

## Research and Development of an e-Learning System for Students Studying Information Technology

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Received: 06th October 2021

Revised: 19th November 2021

Accepted: 06th December 2021

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**Abstract:** The purpose of this study is to develop an e-Learning system for information technology students to learn academic courses at Sindh Agriculture University, Information Technology Department. The general principles connected to the e-learning system are introduced first, followed by a description of the tools utilized in the e-learning system model. The other materials, which are in the form of books, can be downloaded using the e-learning approach. The activities that are included in the construction of online e-learning systems are as follows: To achieve high-quality-based results in education, the design model is used to create implementation and proper implementation assessments. The goal of the e-learning system in the Information Technology Department is to find a pattern that will allow for easier access to academic courses as well as more information and knowledge about the related subjects during each semester or term. The e-learning content is provided in the form of MCQs, objective-type questions, books, other links, and related resources that can be downloaded for each and every subject semester/term wise. This study investigates the use of e-learning in the information technology department. In this department, the problem of keeping subjective information and practical guidance for the IT students is very necessary. This study gives background to the study by reviewing subjects according to the semester or term. The e-learning system plays a main role in education on the basis of web application technology in the form of an e-learning model. Students must realize that a new, leaner framework is offered by modern on-line learning technology. An information technology student with basic internet and web skills can explore a new world of knowledge while being free from website surfing and self-organized education through online resources. Although online learning systems are a form of education that is used in educational institutions in developed countries, especially in their higher educational institutions, the primary role of this research is to describe and understand students' needs, problems, and so many other issues, especially at the time of their departmental examinations at university. E-learning is beneficial for students' future careers, and our aim is to polish them and make their careers bright.

**Keyword:** e-Learning, web application, programming, programming languages.

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## 1. Introduction

Learning is the process of obtaining information that the learner desires as a learner and then observing it on one's own. Many learners learn from instructors or through the use of informatory sources such as guidebooks, menus, and so on [1]. e-Learning is a type of learning that is placed on the computer's network; that could be the internet connection or just a school, college, or university[2]. The basic definition of e-learning in many documents can be defined as a complete system which provides an easier platform for learning through online learning programmes that are designed and implemented on a logical and technical basis[3],[4]. There are synonyms which are used for online learning, such as internet learning, e-learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, web-based learning, and distance learning[5],[6]. Nowadays, most portable devices have been developed. E-learning, or distance learning, can be used for online reading. As a result, it is the use of portable devices or computers for the purpose of learning through various technologies [7]. Another definition regarding e-learning [8]. They have been written very easily. They said that a type of source that has learning methods both formal and informal without restriction of learning and across a wide range of technologies [9]. In the book that was written by [10], in that article, the interesting line was written that he wanted to remove the ambiguity caused by this term. Actually, e-learning is the future of users or it will be caused by risk. Here we should be clear about e-learning. By utilizing this technology, all skills related to education can be improved, and it will be beneficial for students. From the standpoint of the geographically located service, it provides teaching and its materials electronically. What is needed and where is e-learning used. As a result, it is mostly used in various organisations such as educational institutions as well as training centers for educational departments, corporations, and government agencies. E-learning helps students who are enrolled in a school, college, or university to accomplish their aims without going to classes. The internet provides students with educational resources[11-20]. Education resources include books, presentations, lectures, assignments, training, videos, and so on. It is also encouraged for the students of school, college, or university to learn as much more at any time at any place they want. This research solved the problems of students focused on who face problems during the period of examination for their academic examinations, career development, and academic advisory and used IT resources by using technology to enhance the students' service and student issues through online techniques during each semester of their institution of Information Technology. Many institutions have adopted e-learning for online courses to facilitate learning for students, so students of all ages and abilities have the chance to learn anywhere, any place, any time when they want. Here, some challenges should be summarized as follows: IT students' administration, to maintain the resources for IT students, course structure, lectures, communication with the teacher, further requirements of the students, satisfaction of the students, and satisfaction of the teachers. This research goal is to identify the drawbacks which are affecting the implementation of existing e-learning in view of the following perspective related to students: There should be complete knowledge in different ways of the subject in which the student is enrolled.

The main purpose of the study is to develop an e-learning system at the institute of Information Technology at Sindh Agriculture University Tandojam, so the use of e-learning implementation has increased. The need of this study is to generate a way out to improve the result and effectiveness of e-learning system implementation in the information technology centre at the university. In the implementation of an e-

learning system, more than just technology is required to be successful. There is also a requirement for academic professionals well known and trained in IT who will be capable of maintaining and using the e-learning system and providing learning resources that require IT student learners in the future. At the institution of information technology at Sindh Agriculture University, the theory is based on the researcher's point of view. As a special issue, does the development of an e-learning environment improve students' thinking and enhance their skills? What are the class elements that affect students' attitudes toward e-learning methods? How can we develop a new strategy for the institute? There are a number of universities and colleges, especially in developing countries, that have adopted learning systems. There is still an e-learning system required and, according to the aim of this thesis, an e-learning system for IT students supported for learning activities should be implemented. Furthermore, it is a system that was implemented some years ago in higher education, like the virtual university of Pakistan, but a number of them failed to produce the expected technological result. The model design and implementation of an E-learning system for IT students, once well implemented, understood and visited by the students, can help IT institutions and universities achieve their academic educational aim and academic community in producing quality theses at undergraduate and postgraduate levels, improving the quality of research and providing more knowledge about the subject and other practical programmes in the complete process. This research aims to realise and examine the development of an e-learning platform in the institution of Information Technology, Sindh Agriculture University Tandojam through SWOT model results. In this research, multiple tools have been used and important data has been collected from different sources such as the internet, books, slides of the lectures which are conducted in the class, and the researcher's own experience. Microsoft Visual Studio Ultimate 2012 version 11.0.727.1 RTMREL has been used to analyse the collected data nowadays, so many departments have to be found a diversity of students' services online, including online admission, registration, and career services. Meanwhile, web services We can say that the internet provides services to facilitate needy people to perform better service, at a lower cost, and on the spot at a time and location very suitable for the students, but until e-learning programmes have been developed, there are unsure and more ambiguous issues and problems. These kinds of issues may occur due to the fact that students and teachers do not have face-to-face exchange of information among themselves as well as a department that solves students' problems. This research focused on students' affairs and problems that are related to the preparation for their examination.

## 2. Review of Literature

In more recent times, e-learning is commonly used as a synonym for online learning systems [10], [11]. In the United States as well as Canada, its basic integration or relationship depends on the learning practices and web-based applications similar to the Internet [21], [22]. Concentration and interest in "e-learning" increased within the United States, Canada, and Australia in the nineties and before the 2000s [23]. Both levels, including elementary and secondary levels, led researchers to tout e-learning's many benefits for the studies of American students. After this technology, people will be able to achieve education by remote access and various learning styles will be provided [25-27]. Although many educationalist scholars have given various examples of e-learning preparation with the development of different technologies such as web-based applications and email in the early 1990s and periodically with the introduction of innovative such as virtual schools in the early 1990s [24]. When, we discussed the term "e-learning" after this study, most educational scholars and researchers discarded the term "synonyms" which are used for the term

"online learning". They have defined e-learning in a wide range of terms. "The utilization of new information resources in education systems along with different communication technologies". According to the [28], 4.6 million people took one online course in the academic term in America. According to [9] in 2015, in the U.S. higher education student ratio, seventeen percent increase in online-based e-learning [10]. Despite an increase in student participation and interest, the use of online learning has decreased. Therefore, educational journalists and researchers are especially interested in the level of secondary education. They attempted and surveyed in various e-learning programmes such as "Curriculum Design", "Delivery Modes", "Social Communities" and "Instructional-Based Training Methods" [13],[14]. The scope of e-learning has particularly shifted on the geo-cultural front in the past five years in the North [16]. By region, the ratio of students in higher education is the Netherlands [17], There are economic issues and challenges that are faced in such kinds of discussions, especially in developing countries where it is cost-significant to research and investigate the possible presence of e-learning programs[5],[6]. E-learning technology innovation has increased interest among researchers in online learning pedagogy, especially those researchers who are very interested in global socioeconomics and ICT. Geo-cultural regions are one of the solutions[19]. The geo-cultural region is also one solution to that, because it is just bringing very serious concentration to both kinds of researchers, ICT researchers as well as e-learning scholars[20]. While in the Latin American countries, several universities worked on online learning programmes to achieve profit from e-learning programmes and prove better and easier platforms for learning, which included Brazil and Chile. Companies and organisations have introduced us to various profits over the last three to five years. Although higher education has also become a need to start online learning, especially in progressive and developing countries [3]. The Universidad de Chile in Santiago developed very heavily interactive e-learning technology in Latin America, i.e., course management. After a long time, researchers showed the effectiveness of programmes in both e-learning and ICT. In which different pedagogical perspectives have been informed [7].

In the study, Latin American researchers pointed out the complex and mixed enthusiasm and explained it in detail on the basis of some social cultural interest in e-learning technologies in higher education institutions. And along with the lack of interest in distance learning in North America, the lack of interest goes on the way to a new pedagogical process[15]. On the basis of such results, several researchers published current research papers in which the benefits of e-learning are highlighted, which are invisible and its importance. Although higher education continuously controlled and worked on it, putting in place a widely accessible national communication infrastructure in the 21<sup>st</sup> century [18]. Explains the difference between distance education and distance learning. While distance learning or education was seen as the formal process of distance learning with information being broad in scope, including university and college courses, distance learning was seen as the achievement of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance. Whether distance education and distance learning have the same meaning or not, Both are explained. Distance learning uses the formal process of achieving knowledge and has a great scope of information like traditional learning, such as secondary, higher secondary, and bachelor's degree curricula and skills through third way. Information and guidance are available, and so many other forms of learning are provided at remoteness [2].

[10] Concentrated and thought about how to use scientifically validated methods to increase the scope of e-learning. Authors studied a lot for that purpose. After the study, Fischer also studied 427 scientific articles.

Authors did not only study the articles; he also managed conferences in German and in Switzerland and Austria[11]. He has played an important role in e-learning and has defined the importance of digital media in higher education. He explained several benefits of e-learning. [22] Applied digital media in the department of higher education. [12]according to his research, followed suit.He has defined how e-learning is an effective tool for the students' achievements. Moravec managed a programme of e-learning in which approximately two thousand students participated. The outcome of that programme provided a positive affection in the e-learning program. Programme was to know how e-learning plays a positively affectionate role. A lot of students gave their positive feedback regarding online learning. So many questions were kept in that programme and an e-learning tool was provided.Described the strength and relations between the students and their achievement in e-learning. Authors,furthermore, defined students' academic achievements in his research in the period from 2010 to 2012 of e-learning in higher education[4].[5] Defined that ICT is also positively affected by students' achievements in e-learning.[6] thought and said that there should be a single platform on which everything and anything is available on that. After a long time of research, he finally reached his aim. He designed and prepared a unique model of knowledge disciplined. After much effort, e-learning was finally developed and is being worked on in some sub-disciplines.Knowledge, sharing, application, and generation are sub-technical parts that have been used. Because by using these sub-technical parts, the strength of e-learning could be increased. Judrups solved a big problem. He formed disciplines in both knowledge and e-learning for each other. Researchers found a solution to the problem that mobile learning has on students' learning platforms, especially for students. Both researchers worked on "e-learning" and "m-learning" to provide a better quality of education, and after that, the quality of education appeared very clearly[8].

### 3. Research Methodology

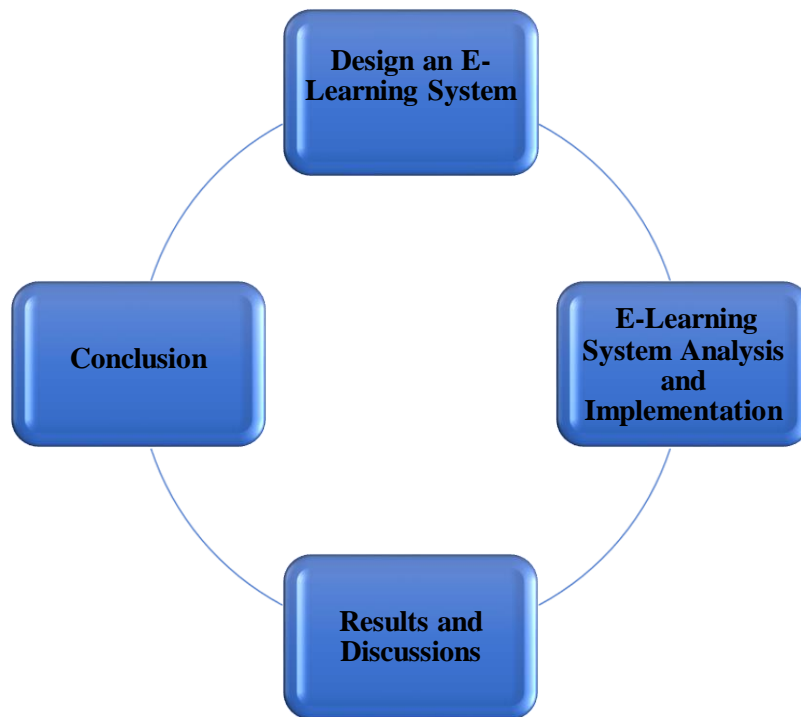
This section describes the procedures in the design and implementation of an E-Learning system. It exploits web-based technology as its basic technical infrastructure to deliver knowledge as the current academic institution's reality is to increase the use of e-learning systems. In the near future, a higher demand for technology support is expected. In particular, a software tool supporting the critical task of instruction design should provide automated support for the analysis, design, implementation, and deployment of instruction via the Web.

In our research, we performed the following steps:

1. Create an e-learning system
2. Analyze and implement an E-Learning system
3. E-learning system outcomes

The E-learning system for IT students' consists of:

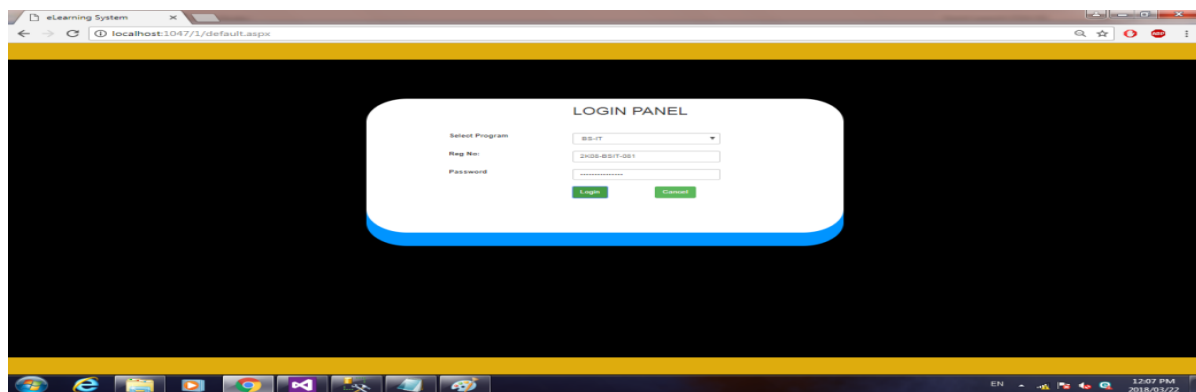
1. Computers
2. Programming Tools
3. Programming Languages such as HTML, CSS, Javascript, Bootstrap, JQuery, C#, Asp.net)
4. Making, Reading, Updating, and Deleting
5. A Database (SQL Server)
6. Process and store all information according to academic courses.
7. Website deployment on a local server machine



**Figure 3.1:** Design and implementation of an E-Learning system methodology layout

#### 4. Implementation Results

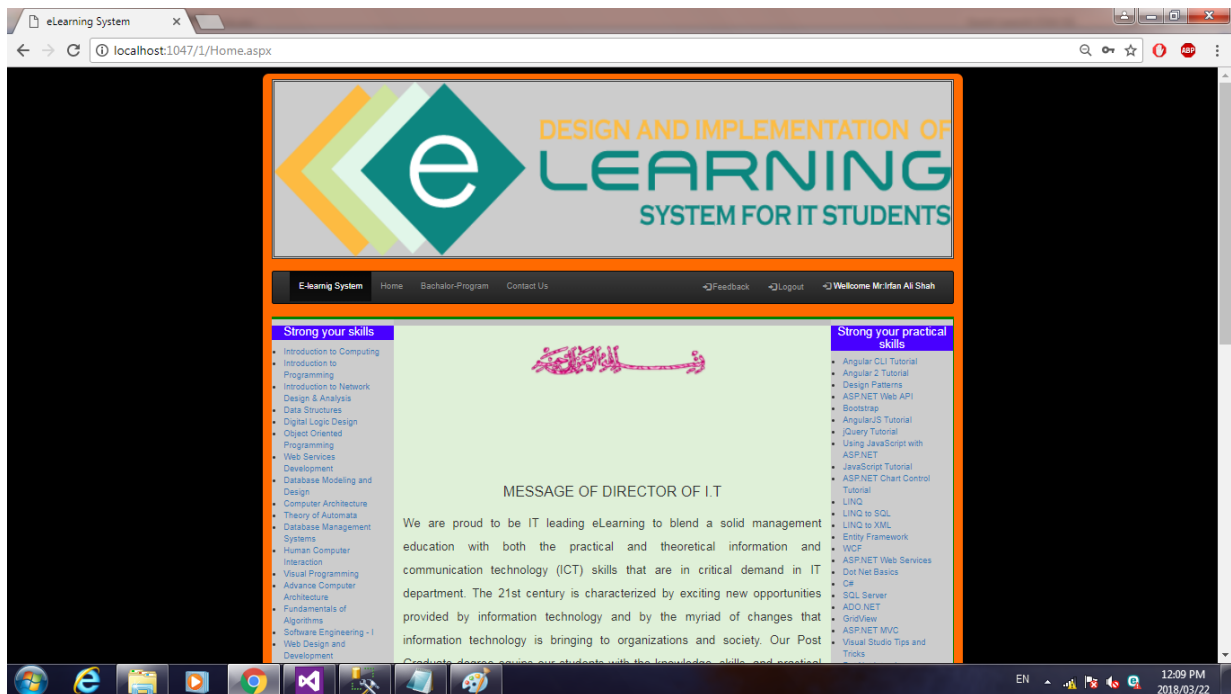
This study enables students to provide a better and easier platform for self-study. The proposed application saves and displays the information of academic courses with easier access. Students can improve their knowledge, skills, and concepts by utilizing the e-Learning system.



**Figure 4.1:** The login page for e-Learning web application's

There are three things that are mentioned on the login page for students: Firstly, his degree title, whether he is a bachelor's degree programme student or a master's degree programme student, secondly, his student registration number, and lastly, his password. Those students who are enrolled in bachelor's degree programmes will not be able to login into the master's degree programme category, just like master-based

enrolled students will not be able to login into the selected bachelor's degree category. The student's registration number and password will be sent by admin to them for login. By entering the wrong registration number or password, he/she will not be able to login. After successfully logging in, the main or index page will be displayed.



**Figure 4.2:** Index page of the E-Learning System

After successfully logging in, a student could see the logo, menu bar, and logout information in the header section, which are maintained on the master page by the admin. There are also links to other websites that have been made available for the help of students to strengthen their skills and concepts. main or index web page displaying the message of the Director of Information Technology. It provides the information and benefits of this system. The footer, which displays the copy right information, is also available at the bottom of this page.



Figure 4.3: Index page's bottom view

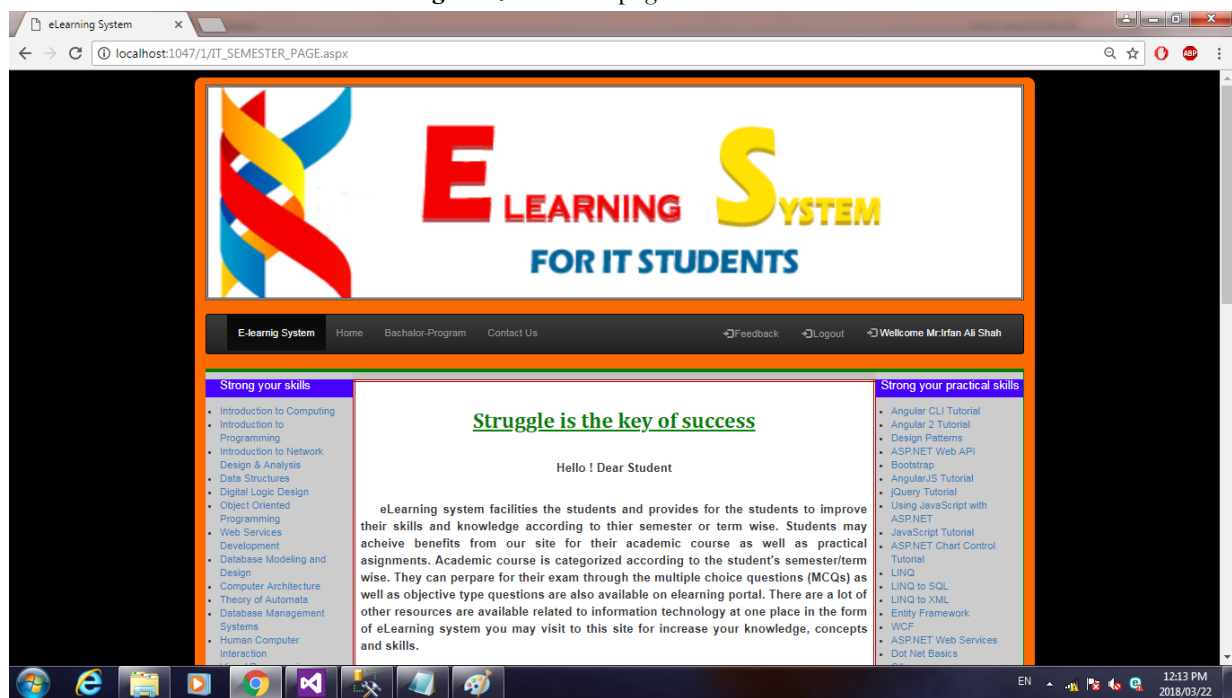


Figure 4.4: Undergraduate (bachelor's degree Program) Course Index View

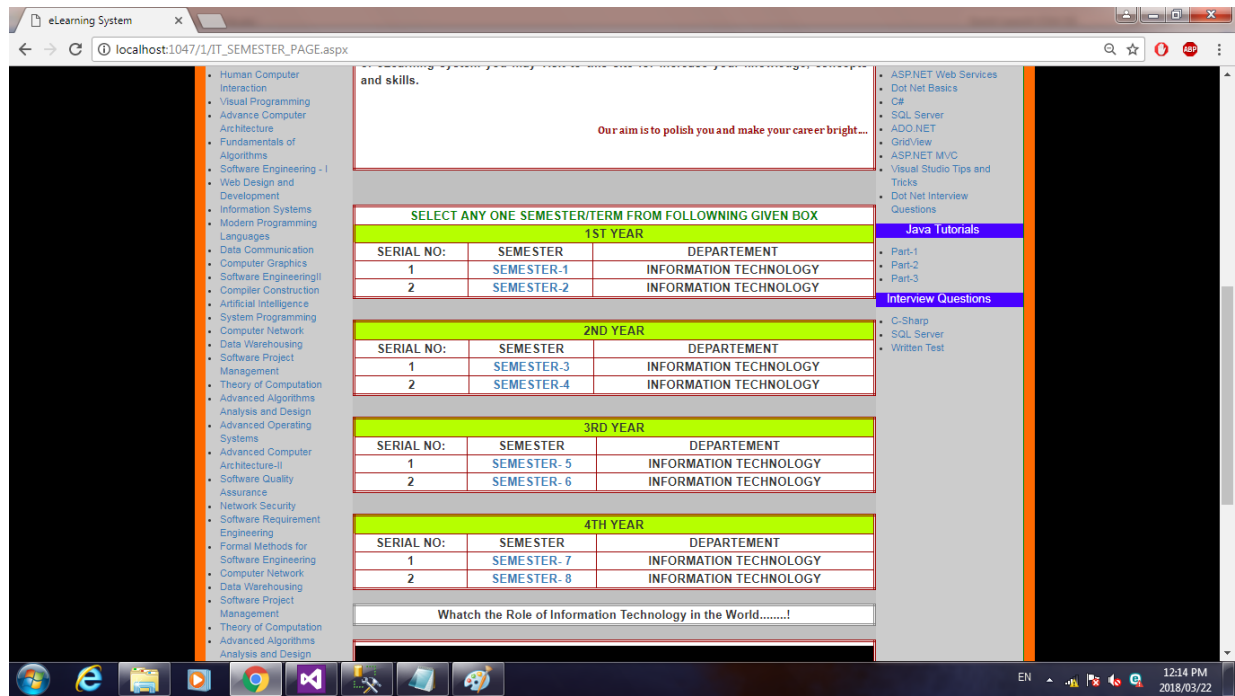


Figure 4.5: List of terms and semesters of the undergraduate (Bachelor's) Program

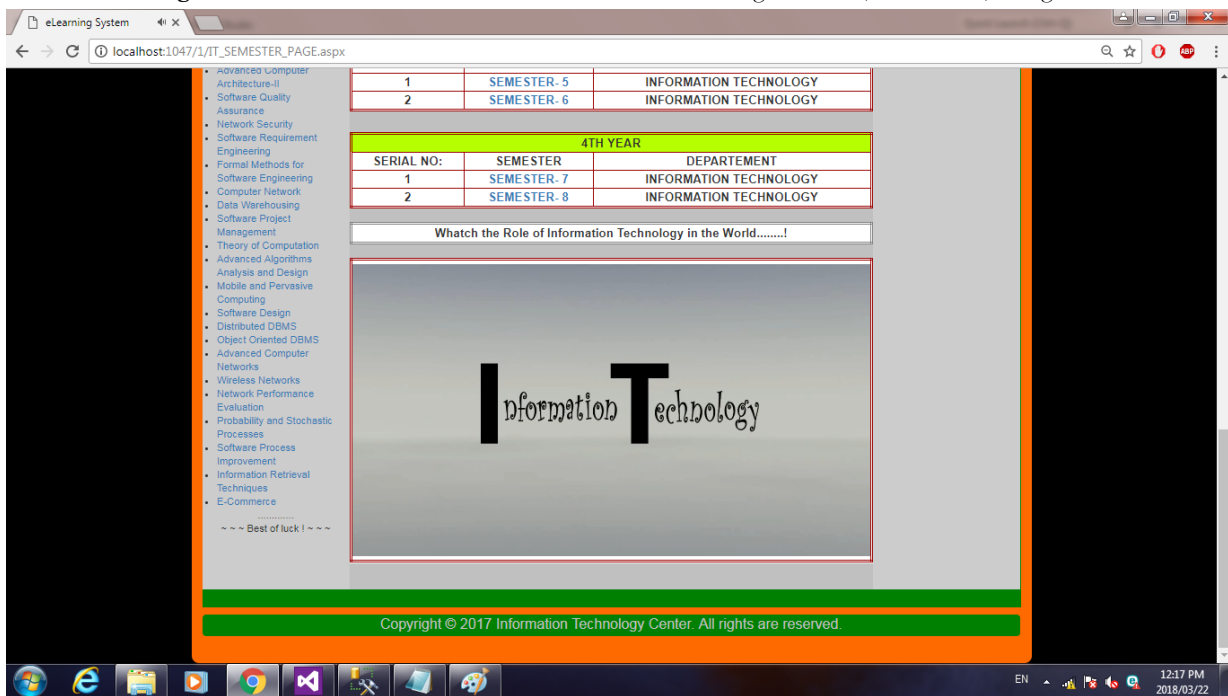


Figure 4.6: Bottom view of the course index page

While the course table web page figures from 4.5 to 4.6, the fourth-year degree programme contains eight terms/semesters which are designed according to the course plan of Sindh Agriculture University Tandojam.



Figure 4.7: Select the 1st Term/Semester of Information Technology

Now in the course table, a four-year programme is designed that contains the serial number, number of semester/terms, and name of department. When we select any one semester from the given box, when we click on any semester or term, the following page will be displayed.

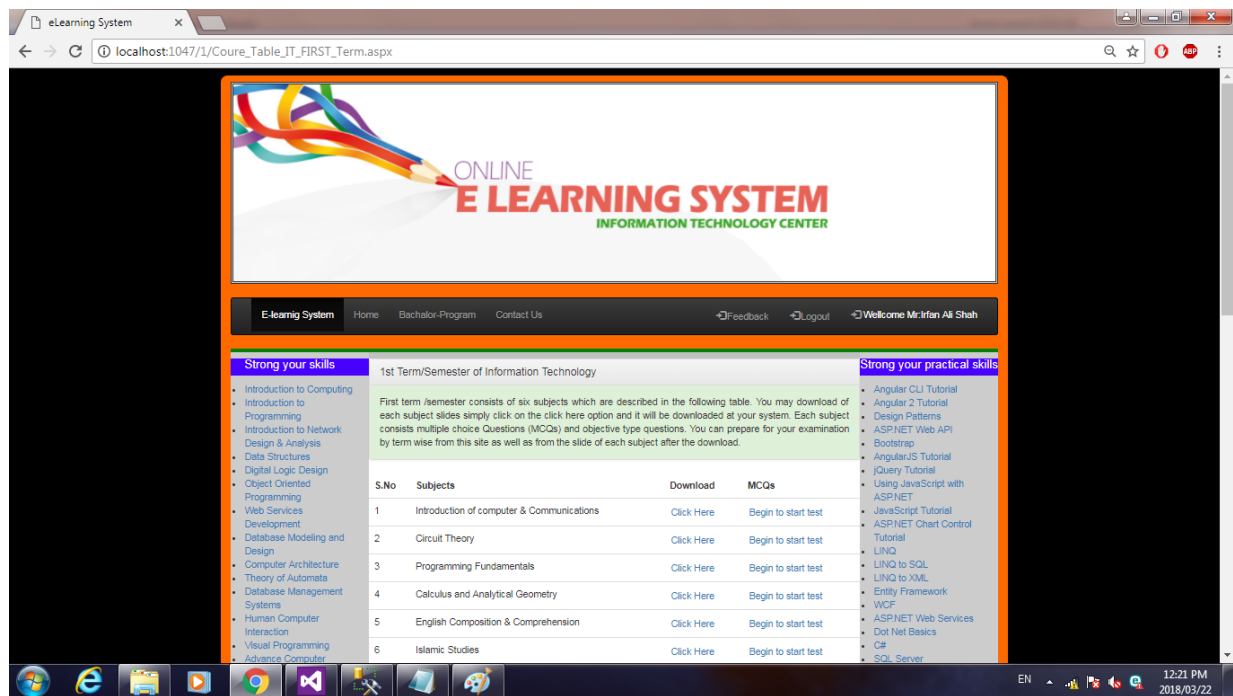


Figure 4.8: List of all subjects in the 1<sup>st</sup> term/semester of Information Technology

It is the list of subjects which is displayed after the click of the 1<sup>st</sup> semester/term. The list of subjects includes the serial number, subject name, download files, and the start of the test.

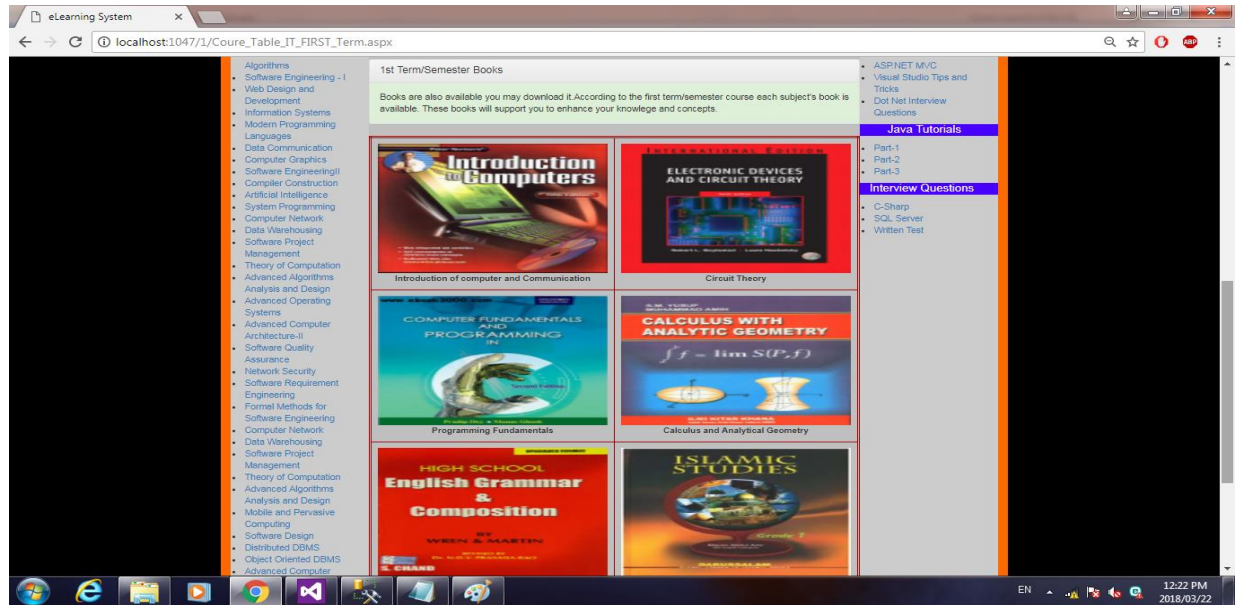
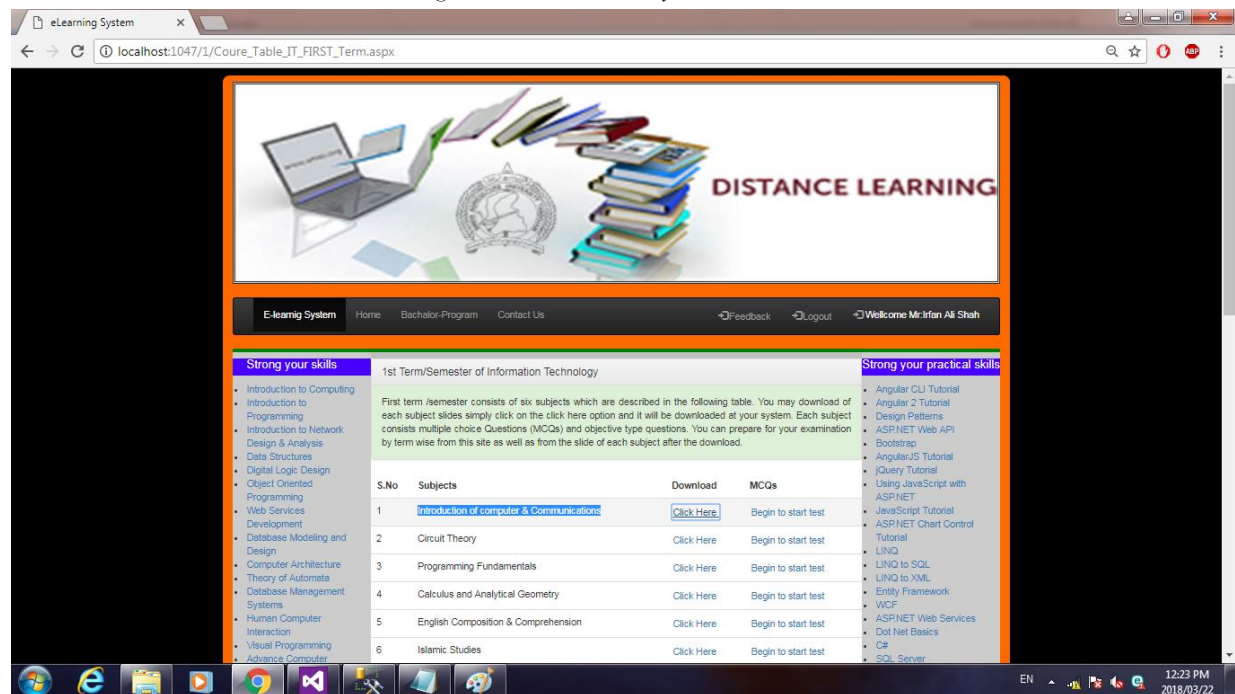


Figure 4.9: List of books for each subject in the 1<sup>st</sup> semester/term

There are six books available according to the ratio of subjects in term 1. These books can be downloaded.



4.10: Click here to download the lecture and more other files.

In addition to this subject, namely the introduction of computers and communication, the click here option is available. When we click on that option, the following page will be displayed.

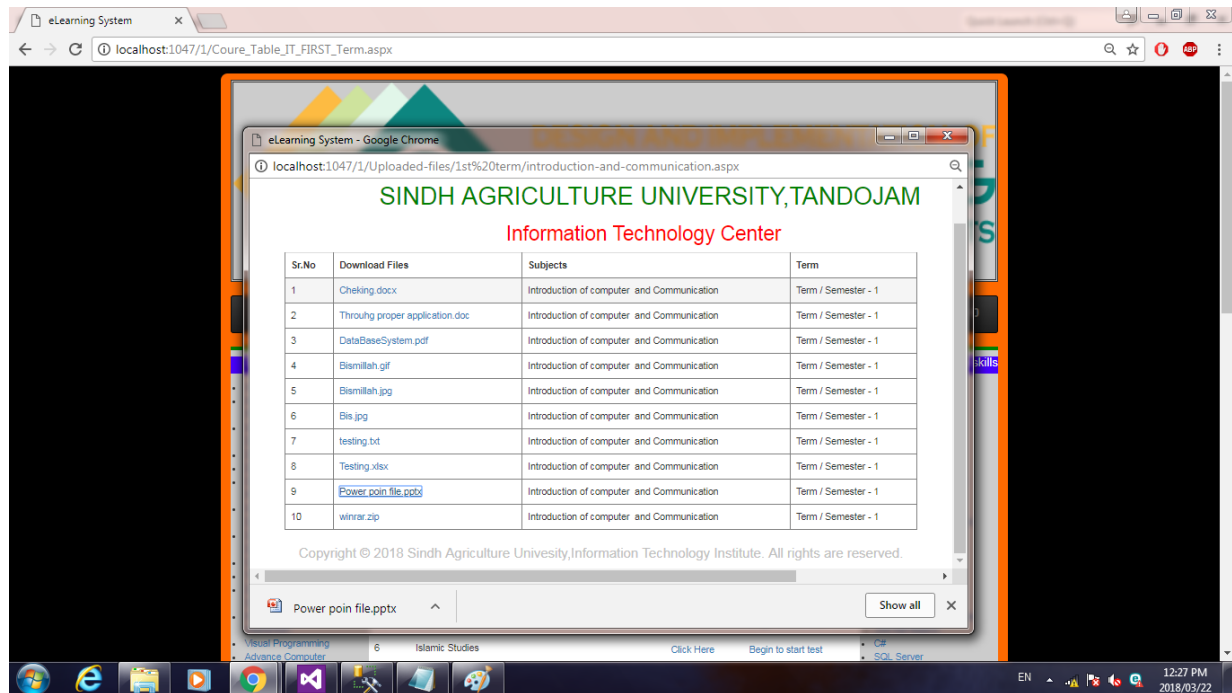
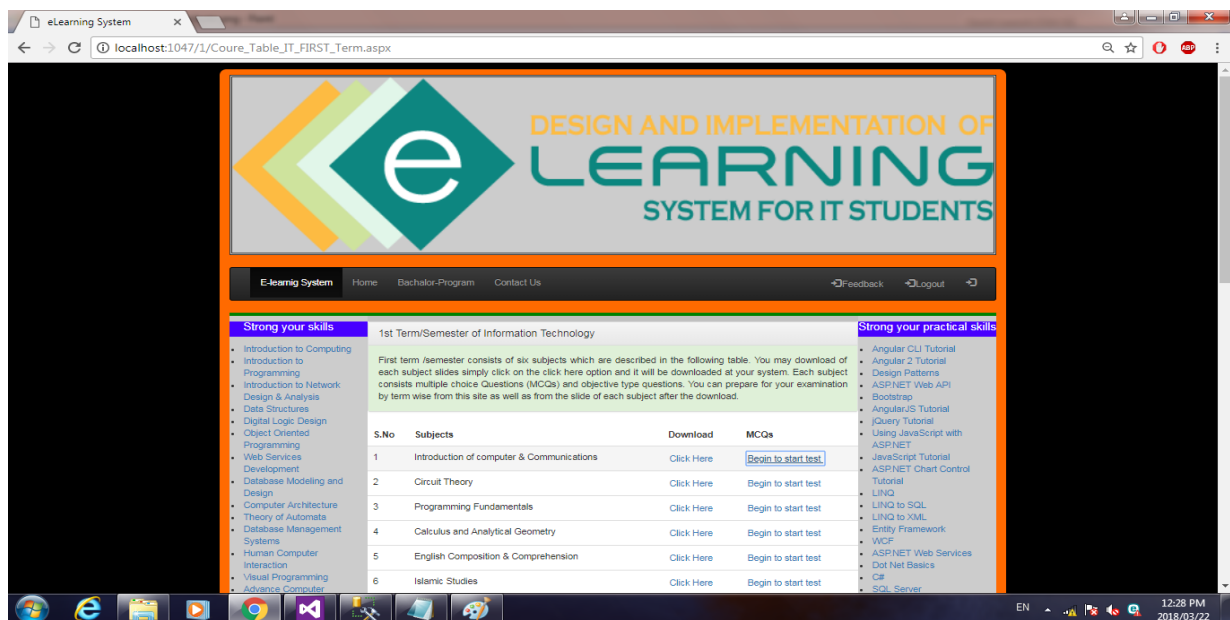


Figure 4.11: File list for subject 1 in the first semester or term

Now you can see the list of files which can be downloaded as per requirements. Here are three options that are available: name of file, name of subject, and name of term. You can see that all files are available according to the subject. No other subjects or terms are showing except subject 1 and term 1 because you have selected semester/term 1 from the semester course page. In the above figure, you can see the power point file is selected for download. The file has been downloaded after the click. You may see it in the footer of the page.

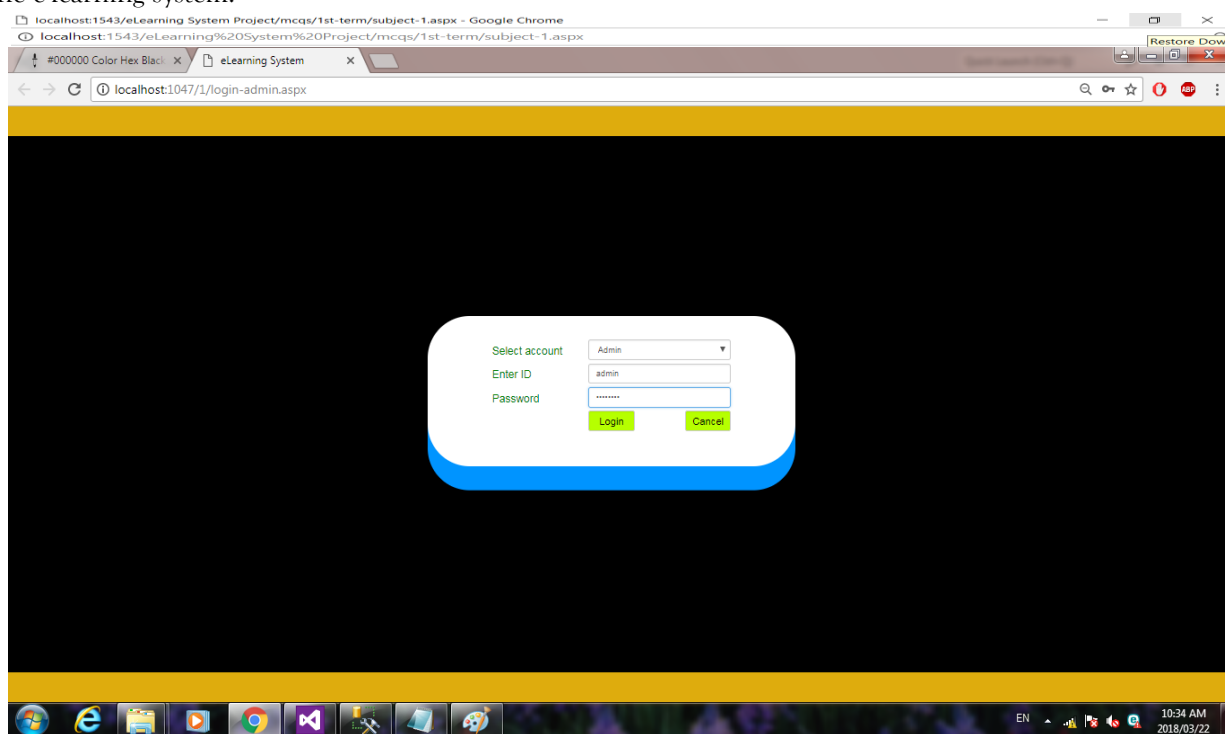


**Figure 4.12:** Begin to start test of subject introduction of computer

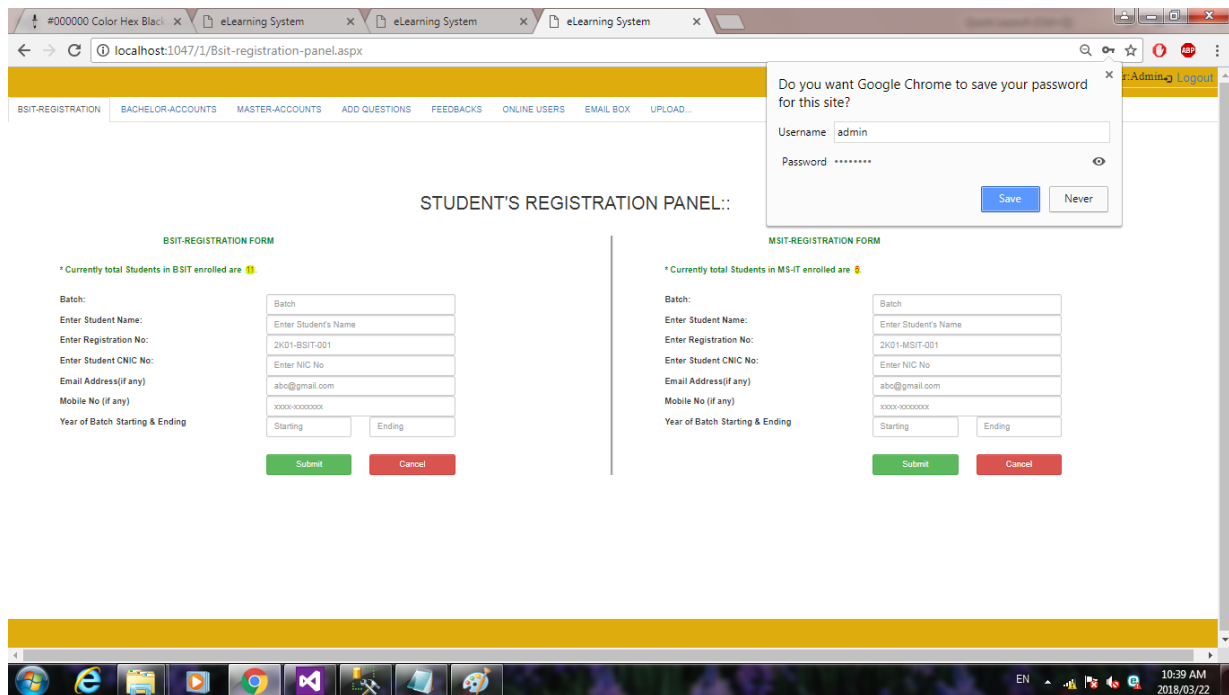
**Figure 4.13:** Online MCQs Test Page

In the above figure, the MCQs column contains the beginning of the test. It is highlighted so you can see it. After you click on that option, the following page will be displayed. This is the page of the online MCQs-based test page, which contains in the header the name of the student, his/her registration number, name of subject, and total questions. Currently, it shows a hundred new online questions added every day. We can say that it is an online testing service that provides a platform for students to increase their knowledge of a selected subject only. The selected subject is Introduction to Computer and Communication, while all the questions are loaded only for this subject in a sequence form with the topic and chapter wise of the academic course. The main role of this portal is that the student's mind will not be delivered to another subject. All the information will be limited to the selected subject. In the future, the ratio of total questions per subject may increase or decrease and its options are loaded from the database. Four options have been given, along with the button to check the correct answer. In the footer of this page, select page information is given. Currently, page one is selected and its color is different from another. It shows ten-page numbers, and the remaining page numbers are hidden.

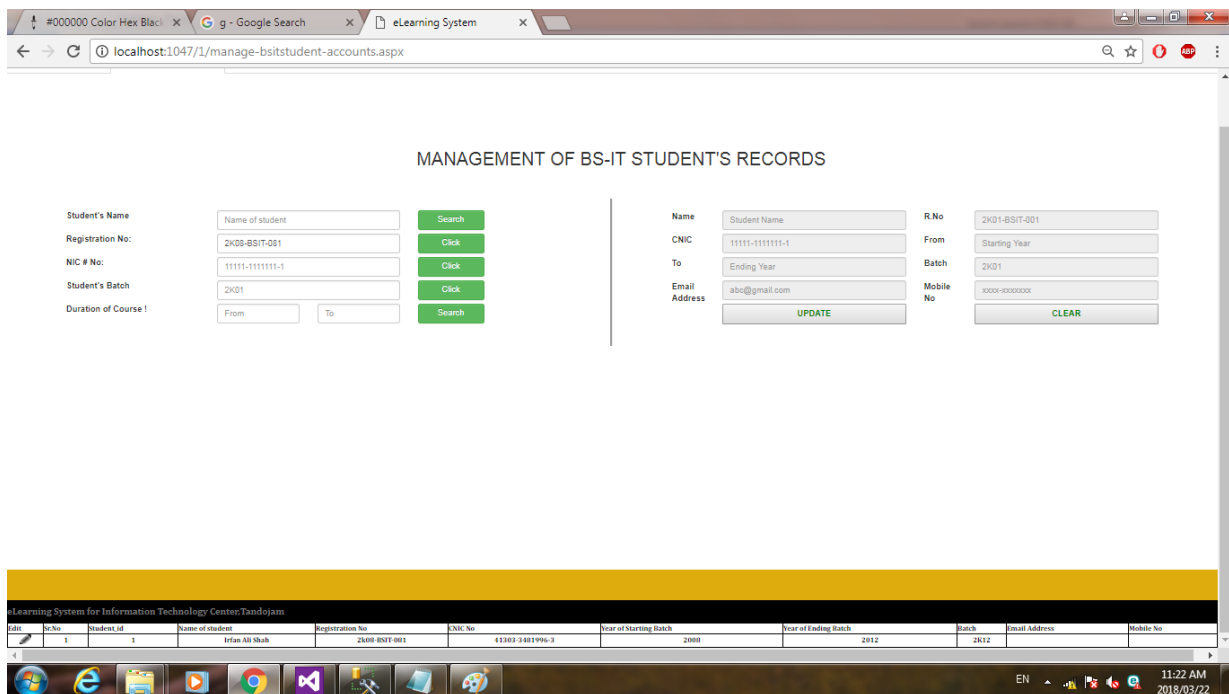
It is completely a student's portal, which we have discussed above. Now we will discuss the admin panel of the e-learning system.



**Figure 4.14:** Admin Login Panel



**Figure 4.15:** Successful admin login and display of the dashboard



**Figure 4.16:** Record found by the Registration Number of a student's

A record has been successfully found by the registration number 2K08-BSIT-081. Recode has been shown at the bottom of the above figure. You can note one thing in the record: an edit button is also available. When you click on the edit button, the following figure will appear.

This research result shows that students who are interested in gaining knowledge of academic subjects can easily read, copy, and download data from our web-based application. Each subject has an online MCQs-based test to help students prepare for exams and improve their knowledge based on their academic courses, either term or semester. There are a lot of e-learning systems available. But this web application is completely different from those applications. It is developed on the basis of traditional learning. It is developed in the sequence as per the needs of the villagers' students who are not aware of the computer field. Most students who belong to villagers are confused when they take classes in computer science subjects, especially at the period of examination for university. Because they don't have knowledge of computers and their use, students get anxious about using computers and studying their subjects. This is a time in which students think and search for any helper to guide them. This need of students provides our system and helps those students who are interested and very needy. To deal with the issues of students, the study has arranged an application that will give the academically required course information to the students by utilizing an online application. This application consolidates the data as per the university course. It works as per traditional learning. It is completely designed on the basis of the course plan of the information technology department of Sindh Agriculture University Tandojam. There is not a little bit of difference in course planning. Each subject is designed as per sequence according to the policy of Sindh Agriculture University, Tandojam. After the admission process, the students who are successfully selected in the department of information technology will be called from the admission branch of the Sindh Agriculture University. The administrator of the e-learning system will work on that list and register each student who has gotten admission into IT. While login information will be sent to the students along with the "url" of our website, their login ID as well as password will be sent to them so that they can login into their account successfully. Along with outside students, they cannot login into our portal. A student could be logged in who is continuously studying in the Information Technology Department. After the completion of their studies, the student's record will be deleted from our website and they will not be able to login to their account in the future. A user can access the course plan after logging into the system. They can easily access the term/semester in which they are studying.

## 5. Discussion & Conclusion

This web-based application is based on information technology fields, but other fields or departments, such as crop production, crop protection, animal and husbandry science, agriculture engineering, and social science, will be included in our system in the future, as these departments are currently not included in the e-learning system. Since, we have seen the importance of villager students, we ought to enhance knowledge and smooth guidance in the aspect of studying and learning.

This research provides exact requirements, configuration, and usage of a data framework where information technology students could upgrade themselves whenever and anywhere by utilizing various electronic gadgets, including private personal computers, tablets, cell phones, and the web. Most students who belong to villages are poor, and they face difficulties during their period of study. It is difficult to bear the expenses of study such as books, photocopies of lectures and notes, and all other resources which are related to study. The utilization of this framework decreases the huge and heavy expenses of education at the limitation of time and could save money. While this research's main goal is to provide easy access to the study resources without incurring expenses, a lot of resources are available on this e-Learning system. Initially, there was no

such kind of system available at Sindh Agriculture University that provided knowledge and accessibility through this website. There are so many websites that provide information about computer fields, but the problem is that when a student visits such a website, his or her mind will be diverted to that and sink into it. So many e-Learning systems are available, but their policies and sequence of subjects, pattern, and style are different and provide high-level information which is very difficult to understand for the basic-level student. We almost always see the same questions being available on different websites, and students face difficulties because those do not fulfil their needs and requirements as they want. So, through this system, we make a little effort to make the system easier to manage. It has a lot of features that make it easy to manage by students. This system completely depends on the pattern of traditional education and the learning system of Sindh Agriculture University Tandojm. Almost all distance learning systems are independent, but our system is not independent like those, and it completely depends on the university course plan and follows the rules and regulations of the university. It system provides a wealth of information on each subject. Currently, there are a hundred multiple-choice questions for each subject on this web application. But in the future, the ratio of multiple-choice questions could be increased by chapter and topic wise for each subject in the series. It is difficult to estimate the total ratio of the questions as per subject. But here it is necessary to mention that there is no limitation on the ratio of online multiple-choice questions. In the future, it could be increased and decreased in any condition. There is no requirement that there be the same number of questions on each subject in each term or semester. Each subject would have a different ratio of online questions within the semester. Along with that, there is the availability of a list of objective-type questions, samples of question papers, and practically programme assignments, presentations, activities, and all types of data will be available for each subject. This research also provides a way to increase students' confidence and keep everything on a single platform, so they will not worry about anything and could get a lot of benefits which they can't assume. The main and important role of the e-learning system is to provide facilities for the students and provide resources for the students to improve their skills and knowledge according to their semester or term wise. Our website can help students with their academic courses as well as practical assignments. Academic courses are categorized according to the student's semester or term. They can prepare for their exam through the multiple-choice questions (MCQs) as well as objective type questions that are also available on the e-learning portal. There are a lot of other resources related to information technology available in one place in the form of an e-learning system. You may visit this site to increase your knowledge, concepts, and skills. Our goal is to polish the student and help them advance in their careers.

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