BEST PRACICE -1

1. **Title of the practice**

SOLAR POWERED COMPUTER LAB-KANNUR UNIVERSITY GREEN COMPUTING SOLUTIONS

2. **The context that required the initiation of the practice**

The present day computational practices are not eco-friendly. Elimination of e- waste has become a serious hurdle in the field of technology and to various industries that make use of computers and other sophisticated equipment. Issues like pollution of water, air, and soil demand special attention in these days of global warming. University had to find alternative measures to overcome these problems and so the practice given here became necessary

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3. **Objectives of the practice**

- **a.** To Save space and eliminate hazardous e-waste from Battery and UPS.
- **b.** To ensure maximum uptime and longer life cycle due to latest technology, non-mechanical components, and tightly integrated design.
- **c.** To develop a computer solution which will significantly contribute to the reduction in CO2 emission by leveraging solar power.
- **d.** To make significant savings in both initial investment and operational expenses.

4. **The Practice**

Central Computing Facility is set up with 53 Computers. They are fully powered using the energy received from 12 Solar panels of 325 Watts Each. The facility provides 2 hour power backup with integrated Solar PV UPS in the absence of solar and grid power. Consequently, conventional UPS and Lead acid batteries could be replaced which, in turn, could save space and reduce electrical losses. Moreover, Micro PCs were installed instead of conventional desktops. This practice enabled the university to reduce its power consumption by 60%. It is estimated that this practice can save electricity by 144000 Units in five years and can avoid 102 Metric Tonne of CO2 in five years

5. **Obstacles faced if any and strategies adopted to overcome them**

The major obstacle in the implementation of the programme was the lack of money to set up the equipment required. The total cost of the Project was 31 lakhs and it could be met with the Plan Fund 2020-21

6. **Impact of the practice**

"Total Green Computing Solution", a prestigious project from Kannur University, will have Global visibility in IT Industry. This solution can totally eliminate the need of conventional UPS and Grid current. This can save Crores of rupees in terms of electricity cost and be a significant contributor to reduce CO2 emission. Electricity generation through solar photovoltaic (PV) systems is widely accepted as a low-emission, non-depletable energy source.

The High-Performance Micro PC consumes only 35W power compared to 200 Watts of traditional desktop PC and can be mounted behind the monitor saving lot of workspace. With no moving parts, the failure / maintenance is near zero. The industrial grade aluminium green computing body design ensures minimum e-waste. The solar powered smart power station with 3 hours battery backup ensures near zero grid usage. The highly efficient integrated solar PV UPS ensures that 95% of the total energy requirements are met with solar power. It also guarantees sufficient backup.

BEST PRACICE -1I

Title of the practice

A NOVEL AUTOMATIC QUESTION PAPER GENERATION SYSTEM FOR UNIVERSITY EXAMINATION BASED ON BLOOM'S TAXONOMY

Introduction/Context

Education has become an integral part of our society today. Examination plays a vital role in any educational system as it helps in testing students' performance. Thus the nature of the questions asked in examinations would determine the quality of the students produced by various educational institutions. This makes it necessary to have a smart question paper generating system for measuring the growth and learning skills of students. Preparing the question papers for University examinations is a very challenging, tedious and time consuming task for the administrators. Experts are not available to create good question papers. Most of the question papers generated in the existing system suffer from the lack of clarity and the presence of errors. Examinations are postponed due to the lack of availability of question papers in time. Repetition of questions within the same question paper is another issue associated with the existing system. Many Questions from outside the prescribed syllabus appear in the question papers. Lack of equal distribution of syllabus in question papers is yet another serious issue to be tackled. Blooms taxonomy, a standard for the classification of learning outcomes and objectives is usually not followed in the educational institutions. Hence, in this practice we are presenting a novel model for the generation of smart question papers for university examinations. It helps to overcome the various hurdles described above regarding the generation of question papers. Our system contains an automatic question paper generator model which is able to generate questions based on different Blooms taxonomy level. The system shows characteristics like simple

operation, a great interface, good usability, immense security, and high stability along with reliability.

Objectives

- Reducing the workload, cost and effort associated with the university examination system
- Creation of a digital, error free and secured question bank for all the subjects under various departments in the University
- Generation of quality question papers
- Accurate question papers without errors and inconsistencies
- Identification of memorizers and real learners
- Proper distribution of questions across the syllabus
- Timing is controlled (Can answer all the question papers on given time)
- Producing the focused outcome predetermined in the curriculum
- Automatic generation of question papers for University examinations
- Maintaining the security and confidentiality associated with the question paper generation phase in university examinations
- Reducing the time required for the creation of question papers
- Automatic generation of question details (including unit number, question setter's name, Blooms taxonomy level, etc. related to the generated question paper)
- Automatic generation of answer keys corresponding to the generated question papers
- Adopting the standards posed by Bloom's taxonomy in question paper generation process.

Methodology/Practice

The developed practice involves two phases namely, Question bank creation phase and Question paper generation phase. First phase is the question bank creation phase which involves several modules like super admin module, Department admin module, subject admin module and user admin module. The super admin module is controlled by the academic section of the university. The super admin can add various departments, courses and subjects to the question bank. He also provides the username and passwords generated during the department creation time to the department administrators. The total number of departments, courses under various departments, subjects under various courses, etc., are controlled from this login.

The department login module is controlled by the heads of the departments. Department administrators can add faculties corresponding to different courses and subjects in their departments. They have the privilege of passing usernames and passwords to the added faculties in their departments. They also have the provision of verifying the questions and relations that are reported for mistakes. There are two types of faculties that can be added to any department namely, permanent and guest. Guest faculty login will be expired within one month time. The

subject admin module contains usernames and passwords for various faculty logins within a department. It is also controlled by the heads of the departments. Finally, the user admin module is controlled by the registered faculties within each department. Upon receiving the usernames and passwords from the heads of the departments, he/she can enter the system and add the questions along with the required details to the question bank at any time. These details include the unit number, subunit number, mark distribution and Blooms taxonomy level. He/she can also add relation of one question with the others and report erroneous questions. Wrong questions and relations can also be removed from the bank.

Second phase of the practice involves the generation of question papers using the created question bank. This phase involves the use of an efficient algorithm which performs the scrutiny and composes the examination paper with a high rate of success. In order to avoid the repetition of questions/topics in the question paper, each unit in the syllabus is virtually divided into two parts-say A and B. An additional relation marking scheme is also employed in the question bank to avoid the same. The algorithm picks a couple of questions from each subunit of the syllabus to ensure the distributional representation of the complete syllabus. The combination of the couple selected can be either (10, 3), (5, 5) or (5, 3). The choice of selection of each subunit for a particular couple is purely random. The selection of the second question from a particular subunit is done with utmost care to avoid the repetition of questions/topics. The relation marking logic incorporated in the question bank and the algorithm is to ensure this point. With this algorithm, the controller of examination only needs to specify the department name and subject name to generate the required question paper within seconds. He can also generate unlimited number of question papers just before the scheduled examination time. This practice can be employed in any academic institution that emphasizes quality question papers.

The details of the adopted question paper and revised Bloom's taxonomy are given in the following chart.

Model (Distribution of Marks –Using revised Bloom's Taxonomy).

Q - Number of questions to be answered

C- Number of questions in the question paper

Type of questions	Q/C	Level (Bloom's Taxonomy)	Remarks
Part A questions (15 marks)	5/6	1 Remembering 2 Understanding	Preference to understanding
Part C Questions (30 marks)	3/5	3. Applying 4. Analyzing 5. Evaluating	A mixture of levels 3,4 and 5.

Part B Questions (15 marks)	3/5	6. creating	

Obstacles Faced

The first obstacle we faced during our project was the variety in question paper formats among different departments in the university. Variation in the total number of units in the syllabus across departments was also an issue faced during the earlier stages of the project. It was impractical to go with a model which can keep all those properties unscathed. Hence, these issues were overwhelmed by standardizing the syllabus structure and question paper formats across various departments of the university through a meeting of the Heads of the Departments chaired by the Vice-Chancellor. Another challenge we faced during the project was related to questions containing mathematical equations as most of the subjects using mathematical equations in their question papers were using latex templates for question paper formatting. Hence, we were forced to give the option of latex interface for such questions. It was executed by bringing the latex editor to the front end of the question bank. Positioning the images in question papers for questions containing image data was also an obstacle we faced during the practice. It was fixed using the image tag feature available in HTML.

Impact of the Practice

The first and foremost impact of the developed practice was the ease in overall process of question paper generation. Earlier, the overall process was constituted by a set of tasks such as inviting the subject experts, facilitating them, paying the remuneration bills, maintaining the confidentiality, transportation of question papers, etc. Now it only takes less than 2 seconds time to generate a question paper for any subject in the university. That too will be on the table of controller of examination with high degree of confidentiality. The main problem in the conventional system is the low quality of question papers caused by some human factors such as instability and relatively narrow range of topics. Moreover, teachers need to spend a lot of time and energy in composing examination papers. They should also keep the unit wise weightage of mark towards the total score. This does nothing for the separation of teaching and testing. Therefore, with the use of computers, automatic generation of question papers is an important measure for achieving the separation of teaching and testing.

With the introduction of new practice, subject experts need not want to travel from his place to the university or department for the question paper setting purpose. He/she can do the task of question creation and addition to the question bank at his own free time. The only thing he needs is the user level username and password provided by the Head of the Departments. In traditional system, the process of question paper generation is carried out much before the examination dates. But according to the new practice, the entire process can be started just half an hour before the examination time. This also avoids the threat of question paper leakage associated with the

overall examination process. The new practice is expected to reduce the overall cost of question paper generation to 10% of the earlier cost.

Resources Required

- The panel of entire faculty from the various departments of the university who create the questions.
- Subject experts from outside the University for Scrutiny of the created questions.
- The question paper project team, a group of faculty members working behind the project.
- The office of the controller of Examinations that will use the final software once it is launched.
- IT centre that takes charge of the software once it is launched