

Automated Integrated University Examination System

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INTRODUCTION

Information and Communication Technology (ICT) has become a valuable, decisive and critical resource for individuals, communities, enterprises and organisations. ICT has reached at every door step, but its protential has not been fully utilised. ICT is a very helpful tool for providing good governance by bringing a sea-change in the working of organisations and institutions. Most of the developing countries now understand the importance of ICT and have been adopting it as a basic tool for good governance. The new ICT mediated good governance is also called e-governance. In most of the government run Indian Universities, examination system is managed manually. The manual examination system is facing many problems such as not declaring examination results in time and accurately. ICT is an effective tool for integrating and automating various activities of examination system at different administrative levels to bring reliable, efficient, scalable, transparent and robust e-governance solutions.

NEED OF ICT IN EXAMINATION SYSTEM

In Indian higher education system, there has been many fold increase in its institutional capacity since independence. As per University Grants Commission (2008) report titled "Higher Education in India-Issues related to expansion, inclusiveness, quality and finance", the number of universities in India has increased from 20 in 1950 to about 431 in 2008, colleges from 500 in 1950 to 20,677 in 2008 and enrolment of students has increased from mere 100,000 in 1950 to 11,612,000 in 2008. The Gross Enrolment Ratio (GER) i.e. which is a ratio of persons enrolled in higher education institutions to total population of the persons in age group of 18 to 23, rose from 0.7% in 1950 to about 11% in 2007. Still the fact remains that the GER in India is quite low compared to that of the developed countries and world average having GERs 54.6 % and 23.2% respectively. Indian government aims to bring GER to 15 % by 2012. India's higher education system is the third largest in the world next to China and United States. Student enrolment at university level and at collegiate level is increasing manifold. The management of examination data of the

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large number of students is a very tiresome and a complex job involving different types of data by different administrative line branches. According to Sofield (2000), many developing countries have not taken up ICT to the fullest possible extent as a means of reaching increased socio-economic development. Educational institutions are also increasingly recognizing the importance of ICT in education and examination reforms.

ICT, as an assortment of new computing and communication artifacts, is a rapidly advancing technology. ICT has provided means for faster and better communication, efficient storage, retrieval and processing of data and exchange and utilization of information to its users, be they individuals, groups, businesses, organizations or governments. ICT has the potential to provide better services to the citizens, interaction with business enterprises and communication and exchange of information between different agencies of the government in a speedy, convenient, efficient and transparent manner. If optimum potential of ICT is utilised, it can definitely increase efficiency and effectiveness of the system. The cases of Indian railway computerization and online banking are the candidate examples demonstrating the benefits of ICT. Thus, ICT has become indispensable and an effective tool of growth in any society. The nature of technology is that everything becomes almost transparent once it is ingrained in everyday life. In his 2004 Independence Day speech, Dr. A.P.J. Abdul Kalam, the then President of India, said that "there is a demand for a more transparent and reliable system of examination, evaluation and reporting".

EXAMINATION SYSTEM IN INDIAN UNIVERSITIES

Examination occupies a very significant place in a university system. Examination is an instrument to test what the student has learned and retained in his mind during course of study. University examinations have stimulating effect on both students and teachers. To the Student, it gives a goal toward which he is directed and impels him to attain that goal within specified period of time. Examination may be used as a means to organize and integrate knowledge, it encourages student to go through various books and integrate ideas to respond to a given problem. For a teacher too, examination gives a stimulus and goal orientation to his work. In a nutshell, we may say that examinations are inevitable, without examination the work of students and teachers will neither have precision and any direction. Examination is always an effective instrument to evaluate the quality and quantity of knowledge or say learning in a specific field Mishra (1988). University examinations are conducted for each stage at the end of the academic session. There is hardly any month for which there is no exam. Examinations continue for months causing physical and mental stress both for students as well as for university administration. Declaration of results also takes very long time owing to which students remain idle for months together. Moreover, the dates of examinations and those of declaration of result also vary between different universities, so sometimes

students are not able to get admission to higher studies in the universities or academic fields of their choice.

ORGANIZATION AND VARIOUS PHASES OF EXAMINATION SYSTEM

Organisation of examination is a peculiar type of jobs involving different types of data processed and managed by different line branches within the examination wing of the university. Its complexity increases with the increasing number of examinations during the session. Right from the initial stage of students' enrolment to the final stage of the declaration of result, various jobs are required to be under-taken with proper care and sophistication.

In a typical government university, in order to understand examination systems, it is essential to understand the organizational structure of the university and sources of data. The university has campus teaching departments, distance education directorate and affiliated colleges spread across geographical jurisdiction. The university conducts examination for the students who are on regular rolls of these organs. Also there are students either failure candidates or who are authorized by the law to appear as private candidates in the examination. The regular students apply for examination through the head of the institutes they are studying and other students apply directly to the head of examination called Controller of Examinations (COE). The examination related data management can be divided into two phases:

- i. **Pre-Conduct Phase:** In this phase the application form of the students are processed and all the relevant details of students like college code, registration number, fee details, paper code, hall ticket generation etc are created. Any discrepancy in form is communicated to the student so that it can be removed in time. This is one time activity carried out at least one month before the examination.
- ii. **Post-Conduct Phase:** This phase involves from sending answers sheets for evaluation, collecting evaluated answer books, tabulation of marks obtained, applying moderation or grace marks criteria, declaration of results, generating & dispatching detailed marks cards (DMCs) etc. up to the processing student's request for revaluation. In this phase some processes can be carried out time and again like students can always ask for duplicate DMCs.

During these phases, the data related to students need to preserved for a specific period of time and some of the data like marks of the students and their registration need to be preserved for good in order to ensure future verification or to settle disputes arising about veracity of the university degree at anytime during the life time of the student. The branches of examination system viz. Registration Branch, Conduct

Branch, Examination Branch, Evaluation Branch, Re-evaluation Branch, Secrecy Branch work in unison; therefore, generally all the branches are housed in the close vicinity or in the same building in a typical university system. These branches are manned by different officials by clearly defining their roles & responsibilities and they are accountable for any breach or any foul play with the examination activities. All these data related activities are carried out by various examination branches in co-ordination as shown in Fig. 1.

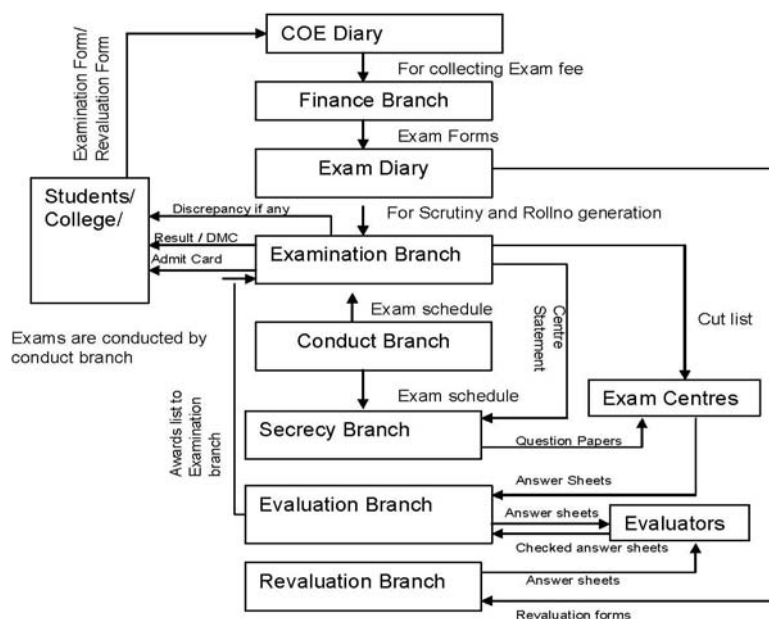


FIGURE 1: Organization of Manual Examination System

LIMITATIONS OF MANUAL EXAMINATION SYSTEM

Though the manual examination system is organized in well defined physical branches, still the movement of paper based records is slow. The examination process in manual system continues for months causing both physical and mental strains over the examinees. Publication of results also takes a very long time owing to which students remain idle for months together. Sometimes the delay in declaration of result cause heavy losses to the students as generally they cannot join further studies or appear in competitive exams or join jobs because of the non-availability of examination result in time. Some of the limitations of the existing examination system, though not comprehensive, are as follows:

- Students have to either correspond through postal mail or visit university even for minor queries regarding examinations. Sometimes due to increased paper load in the examination branches their correspondences/applications are not traceable. The personal visit to universities wastes a

student's precious time and money and cause unnecessary harassment. It is a common sight to find students jostling near university in various service windows purchasing examination forms, depositing examination fee and to get to know the status of their results.

- The manual examination system leads to errors, more time consumption, inefficient and wastage of valuable resources. Moreover ever increasing paper based record registers are difficult to store securely due to space scarcity.
- There is repetition of work in the existing system because the same data is recorded in different branches of the examination. This leads to data duplications as well as huge money is spent by the university to purchase papers. In existing system, managing of students' record is very tedious. Retrieval of students' records through manual registers, maintaining of records and data reconciliation etc. are very time consuming.
- In manual examination system, there remain chances of tempering of students records. Sometimes fake degrees are prepared and there is no online verification of the same. This leads to unfair practices and also it mars the credibility of a university.

AN ALTERNATE APPROACH

Do we need to automate the existing examination system? The answer is in affirmative because the traditional examination system was meant for the times when the number of students enrolled in the university was less and the numbers of courses taught were limited. In present situation, the ever increasing burden on examination system due to increasing GER is leading to various inefficiencies in handling the examination related processes, as discussed in the previous section. By automating the examination system we meant to minimize human intervention by adopting ICT since the technology promises compact storage, speedy retrieval of data and untiring diligent work. Maki (2008) has described ICT as that technology which can be used right from student administration to various resource administrations in an education institution, where as administrative subsystems include Personnel administration, student administration, resources administration, financial administration and general administration. Ulf Fredriksson et.al (2009) mentioned that Communication and general administration are the two main areas in which ICT is used in the management of education institutions. Zainally (2008) has also elaborated the uses and possibilities of Information and Communication in educational institutions for administrators. It has changed the very nature of administration in higher education institutions, the way information is transferred, stored, retrieved, and processed results in increase in managerial effectiveness and efficiency through usage of Information and Communication technologies. Bhardwaj and Singh (2008) has also suggested the concept of integration of examination system at the

university level to bring integrateable, scalable, transparent and robust e-governance solutions as that examination system can be put under single portal system.

By integrating and placing student's database from different branches of examination at centralized computer server interconnected on LAN or Internet, the data inconsistencies can be almost minimized and data can be made available anywhere -anytime through Internet.

Some of the common tangible benefits by switching over to the alternate approach based upon automation and integrating the examination systems, which we rechristen as Automated Integrated Examination System (AIES) to differentiate it from manual examination system can be put as bullet points below:

- Total automation of the system will facilitate integration of all branches physically, though logically these branches may keep functioning as before.
- The new system will streamline the procedure for collation of exam fees, issuing receipts to large number of students and keeping a track of cash flow. There will be centralized, secure and robust database of the candidates appearing in the examination without duplication of records.
- It will bring improvement in quality of services to the stakeholders by introducing computerised window system and online availability of information.
- The complete Computerisation of Examination System will lead to effective monitoring of examination processes by the concerned authorities and the possibility of fraudulence will be minimised.
- The computerised statistical analysis of data will enable the management to see trends in result at various levels and timely availability of compiled reports can be used to make strategic decisions in favour of university and students.

Besides these benefits of AIES, another major impetus for change to an alternate approach of examination is the societal pull. There are increasing trends in academic frauds and corrupt practices in the society. Some of the major factors which are causing academic fraud are expanding higher education, increasing gross enrolment ratio, competition among students and institutions, globalization which is resulting in international mobility of students, use of traditional method of management of examination system, poor regulation and lack of accountability. Hallak and Poisson (2007) have highlighted different types of academic frauds and corrupt practices in quality assurance and accreditation processes in higher education institutions. Transparency and effective management are the key factors to curb academic frauds. Bhardwaj and Singh (2011) has highlighted various security threats in Automated Integrated Examination Systems (AIES) and suggested measures in dealing security threats which can thwart the very purpose of ICT if left unattended.

Connecting Various Units of Examination Process with Centralized Database

The ICT in general and Internet in particular, undoubtedly, has the immense potential as a tool for transparency and effective management. Overall functioning of proposed system has been shown in Fig.2.

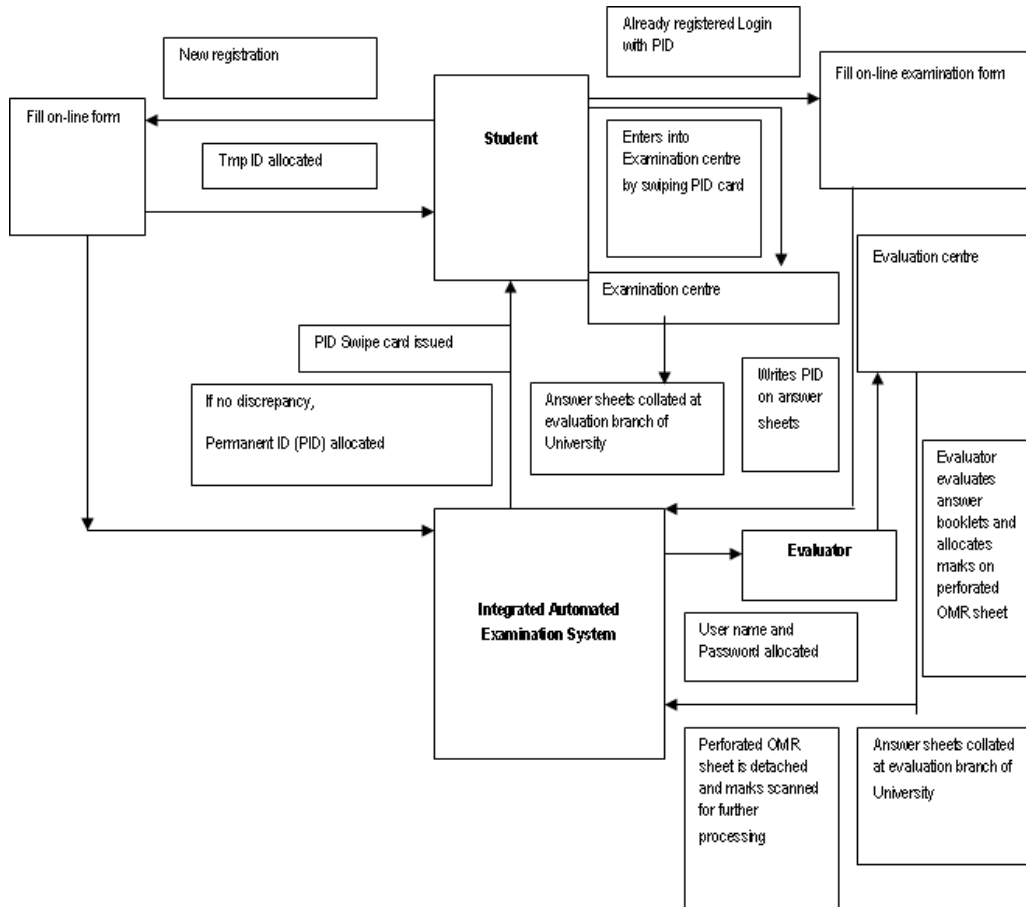


Figure 2: Automated Integrated Examination System

Student has to get registered on-line for the particular examination, possibly few days before the examinations begin. If student is not eligible for the particular exam, he/she will be informed about the discrepancy through e-mail. If his/her examination forms are found to be eligible, he will be allowed to sit in the exam. Some examples of the automated examination process are given below:

ISSUING OF PERMANENT IDENTITY CARD (PID)

Candidate is given a temporary ID number while getting registered on-line. After verifying his/ credentials, eligibility and other documents (fees etc.), he will be allotted Permanent Identification Number (PID). This PID will be unique and will be required for all the queries.

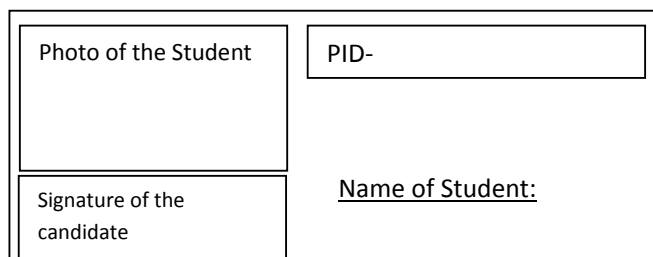


Figure 3: Permanent Identity Card issued to student for appearing in examination

Student Appearing in Examination

In AIES all the branches are interconnected and there is a centralized database of students. Students are informed through e-mail about their examination centre. For appearing in exam, student has to bring PID card. He can enter in the examination hall only by swiping his PID card through card reader. Access authorization to computers and database can be authenticated through user ID and password, this signifies attendance and validates the identity and verify the person with the photograph. Student who is sitting in the examination centres has to write PID on the answer sheet.

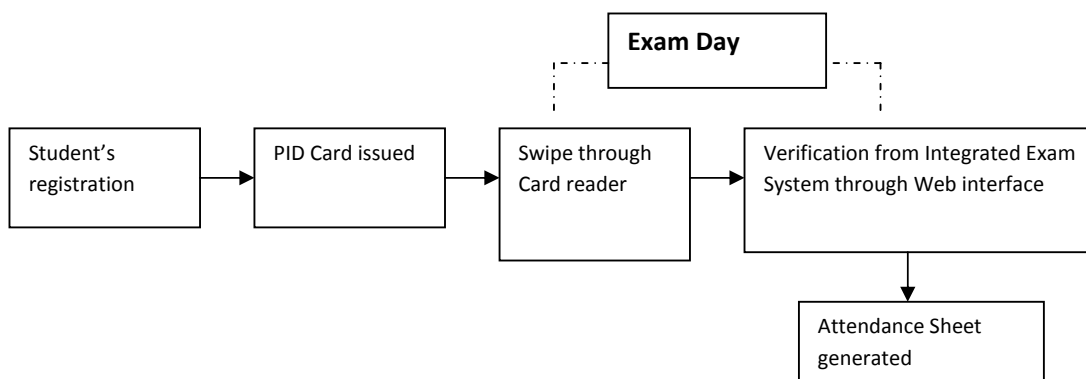


Figure 4 : Swiping of student's ID card on examination day

CHALLENGES OF INTEGRATING ICT IN EDUCATION

As discussed earlier, ICT has huge potential to make the Indian universities as fully automated universities. Most of the manual work can be taken care of by ICT, but there are many challenges which hamper the exploration and exploitation of its opportunities. Some of the key challenges are highlighted below:

- **Non-availability of ICT infrastructure:** There is no proper housing facility for these technologies. This is due to lack of proper planning. Computers are purchased ahead without making any proper plans or without furnishing the room or building to install these computers. Moreover, infrastructure in developing countries is of poor quality.
- **Reluctance to adopt new technology:** Most of the Indian government universities were established in 60 or 70s and most of the employees working in these universities are at their retirement age presently, so it is very difficult to change mind set to adopt new technology. The employees are of the opinion that at old age it is hard to learn new ways of doing work using technology. Some of them are not even willing to listen to go for the new technology. Officers/officials who are young and energetic need to be get exposed to the new technology and made aware of the benefits of the technology.
- **Lack of motivational quality:** Integrating ICT in university examination is not an easy task. It requires a wide range of support including higher management convincing the officers and officials to adopt ICT. For this task a motivational leader is required. The motivational leader is necessary before, during and after the implementation of the project.
- **Frequent changes in administration:** The frequent changes at the top administration adversely affect the institutions. New incumbent takes months to understand the situation and it also depends upon his willingness. Sometimes before understanding the situation he has to leave the institution.

CONCLUSION

Modern era is the era of technology, resulting in changing the lives of millions of people. Today almost every Indian University is imparting education in the field of ICT, but its use in teaching and administrative functioning of university is meagre. The meaning of computerization is limited to just typing or surfing web; full potential of ICT has not been explored by many universities. ICT is very useful tool to have transparency, reliability and efficiency in university examination system. There are endless possibilities by integrating ICT with examination system. Automated Integrated Examination System will ensure efficiency and effectiveness in the examination system and render convenience of on-line queries by cutting down

time and cost and breaking down geographical barriers, thus bringing a sea change in the existing manual examination system.

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