



eSecure Question Paper Generator with Color Pass Technique and Randomization Algorithm

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ABSTRACT: Examination process is an important activity for educational institutions to assess student performance. Thus the nature of the exam questions would determine the quality of the students produced by the institutions. Preparing exam questions is time consuming activity. Thus with the help of this paper, I intend to present the solution in form of Automatic Question Paper Generator System which makes use of Color Pass Technique and Randomization Technique. This system consists of three modules which are Login Module, Professor Module and Administrator Module. Color Pass Technique is use for professor login security to avoid shoulder surfing attack. Professor enters question to the database and while paper generation, it will retrieve questions from the database by entering Department, Semester, Subject, Question id, Unit id, CO id, Question Number and Number of Questions. From the entered input, the examination paper will be generated automatically using Randomization Technique. Security is provided to the database using AES encryption algorithm. The system shows characteristics such as simple operation, a good interface, high security, excellent usability, and high stability along with reliability.

KEYWORDS: Automation, Question Paper Generation, Color Pass Technique, Module, Randomization, Database, AES encryption algorithm

I. INTRODUCTION

In this modern world, there is a revolutionary switching of manual to automated systems for different aspects of education system. At every level of education, Question Paper is the fundamental process of education system. However the main problem is Professors need to invest a lot of time and energy in composing examination papers and also there is chance of paper leaks. So, automation is required in generation of Question Paper.

Automatic Question Paper Generator System is special software which is useful to schools, colleges, institutes, publishers and Question Paper setters who want to have a huge database of questions and generate Question Papers frequently with ease. This paper introduces the usage of Color Pass Technique and Randomization algorithm in Automatic Question Paper Generator System. Color Pass Technique is use for security to avoid shoulder surfing attack. Randomization algorithm is use to provide different sets of Question Paper. You can enter unlimited questions depending upon the system storage, capacity and as per the requirement.

As shown in Fig.1. Administrator adds professor with details of professor and stores all the details of professor to the database. Then professor will login using Color Pass technique and set CO according to unit, then enter questions in question bank by specifying Department, Semester, Subject, Unit id, Question and Weightage. After entering questions, he will generate pattern for particular test and then generate Question Paper by entering Department, Semester, Subject, Year, Time, Total Marks and Test Pattern. Finally Question Paper is generated using Randomization Algorithm. Professor can view previously generated papers also.

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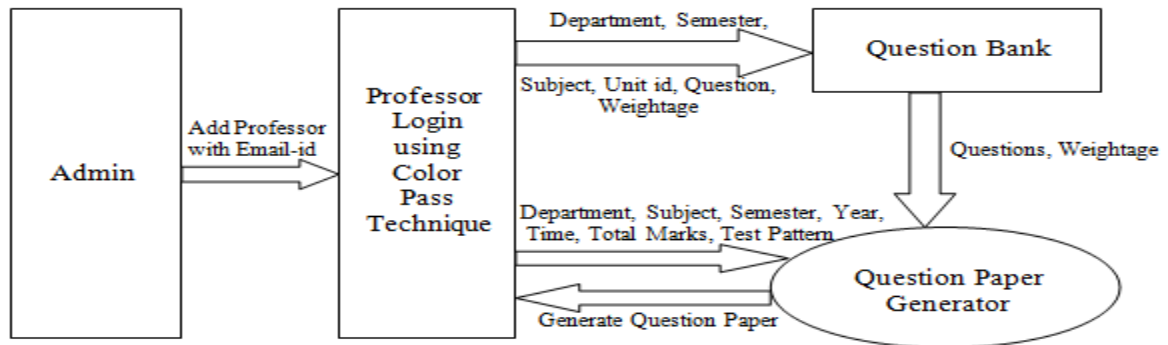


Fig.1. Working of Automatic Question Paper Generator System

II. LITERATURE SURVEY

Automatic Question Paper Generator System (QGS) [1] which makes use of shuffling algorithm as a randomization technique. This system includes several modules like user Administrator, subject selection, difficulty level specification, question entry, question management, paper generation, and paper management. In Question Paper Generator System [2], Administrator of the database inputs set of Question Paper with an option of check box to tick the correct answer. Moreover weightage of the particular question in terms of marks, hours and the complexity of the questions are determined. After this process whole Question Paper along with the weightage is stored in the database.

Semantic based Automatic Question Generation System [3] is using both Semantic Role Labeling and Named Entity Recognition techniques to convert the input sentence into a semantic pattern. The question types considered here are set of WH-questions like who, when, where, why, and how. Then a pattern matching phase is applied to select the best matching questions pattern for the test sentence. Automated Question Generation [4] combines several distinct tools from very different areas of information technology, among other clustering and classification units. Researcher is going to use NLP (Natural Language Processing) for automatic question generation system [5].

Automatic Question Generation system called G-Ask [6], which generates particular questions as a form of guidance for student learning. For generating question Semantic Role Labeller and NER (Named Entity Recognizer) is used to identify whether its Name, Location or Name of Organization. Once Question sentence is prepared, and then measures the resemblance between the Question sentence and each sentence from the Question knowledge based. Sort the obtained similarity values from other sentences and Get three keywords from three different sentences as a distracter values. The result of research was nearly 145 parsed sentences, there were 109 considered better for the keywords obtained from them. Shuffling algorithm for Automatic Generator Question Paper System (GQS) [7] uses a randomization technique for organizing sets of exam paper.

An implementation of an automatic examination paper generation system [8] uses lightweight J2EE tools based on B/S architecture to design an auto-generated paper management system. With this algorithm, the user needs to identify the subject, the question type and the difficulty level. From this input, the examination paper will be generated automatically. In Automatic Question Generation Using Software Agents for Technical Institutions [9], the focus is to take input in form of a text file from user which contains of the text upon which the user desires to fetch questions; the output is produced in form of a text file containing questions based on Bloom's taxonomy.

In this work G.T Wilfong [10] proposed a methodology where user has to perform a simple mathematical operation. User remembers a four digit PIN number from the set {0, 1,..., 9}. User receives a challenge from the set {0, 1,..., 9} via a protected media. User will add the challenge digit with the corresponding PIN digit and will perform a modulo 10 operation. Finally he will enter back the obtained digit using a public keyboard. Suppose the first digit of the user chosen PIN is 5. User now securely receives a challenge 7 from the system. So the valid response by user will be (5+7) modulo 10 (which is equal to 2). Though this method is easy to execute for math oriented people and gives good security against guessing the password but for non-math-oriented people this methodology is difficult to adopt.

In this method, Perkovic et.al. [11] Proposed a concept of lookup table. If user chosen PIN digit is 5 and the system generated challenge is 7 then the user first goes to the row number 5 in the lookup table and subsequently goes to the digit 7 in that row. After that user will see the corresponding column number where 7 is placed (here 9) and enter back

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9 as response corresponding to the first challenge. If the digits in the top row of Table 1 is arranged in ascending order from 0 to 9 then it will be equivalent as modulo 10 addition. Hence the name of the table is justified. But one of the drawback of this procedure is login time in this method goes high with respect to modulo 10 method.

	6	3	9	4	8	1	7	2	5	0
0	0	1	2	3	4	5	6	7	8	9
1	9	0	1	2	3	4	5	6	7	8
2	8	9	0	1	2	3	4	5	6	7
3	7	8	9	0	1	2	3	4	5	6
4	6	7	8	9	0	1	2	3	4	5
5	5	6	7	8	9	0	1	2	3	4
6	4	5	6	7	8	9	0	1	2	3
7	3	4	5	6	7	8	9	0	1	2
8	2	3	4	5	6	7	8	9	0	1
9	1	2	3	4	5	6	7	8	9	0

Table 1: User Lookup Table

PIN	Challenge	Response
9	3	↓
6	6	o
9	5	↖
7	7	o
8	1	↙

Table 2: User Response Table

III. PROPOSED SYSTEM

A. STEPS INVOLVED IN AUTOMATIC QUESTION PAPER GENERATOR –

- Step 1: When the application starts, the Administrator will login by entering his credentials i.e. login id and password.
- Step 2: Administrator will add professor to the database with Email-id and color pass code.
- Step 3: Color pass code is sent to the professor's Email-id.
- Step 4: Professor will login using Color Pass Technique. For that he will check his Email id for color pass code, then he will enter his credentials accordingly.
- Step 5: After successful user authentication, professor will enter questions to the database with weightage.
- Step 6: Then he will Set CO for particular unit. He can view as well as delete CO using ViewCO and DeleteCO tab respectively.
- Step 7: Professor will set pattern for any Question Paper he want to generate. He can generate Question Paper with any format i.e. 15 marks, 20 marks, 60 marks, 80 marks, etc. He can view as well as delete pattern using ViewPattern and DeletePattern tab respectively.
- Step 8: User will generate Question Paper by entering Department, Semester, Subject, Year, Time, Total Marks and Test Pattern.
- Step 9: Then user has to click on the "Generate Paper" button to generate Question Paper.
- Step 10: He can view previously generated paper using ViewPaper tab.

B. MODULES IN AUTOMATIC QUESTION PAPER GENERATOR:

As shown in Fig.2. Modules are given below –

1. Login Module
2. Administrator Module
3. Professor Module

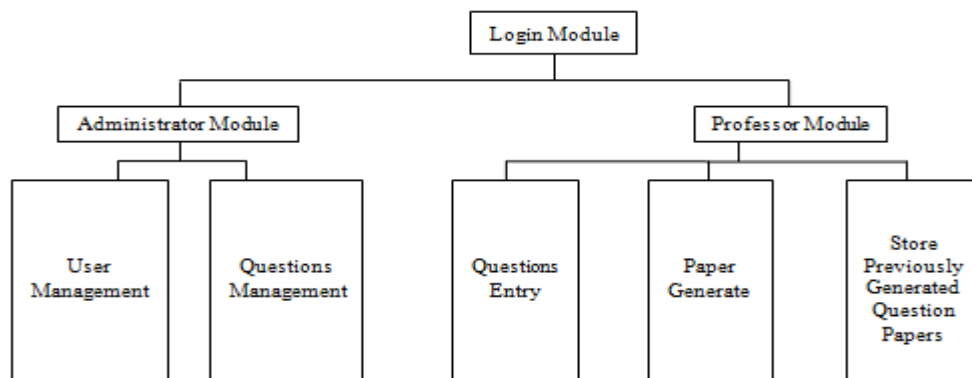


Fig.2. Modules in Automatic Question Paper Generator System

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1. Login Module: Login Module is divided into two parts as Administrator Module and Professor Module. In Login Module, Administrator as well as professor will enter their credentials i.e. Login id and Password to access the proposed system.
2. Administrator Module: Administrator Module has two major roles: User Management and Question Management.
 - 2.1 User Management – In User Management, the Administrator will login by entering his credentials i.e. login id and password. Administrator will add professor to the database with Email-id and color pass code, post which color pass code is sent to the professor’s Email-id for accessing Automatic Question Paper Generator System.
 - 2.2 Question Management –Administrator will manage questions through the database according to the Department, Semester, Subject, Unit id and Weightage. Security is provided to the database using AES encryption algorithm.
3. Professor Module: Professor Module has three major roles: Question Entry, Paper Generation and Store previously Generated Question Papers.
 - 3.1 Question Entry –Professor will make question bank by entering questions according to Department, Semester, Subject, Questions and Weightage and this question bank will be store in the database.
 - 3.2 Paper Generation – Professor can generate Question Paper by entering Department, Semester, Subject, Year, Time, Total Marks and Test Pattern.
 - 3.3 Store Previously Generated Question Papers – Professor can view his previously generated Question Papers in the system by using ViewPapers tab.

IV. ALGORITHM

A. COLOR PASS TECHNIQUE:

This is PIN entry mechanism widely used for authenticating a user. This mechanism resist the shoulder surfing attack so that any genuine user can enter the session PIN without disclosing the actual PIN. The professor gets Email of PIN of four different colors. During the login procedure, the Feature Tables appears on the screen as shown in the fig.3 and then the system throws some challenge values to the professor. The challenge is passed to the professor via headphone. After listening to each challenge value, professor selects a Feature Table. Then corresponding to the chosen color PIN, he locates the color cell in that table. The professor searches the digit in that color cell and enters that digit as response to the challenge.

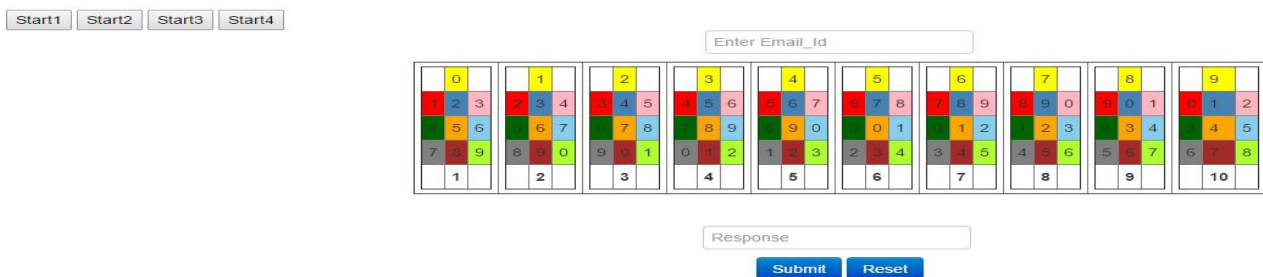


Fig.3. Feature Table User Interface on Screen

Color Pass Technique Algorithm:

- Step 1: System will generate Feature Tables as shown in fig.3. This will take array Color [0,1,...9] as input and generate Feature Tables FT(0)···FT(9)
- Step 2: System then generates four random challenge values ranges from 1···10
- Step 3: User response will be evaluated by system. This will take array UCOL, array CLICK and array RAN as input and update value of array EVAL by 1 for each valid response.
- Step 4: Finally system will decide whether the user is legitimate or not. This will take array EVAL as input and check whether user is allowed to Login or not.

B. RANDOMIZATION TECHNIQUE:

This algorithm is a suitable and very effective way to implement for randomization of stored questions in the database. It checks for replication and repetition of the randomly generated questions. The nature of this algorithm is as followed, for a set of N (the total number of questions) elements for generating a random alteration of the numbers 1–N.

Randomization Algorithm:

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```
Step 1: Create an array of N locations
Step 2: Generate random number
Step 3: if (loc == 0)
    Store generated number
else
    Compare the generated number with previous number in array
if matching value found,
    go to step 2;
else
    Store the no in next location
Step 4: Repeat step 2 for N numbers
Step 5: Select questions from DB matching with values from array location one by one
```

C. AES ENCRYPTION TECHNIQUE:

AES (Advanced Encryption Standard) is a strong symmetric encryption algorithm used for database security. A secret key is used for the both encryption and decryption of data. Only someone who has access to the same secret key can decrypt data. AES encryption provides strong protection to your data.

AES encryption Algorithm:

```
Step 1: Generate a plain text for encryption
Step 2: Get a secrete key
Step 3: Get the AES encryption key
Step 4: Encrypt plain text in AES using secrete key
```

V. SIMULATION RESULTS

An Automatic Question Paper Generator System is developed for further mentioned Engineering branches (Chemical Engineering, Computer Engineering, Electronics and Telecommunication Engineering, Instrumentation Engineering, Information Technology Engineering and Mechanical Engineering), at Bharati Vidyapeeth College of Engineering, Kharghar, Navi Mumbai.

As shown in fig.4. Login Module has two parts as Administrator Module and Professor Module. In Login Module, if Professor has his credentials then he will directly access the system else Administrator will enter his credentials and then add Professor.

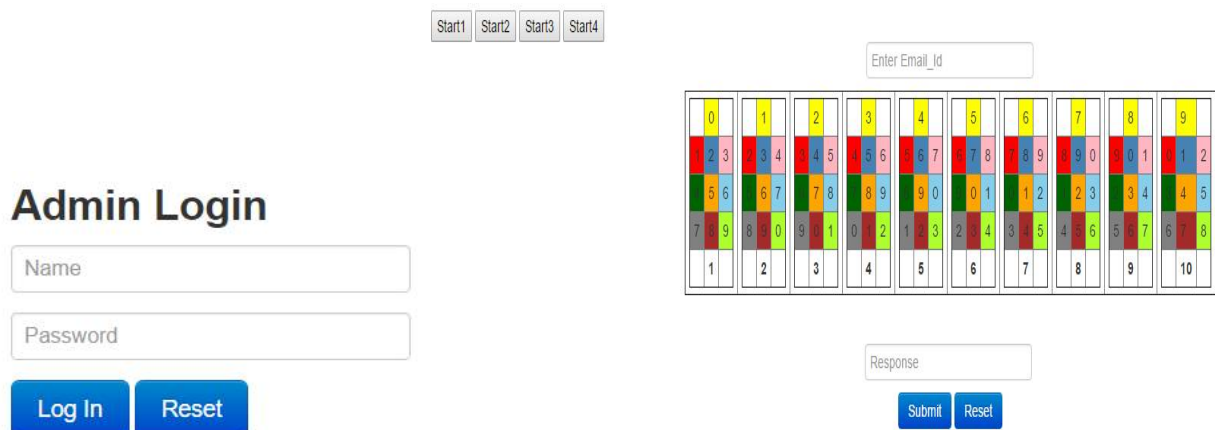


Fig.4. Login Module

In Add Professor Page, Administrator will add Professor to the system by entering User Name, Address, Email Id, Contact Number and branch as shown in fig.5. Then system will send Professor's credentials such as login id and password to the Professor's Email id for accessing Automatic Question Paper Generator and Administrator can view professor list through View Professor tab as shown in fig.6. And system will store professor details to the database.



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Add Professor

Enter User name
name

Enter Address
address

Email Address
Email Address

Enter Phone number
Phone Number

Select Branch

Register **Reset**

Fig.5. Add Professor

Name	Branch	Email	Address	Contact
ladubai	Computer	ladubait.eiosys@gmail.com	mumbai	4567891230
avi	Electronics	avinash.ghodake7@gmail.com	vashi	7894563210
gautami	Machanical	gautamithakur42@gmail.com	mumbai	7896541230
swapna	Computer	swapnalip.eiosys@gmail.com	mumbai	4569871230
sharad	Computer	sharadk.eiosys@gmail.com	vashi	7894563210
Suhasini	Computer Engineering	suhasinis.eiosys@gmail.com	Pune	1234567654
Shri	Information Technology	shri.eiosys@gmail.com	Pune	1234567655
Ra	Computer Engineering	rasika.dhavale@universal.edu.in	Borivali	7208595849
Rasika	Information Technology	rasika28dec@gmail.com	Kharghar	7208595849
Nidhi	Computer Engineering	nidhipranjan@gmail.com	Nerul	9820220134

Fig.6. View Professor

After Login, Professor first Set CO for respective subject and unit as shown in Fig.7. He can view as well as delete CO and change it accordingly.

Select Co_Name

Select Unit_Number

Select Subject

Set

Fig.7. Set CO

Then Professor Add Questions to the database according to Department, Semester, Subject, Unit No. Questions and Weightage as shown in Fig.8. Professor can delete questions as and when required.

Add Question Here

Select branch

Select Class

Select Semester

Select Subject

Select Unit-No

Next

Mathematical Operators for Question1 :
- + / \ * . √ ε ε ε ε ε ε ε ε ■ □ ∏ ∫

Question1

Mathematical Operators for Question2 :
- + / \ * . √ ε ε ε ε ε ε ε ε ■ □ ∏ ∫

Question2

Mathematical Operators for Question3 :
- + / \ * . √ ε ε ε ε ε ε ε ε ■ □ ∏ ∫

Question3

Fig.8.Add Question



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Next, Professor will add pattern for any format i.e. the Question Paper can be of 20 marks, 80 marks, 60 marks, etc. as shown in Fig.9. He can View as well as Delete pattern.

Fig.9.Add Pattern

Finally Professor will generate paper as shown in fig.10.

Bharati Vidyapeeth College of Engineering, Kharghar

UNIT TEST I

Subject: Software Testing

Time: 1 hr.

Class: T.E. (Computer)

Marks: 20

Q.1. Answer in one/two sentence (Attempt any 5) (10)

- 1) Define Software Quality.
- 2) What is Regression Testing?
- 3) List down different types of models.
- 4) What is the difference between Verification and Validation?
- 5) What is alpha testing?
- 6) What are the advantages and disadvantages of V-model or V-V Model?

Q.2. Answer in brief (Attempt any 2) (10)

- 1) Describe software test levels.
- 2) Describe Waterfall or Sequential Model.
- 3) Explain principles of testing.

Fig.9.Generate Paper

VI. CONCLUSION AND FUTURE SCOPE

The main purpose of this application is to describe Automatic Question Paper Generator System using Randomization algorithm for randomization. This system generates multiple sets of exam paper and avoids chance of paper leaks. This System will cover wide portion. From usability point of view, this technique is user friendly and prepares Question Paper in very less time in easy steps.



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Our future effort is to employ different types of randomization for unduplicated sets of paper.

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BIOGRAPHY



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