AN AUTOMATED AND CUSTOMIZABLE QUESTION PAPER GENERATION SYSTEM FOR EDUCATIONAL INSTITUTIONS

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ABSTRACT

Question paper is a document that contains a set of questions designed to test the knowledge, understanding, and skills of students. Question papers are used in educational institutions, such as schools, colleges, and universities, as a means of assessing students' performance in exams, tests, or quizzes. The manual method of generating question papers involves a teacher selecting questions from textbooks or other sources, arranging them in a particular order, and manually typing or writing out each question and its associated options, answers, and marks, this process is often time-consuming, error-prone, and does not offer the level of customization that is possible with a computer-based system. The Online Question Paper Generation System is a web-based application that automates the process of generating question papers for educational institutions. The system provides an easy and efficient way for teachers to create and generate question papers, thus reducing the manual workload and saving time. This system enables teachers to create question banks, add questions, and categorize them based on different subjects, topics, and levels of difficulty. Teachers can then select questions from the question bank to create customized question papers for exams, tests, or quizzes. The system also has a feature that randomizes the order of questions using random shuffling algorithm, thus ensuring that each student receives a unique question paper. The system is developed using Python, a popular scripting language for web development, and incorporates various features such as user authentication, question bank management, question paper generation, and result analysis. The project aims to simplify the process of generating question papers, reduce the workload of teachers, and ultimately improve the quality of education by providing students with fair and unbiased exam.

Keywords:- web development, question paper generation, random shuffling algorithm, personalized question paper.

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1. INTRODUCTION

Question paper is a document that contains a set of questions designed to test the knowledge, understanding, and skills of students. Question papers are used in educational institutions, such as schools, colleges, and universities, as a means of assessing students' performance in exams, tests, or quizzes. The manual method of generating question papers involves a teacher selecting questions from textbooks or other sources, arranging them in a particular order, and manually typing or writing out each question and its associated options, answers, and marks, this process is often time-consuming, error-prone, and does not offer the level of customization that is possible with a computer-based system. Manual question paper generation can pose security risks such as unauthorized access, tampering, or loss of the question paper. This can compromise the integrity of the assessment and affect the credibility of the examination process. In today's digital age, traditional methods of generating question papers for assessments can be time-consuming, prone to errors, and lack consistency. Educational institutions require a more efficient and effective

approach to create question papers that accurately measure the knowledge and skills of their students. Therefore, there is a need for an automated and customizable web-based question paper generation system that can streamline the process, reduce errors, and provide consistent assessments. The web-based system should allow for easy access and customization of question papers from any location, making it convenient for educators to generate question papers for their courses. The system should be able to generate question papers that align with the learning objectives of the course and provide a diverse range of question types, including multiple-choice, short-answer, essay, practical, and oral questions. The system should also be capable of customizing the 11 difficulty level of questions to suit the proficiency of the students. Furthermore, the system should provide access to a wide range of relevant resources such as textbooks, question banks, and educational materials through its web interface. The system should also prioritize the security of the question paper, ensuring that the question papers are kept confidential and prevent unauthorized access, tampering, or loss of the question paper. In summary, an automated and customizable web-based question paper generation system would significantly improve the efficiency and effectiveness of the assessment process in educational institutions, leading to more accurate assessments and better student outcomes while providing ease of access to educators from anywhere The Online Question Paper Generation System is a web-based application that automates the process of generating question papers for educational institutions. The system provides an easy and efficient way for teachers to create and generate question papers, thus reducing the manual workload and saving time. This system enables teachers to create question banks, add questions, and categorize them based on different subjects, topics, and levels of difficulty. Teachers can then select questions from the question bank to create customized question papers for exams, tests, or quizzes. The system also has a feature that randomizes the order of questions, thus ensuring that each student receives a unique question paper. The system is developed using Python, a popular scripting language for web development, and incorporates various features such as user authentication, question bank management, question paper generation, and result analysis. The project aims to simplify the process of generating question papers, reduce the workload of teachers, and ultimately improve the quality of education by providing students with fair and unbiased exams. 12 1.1 SCOPE OF THE PROJECT The scope of the project for an automated and customizable web-based question paper generation system for educational instituti

1.1 MOTIVATION AND SCOPE OF THE STUDY

The scope of the project for an automated and customizable web-based question paper generation system for educational institutions includes the following: • Development of a user-friendly web-based platform that enables educators to generate question papers quickly and easily. • Integration of a variety of question types, including multiple-choice, shortanswer, essay, practical, and oral questions, to provide a diverse range of assessment options. • Customization of the difficulty level of questions to suit the proficiency of the students. • Integration of a secure login system and user access controls to ensure the confidentiality and security of the question papers. • Provision of easy access to a wide range of relevant resources such as textbooks, question banks, and educational materials through the web interface. • Development of a customizable platform that can be tailored to the specific needs of educational institutions, including the ability to add and remove courses, questions, and other features. • Implementation of a version control system that enables educators to view and track changes made to question papers. • Provision of a reporting system that allows educators to view assessment data and analyse student performance. • Development of an efficient system that reduces errors and inconsistencies in the assessment process. 13 The scope of the project is to develop a comprehensive and customizable webbased question paper generation system that will enhance the efficiency, accuracy, security, accessibility, consistency, and flexibility of the assessment process in educational institutions

2. TECHNOLOGIES USED:

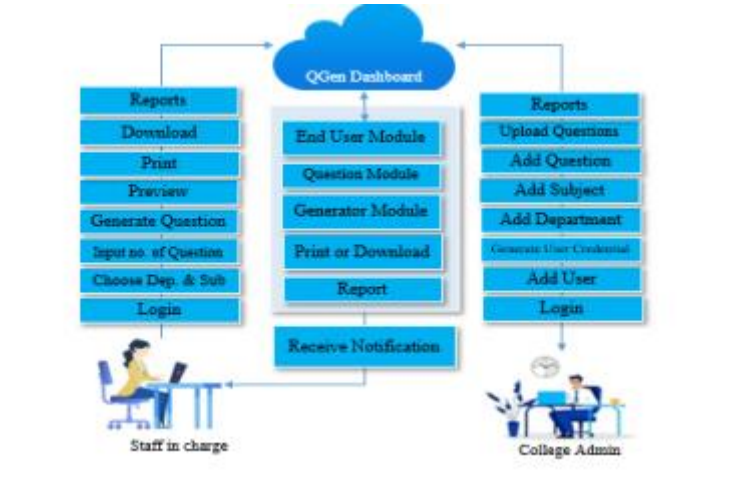
2.1 FRONTEND TECHNOLOGIES*:*

The frontend will be developed using HTML, CSS, and JavaScript. The user interface will be intuitive and easy-to-use, allowing teachers to select the subjects, topics, difficulty levels, and question types for generating question papers

2.2 BACKEND TECHNOLOGIES*:*

The backend will be developed using Python and Flask. It will handle the logic of generating question papers based on the selected options. It will also ensure that the order of questions in each section is randomized to prevent any student from having an unfair advantage.

3. OBJECTIVES AND METHODOLOGY



3.1 OBJECTIVE

The objective of the project for an automated and customizable web-based question paper generation system for educational institutions is to develop a userfriendly and efficient platform that will streamline the process of generating question papers for assessments. The project aims to achieve the following objectives:

• Increase efficiency: The web-based system will eliminate the timeconsuming manual process of question paper generation and automate it, thereby increasing the efficiency of the assessment process.

• Improve accuracy: The system will provide a diverse range of question types and customizable difficulty levels that align with the learning objectives of the course, leading to more accurate assessments of student knowledge and skills.

• Enhance security: The system will prioritize the security of the question paper and prevent unauthorized access, tampering, or loss of the question paper, ensuring the integrity of the assessment process.

• Provide easy access to resources: The web-based system will provide easy access to a wide range of relevant resources such as textbooks, question banks, and educational materials, making it convenient for educators to generate question papers for their courses.

• Increase consistency: The system will ensure that the difficulty level, format, and style of questions are consistent, leading to a fair and standardized assessment for all students.

• Enhance flexibility: The web-based system will be customizable to the specific needs of educational institutions, providing flexibility in question paper generation.

The project aims to develop an automated and customizable web-based question paper generation system for educational institutions. The system will provide an efficient and effective solution for generating question papers for different courses and examinations. The system will be developed using modern web technologies, making it accessible through any web browser. It will offer a range of customization options for generating question papers, including the selection of subjects, topics, difficulty levels, and question types. The system will also ensure that the

order of questions in each section is randomized to prevent any student from having an unfair advantage. The proposed system for an automated and customizable web-based question paper generation system for educational institutions will be developed using Python, Flask, and MySQL. The system architecture of an automated and customizable web-based question paper generation system can be described as follows: FIG 1. SYSTEM ARCHITECTURE 21 3.2 METHODOLOGY Frontend: The frontend will be developed.

3.2) METHODOLOGY

Frontend: The frontend will be developed using HTML, CSS, and JavaScript. The user interface will be intuitive and easy-to-use, allowing teachers to select the subjects, topics, difficulty levels, and question types for generating question papers.

Backend: The backend will be developed using Python and Flask. It will handle the logic of generating question papers based on the selected options. It will also ensure that the order of questions in each section is randomized to prevent any student from having an unfair advantage.

Database: The database will be developed using MySQL. It will store all the questions categorized based on the subject, topic, and difficulty level. The database will be constantly updated and maintained by the system administrators.

Question Bank: The system includes a database of questions that are categorized based on the subject, topic, and difficulty level. This question bank is constantly updated and maintained by the system administrators.

User-friendly interface: The system will have an intuitive and easy-to-use interface that can be accessed through any web browser.

Customization Options: The system offers a range of customization options for users to generate question papers based on their preferences. Users can select the subject, topic, difficulty level, and question type for each section of the question paper.

Randomization: The system ensures that the order of questions in each section is randomized to prevent any student from having an unfair advantage. Output: The system generates a PDF file of the question paper that can be easily downloaded and printed.

System Flow: The system flow for the proposed project, An Automated and Customizable Web based Question Paper Generation System for Educational Institutions, can be described as follows:

1. Admin/User Login: The first step is to login as an admin/user by providing valid login credentials.

2. Dashboard: After successful login, the user is directed to the dashboard where they can choose to create a new exam or edit an existing one.

3. Add Questions: Once the exam details are added, the user can add questions to the exam. They can select the subject, topic, difficulty level, and question type (multiple choice, short answer, etc.) and add the question and answer options.

4. Question Pool: All the questions added by the user are stored in the question pool. From here, the user can select questions to be added to the exam.

5. Generate Question Paper: After selecting the questions for the exam, the user can generate the question paper. The system automatically shuffles the questions to create a unique question paper for each student.

6. Preview and Download: The user can preview the generated question paper before downloading it in PDF format.

7. Logout: The user can logout from the system after completing their tasks.

Random Shuffling Algorithm: A shuffling algorithm is an important component of a question paper generation system, as it ensures that the order of questions in a generated question paper is randomized and fair. The following is an example of a shuffling algorithm that can be used in a question paper generation system:

1. First, the system will retrieve a set of questions from the question db based on the selected criteria, such as subject, topic, and difficulty level.

2. Next, the system will randomly select a question from the set of questions and add it to the question paper.

3. The system will then remove the selected question from the set of questions to prevent duplicate questions from being added to the question paper.

4. The system will repeat steps 2 and 3 until the desired number of questions have been added to the question paper.

5. Finally, the system will shuffle the order of questions in the question paper to further randomize the sequence.

This algorithm ensures that the generated question paper is randomized and fair, while also preventing duplicate questions from being included. Additionally, shuffling the order of questions ensures that no student receives an unfair advantage by receiving an easier set of questions at the beginning of the exam. Hence, the proposed system for an automated and customizable web-based question paper generation system for educational institutions aims to provide a more efficient, effective, and customizable solution to the current limitations of traditional manual methods and existing computerized systems.

3.3 FRONT END: DEVELOPMENT

Python 3.7.4 Python is a general-purpose interpreted, interactive, object-oriented, and highlevel programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL). This tutorial gives enough understanding on Python programming language. FIG 2. PYTHON 24 Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages. Python is a MUST for students and working professionals to become a great Software Engineer specially when they are working in Web Development Domain. Python is currently the most widely used multi-purpose, high-level programming language. Python allows programming in Object-Oriented and Procedural paradigms. Python programs generally are smaller than other programming languages like Java. Programmers have to type relatively less and indentation requirement of the language, makes them readable all the time. Python language is being used by almost all tech-giant companies like – Google, Amazon, Facebook, Instagram, Dropbox, Uber… etc. The biggest strength of Python is huge collection of standard library which can be used for the following:

• Machine Learning

• GUI Applications (like Kivy, Tkinter, PyQt etc.)

• Web frameworks like Django (used by YouTube, Instagram, Dropbox)

• Image processing (like OpenCV, Pillow)

• Web scraping (like Scrapy, BeautifulSoup, Selenium)

• Test frameworks

• Multimedia

• Scientific computing

• Text processing and many more.

3.4 FRONT END: DESIGN Bootstrap 4 Bootstrap is a free and open-source tool collection for creating responsive websites and web applications. It is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first websites. FIG 3. BOOTSTRAP It solves many problems which we had once, one of which is the cross-browser compatibility issue. Nowadays, the websites are perfect for all the browsers (IE, Firefox, and Chrome) and for all sizes of screens (Desktop, Tablets, Phablets, and Phones). All thanks to Bootstrap developers - Mark Otto and Jacob Thornton of Twitter, though it was later declared to be an open-source project. Easy to use: Anybody with just basic knowledge of HTML and CSS can start using Bootstrap Responsive features: Bootstrap's responsive CSS adjusts to phones, tablets, and desktops Mobile-first approach: In Bootstrap, mobile-first styles are part of the core framework Browser compatibility: Bootstrap 4 is compatible with all modern browsers (Chrome, Firefox, Internet Explorer 10+, Edge, Safari, and Opera) Using an IDE As good as dedicated program editors can be for your programming productivity, their utility pales into insignificance when compared to Integrated Developing 26 Environments (IDEs), which offer many additional features such as in-editor debugging and program testing, as well as function descriptions and much more. Flask: Flask is a web framework. This means flask provides you with tools, libraries and technologies that allow you to build a web application. This web application can be some web pages, a blog, a wiki or go as big as a web-based calendar application or a commercial website.

Flask is often referred to as a micro framework. It aims to keep the core of an application simple yet extensible. Flask does not have built-in abstraction layer for database handling, nor does it have formed a validation support. Instead, Flask supports the extensions to add such functionality to the application. Although Flask is rather young compared to most Python frameworks, it holds a great promise and has already gained popularity among Python web developers. Let's take a closer look into Flask, so-called "micro" framework for Python. Flask was designed to be easy to use and extend. The idea behind Flask is to build a solid foundation for web applications of different complexity. From then on you are free to plug in any extensions and you are free to build your own modules. Flask is great for all kinds of projects. It's especially good for prototyping. Flask is part of the categories of the micro-framework. Micro-framework is normally framework with little to no dependencies to external libraries. This has pros and cons. Pros would be that the framework is light, there are little dependency to update and watch for security bugs, cons is that some time you will have to do 27 more work by yourself or increase yourself the list of dependencies by adding plugins.

3.5 BACKEND DEVELOPMENT:

MYSQL MySQL tutorial provides basic and advanced concepts of MySQL. Our MySQL tutorial is designed for beginners and professionals. MySQL is a relational database management system based on the Structured Query Language, which is the popular language for accessing and managing the records in the database. MySQL is open-source and free software under the GNU license. It is supported by Oracle Company. MySQL database that provides for how to manage database and to manipulate data with the help of various SQL queries. These queries are: insert records, update records, delete records, select records, create tables, drop tables, etc. There are also given MySQL interview questions to help you better understand the MySQL database.

MySQL is currently the most popular database management system software used for managing the relational database. It is open-source database software, which is supported by Oracle Company. It is fast, scalable, and easy to use database management system in comparison with Microsoft SQL Server and Oracle Database. It is commonly used in conjunction with PHP scripts for creating powerful and dynamic server-side or web-based enterprise applications. It is developed, marketed, and supported by MySQL AB, a Swedish company, and written in C programming language and C++ programming language. The official pronunciation of MySQL is not the My Sequel; it is My Ess Que Ell. 28 However, you can pronounce it in your way. Many small and big companies use MySQL. MySQL supports many Operating Systems like Windows, Linux, MacOS, etc. with C, C++, and Java languages. Wampserver WampServer is a Windows web development environment. It allows you to create web applications with Apache2, PHP and a MySQL database. Alongside, PhpMyAdmin allows you to manage easily your database. Wampserver is a reliable web development software program that lets you create web apps with MYSQL database and PHP Apache2. With an intuitive interface, the application features numerous functionalities and makes it the preferred choice of developers from around the world. The software is free to use and doesn't require a payment or subscription

4. RESULT AND DISCUSSION

4.1 RESULTS: An automated and customizable web-based question paper generation system for educational institutions can offer several benefits, such as: 1. Time-saving: The system can save time for teachers and administrators by automating the process of creating question papers. Instead of manually selecting questions and formatting them, the system can generate question papers based on pre-defined criteria and question banks. 2. Customization: The system can be customized to meet the specific needs of different educational institutions, courses, and subjects. Teachers can create their own question banks and set criteria for selecting questions based on the difficulty level, topic, and other factors. 3. Reduced error: The system can help reduce errors and inconsistencies in question papers by automating the selection and formatting of questions. This can help ensure the accuracy and fairness of the assessments. 4. Scalability: The system can be used to generate question papers for large numbers of students, making it suitable for educational institutions with a large student population.

4.2 LIMITATIONS: 1. Dependence on pre-defined question banks: The quality and variety of the question papers generated by the system depend on the quality and variety of the questions in the question banks. If the question banks are not comprehensive or up-to-date, the generated question papers may not be of high quality. 38 2. Difficulty in accommodating subjective questions: The system may not be able to generate subjective questions that require human judgment and interpretation. This can limit the scope of the system to generate only objective questions. 3. Technical expertise: The development and maintenance of such a system require technical expertise in web development, programming, and database management. Educational institutions may need to invest in training and hiring skilled personnel to develop and maintain the system. In summary, an automated and customizable web-based question paper generation system for educational institutions using Python Flask and MySQL can provide significant benefits in terms of time-saving, customization, reduced error, and scalability. However, it also has limitations related to the quality of question banks, subjective questions, and technical expertise required for development and maintenance.

4.3 DISCUSSION: An automated and customizable web-based question paper generation system can offer several benefits to educational institutions, such as saving time, improving accuracy, and increasing efficiency. However, it is important to ensure that the system is user-friendly, secure, and able to produce high-quality question papers that meet the learning objectives of the students. By addressing the challenges of technical expertise, quality control, user adoption, and security, such a system can provide significant advantages to educational institutions, enabling them to focus on delivering high-quality education to their student

5. CONCLUSION

In summary, Career Compass has transformed career counseling and support for engineering students, representing a major advancement in the fields of individualized help and group education. Career Compass was first designed to give students a complete toolkit to help them negotiate the intricacies of the job market. However, because to its persistent commitment to user-centric design and continual innovation, Career Compass has exceeded expectations. From the platform's conception to its completion, unrelenting efforts have been made to build a vibrant and welcoming online community where students may obtain a multitude of career tools and insights. Career Compass is a potent tool that helps bridge the gap between academia and industry by increasing interview preparation and drawing on the collective expertise and experiences of its members.

A helpful community that actively engages in information sharing has been cultivated through the platform's interactive features, which range from user profiles to content categorization and tagging. Users have taken advantage of the chance to network with people who are on similar professional trajectories, get guidance, and create networks that go beyond the platform. This active social environment has improved the lives of our users while also highlighting the value of group learning. We have been able to maintain our agility, responsiveness to user needs, and alignment with new trends in interview preparation thanks to the iterative development approach.

The Career Compass team is dedicated to maintaining the platform's influence and relevance in the future. We will keep improving the functionality, gathering user feedback, and adjusting to changing interviewing procedures. Our objective remains centered on the goal of creating a welcoming and encouraging environment for interview preparation. Career Compass is a testament to the potential of collaborative learning and the ability of technology to give students the tools they need to succeed in the workplace. We would like to express our appreciation to our users, whose efforts and participation have been the foundation of the success of this platform. We remain

committed to meeting the requirements of our user community and influencing the direction of interview preparation as we set out on the next leg of our journey.

A notable accomplishment of Career Compass is its capacity to foster a community in which users actively participate in networking and knowledge exchange. Career Compass, with its interactive elements like community forums, role evaluation tools, and resource sharing functionalities, has encouraged peer collaboration and support. With an eye towards the future, the Career Compass team is dedicated to improving the platform's usefulness and applicability in the constantly changing field of career development. Career Compass remains committed to assisting students in their pursuit of academic and professional success by embracing technology improvements, staying abreast of developing trends, and soliciting user input.

We would like to express our sincere gratitude to all of our users, whose involvement and efforts have been crucial in determining Career Compass's success, as we begin this next chapter in our journey. We reaffirm our shared commitment to transforming career counselling and education in the future, one creative solution at a time. From providing a rich repository of resources to fostering a supportive community of learners and mentors, Career Compass encapsulates the essence of collaborative learning and knowledge sharing. As users engage with the platform's tools, interact with peers, and embark on personalized learning journeys, Career Compass remains steadfast in its commitment to facilitating growth, fostering connections, and propelling individuals towards their career aspirations. With its user-centric approach and innovative features, Career Compass continues to redefine the landscape of career development, empowering individuals to chart their course towards success.

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