HADHRAMOUT UNIVERSITY

COLLEGE OF ENGINEERING & PETROLEUM

COMPUTER ENGINEERING DEPARTMENT

University Question Bank

A FINAL PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ENGINEERING IN COMPUTER ENGINEERING

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The "University Question Bank" project aims to create a digital platform that makes preparing for exams and managing educational content easier and more efficient. The project focuses on building a system that allows the exam committee to access a large collection of different questions, helping them design exams quickly and easily.

The system will also use artificial intelligence tools to improve the quality of the questions and make the whole process more effective. It will support paper-based exam preparation and help assess the effectiveness of the questions.

This project is important for the academic field because it helps improve how exams are prepared, saves time for teachers, and makes exams more accurate and efficient. By using modern technologies like artificial intelligence, the system will improve exam preparation and analyze student results, which helps teachers provide better teaching.

1.2 Problem Statement

Universities face many challenges when preparing exam questions because they still rely on traditional methods. These methods take up a lot of time, increase the chance of mistakes, and require careful checking of everything, like making sure the questions are diverse and that the scores are balanced. This puts a lot of pressure on teachers.[2]

Additionally, many existing questions bank systems don’t allow teachers to organize questions well or use smart tools to improve the quality of questions. These systems also don’t analyze student results deeply or help students when they face problems during exams, making the whole evaluation process harder.

1.3 Objectives

The main goal of this project is to make exam preparation easier and more effective. To do this, we will create a digital platform for managing the question bank and use artificial intelligence to enhance and improve the quality of questions. This will save time and effort and make the exam process more accurate and efficient.[1]

The specific goals of the project are:

1. To provide a digital platform for managing the question bank.
2. To help classify and organize academic questions effectively.
3. To use artificial intelligence tools to improve the quality of questions.
4. To reduce the time and effort needed to prepare exams.
5. To improve the accuracy and efficiency of academic assessments.

1.4 Project Scope

The project is designed to be useful in different educational settings, so it can be used by schools and universities at all academic levels. The "University Question Bank" system is flexible and can be customized to meet the needs of different colleges and fields of study.

1.5 Structure of the Project

After we have taken an introduction and overview of our project in this chapter, the rest of the project report is organized as follows. Chapter two addresses a literature survey and an overview of the components used to build the proposed circuit.

Next, chapter three describes the methodology to describe the analysis and design stage, then it addresses the implementation stage and discusses the results. Finally, chapter four introduces the main conclusions and suggested recommendation work of the project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides background information on related works and software tools used in designing and implementing similar projects.

2.2 Related Work

2.2.1QMANS System

QMANS is a web application designed to gather faculty members to build a question bank that can be used to prepare exams. The system focuses on simplifying the process of creating, organizing, and managing educational content. This collaborative approach ensures the creation of a comprehensive database of questions that align with academic needs.The system offers several core functionalities to enhance its usefulness.

The system also allows the creation of different types of questions, such as multiple choice, true or false, essay questions, and case studies, subjecting them to multi-faceted review processes by relevant reviewers.
Furthermore, the system maintains a historical record of questions, storing all previous modifications through old versions, ensuring transparency and traceability. Exams can be delivered to students using answer sheets that are later graded by a computational tool.[3]

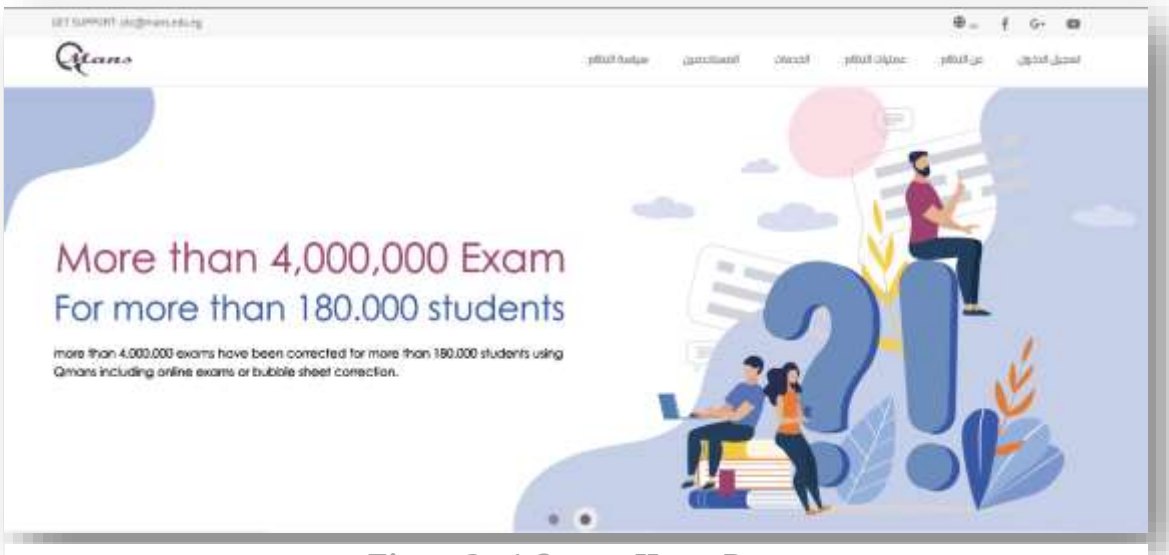

Figure 2 - 1 Qmans Home Page

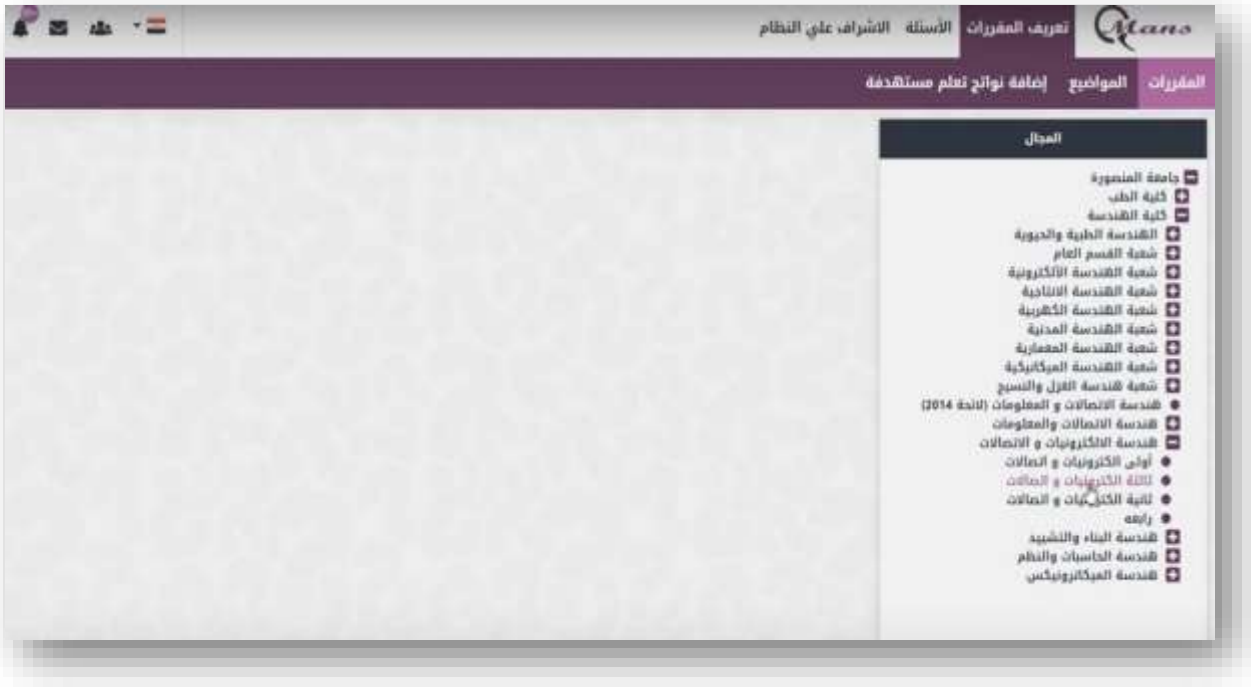

Figure 2 - 3 Qmans Department and Subject Page

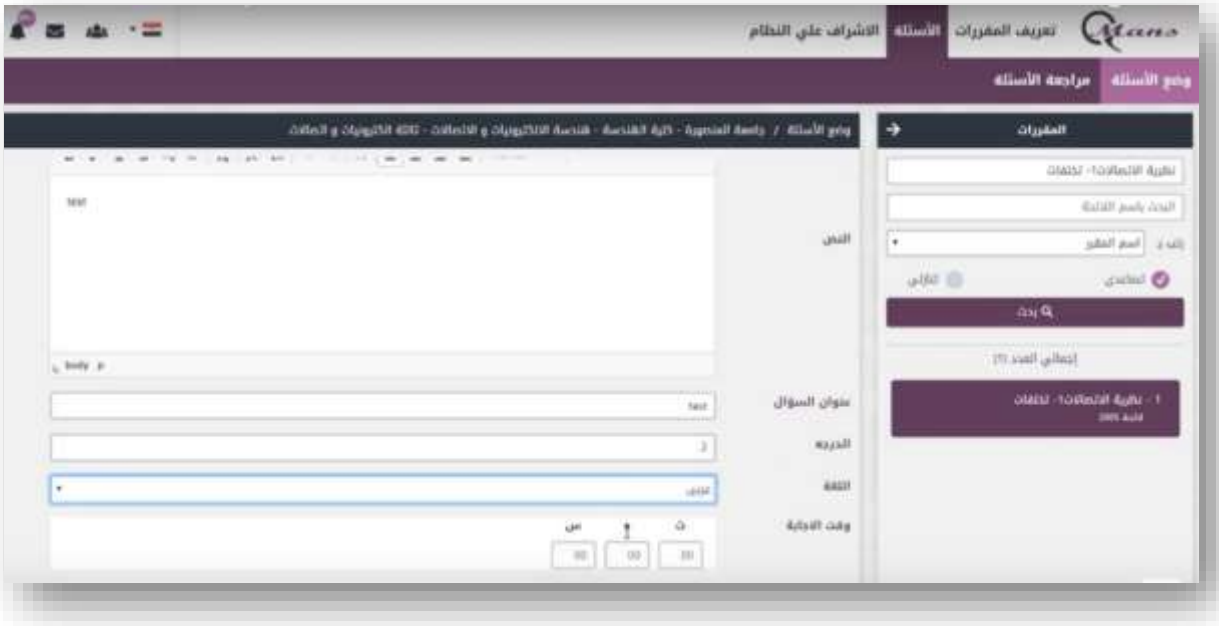

Figure 2 - 2 Qmans Question Page

2.2.2 Questionbank.ibo System

The "Questionbank.ibo" website is a specialized educational platform affiliated with the International Baccalaureate Organization (IBO), providing a comprehensive database of questions and tests covering a wide range of academic subjects. The website aims to support teachers and students in preparing for exams and gaining a deeper understanding of educational materials through varied and progressively difficult questions.

The site can be used to build a question bank for universities in several ways. It features a wide variety of questions, including multiple choice, essay questions, and problem-solving questions, allowing the creation of integrated question banks to meet diverse academic needs. The questions adhere to internationally recognized quality standards, helping ensure a high-quality university question bank.

The website helps organize questions by subjects or courses, simplifying their classification within the program according to different disciplines or curricula. Additionally, using pre-existing questions reduces the time and effort required to manually prepare exams, with the flexibility to modify them to suit course requirements.[4]

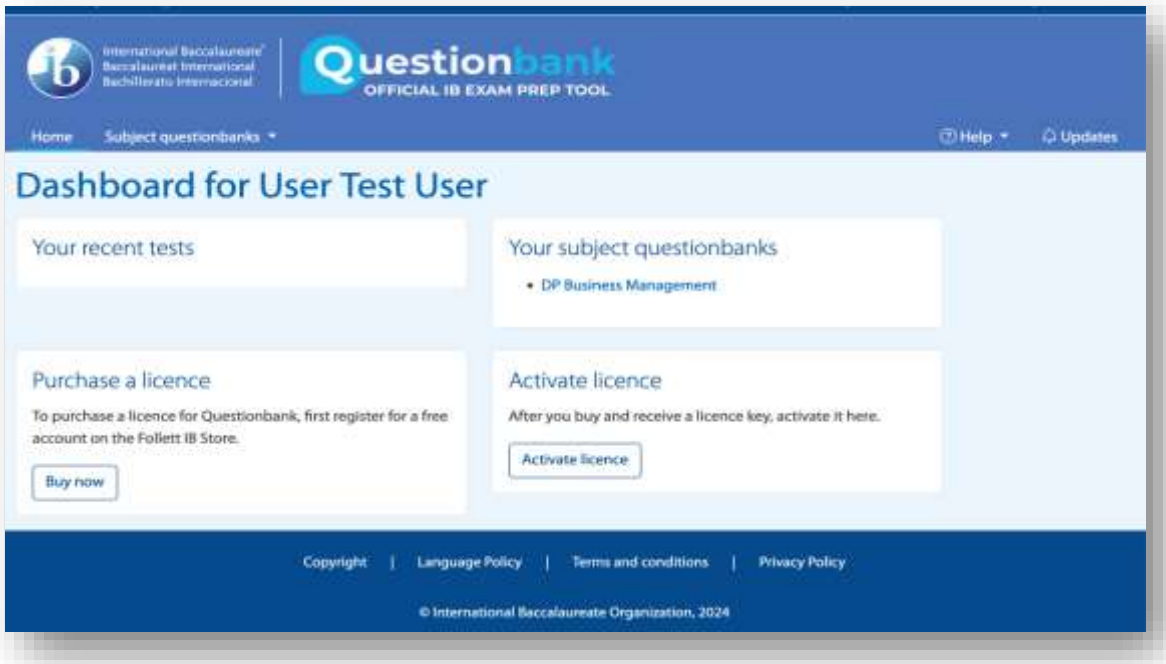

Figure 2 - 4 Questionbank.Ibo Home Page

2.2.3 Testmoz Platform

Testmoz is an online platform dedicated to creating and managing tests easily and efficiently. It features a simple interface that supports users without the need for registration or advanced technical expertise. The platform offers flexible tools to create various types of questions that suit educational needs.

It supports multiple question types, such as multiple choice, short answer, true/false, and essay questions. The platform provides automatic grading for objective questions, with the ability to manage tests using passwords to ensure content security. Additionally, it generates detailed student performance reports to analyze understanding levels and areas requiring improvement.

Testmoz helps universities build an organized and comprehensive question bank, categorized by discipline and academic level. The platform simplifies the creation of customized exams that meet course requirements, with tools for analyzing results to improve the quality of education and ensure more accurate and effective assessments.[5]

Figure 2 - 5 Testmoz Home Page

2.3 Background

In this section, we provide basic information about the programming languages and tools used to build the website. The development of the website is divided into two phases: frontend and backend. The frontend refers to the interfaces that visitors interact with on the website. These interfaces are structured using HTML and styled using CSS. JavaScript is also used, while the Laravel framework is utilized in the backend to manage various functions during interactions between the client and server. Finally, SQL is used to build the database, which integrates smoothly with Laravel.

2.3.1 Software

2.3.1.1 Frontend

Frontend development, also known as client-side development, involves creating HTML, CSS, and JavaScript for a website or web application so that users can see and interact with them directly.

- **HTML**
  HTML (HyperText Markup Language) is a set of tags or codes inserted into a file intended to be displayed on the web. The tags instruct web browsers on how to display words and images on a webpage. HTML provides the basic structure of content on a website, such as images, text, and videos.[6]

- **CSS**
  CSS (Cascading Style Sheets) is a language used to define how documents are displayed to users—how they are styled, arranged, and formatted. CSS can be used for basic styling like changing the color and size of text, as well as more advanced tasks such as layout design and adding effects like animations.[7]

- **JavaScript**
  JavaScript is a programming language executed in the browser. It turns static HTML pages into interactive ones by dynamically updating content, validating form data, controlling multimedia, animating images, and performing many other functions on webpages.[8]

2.3.1.2 Backend

Backend refers to server-side development. It focuses on databases, scripting, and website architecture. Backend activities occur in the background when a user interacts with the site, allowing browsers to communicate with databases.

- **PHP**
  PHP is a server-side scripting language used to build dynamic websites and web applications. It is primarily used for writing the code in the backend of websites.[9]

- **Laravel_Framework**
  Laravel is a PHP framework designed for rapid, secure, and maintainable web application development. It provides several features like security, ease of maintenance, and solutions for database management and user authentication in web applications.[10]

2.3.1.3Database

SQL: (Structured Query Language) is a language used to manage relational databases. It is widely used for storing, retrieving, updating, and deleting data from databases. SQL integrates seamlessly with Laravel to handle data and query processing effectively.[11]

2.3.1.4Artificial_Intelligence_Tools

API: API stands for **Application Programming Interface**, which is a set of rules and methods that allows different software systems to communicate with each other. In simpler terms, an API enables one program to access features or data in another program. Many artificial intelligence services, such as text analysis, image recognition, and recommendations, rely on APIs. These tools can be integrated into the website by sending and receiving data using web technologies like JavaScript in the frontend and PHP in the backend.[12]

Artificial Intelligence Tools in the System Include:

- Question analysis tool.
- Question rephrasing tool.
- Grammar check tool.
- Question generation and extraction tool.
- Question extraction tool.

2.3.2 Hardware

1- **Local server:** Any device that performs the task of the server and works to store data well.

2- **Broadcast modem:** It is a wireless device that works to create a Wi-Fi access point and is widely used in capturing the network signal and then broadcasting it to users, and we will use it to allow users to enter the program via Wi-Fi.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter will be presented analysis and design, implementation, testing, results and discussion.

3.2 Analysis and Design

3.2.1 context diagram

The context diagram of the university question bank system aims to clarify how the entire system interacts with external elements, such as users or other system.

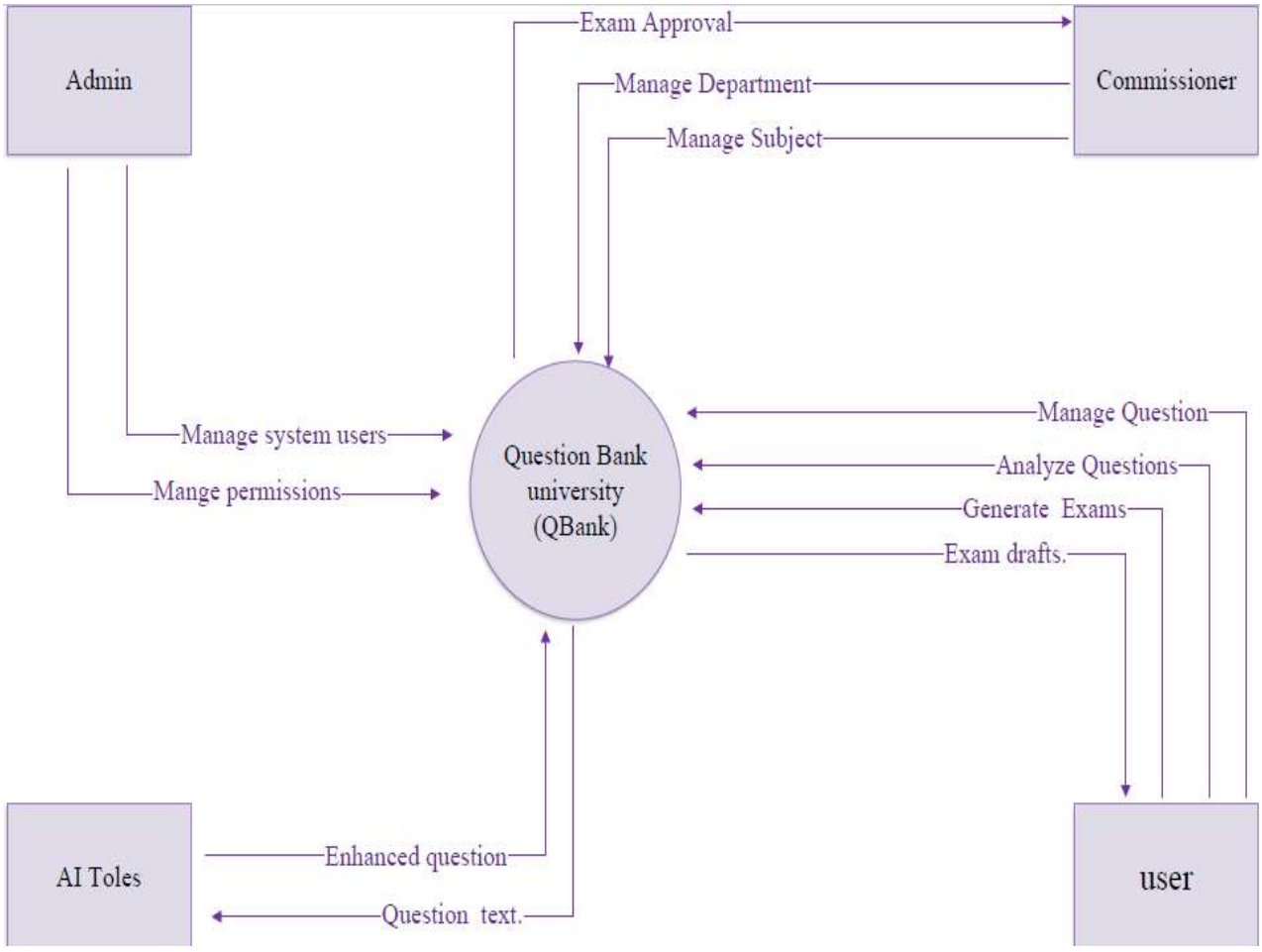

Figure 3 - 1 Context Diagram

3.2.2 Use Case

The use case diagram for the university question bank system aims to clarify the internal user interactions with the system and provides details about the functions and processes.

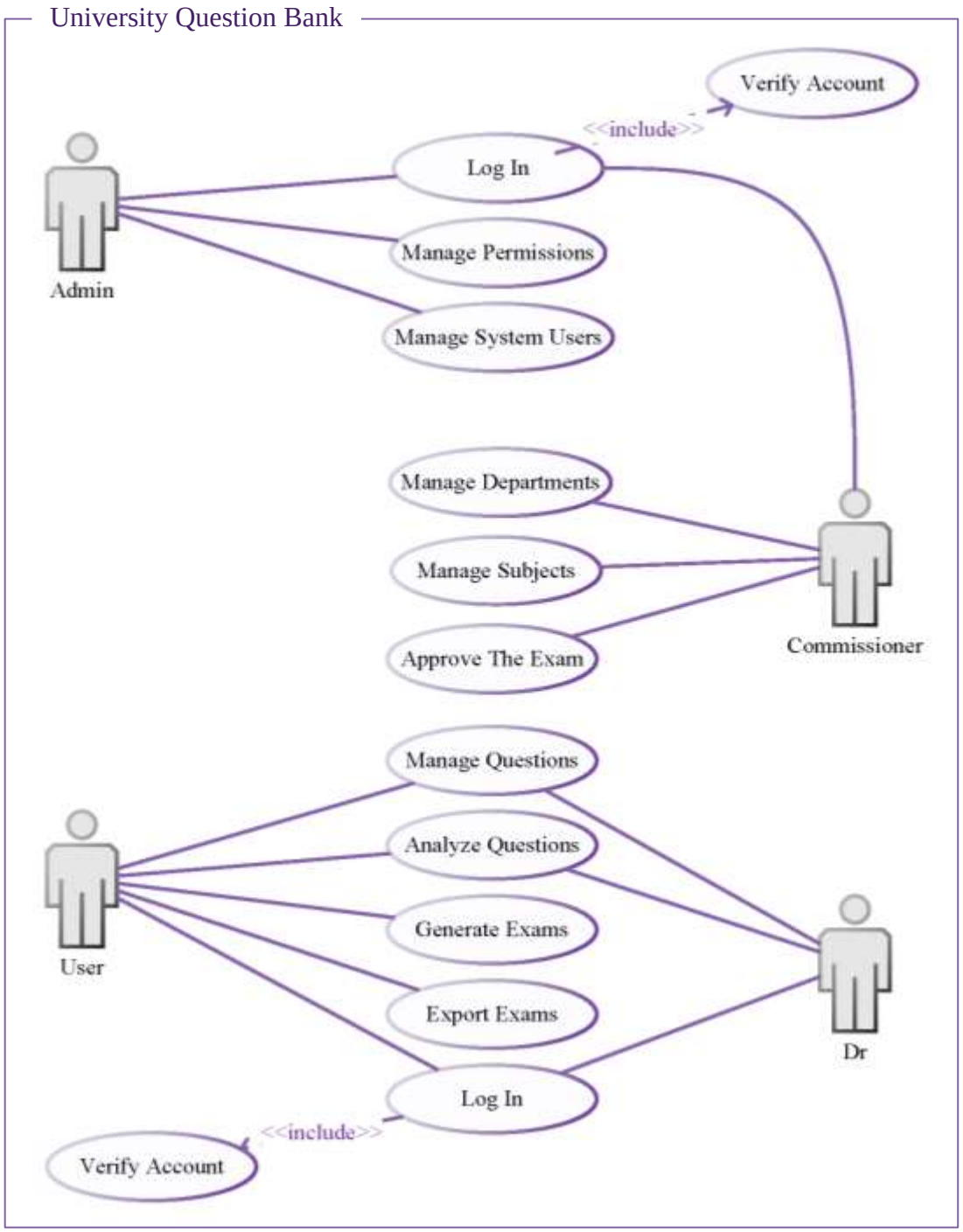

Figure 3 - 2 Use Case

Entities and Their Actions

Admin

Table 3 - 1 Use_Case Admin Entities

Action	Description
Manage System Users	Create, update, or delete user accounts in the system.
Manage Permissions	Assign or revoke permissions to control user access to various functionalities.

Commissioner

Table 3 - 2 Use_Case Commissioner Entities

Action	Description
Manage Subjects	Add, update, or delete subjects within the system.
Manage Departments	Organize and maintain departmental information and structure.
Approve The Exam	Review and approve exams to ensure compliance with standards.

User

Table 3 - 3 Use_Case User

Action	Description
Manage Questions	Add, update, or organize questions for exams.
Generate Exams	Create exams by selecting questions from the database.
Analyze Questions	Analyze the questions to ensure their correctness, absence of errors.
Export Exams	Save or print exams for further use.

Dr

Table 3 - 4 Use_Case Dr

Action	Description
Manage Questions	Add questions.
Analyze Questions	Analyze the questions to ensure their correctness, absence of errors

3.2.3 ERD

The Entity-Relationship Diagram (ERD) provides an accurate and detailed representation of data and its relationships within the database, ensuring that the design supports operations and maintains data integrity.

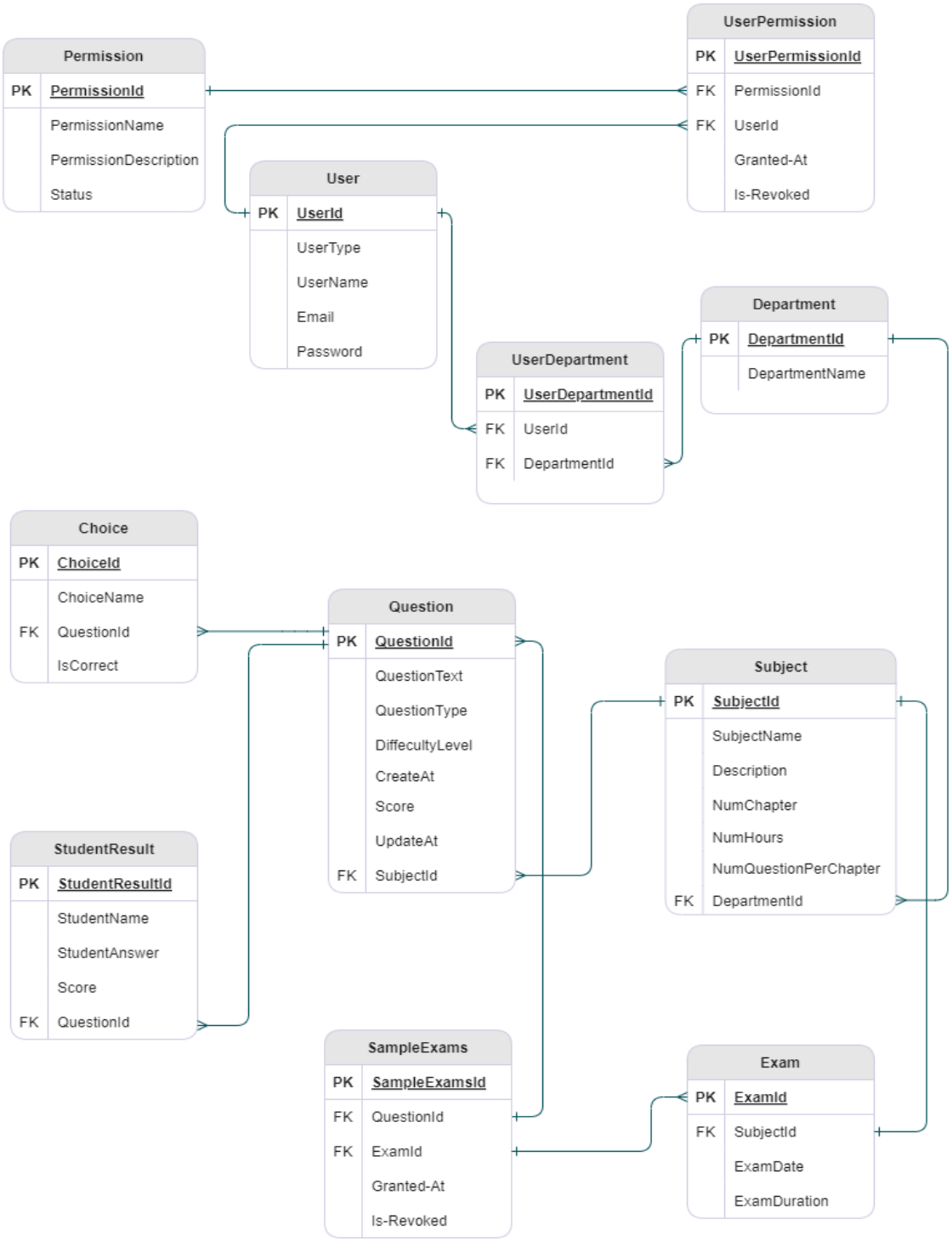

Figure 3 - 3 ERD

Database dictionary

This section describes the tables that are linked to the project. These tables is described in the following point:

- User
- Permission
- User permission
- Department
- Subject
- Sample Exams
- Question
- Option
- Student result
- Exam
- User Department

- User: Store user information.

Table 3 - 5 ERD_Users

Field name	Data type	Key
UserId	Int	Primary key
UserType	Varchar	
UserName	Varchar	
Email	Varchar	
Password	varchar	

- Permission: Extraction and Presentation of User Privileges.

Table 3 - 6 ERD_Permission

Field name	Data type	Key
PermissionId	Int	Primary key
PermissionName	Varchar	
PermissionDescription	Varchar	
Status	Varchar	

- User permission: Modeling the Association Between Users and Permissions.

Table 3 - 7 ERD_User Permission

Field name	Data type	Key
UserPermissionId	Int	Primary key
PermissionId	Int	Foreign key
UserId	Int	Foreign key
Granted-At	Date	
Is-Revoked	Date	

- Department: Displays the Departments Available on the Site

Table 3 - 8 ERD_Department

Field name	Data type	Key
DepartmentID	Int	Primary key
DepartmentName	Varchar	

- Choice: Adding Question Choices

Table 3 - 9 ERD_Option

Field name	Data type	Key
ChoiceId	Int	Primary key
ChoiceName	Varchar	
QuestionId	Int	Foreign key
IsCorrect	boolean	

- Subject: Displaying Subject Data and Their Associated Departments

Table 3 - 10 ERD_Subject

Field name	Data type	Key
SubjectId	Int	Primary key
SubjectName	varchar	
Description	txt	
NumChapter	Int	
NumHours	Int	
NumQuestionPerChapter	Int	
DepartmentID	int	Foreign key

- Question: Insert Question Data.

Table 3 - 11 ERD_Question

Field name	Data type	Key
QuestionId	Int	Primary key
QuestionText	Varchar	
QuestionType	Varchar	
DiffecultyLevel	Int	
CreateAt	Date	
Score	Int	
UpdateAt	Date	
SubjectId	Int	Foreign key

- Student Result: Displaying Students' Scores on the Question to Assess Its Difficulty

Table 3 -12 ERD_Student Result

Field name	Data type	Key
StudentResultId	Int	Primary key
StudentName	Varchar	
StudentResult	Varchar	
Score	Int	
QuestionId	Int	Foreign key

- Exam: Preparing the Subject Exam Paper

Table 3 - 13 ERD_Exam

Field name	Data type	Key
ExamId	Int	Primary key
SubjectId	Int	Foreign key
ExamDate	Date	
ExamDuration	Interval	
Score	Int	

- User Department: Establishes a Relationship Between Users and Departments

Table 3.2.3. 10 ERD_User Department

Field name	Data type	Key
UserDepartmentId	Int	Primary key
UserId	Int	Foreign key
DepartmentId	Int	Foreign key

- Sample Exams : Establishes a Relationship Between Question and Exam

Table 3.2.3. 11 ERD_User Department

Field name	Data type	Key
SampleExamsId	Int	Primary key
QuestionId	Int	Foreign key
ExamId	Int	Foreign key
Granted-At	Date	
Is-Revoked	Date	

3.3 Implementation

3.3.1 Home page

This is the main interface of the system, showing the project title and some of the advantages of this system, which is that it is fast, easy to use, and flexible to deal with and another information.

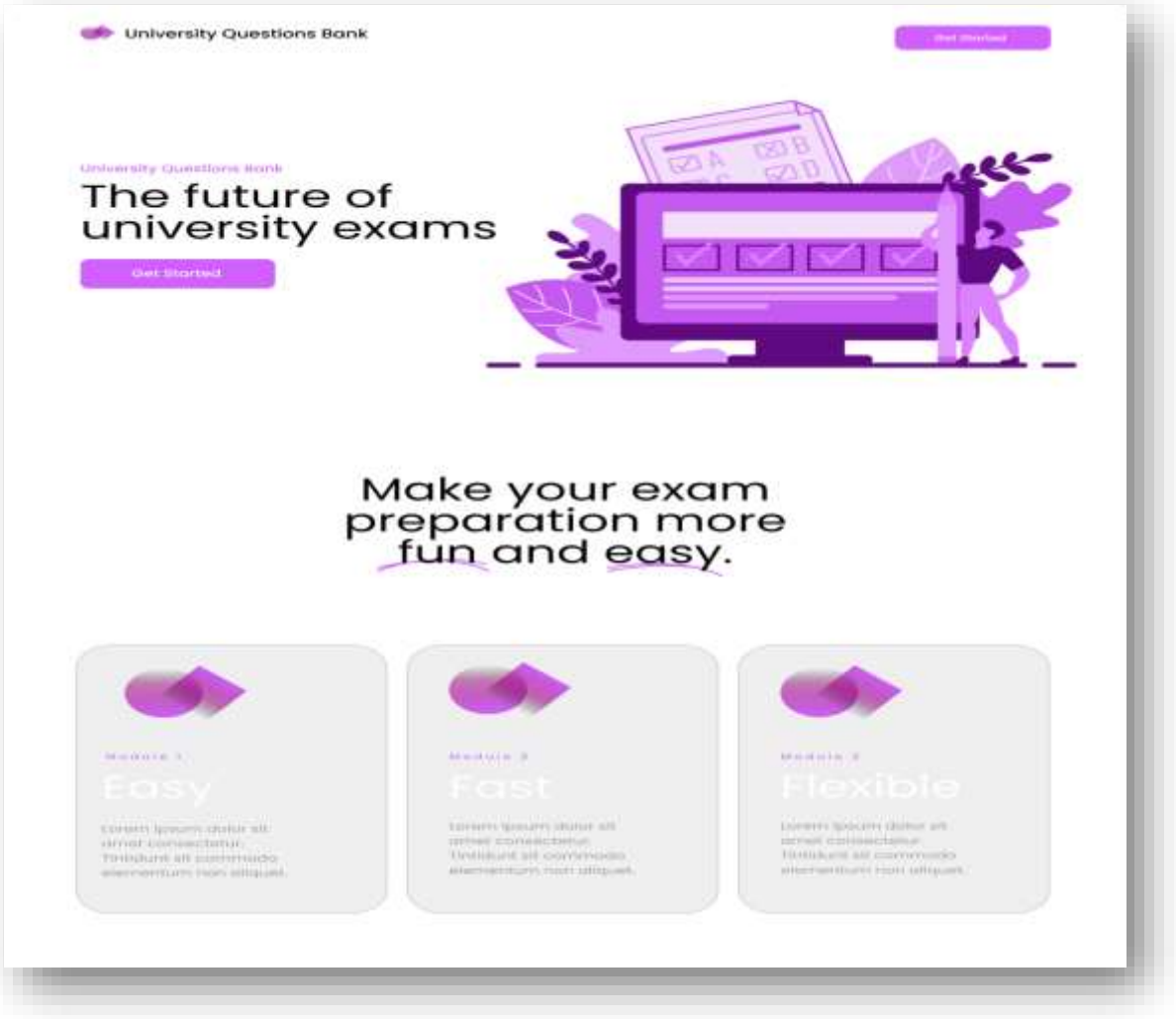

Figure 3 - 4 UQB Home Page

3.3.2 Question Banks page

This interface is the main part of the bank management in the Faculty of Medicine, it includes Display of banks in the system with additional details Bank name , Number of exams and questions: Information about the number of exams and questions associated with each bank, Bank creator, Management: The user can enter or modify questions within each bank, Adding a new question bank.

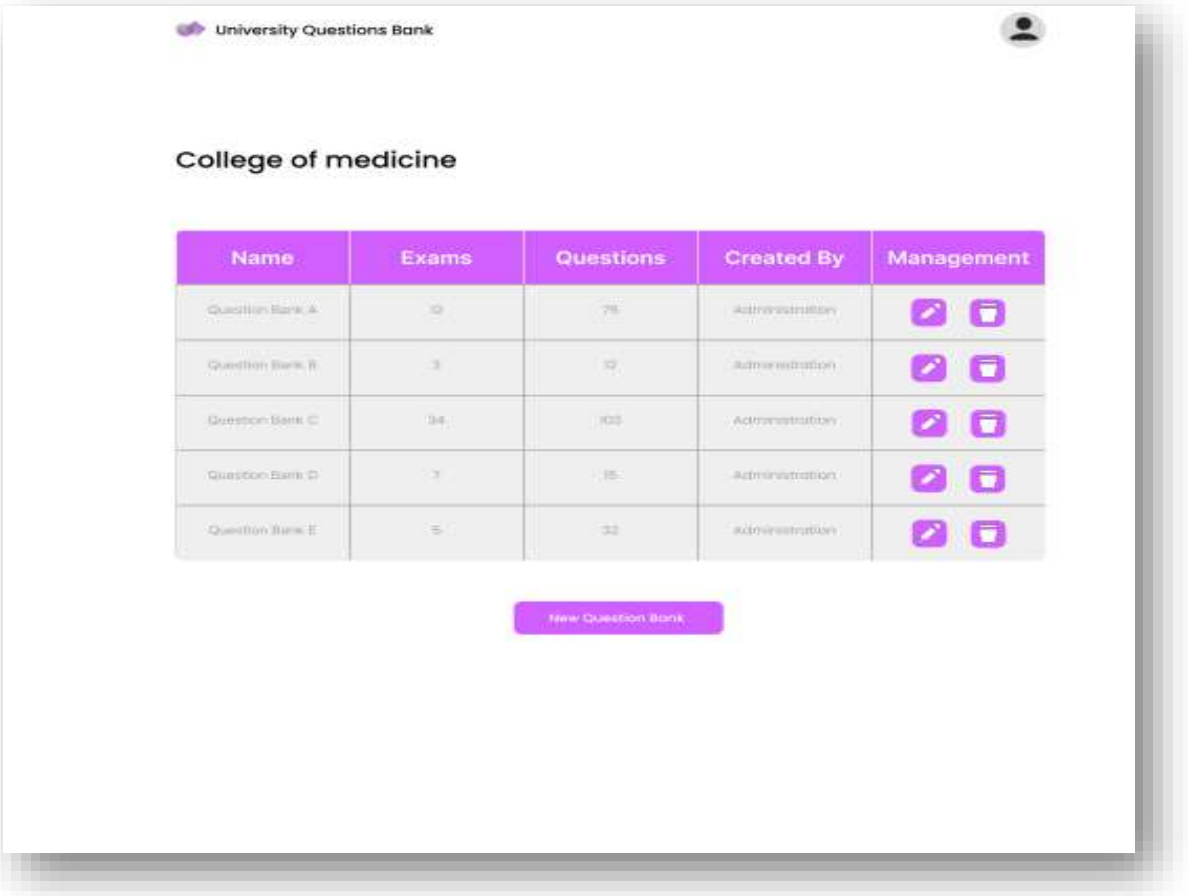

Figure 3 - 5 UQB Question Banks page

3.3.3 Exams page

This interface allows the user to view a list of the tests in the bank, with details such as: test number, academic level (e.g. first, second, third), block (block is the tests according to the medical college system), date the test was created, and the option to edit or delete tests. You can add a new test by clicking on "New Test".

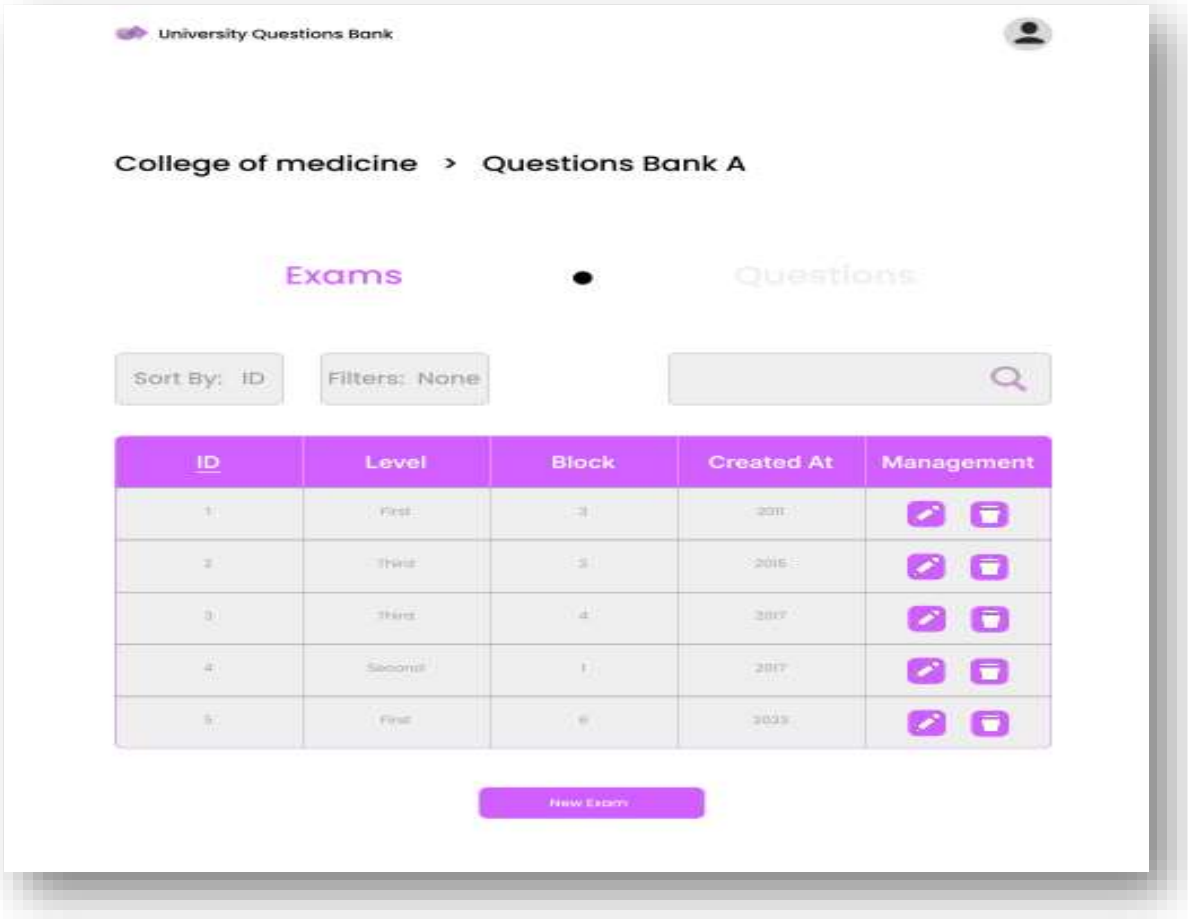

Figure 3 - 6 UQB Exams page

3.3.4 Question Page

This interface is responsible for displaying and managing questions in the bank. Questions in the bank can be displayed with the following details: the Course, Question the correct answer to the question, who added the question, the difficulty level (e.g. easy, medium, hard), and options to edit or delete questions. You can add a new question using the “New Question” option.

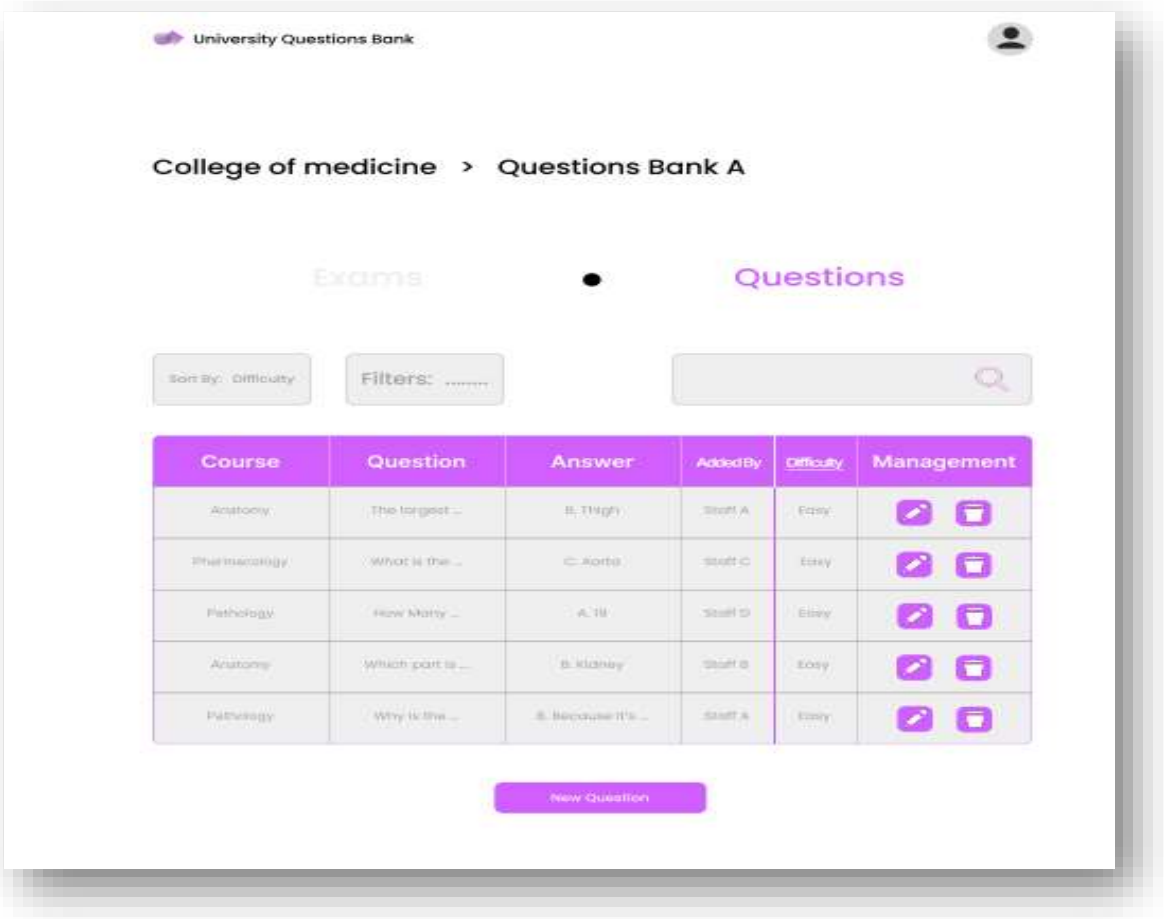

Figure 3 - 7 UQB Question Page

3.3.5 Adding Questions Page

This interface is responsible for adding questions to the bank. The administrator adds the question with all the answers, specifying the correct answer, specifying the name of the course, the number of points, and specifying the difficulty level of the question, in addition to a special icon for rephrasing the questions, which will be explained in the other interface.

"Import Icon" This icon allows us to add a set of questions.

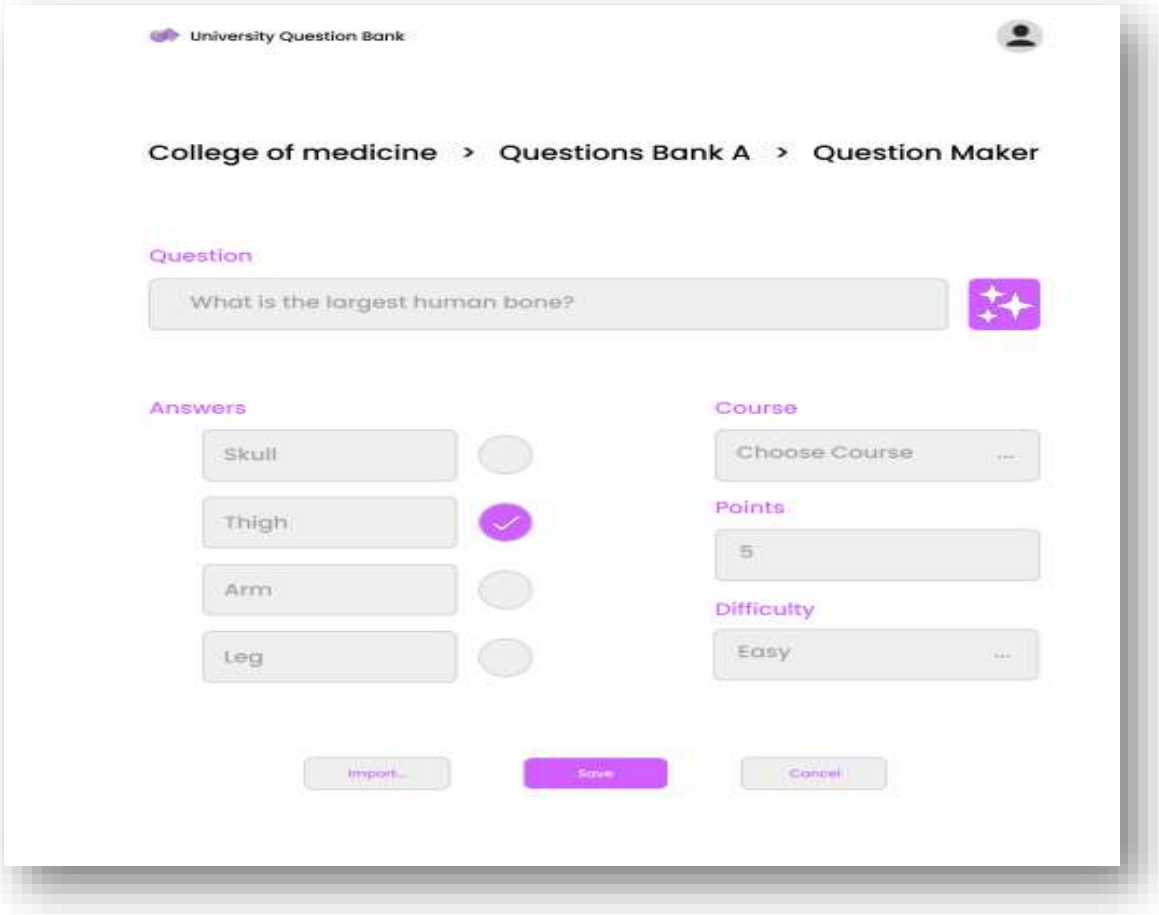

Figure 3 - 8 UQB Adding Questions Page

3.3.6 Rephrasing Questions

There is a tool to rephrase the question automatically, when you rephrase the question, you can get several different versions of the question (eg: "What is the largest bone in the human body?" can be rephrased to "Which bone in the human body is the largest?").

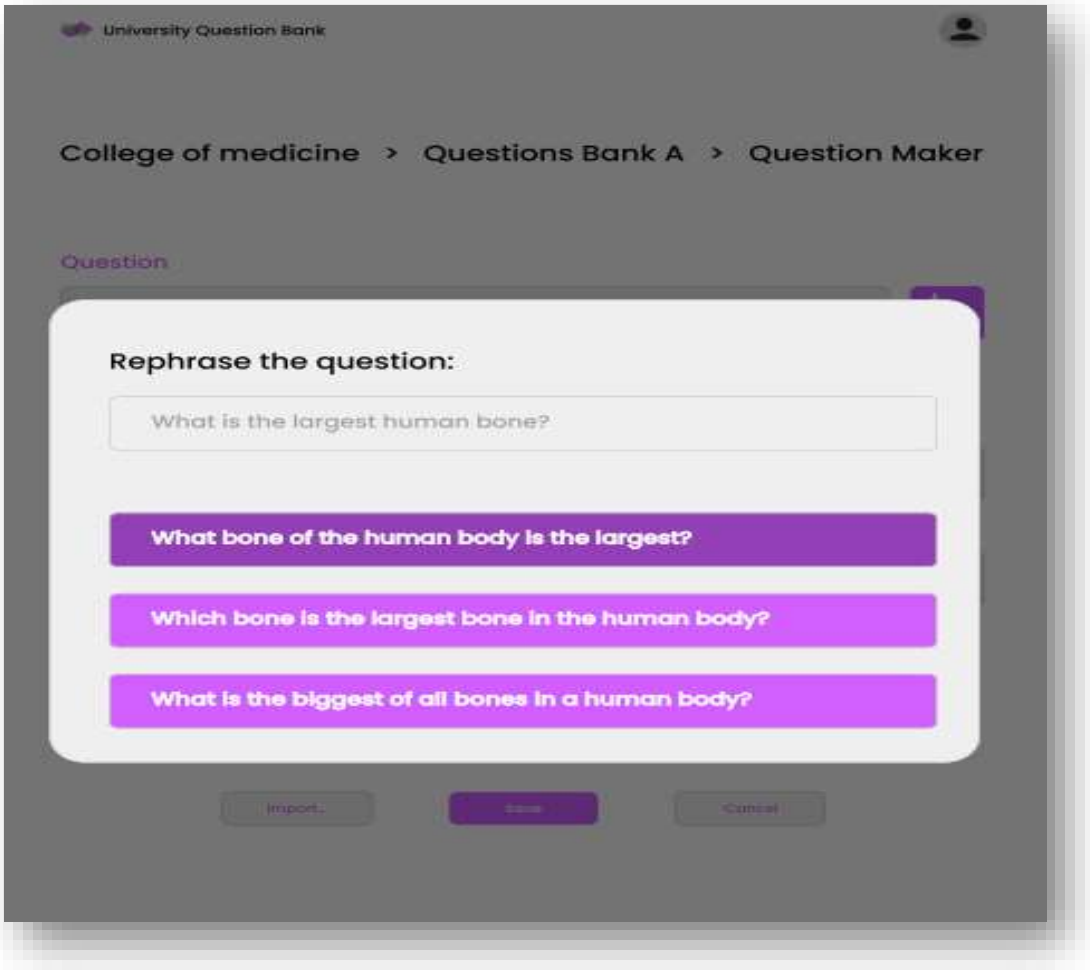

Figure 3 - 9 UQB Rephrasing Questions

3.3.7 AI Questions Extraction

This interface allows the user to interact with artificial intelligence, so that the user can send a file to the artificial intelligence, which summarizes a set of questions from this file, then displays them to the user. After that, the user selects the required questions and adds them to the bank.

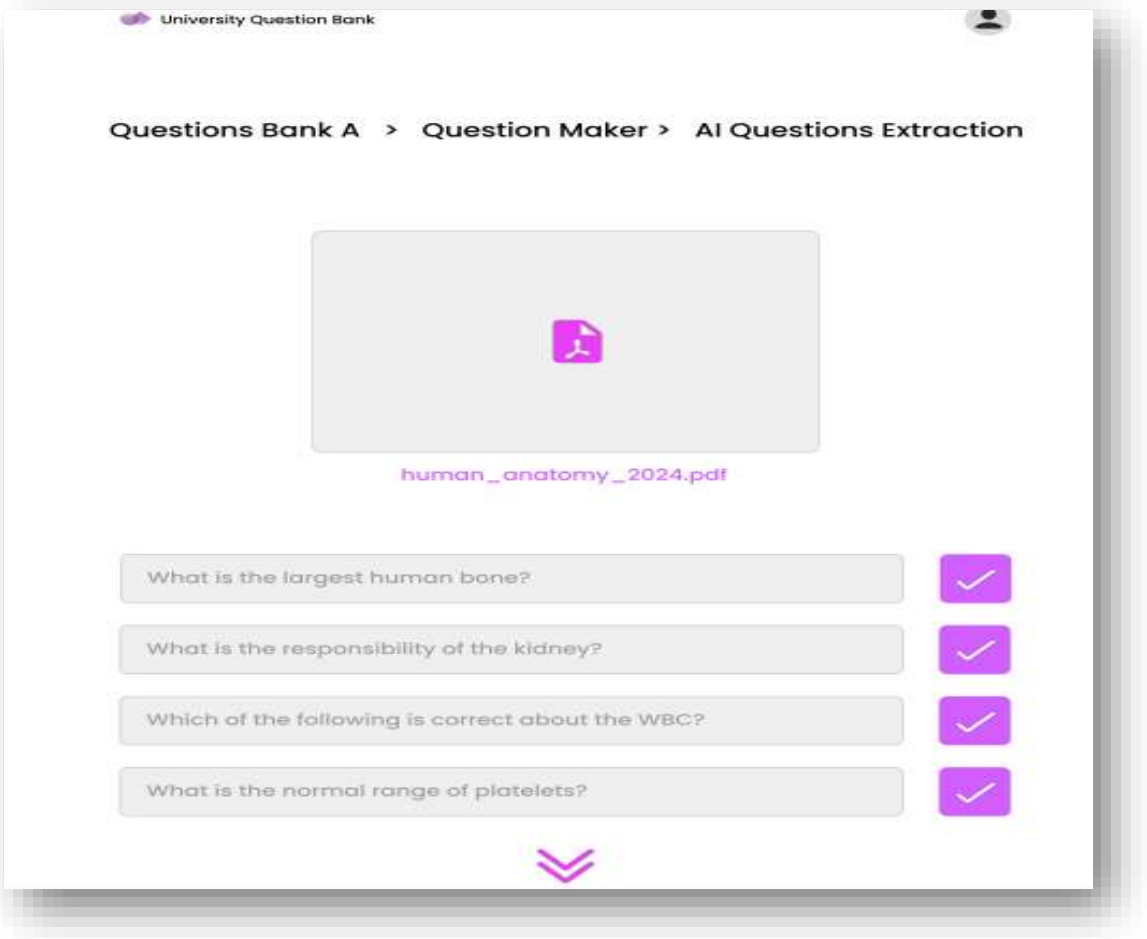

Figure 3 - 10 UQB AI Questions Extraction

3.3.8 Exams Builder Page

This interface allows you to create tests from the questions saved in the bank, by: Selecting the academic level and selecting the test system Selecting the study material and selecting the difficulty level and number of points

• When selecting questions, you can preview the test before saving it, allowing you to modify the questions or arrange them before completing the test.

• The "Filter and Sort By" feature can be used to filter data based on certain criteria such as:

• Sorting questions by difficulty

• Filtering by course name

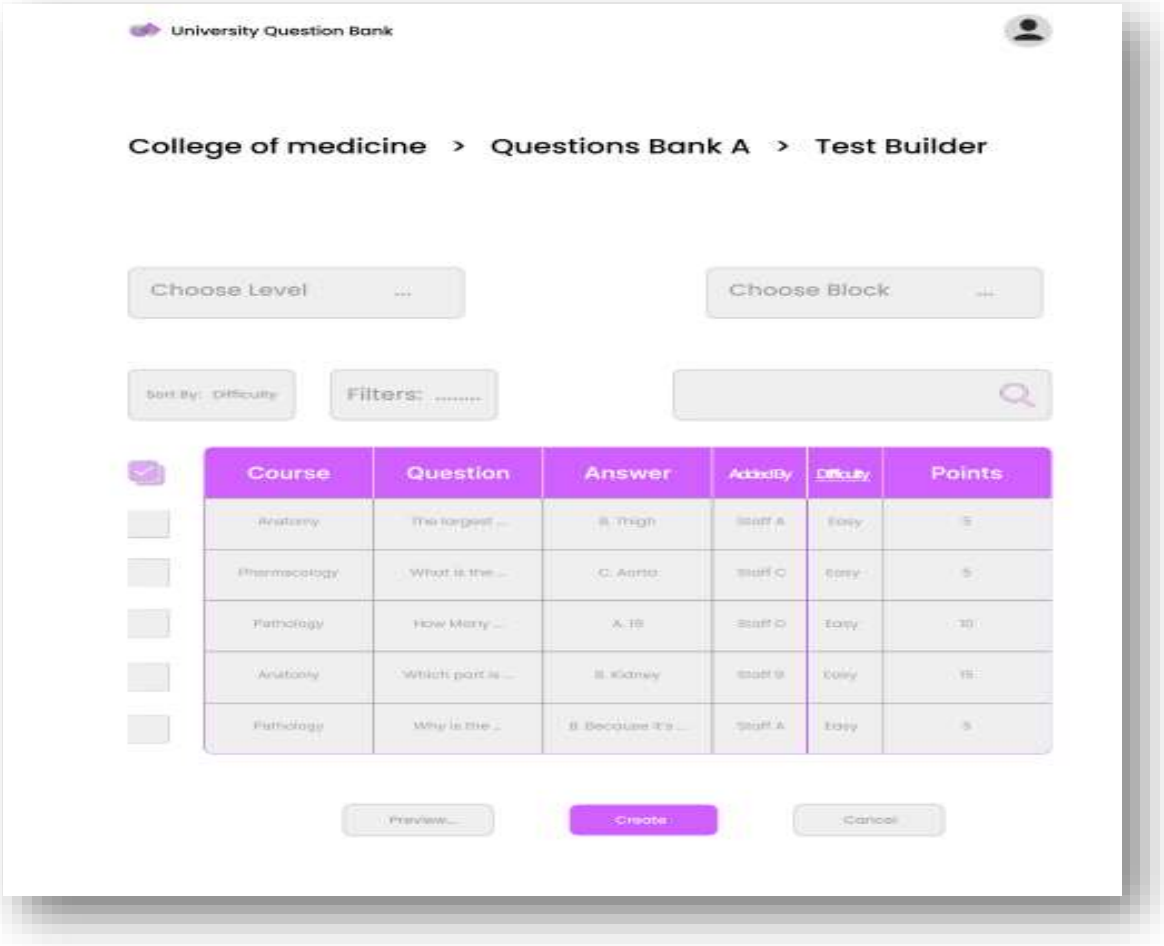

Figure 3 - 11 UQB Exams Builder Page

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