

Smart Question Paper Generator Using Oracle Apex Framework

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Abstract: The Smart Question Paper Generator using Oracle APEX is a software application designed to streamline the process of generating question papers. It uses Oracle Application Express (APEX) as a development platform to create an intuitive and user-friendly interface that allows educators and examiners to easily create and generate question papers. The system utilizes a database of questions that can be sorted by topic, difficulty level, and type of question. With this information, the system can automatically generate a customized question paper based on the criteria specified by the user. The application saves time and effort, reduces errors, and ensures consistency in the quality of the question paper. Overall, the Smart Question Paper Generator using Oracle APEX is a powerful tool that simplifies the question paper generation process and increases the efficiency of educators and examiners.

Keywords: Oracle, APEX, Artificial Intelligence, Database.

I. INTRODUCTION

Automatic question paper generators can be very useful for educators who need to create exams or assessments for students. These tools can automatically generate questions, based on a variety of parameters such as topic, difficulty level, and learning objectives. In addition, they can also generate multiple versions of the same exam, to prevent cheating and improve fairness. In terms of functionality, an automatic question paper generator built using Oracle APEX can use metadata such as Bloom's taxonomy to generate questions. Bloom's taxonomy is a widely used framework for classifying learning objectives into different levels of cognitive complexity. Using this framework, the generator can ensure that the questions are aligned with the learning objectives and assess the students' mastery

of the material [1-2]. To develop an automatic question paper generator using Oracle APEX, several steps need to be taken. These include defining the data model, creating user interfaces for inputting metadata and viewing generated questions, and implementing the business logic for generating questions based on the input metadata. Finally, the generator can be deployed on a web server and accessed by educators and other users. Overall, an automatic question paper generator using Oracle APEX can be a valuable tool for educators, helping them to save time and effort while ensuring high-quality assessments for their students.

II. LITERATURE SURVEY

1) "Automatic Question Paper Generator using Genetic Algorithm" by Gopal Krishna Pradhan et al (2016). This paper proposes an automatic question paper generator using a genetic algorithm. The system can generate question papers based on parameters such as subject, chapter, difficulty level, and type of question. The paper evaluates the effectiveness of the system by comparing the generated question papers with manually created ones [3-4]. The system's genetic algorithm involves generating an initial population of questions and then using a fitness function to evaluate their quality. The fitness function considers factors such as the relevance of the question to the topic and the difficulty level. The algorithm then selects the best-performing questions and recombines them to create new generations of questions. The system can generate question papers with various types of questions, including multiple-choice, fill-in-the-blank, and short-answer questions.

2)"Automatic Question Paper Generator using Latent Semantic Analysis" by S. Anitha et al. (2019). This paper presents an automatic question paper generator that uses Latent Semantic Analysis (LSA) to identify related concepts and generate questions. The system allows educators to select the number of questions required and the type of questions [5-6]. The paper evaluates the system by comparing the generated question papers with manually created ones. The system's LSA algorithm involves analyzing a corpus of texts to identify related concepts and generate questions based on those concepts. The system can generate question papers with various types of questions, including multiple-choice, fill-in-the-blank, and short-answer questions. The paper evaluates the system by comparing the generated question papers with manually created ones. The results show that the system can generate high-quality question papers that are comparable in difficulty and coverage to manually created ones [7].

3)"Question Paper Generator System based on Association Rule Mining Technique" by Shalini Singh and Rahul Rishi (2016). This paper proposes a question paper generator system that uses association rule mining to generate question papers based on the topics covered in the syllabus. The system can also generate sample question papers for students. The paper evaluates the system by comparing the generated question papers with manually created ones. The system's association rule mining algorithm involves analysing a corpus of texts to identify associations between topics and generate questions based on those associations. The system can generate question papers with various types of questions, including multiple-choice, fill-in-the-blank, and short-answer questions. The paper evaluates the system by comparing the generated question papers with manually created ones. The results show that the system can generate high-quality question papers that are comparable in difficulty and coverage to manually created ones [8-9].

4)"Automated Question Paper Generation using Natural Language Processing and Deep Learning" by S. Radha and V. Ganapathy (2021). This paper proposes an automatic question paper generator using natural language processing and deep learning techniques. The system can generate questions based on the topic and difficulty level, and can also generate questions based on the content of the textbooks. The paper evaluates the effectiveness of the system by comparing the generated question papers with manually created ones. The system's natural language processing and deep learning algorithms involve analysing a corpus of texts to identify key concepts and generate questions based on those concepts. The system can generate question

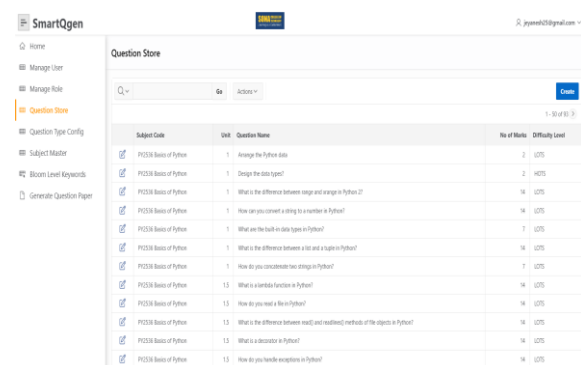
papers with various types of questions, including multiple-choice, fill-in-the-blank, and short-answer questions. The paper evaluates the system by comparing the generated question papers with manually created ones. The results show that the system can generate high-quality question papers that are comparable in difficulty and coverage to manually created ones [10-11].

III. DATABASE

A question database can be created by manually inputting questions or importing questions from other sources, such as textbooks, previous exams, or other online resources. The questions can be stored in various formats, such as plain text, HTML. The benefits of using a question database include [12-13]:

- (i) Time-saving: A question database eliminates the need to create questions from scratch for each assessment, saving time for educators and allowing them to focus on teaching.
- (ii) Consistency: A question database ensures that the questions used in assessments are consistent in terms of difficulty level, format, and content.
- (iii) Flexibility: A question database allows educators to create assessments tailored to specific learning objectives, student abilities, and assessment types.
- (iv) Reusability: A question database enables educators to reuse questions in multiple assessments, reducing the workload of creating new questions and ensuring that questions are not repeated too frequently.

Overall, a question database can be a valuable tool for educators in creating effective assessments that accurately measure student knowledge and progress. We can add, edit and delete the questions.



Subject Code	Unit	Question Name	No of Marks	Difficulty Level
PC22B Basics of Python	1	Arrange the Python data	2	LOTS
PC22B Basics of Python	1	Design the data type?	2	MOTS
PC22B Basics of Python	1	What is the difference between range and xrange in Python 2?	16	LOTS
PC22B Basics of Python	1	How can you convert a string to a number in Python?	16	LOTS
PC22B Basics of Python	1	What are the built-in data types in Python?	7	LOTS
PC22B Basics of Python	1	What is the difference between a list and a tuple in Python?	16	LOTS
PC22B Basics of Python	1	How do you concatenate two strings in Python?	7	LOTS
PC22B Basics of Python	1.3	What is a variable function in Python?	16	LOTS
PC22B Basics of Python	1.3	How do you read a file in Python?	16	LOTS
PC22B Basics of Python	1.3	What is the difference between read() and readlines() methods of the objects in Python?	16	LOTS
PC22B Basics of Python	1.3	What is a decorator in Python?	16	LOTS
PC22B Basics of Python	1.3	How do you handle exceptions in Python?	16	LOTS

Figure 1 Image of the Question Store

IV. BLOOM KEYWORDS

Questions can be stored in a question database based on the Bloom's taxonomy keywords,

which is a framework for categorizing educational goals and objectives. The taxonomy consists of six levels, including remembering, understanding, applying, analysing, evaluating, and creating. By storing questions based on these levels, educators can ensure that assessments cover a range of cognitive abilities, from simple recall to higher-order thinking skills. This allows for more effective assessment of student knowledge and provides a comprehensive picture of their understanding of a subject. Additionally, storing questions based on Bloom's taxonomy keywords can help educators design assessments that align with specific learning objectives, which can improve the quality and effectiveness of teaching and learning [14-15].

Bloom Name	Difficulty Level	Status
Average	LOTS	ACTV
Define	LOTS	ACTV
Describe	LOTS	ACTV
Diagnose	LOTS	ACTV
Identify	LOTS	ACTV
Analyze	HOTS	ACTV
Appraise	HOTS	ACTV
Breakdown	HOTS	ACTV
Calculate	HOTS	ACTV
Compare	HOTS	ACTV
Compare	HOTS	ACTV

Figure 2 Image of the Bloom Level Keywords Storage

Figure 2 represents the bloom level keywords used for the identification of difficulty of the questions. The Newly Entered Question can be identified as LOTS (Lower Order Thinking Skill) or HOTS (Higher Order Thinking Skill) based on the bloom keyword. Furthermore, Bloom's taxonomy can also be used to guide curriculum design and assessment development. By using Bloom's taxonomy keywords to guide the design of learning objectives and assessments, educators can ensure that the curriculum is comprehensive, covering a range of cognitive skills, and that assessments are aligned with the intended learning outcomes. This approach can improve the quality of education by promoting higher-order thinking and critical reasoning skills, and ensuring that students are adequately prepared for the challenges of the modern workforce.

V. PROPOSED METHODOLOGY

The methodology for developing a smart question paper generator using Oracle APEX can be broken down into the following steps:

(a) Requirement analysis: The first step is to identify the requirements and specifications of the automatic question paper generator, including the type of questions to be included, the difficulty level, and the number of questions to be generated [16-17].

(b) Data collection: The next step is to collect the required data, such as questions and their associated metadata, from various sources such as textbooks, previous exams, and other online resources.

(c) Data pre-processing: The collected data must be pre-processed to ensure that it is in a format that can be used by the question generator. This may involve cleaning and structuring the data to ensure that it is consistent and organized.

(d) Database design: The database must be designed to store the questions and their associated metadata, such as difficulty level, subject, and topic. The database design should also take into account the relationships between different types of data, such as questions and topics.

(e) Algorithm Development: The algorithm for generating questions must be developed based on the requirements and specifications identified in the requirement analysis stage. This algorithm should take into account the metadata associated with each question and use this information to generate questions that meet the required specifications.

(f) User interface design: The user interface should be designed to enable users to specify the type of questions they want to generate and to view the generated questions.

(g) Implementation and testing: The smart question paper generator should be implemented using Oracle APEX and tested to ensure that it meets the requirements and specifications.

(h) Deployment: Once the generator has been tested and validated, it can be deployed to the target environment, such as an educational institution, for use.

This methodology for developing a smart question paper generator using Oracle APEX involves requirements analysis, data collection, data pre-processing, database design, algorithm development, user interface design, implementation and testing, and deployment.

VI. FLOW CHART

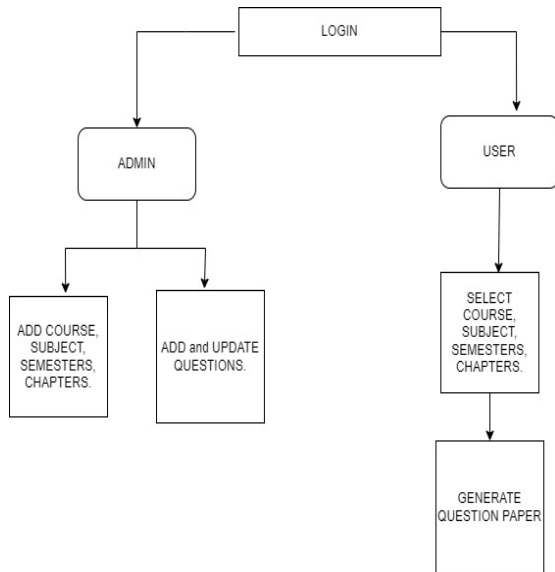


Figure 3 Flow Chart of our Interface

This is the flowchart of our proposed system. The login credentials are differentiated into two types of roles such as Admin role and User role. Admin can access the whole interface such as addition of courses, semesters, chapters and they have the access to add and update the questions. While the User can only select the course, subject and chapters to generate question paper. So, every person logging into this interface cannot generate the question paper. Only admins have the access to set roles. For instance, in a university, if there is an exam to be held, the question paper needs to be generated. Particular staff members can generate question paper for that exam using our proposed system. But only one staff has the access to key in the questions to the database [25-26].

This system can be used to prepare questions at the last minute for any exams.

VII. WORKFLOW

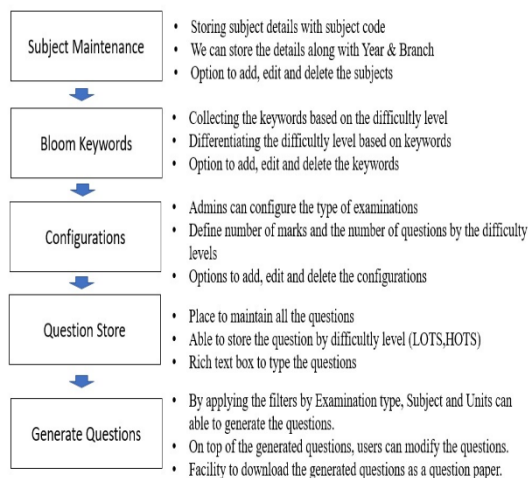


Figure 4 Image of Work Flow Process

Figure 4 represents the work flow process of our Smart Question Paper Generator. All the subjects are maintained separately and the difficulty level of the questions can be identified automatically using the bloom level keywords. Further the questions are dumped and stored in question store in which we can add, edit and delete the questions. By entering the necessary details, we can generate the question paper.

VIII. COMPARISON OF OTHER PAPER

Our Smart Question Paper Generator is unique when compared to others because it has a special feature in which the question can be edited after the generation of question paper. If the Teachers or Evaluators need to change any questions, they can select those questions and edit it. Those questions are further stored in the database as well. In addition, educators can inactivate the questions which will not be considered during the generation process. The difficulty level of the questions can be identified as LOTS (Lower Order Thinking Skill) or HOTS (Higher Order Thinking Skill) based on the bloom keywords. Let us now compare our work with the already existing work in this same domain. In IEEE Conference, a paper was published in May 2020 with the title, “Automated Question Paper Generation using Natural Language Processing” [12]. In this paper, the authors have proposed a method to generate questions after selecting the chapters and subjects. But the questions cannot be edited after generation. It can generate questions only from the database, we cannot change it further. The main advantage of our proposed method over the existing method is that, we have added an edit button in which the selected questions can be edited after generation of the question paper and also those edited questions are further stored in the database. It will be useful for the Teachers and Evaluators to change the questions so that repetition of questions can be avoided.

IX. RESULT AND CONCLUSION

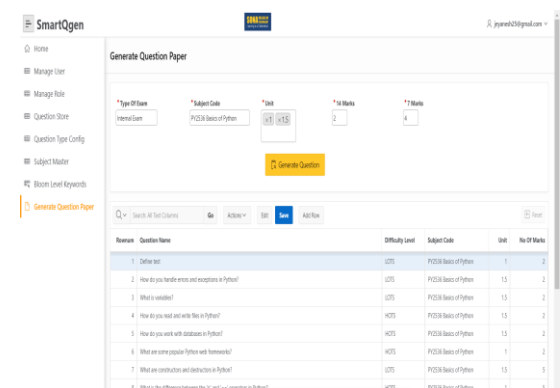


Figure 5 Image of the Question Paper Generator

Figure 5 represents the result of our smart question paper generator in which we need to enter the type of exam, subject code and units as input. Based on the given input the questions are generated as per the functionality of the type of exam. The questions can also be edited before downloading as pdf format.

Further there is a reset button available which resets all the questions and provide a new set of questions. There is a button called download in which you can download the generated question paper as pdf format.

X. REFERENCES

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