EXAMINATION MANAGEMENT MODULE

1. Purpose of the Document

This document provides a high-level architectural and functional overview of the Examination Management Module to be implemented within the Student Management System.

The objective is to define:

- Scope & boundaries
- Core features
- System interactions
- User roles & responsibilities
- End-to-end workflows
- Integration points with existing modules
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2. Business Objective

The objective of this module is to digitize and automate the complete examination lifecycle including

planning, execution, evaluation, and result publishing.

The Examination Module aims to **digitize and automate the complete examination lifecycle**, reducing manual effort, increasing transparency, and ensuring secure, auditable, and scalable exam operations.

Key Goals

- Centralized exam planning & execution
- Secure question paper handling
- Automated seating & faculty allocation
- Seamless communication with students and faculty
- Accurate evaluation & result publication

3. Scope

In Scope:

- Exam creation and configuration
- Syllabus and subject mapping
- Question paper management
- Exam scheduling and seating allocation
- Faculty role assignment
- Attendance and exam records
- Evaluation and result publishing
- Notifications and communication

4. User Roles

Role	**Responsibilities**
System Admin	Full control of exams, scheduling, publishing
Examination Admin	Exam execution & monitoring
Faculty	Question paper upload, invigilation, evaluation
Student	View exam schedule, syllabus, seating, results
Parent (Optional)	View student exam updates & results

5. High-Level Architecture Overview

Architectural Style

- **Modular Monolith / Service-based architecture**
- Examination module acts as a **bounded context**
- Reuses existing core services (RBAC, Notifications, Users)

Key Components

- Exam Configuration Service
- Scheduling & Allocation Engine
- Question Paper Management
- Evaluation & Results Engine
- Notification & Communication Layer

6. Functional Overview (Module Breakdown)

6.1 Examination Master & Configuration

- Create and manage examinations
- Define exam types, grading systems, rules
- Map exams to academic year, class, section

6.2 Subject & Syllabus Management

- Map subjects to exams
- Upload and publish syllabus documents
- Lock syllabus after exam publication

6.3 Question Paper Management

- Upload question papers (PDF)
- Version control (Draft → Final → Locked)

- Secure publishing with time-based visibility
- Full audit trail of actions

6.4 Exam Scheduling & Seating Allocation

- Define exam date, time, duration
- Assign exam halls and rooms
- Auto-generate seating arrangements
- Export seating charts and hall-wise lists

6.5 Faculty Allocation & Monitoring

- Assign faculty to exam roles:
    - Question setter
    - Invigilator
    - Evaluator
    - Chief superintendent
- Conflict detection and validation
- Generate duty orders

6.6 Exam Execution & Records

- Student attendance tracking
- Absentee and malpractice recording
- Incident reporting by invigilators
- Post-exam documentation & logs

6.7 Evaluation & Result Publishing

- Marks entry and validation
- Grade calculation
- Publish results with access control
- Student & parent result views

7. End-to-End Examination Workflow

1. Exam created by Admin
2. Subjects & syllabus mapped
3. Question papers uploaded by faculty
4. Exam schedule finalized
5. Seating & faculty allocation generated
6. Automated notifications sent
7. Exam conducted & attendance recorded
8. Evaluation completed by faculty
9. Results reviewed & published
10. Students & parents notified

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8. Communication & Notification Flow

Notification Triggers

- Exam schedule published
- Syllabus released
- Seating allocation available
- Exam reminders
- Results published

Channels

- Email (Not implemented for Now)
- In-application notifications (Implemented for Now)
- (Optional) SMS / WhatsApp

Notifications are **event-driven** and role-targeted.

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9. Data & Audit Considerations

- All exam-related actions are logged
- Secure storage for question papers
- Role-based access to sensitive data
- Full audit trail for:
    - Question papers
    - Marks entry
    - Result publication

10. Non-Functional Requirements

Security

- Strict RBAC enforcement
- Encrypted document storage
- Time-based access control

Performance

- Optimized seating allocation
- Bulk notifications
- Scalable evaluation workflows

Scalability

- Supports multiple exams in parallel

- Handles large student volumes

Reliability

- Fail-safe publishing mechanisms
- Data consistency guarantees

11. Workflow

Exam creation → Scheduling → Allocation → Exam conduction → Evaluation → Result publishing

12. Security and Audit

- Role-based access, secure document storage, and full audit logs.
- This module enhances transparency, efficiency, and scalability of the Student Management System.

13. Integration with Existing Modules

Existing Module Integration	**Existing Module Integration**
Student Management Candidate data	Student Management Candidate data
Faculty Management Roles & assignments	Faculty Management Roles & assignments
Academic Structure Class, section, year	Academic Structure Class, section, year
Notification System Alerts & emails	Notification System Alerts & emails
RBAC System Access control	RBAC System Access control