client-server architecture.
- Defined core modules: Authentication, Trend Analysis, Mock Test Engine, Timer & Tracking, Results & Analytics, and Administrator Management.

3. Database Design
- Developed a relational database to store users, questions, mock tests, concept trends, and test results.
- Ensured referential integrity and scalability for growing data and users.

4. Implementation
- Developed the front-end using responsive web technologies (HTML, CSS, JavaScript/React).
- Implemented back-end APIs for authentication, test generation, trend analysis, timer management, and result analytics.
- Integrated Google OAuth for secure login.

5. Testing
- Conducted **unit testing** for individual modules to ensure correct functionality.
- Performed **integration testing** to validate interaction between modules.
- Executed **system testing** to verify complete functionality, performance, and reliability.

6. Deployment & Maintenance
- Deployed on a scalable web server with HTTPS and database backups.
- Implemented monitoring for uptime, performance, and error logging.

5.1 MODULES DESCRIPTION

1. User Interface Module
Provides a clean, simple, and intuitive UI for users to interact with the system. Enables easy navigation, quick access to features, and responsive design for all devices.

2. Authentication Module
Handles secure login, registration, and user verification. Protects user data using encrypted credentials and session management.

3. Data Processing Module
Collects, validates, and processes the user inputs or sensor data. Ensures accuracy and efficiency before sending the data for storage or analysis.

4. Database Management Module
Stores and manages all system data. Supports fast retrieval, updates, and secure backup operations.

5. Notification Module
Sends alerts, reminders, or updates to users through SMS, email, or in-app messages.

6. Analytics & Reporting Module
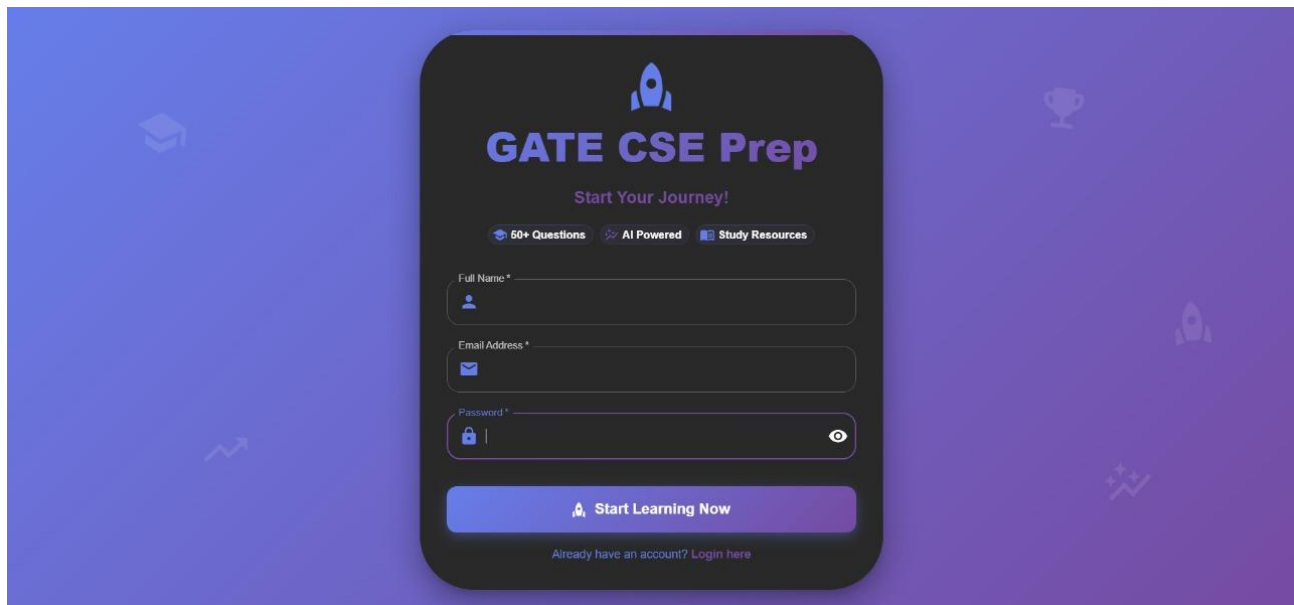Generates smart insights, visual reports, and summaries to help users understand trends and make informed decisions.
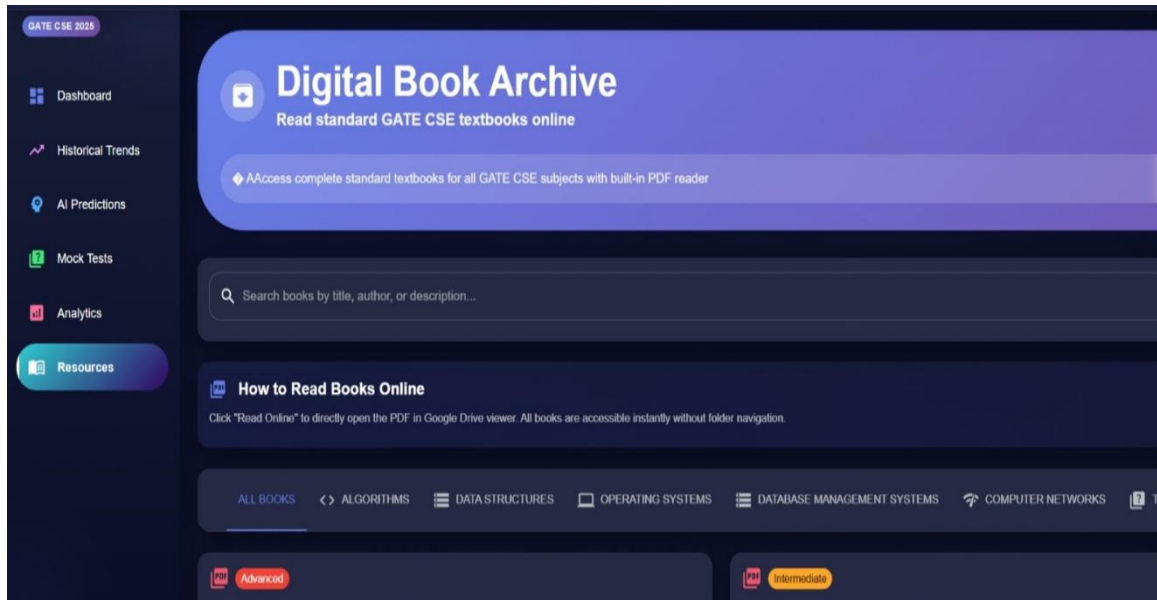
CHAPTER 6
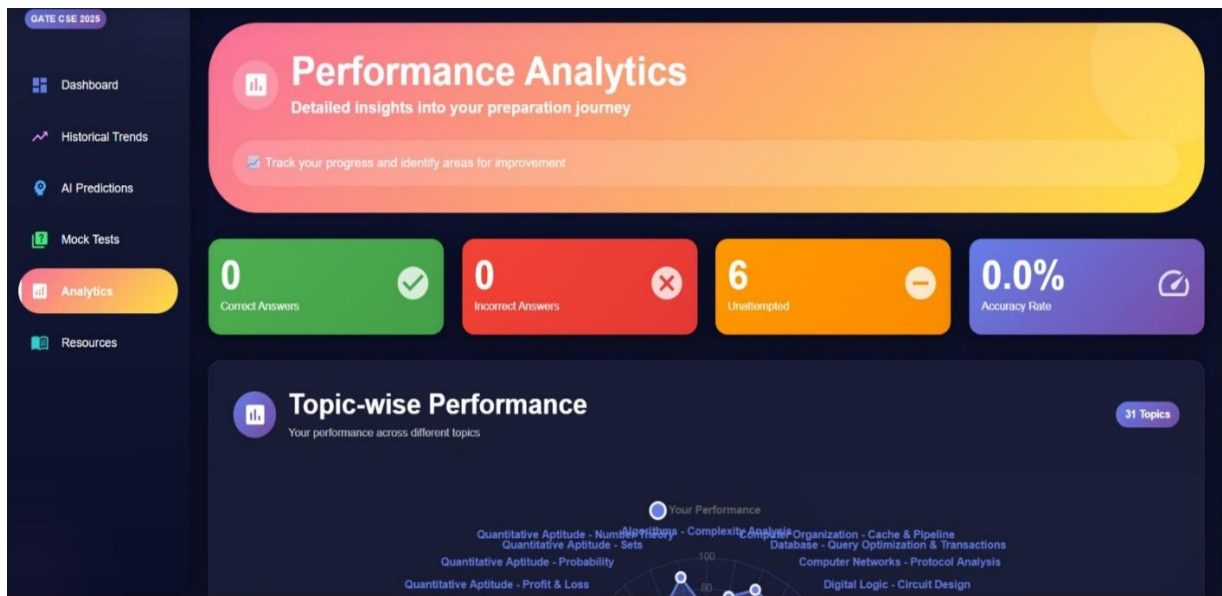# UI/UX SCREENS OVERVIEW

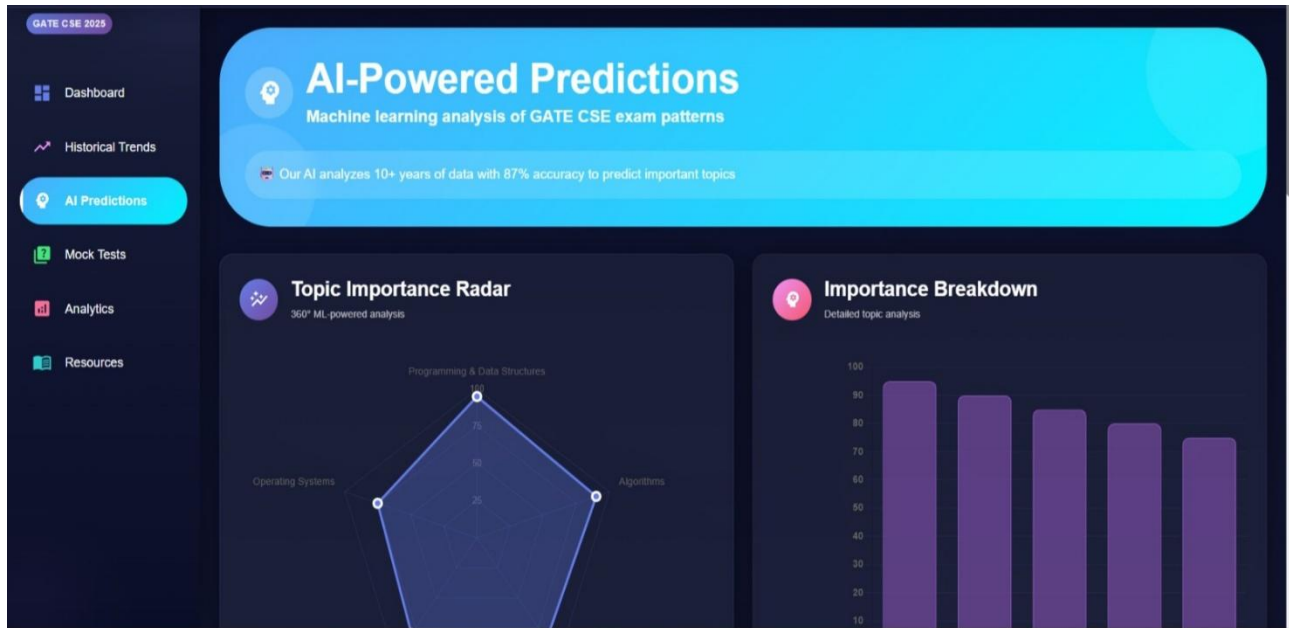## 1.Dashboard Overview
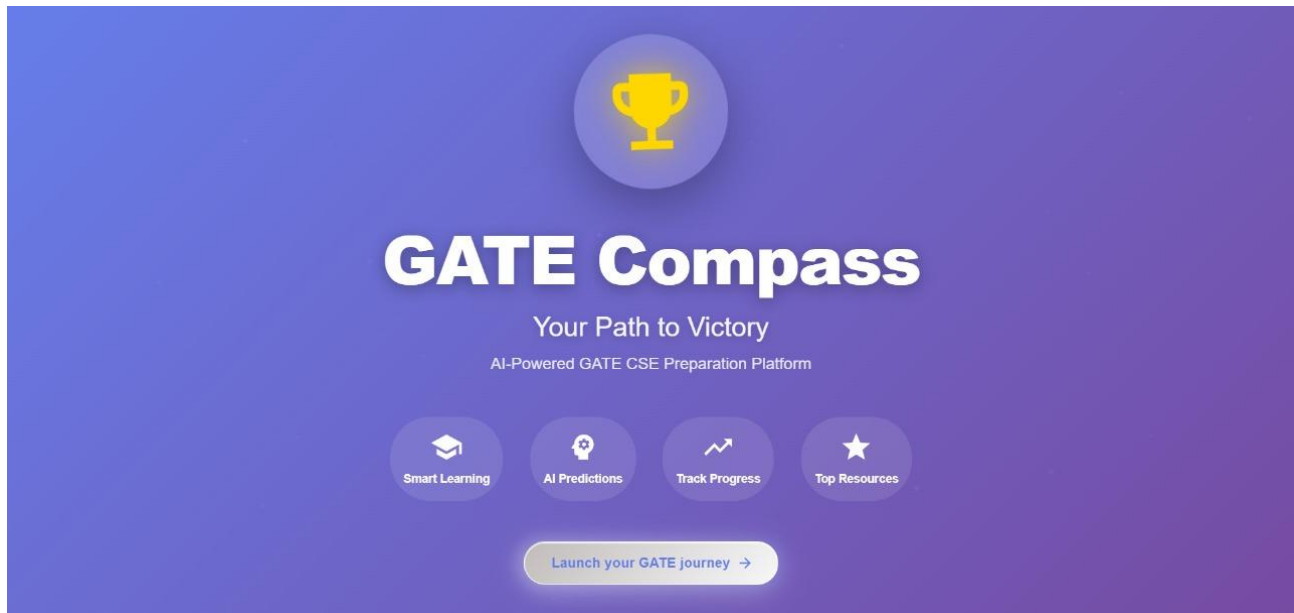
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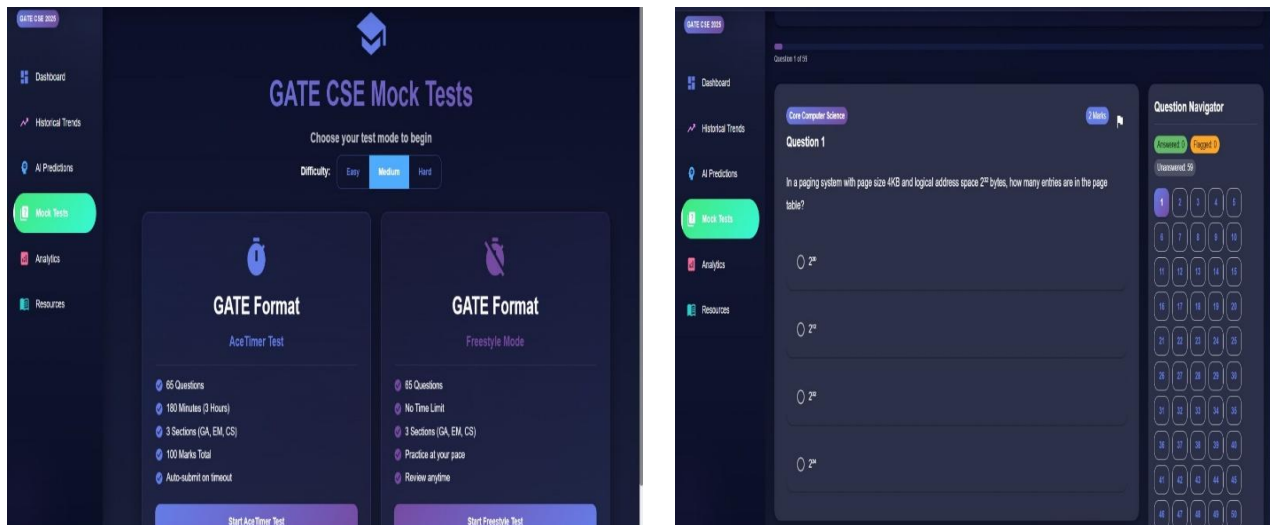
3.Digital Book Archieve

4.Performance Analyticks

3.AI-Powered Predictions:

4.Mock Tests:

CHAPTER 8
CONCLUSION

The GATE COMPASS is designed to provide a smart, efficient, and user-friendly platform for GATE CSIT aspirants. By integrating secure authentication, intelligent trend-based mock test generation, timed test sessions, detailed performance analytics, and administrator-managed content, the system ensures a comprehensive preparation experience. Its robust architecture, scalability, and reliability make it suitable for a growing user base while maintaining accuracy, security, and usability. Overall, GATE COMPASS aims to help aspirants maximize their exam readiness and track continuous improvement effectively.

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