INFORMATION STORAGE AND RETRIEVAL

Student Handbook

For

CLASS - XII

CENTRAL BOARD OF SECONDARY EDUCATION

Shiksha Kendra, 2, Community Centre, Preet Vihar, Delhi-110092

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Student Handbook, Class XII

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भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक सम्पूर्ण [1]प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य बनाने के लिए, तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,
विचार, अभिव्यक्ति, विश्वास, धर्म
और उपासना की स्वतंत्रता,
प्रतिष्ठा और अवसर की समता
प्राप्त कराने के लिए
तथा उन सब में व्यक्ति की गरिमा
[2]और राष्ट्र की एकता और अखंडता
सुनिश्चित करने वाली बंधुता बढ़ाने के लिए

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई॰ को एतद्द्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

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1. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से "प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य" के स्थान पर प्रतिस्थापित।
2. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से "राष्ट्र की एकता" के स्थान पर प्रतिस्थापित।

भाग 4 क

मूल कर्त्तव्य

51 क. मूल कर्त्तव्य – भारत के प्रत्येक नागरिक का यह कर्त्तव्य होगा कि वह –

(क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज और राष्ट्रगान का आदर करे;

(ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;

(ग) भारत की प्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण रखे;

(घ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;

(ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओं का त्याग करे जो स्त्रियों के सम्मान के विरुद्ध हैं;

(च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्त्व समझे और उसका परिरक्षण करे;

(छ) प्राकृतिक पर्यावरण की जिसके अंतर्गत वन, झील, नदी, और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणी मात्र के प्रति दयाभाव रखे;

(ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;

(झ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;

(ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करे जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई उंचाइयों को छू ले;

[1](ट) यदि माता-पिता या संरक्षक है, छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य के लिये शिक्षा के अवसर प्रदान करे।

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1. संविधान (छयासीवां संशोधन) अधिनियम, 2002 की धारा 4 द्वारा प्रतिस्थापित।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a [1]**SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the[2] unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

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1. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "unity of the Nation" (w.e.f. 3.1.1977)

THE CONSTITUTION OF INDIA

Chapter IV A

FUNDAMENTAL DUTIES

ARTICLE 51A

Fundamental Duties - It shall be the duty of every citizen of India-

(a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i) to safeguard public property and to abjure violence;

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;

[1](k) who is a parent or guardian to provide opportunities for education to his/her child or, as the case may be, ward between age of 6 and 14 years.

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1. Subs. by the Constitution (Eighty - Sixth Amendment) Act, 2002

Preface

Library is the heart of any academic institution. Library, Faculty and Students complete the trinity of learning process. It just not only performs the function of acquisition, preservation and dissemination of information/knowledge but also provide inputs to help overall personality development of a student. The modern day libraries require highly skilled manpower/ workforce to maximize the library services and to reach out to the users to fulfill their information needs. The aim of the library profession is to provide relevant information to the right user at the right time with the positive attitude.

The field of Library and Information Sciences is changing rapidly. Recent developments in the field of Information Technology, particularly internet have forced libraries to redesign the new ways of information collection, storage, analysis and dissemination. Libraries now repackage information contents from various sources available online as well as in print to serve the users. Libraries are no more just a storehouse of reading material. It is a lifelong learning system which in partnership with faculty enhances the knowledge and skills of a student.

In response to the demand for a large number of trained personnel in libraries and information centers, CBSE has undertaken the ambitious project of introducing competency based vocational education in its affiliated schools. Taking cue from this need, a new vocational course on Library and Information Sciences is being developed that will help students to join the industry after Class XII or to pursue higher education in this field. On the same pattern the course curriculum and student handbook on Information Storage and Retrieval (ISR) for Class XII is designed and developed by the CBSE Vocational Course Committee in Library and Information Sciences.

The Board is grateful to the members of the Committee of Course for their advice, guidance and total commitment towards development of this course. We are indeed indebted to these academic advisors who have lent us the benefit of their rich and insightful experience. I would like to appreciate Vocational Education Cell, CBSE, for coordinating and successfully completing the work.

Any further suggestion for improving the course content is always welcomed and will be incorporated in the future edition.

R. K. Chaturvedi, IAS
Chairman, CBSE

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Contents

UNIT-1

Library Automation: Planning and Implementing

Location	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
• Class room, library or computer laboratory.	• Understanding library automation.	• Meaning and definitions. • Need and purpose.	• Chart out library automation, need and purpose. • Explain importance of library automation.	• **Interactive lecture:** Library automation, need, purchase and importance. • **Activity:** Visit to a library and an automated library and ask students to compare the functioning of both the libraries.
	• Library automation planning.	• Identification of functions for automation. • Feasibility study. • System requirements. • Budget. • Training.	• Chart out functions of library. • Identify functions to be automated. • Discuss the feasibility. • Plan for automation including system requirements, budget and training.	• **Interactive lecture:** Functions of library to be automated, feasibility study & planning process. • **Activity:** Visit an automated library and make a case study on process of automation planning adopted by the library.
	• Implementing library automation.	• House-keeping operations. • Library services.	• Chart out house-keeping operations like cataloguing, circulation, periodical management, etc. • Chart out service as circulation, reference,OPAC, etc.	• **Interactive lecture:** Different functions under house-keeping operations and services. • Automating these functions. • **Activity:** Visit an automated library and make a report on functioning of automated system covering both housekeeping and services.

	• Practical.	• Identification of hardware. • Identification of software. • Identifications of infrastructure. • Case studies.	• Hardware, software and infrastructure required for automation, make their specifications. • Make a proposal for library automation.	• List of hardware, software and other infrastructure required for automation. • Hands on practice in computer laboratory on functioning of different equipments and software. • OPAC search on Internet, Library of Congress Catalogue or others.

1.1 Understanding Library Automation

The library automation means applications of computer and communication technology in library operations and activities to eliminate/reduce the manual work to serve the library needs of the users. It enhances the access to the library resources and also fosters the routine work. Automation of library operations avoids repetitive jobs, duplication of work; enhance the speed of library functions, and increase the optimal use of library resources. It may apply to all library functions such as acquisition, technical processing, serial control, circulation and reference service. Automation of the functions saves the precious time of both library staff as well as the users.

Figure 1.1: Automated Library
(Source : JNU, New Delhi)

The term automation has derived from the Greek word 'automose' which means, a system having potentiality of spontaneous motion or self-movement. The term 'automation' was first coined by D. S. Harder in 1936, who was then associated with the General Motor Company in the USA. He used the term for handling parts between progressive production processes. Since its inception, the concept has been defined by different sources or scholars differently depending upon the field of application. The definition of the term automation as defined in different reference sources are as given below.

The **Webster's Third New International Dictionary of English Language** defines 'automation' as "the technique of making an apparatus, a process, or a system operate automatically; the state of being operated automatically; automatically controlled operation of an apparatus, processor system by mechanical or electronic devices that takes the place of human labor".

The **Kent's Encyclopedia of Library and Information Science** defines the term as "automation is the technology concerned with the design and development of process and system that minimize the necessity of human intervention in operation".

Likewise, you can find several other definitions of the term in different sources. On the basis of above definitions, we can say that "the automation is a process of making a system based on mechanism and machinery to reduce human intervention in getting the work done".

Now let's understand concept of library automation. The phrase library automation defined in the **Kent's Encyclopedia of Library and Information Science as** "the library automation is the use of automatic and semiautomatic data processing machines to perform acquisition, cataloguing, circulation and other library operations.

Hence, the library automation is a process of developing a library system with the help of a mechanism and machines to get its work done automatically or with less human efforts. The place of mechanism and machines has been taken by information and communication technology.

Need and Purpose

The information is playing a vital role in all walks of human life today. All of us need faster and accurate information to achieve academic, professional or recreational goals. The automated library systems satisfy the expectations of the society better than the manual system hence, automation of the library is the need of the hour. Some of the basic needs of library automation are:

- **Accuracy and Reliability:** It is evident that during the manual processing human can do any sort of error, while the computer performs all set of data processing in error free and reliable manner? Library automation removes the possibility of data error and yields the user a reliable service. Hence improve the efficiency of library staff.
- **Time Saving:** It saves the staff time in doing the manual work and speed up the process of all in-house activities and saves the times of user in finding needed materials within as well as outside the library.

- **Statistics Generation:** Automated in-house activities generate numerous data, which assist to generate multiple statistics. Statistics help us to formulate policies to manage the library and information services.
- **Library Service:** It helps to give better access to resources within library and elsewhere and improve the quality of library services. The automated library can provide bibliographic search facility through OPAC to its users. If the catalogues are made accessible through internet then, the user can search the resources anytime irrespective of location.
- **Resource Sharing:** It makes resource sharing possible as data of the library becomes sharable among libraries.
- **Dissemination of Information:** The wider dissemination of library information with the help of communication technology like internet, telecommunication, etc., becomes possible. The automation provides capability to disseminate information about the resources and services of the library through web. Such dissemination mode saves the time and efforts of the users as they are able to accesses required information remotely with the help of computer, laptop, smart phone, etc.
- **OPAC:** The Online Public Access Catalogue provides the facility to search bibliographic information of the Library resources which helps in locating her/his desired publication/ material.
- **Enhancement of Library Management:** It enhances the library management as reports and statistics become available with the click of mouse. The automated system gives the management input and feedback on various services and also monitors the human resources of the library effectively and efficiently.

Review Questions

A. Fill in the blanks

1. The phrase library automation represents the concept of applications of computer and _____ technology in library operations.
2. Library automation assists in accessing the library _____ available in the library and fosters the _____ works.
3. The term automation has derived from the Greek word _____ which means, a system having potentiality of spontaneous motion or self movement.

B. Multiple Choice Questions

Tick the correct answer

1. Why do we need faster and accurate information?
   (a) For academic purpose
   (b) For professional purpose

(c) For recreational purpose

(d) All of the above

2. How does an automated library disseminate library information?

(a) By Communication technology

(b) By postal service

(c) By courier service

C. Short Answer Questions

1. What is a library automation?
2. What is the need of library automation?
3. Why do we need integrated library management system?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for Assessment Activities.

Part-A

1. Differentiated manual and automated library.
2. Explained the need and purpose of library automation.
3. Identified the benefits of library automation.

Part-B

1. What is an automated library system?
2. Why library automation is needed?
3. How an automated library perform better than manual library system?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain library automation.		
Able to identify need and purpose of library automation.		
Able to explain benefits of library automation.		

1.2 Library Automation Planning

Planning is an important function of management for successfully achieving the goal with optimum utilization of resources. The Business Dictionary defines the planning as "the planning is a basic management function involving formulation of one or more detailed plans to achieve optimum balance of needs or demands with the available resources. The planning process (1) identifies the goals or objectives to be achieved, (2) formulates strategies to achieve them, (3) arranges or creates the means required, and (4) implements, directs, and monitors all steps in their proper sequence".

Hence, a team of professionals having expertise in the field of library management and knowledge of available technology should be given the responsibility of planning. The team may include the librarian, experts of information and communication technology and the members of library authority or committee for effective planning and further implementation.

Before initiating the project of library automation, the planning team identifies the needs and the area of the automation. While planning, the planner undertakes a survey of the technology available in the market, needs of the library, special skills required for handling the technology and the initial as well as the running cost of the system. The planner should have awareness of the general advantages and disadvantages of the technology and related machines and equipment available in the market.

In the process of selecting hardware and software, the libraries should first select the software and then procure the hardware accordingly. It helps in identifying the requisite machine and equipments to run the automated system. The criteria to evaluate the advantage and disadvantages, described by Reynods (1985) in his book on library automation are: (i) Initial cost (ii) Continuous cost (iii) Degree to which software can initially be customized to meet library needs (iv) Level of computer expertise required on the part of the library (v) Control over system performance (vi) Control over hardware upgrade (vii) Control of software enhancement.

While planning the library automation, the planning process should cover following aspects:

(i) Identification of the library functions to be automated

(ii) Feasibility study

(iii) System requirements

(iv) Budget

(v) Training

(i) Identification of Functions for Automated: The identification of the library functions to be automated provides the base to whole process of the automation. All the activities under each functional area should be documented and possible adjudged whether needed to be automated or not. This provides base to select the technology and mechanism for the automation process. For example, to automate the circulation of a library barcode or RFID technology may also be adopted depending upon the need, fund and other factors of the library.

(ii) **Feasibility Study:** It is a process of determining the proposed library automation, achievable on the parameters of i.e needs of the library, functions to be automated, and technology to be used, infrastructure required, and whether the library is capable of investing in the process. Once, such study is done it is easier for a library to adopt automation process.

(iii) **System Requirements:** System requirements depend upon the technology adopted for the library automation. It covers software, hardware, supporting machines and equipments, and infrastructure required for running the automated system. The Library Automation Software has been discussed in the Chapter-2 of this book. Depending upon the software and the technology adopted for automation hardware are finalized. Minimum hardware required may be listed as (a) Web Server, (b) Desktop Computers, (c) Printer, (d) Scanner, (e) Barcode Printer and Scanner, and Data Collection Unit (incase adopting barcode technology) (f) RFID Tags, RFID Activator and deactivator, RFID Sensor and Gate Reader, etc. (in case of adopting RFID technology) (g) Networking equipments and High Speed Internet Connection to server, etc. It may vary.

(iv) **Budget:** It is the most important aspect of Planning As mentioned above, the investment in purchasing hardware, software and other equipments may be high. Creation of bibliographic database of the books and other information resources and database of members also needs finance. Apart from these initial investments, the provision for running cost of the automated system should be made. Otherwise the library may become useless if the running cost is not be provided.

(v) **Training:** The functioning of automated library system is different from the manual library system. For running the automated system the staff and members of the library both should be provided training for getting maximum benefits out of this new system.

The training programme for the staff should be based on the operations of software, hardware, machines and equipments for in house functions as well as providing the services to the members.

The members should be provided training on availing the services through the automated library system. Such training to the members would make them self-dependent in getting maximum benefits out of the system.

Review Questions

A. Fill in the blanks

1. Planning is an important function of management for successfully achieving the _____ goal with optimum _____ of resources.

2. Team of professionals having expertise in the field of library management and knowledge of available _____ should be given the responsibility of library automation planning.

3. The identification of the _____ to be automated provides the basis to whole process of the automation.

B. Multiple Choice Questions

Tick the correct answer

1. The system requirements of library automation covers:
   - (a) Software
   - (b) Hardware
   - (c) Supporting machines and equipments
   - (d) All of the above
2. RFID stands for:
   - (a) Radio Frequently Identification
   - (b) Radio Fault Identifier
   - (c) Radio Frequency Identification
   - (d) Radio Fast Immobilizer

C. Short Answer Questions

1. What is library automation planning?
2. Who should plan library automation?
3. What are components of the library automation planning?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood the concept of library automation.
2. Explained steps of library automation planning.
3. Explained aspects to be covered in library automation planning.

Part-B

1. What is library automation planning?
2. What are different aspects which should be covered in library automation?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain planning process of library automation.		
Able to explain aspects to be covered in library automation planning.		
Able to plan library automation.		

1.3 Implementing Library Automation

The implementation of library automation process is converting planning into action. As per planning, the required software, hardware and equipment should be acquired by the library as well as necessary infrastructure for the automated system should also be created. Once the machines and equipments are in place and the required staff is ready the creation of different database may be started. The operations of the library should be automated step by step.

There two different groups of operations in the library may be automated. These are:

A. House-Keeping operations

B. Library services

A. House-Keeping Operations

The library staff performs many tasks for running a library and providing services to its users. Those tasks include (a) Acquisitions (b) Cataloguing (c) Serials Control (d) Circulation and so on. The scope and the meaning of the term housekeeping and the application of computers have also been discussed in Chapter-2 of this book.

(a) Acquisitions

Automation of acquisition systems are developed to facilitate ordering, receiving library materials, and monitoring expenditures. Acquisition is a labour intensive and time consuming process as well as repetitive in nature. Automated acquisition system empowers library staff to reduce the paper work and help to generate various reports to ease their daily acquisition work. The acquisition work starts at a point where decision has been made to order items. For the purpose of acquiring material, an automated acquisition system should manage and distinguish different orders. It could be gifts, free publication, depository items etc., however status of order is also mandatory such as outstanding, shipped, returned, cancelled, claimed, hold on etc.(Reynolds, 1985).It involves selection of vendors, placement of orders, issuing of reminder notices to vendors, processing of documents.

Following works under the acquisition may be automated:

- **Selection, Approval and Ordering:** This process starts with the selection of document by staff or recommended by the members of the library. The recommendations are collected, verified and approval is sought from concerned authority. However, approval authority may be the librarian or subject specialist or book selection committee. After approval, the order for the book or any other library materials is placed to the concerned vendor to supply.
- **Cancellation, Receiving and Payment:** Sometimes the orders of the library materials are needed to be cancelled as per the cancellation clause in the order. After receiving the order, acquisition staff starts the matching with the order and enter in the acquisition system which proceed to the payment to the suppliers but must maintain its ledger and account balance. All this process is automated using the ILMS acquisition module.
- **Budget:** One file must contain the budget detail of all the departments, subjects and expenditure heads. The input to this master file includes the amount allocated to budget heads for each financial year. In the automated budget system, library staff can define the year, department, budget head, allocation etc. to ease the process of budgeting.

- **Currency:** It also needs to define the currency used in price field at the time of indent and invoice receipt. This is needed to mention in case money is other than the national currency. In automated system, acquisition staff has to define the conversion rate and then the automated system automatically converts the money.
- **Subject:** This option is to prepare a list of subjects used in subject field at the time of indent. The subjects are also assigned with equaling class number from the classification scheme used by the library. Controlled vocabulary such as Sears List of Subject Heading, or Library of Congress List of subject heading, etc., may be used for this purpose.
- **Letters:** Various letters are prepared to communicate with users and vendors etc. Staff can field names within the letter content, which will be replaced with relevant values during the time of generation of letter. Various letter may be prepared in acquisition system : (i) supply order, (ii) intimation of approved & unapproved indents, (iii) intimation of document receipts, (iv) sanction letter, (v) contingent bill, (vi) receipt / issue letter, (vii) intimation to vendor, (viii) supply order, (ix) gratis acknowledgement, (x) cancel supply order etc.

(b) Cataloguing

Cataloguing is the process of creating bibliographic database of the library resources. Cataloguer adds the bibliographic information of the library holding to the catalogue record. Mainly in this module, creation, storage, retrieval and management of bibliographic record are done. Authority control of author, subject heading etc. is also performed in this module. For this purpose standard bibliographic format is adopted. The standard formats provide facility of sharing the bibliographies with other libraries as well as importing bibliographies from other library's bibliographic database. The MARC and CCF are two popular bibliographic formats.

MARC (Machine Readable Catalogue) standard bibliographic format is used to describe the library materials. It was developed by Library of Congress in 1960s and became an international standard in the year 1973. Each field in the MARC describes the information about the material record such as the author, title, publisher, date, language, media type, etc.

Figure 1.2: Web OPAC

(Source: http://125.19.35.233:8080/jopacv11/html/SearchForm, accessed on March 1, 2014)

Common Communication Format (CCF) is the format for exchange of bibliographic records. It was developed and promoted by UNESCO for promoting standardized bibliographic formats among the libraries worldwide. It helps to achieve consistency, uniformity and compatibility to transfer record between computer systems. Basically, it is a tag code to facilitate data exchange between two or more systems. The major drawback in CCF is the different codes used for data elements. However, CCF is widely used format in developing countries.

(c) Serials Control

The automation of serial control includes the process of acquiring periodicals involving selection, order, procurement and other functions. It further, has the provision of selection policy, evaluation, preparation of binding and weeding etc. The serial control system includes following functions:

- **Selection:** It involves the selection of periodicals, magazines, newspapers etc. by periodical section staff with request for purchase for designated selector. The selector may be a collection development team, faculty members, etc.
- **Approval:** Once the request is received regarding periodicals, the concerned staff seeks the approval from authority. Authority could be head of the institution or head of department or a librarian, etc. Most of the libraries order their periodical through single agency but subscription agency often imposes service charges.
- **Ordering:** Many libraries place their periodical orders once in year and often start with the year so that libraries issue start from 1st issue. Each supply order is assigned a unique supply order number during a financial year.
- **Receiving:** A serial issue, the title matches to the correct order and must verify the title. In case of multiple subscriptions for the same title which copy has been received and where it is to be sent for shelving.
- **Claiming:** Claiming is an activity to put off due to pressure of other work, however the activity is becoming increasingly important but we must know when to claim and check on title at fixed intervals.
- **Payment:** Once the invoice is verified it normally sent accompanying voucher to pay to the concerned vendor.
- **Binding:** This utility offer the binding of periodicals, binding pattern and instructions to the binder.

(d) Circulation

Circulation is one of the most important functions of a library. For the circulation purpose, the database of the member is being created and maintained. Automating the circulation system of a library includes following tasks:

(i) **Check-out and Check-in:** The check-out and check-in is also known as issue and return of library materials to the members. For this purpose, either barcode or RFID technology is being used. In any circulation control system it should ensure that

items are securely checked out to library users. The check in function enables the library to accurately record the return of items loaned to library users. Following are the steps to perform this operation:

Figure 1.3: Circulation Counter
(Source: JNU, New Delhi)

- Member's identity card is first scanned to read the barcode which encrypted the detail of user. Thereafter, the users photograph will be pop-up in case it is stored.
- Read the barcode placed on the item such as books, CD-ROMs etc. Once the item code is identified from the data base then staff can issue the item to the library user. If the library adopts RFID (Radio Frequency Identification) technology then the items and the member's identity card are being put on RFID sensing machine for recording the check-out of the library resources.
- Check-in function allows the library to enable the return of the document to the library loaned to library members. In the process of check-in function borrower need not be present in the library premises. However, items need to be verified before check-in and slip of check-in may be printed to empower users.

(ii) Reservation of Documents: The library materials can be reserved for a member if the documents are required by him has already been issued to some other member. However, documents can be reserved on first come first serve basis. Reservation of documents can be cancelled of by the same member or the staff of the library if needed.

(iii) Circulation Reports: Following reports can be generated through the circulation module for a period of time:

- Issue list
- Return list
- Over-due list

- Books received on ILL
- Reserved documents
- Documents with binders
- Written off documents
- Lost ticket charges
- Cost realized documents
- Fine summary

B. Library Services

The implementing automation in library services depends mostly on the automation of housekeeping operations of the library. There are a few services which need special provisions of automations but, most of the services are the product of house-keeping operations. For example (a) OPAC or WEB OPAC (b) Current Awareness Services (c) Selective Dissemination of Information (b) Interlibrary Loan and many more. These services have been discussed in Chapter-2 also.

Review Questions

A. Fill in the blanks

1. The implementation of library automation process is _____ planning into action.
2. Acquisition is labour intensive and time consuming process as well as _____ _____ in nature.
3. Cataloguing is the process of creating _____ database of the library resources.

B. Multiple Choice Questions

Tick the correct answer

1. MARC stands for:
   - (a) Machine Random Catalogue
   - (b) Marks and Result Check
   - (c) Machine Readable Catalogue
2. In which section of library the functions check-in and check-out are performed?
   - (a) Circulation
   - (b) Entry and exit of users
   - (c) Reference
   - (d) Ordering

C. Short Answer Questions

1. What do you mean by implementation of library automation?
2. What are two different groups of library operations?
3. What is MARC?
4. What do you mean by CCF?
5. What do you mean by check-in and check out?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood the process of implementation of library automation plan.
2. Explained the implementation of library automation plan in housekeeping operations.
3. Explained implementation of library automation plan in library service operations.

Part-B

1. What do you mean by implementation of library automation?
2. How are different housekeeping operations automated?
3. How are library service operations are automated?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain implementation process of library automation.		
Able to explain implementation of library automation plan in housekeeping operations.		
Able to explain implementation of library automation plan in library service operations.		

1.4 Summary

The library automation is a process of using technology to reduce manual work to get the work done of a library in less time more effectively and efficiently. The library automation is dominated by the applications of computer, hence sometime it is also termed as computerization instead of automation.

All manual functions can be automated with the help of information and communication technology. There is an established process of automating a library but, depending upon need and available resources, it may vary from library to library. Whatever would be the level of automation, if a library is going to adopt the automated system then it should follow proper planning and implementation process. The proper planning and implementation will create a sustainable automated library system and hence provide effective and efficient services to the users and society.

1.5 Exercise

1. What is the need of library automation?
2. Write a brief note on library automation planning.
3. Write a brief note on system requirement for library automation.
4. How the circulation process gets executed in automated environment?
5. Why the staff and members of the library both should be given training in automation?

1.6 Practical

1. Identify different machines and equipments required for library automation.
2. Identify the steps involved in library automation.
3. Make a case study of the automation process of a school library.

1.7 Glossary

- CCF (Common Communication Format): A common format for exchange of records between libraries/information centers.
- ILL (Inter Library Loan): A service to borrow documents from other libraries on loan.
- ILMS (Integrated Library Management System) : Library management software for automation of libraries.
- JANET (Joint Academic Network): An organization which provides computer network and allied services to academic and research organizations in United Kingdom.
- MARC (Machine Readable Catalogue): A standard format for description of library catalogued items.
- OPAC: Online Public Access Catalogue.

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UNIT-2

Library Automation Software

Location	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
• Class room, library or computer laboratory.	• Understanding concept of software.	• Meaning and definition.	• Explain software.	• **Interactive lecture:** software and their functions. • **Activity:** Show different types of software in computer laboratory.
	• Library automation software.	• Need and purpose.	• Explain need and purpose of automation software.	• **Interactive lecture:** Explaining the need and purpose of specialized library automation software. • **Activity:** Show the functions of library automation Software in automated library.
	• Functions of library automation software.	• Acquisition. • Serial control. • Technical section. • Circulation section. • Inter library loan. • Library catalogue. • OPAC. • Reference section. • Maintenance section.	• Explain different functions of library automation software.	• **Interactive lecture:** Explain the functions of a library performed by software. • **Activity:** Visit automated library and show how library executes different functions using software.
	• Type/Kinds of library automation software packages.	• Proprietary software. • Open source software.	• Explain different types of library automation software, their benefits and limitations.	• **Interactive lecture:** Explain proprietary and open source software, their benefits and limitations. • **Activity:** Visit computer laboratory & show some literature available on internet regarding both categories of software.

	• KOHA.	• Features of KOHA. • System and skills requirement. • Installation.	• Explain features of KOHA. • Identify system and skills requirements. • Skills of installing KOHA.	• **Interactive lecture:** Explain features of KOHA, system and skills required and process of installing KOHA. • **Activity:** Visit computer laboratory & show downloading and installation process of KOHA.
	• Practical.	• Installation of KOHA. • Working with KOHA.	• Skills of down-loading and installing KOHA. • Working with KOHA.	• **Activity:** Visit computer laboratory, download and install KOHA and hands on practice on different modules of KOHA.

2.1 Understanding Concepts of Software

Software is a set of programmes, meant to perform a well defined function. The software is created by grouping various related programmes. These programmes are written in computer programming languages. A programme is a sequence / set of instructions which are made to perform a well defined task. On the basis of functions, the software can be grouped in following categories:

(i) Operating System

(ii) Utility Software

(iii) Application Software

(i) Operating System: The Operating System is a programme which controls the overall internal operations of a computer system. It performs the booting and rebooting functions, schedule the tasks, control the peripherals and manages the files. Windows, Linux, etc., are some of the examples of an operating system.

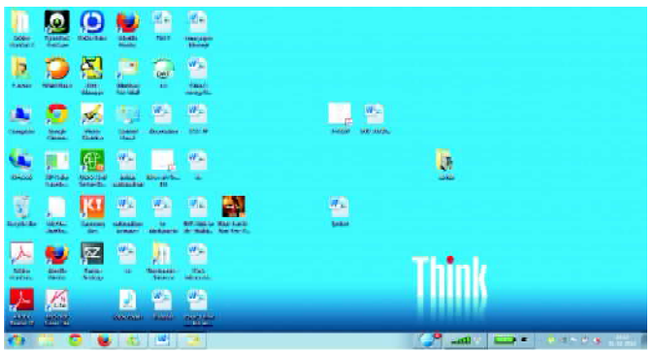

Figure 2.1: Windows Operating System

(ii) **Utility Software:** The utility software is a programme which analyzes, configure, optimize or maintain a computer system without any input. All the antivirus and system software fall under this category. For example: Microsoft Security Essential, etc.

(iii) **Application Software:** Application software is designed to perform a particular task or a group of tasks to satisfy the needs of a particular environment. They are created by analyzing the environment and the need of a particular system. For example, a Library Automation Software (LAS) is a customized application software for managing day to day functions of a library and its management. The Library Automation software is developed to perform the housekeeping as well as storage and retrieval tasks. The work in library can be categorized into two categories:

a) Routine Work

b) Information Service Work

Both the above tasks in a library can be performed easily in less time through the LAS. It helps the library staff performing routine, administrative or clerical works efficiently, accurately and reduces the duplication of work.

The LAS has the provisions of controlling and performing the routine works in acquisition, circulation, accounting, records maintenance, library catalogue, information storage and retrieval, etc. The library automation software, automates the library functions with the help and assistance of computers and other equipments such as radio frequency identification (RFID), barcode, and so on.

Review Questions

A. Fill in the blanks

1. Software is a set of _____, meant to perform well-defined functions.
2. Library automation software is an _____ programme.

B. Multiple Choice Questions

Tick the correct answer

1. Which kinds of operations can be performed through library automation software?
   (a) Shelving
   (b) Classification
   (c) Routine and information service operations
   (d) Book preparation
2. Library automation software automates the library operations with the help of:
   (a) Computer
   (b) Typewriter
   (c) Mobile phone
   (d) Photocopying machine

C. Short Answer Questions

1. What do you mean by software?
2. What is application software?
3. Have you ever seen the use of barcode while shopping?
4. What does RFID stands for?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood software and its categories.
2. Explained equipments required for automating library.

Part-B

1. What is a software?
2. What are different categories of software?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain software.		
Able to explain categories of software.		

2.2 Library Automation Software

Recent advancement in the field of information technology has compelled libraries to automate their functions to provide better services to their members. Suitable library automation software coupled with computers and other equipments can enhance the effectiveness of library services.

The LAS is needed for managing library in computerized environment. The maintenance of library records and provision of lists (catalogues) and notices involve considerable manual efforts and time. There are a number of routine works which are repetitive in nature. With the help of LAS, these functions can be performed easily, efficiently and effectively with less time consumption.

The need of library automation software can realize as follows:

(i) To provide efficient and accurate services.

(ii) To reduce duplication of work, save the time of library staff and increase their productivity.

(iii) To quick and easy update, edit and information retrieval.

(iv) To control the rapid growth of information.

(v) To save the time of the reader/user.

(vi) To utilize the library resources efficiently and effectively.

(vii) To prepare library catalogues.

(viii) To provide OPAC.

(ix) To prepare various records of library such as circulation records, accession register, etc.

(x) To create different statistical reports.

(xi) To make statistical analyses,

(xii) To compare with records of previous year to enhance efficiency of the library.

(xiii) To provide current awareness services and selected dissemination of information.

(xiv) Stock verifications, etc.

The purpose of LAS can be understood as:

(i) The LAS introduces in library to keep pace in the era of information explosion and the need of the users. Once information is store in the computer and verified, it becomes an asset for the library. After that it provides accurate information to the users and the library staff, easily and quickly.

(ii) There are a numbers of repetitive works performed by the library staff which consumes time and prone to make mistake also. For example, sending reminders, different notices, circulars, ordering books and many others. with the help of LAS, the repetitive works may be done in very less time and with accuracy. It reduces the burden of library staff and save their time which would enhance their productivity.

(iii) The application of LAS saves the precious time of the library users/readers as it provides them quick and accurate information services.

(iv) The LAS facilities to update, edit and replace the existing data and different information which make day-to-day task easier and to complete them within the specific time.

(v) The LAS helps in locating the resources available in-house as well as in other libraries which makes staff and users both controlling over the rapid growth of information and finding the relevant information resources with less effort and time.

(vi) The LAS provides tool to create centralized library catalogue and make it searchable over Internet or Intranet. This provision of the software maximizes the utilization of the library resources and makes the users self-dependent in using the library services.

(vii) The LAS has the provisions of creating different reports which helps in managing the library functions and further planning and designing better services to the users.

(viii) The LAS provides tools for reference services, as new addition list, selective dissemination of information, arrival of new issues of journals, compilation of study list or bibliography on the topic of interest, etc.

(ix) The LAS provide different administrative tools for the authority of the library to monitor the library functions, keep eyes on activities of the libraries, consumption of budget, stock verification, etc. There are such provisions through which a library can be monitored remotely in real time environment.

(x) The LAS gives time and tools for research and development in the field of library and information science.

Review Questions

A. Fill in the blanks

1. Library automation software is needed for managing library in _____ environment.
2. Library automation software is needed to provide efficient and _____ services.
3. Application of library automation software save the time of staff and _____ _____.

B. Multiple Choice Questions

Tick the correct answer

1. Library automation software is needed for maximum utilization of:
   - (a) Library space
   - (b) Library furniture
   - (c) Library users
   - (d) Library resources
2. Once information is stored in computer and verified, it provides accurate information to both:
   - (a) Users and staff
   - (b) Members and community
   - (c) Staff and librarian
   - (d) None of the above

C. Short Answer Questions

1. Define library automation software.
2. How does an LAS save the time of the users?
3. How does an LAS saves the time of the Library staff?
4. How does an LAS helps in better planning and designing library services?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood the needs of library automation software.
2. Explained the purposes of library automation software.
3. Explained the benefits of using library automation software.

Part-B

1. What are the needs of library automation software?
2. What are the purposes of library automation software?
3. Explain the benefits of using library automation software?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain needs of library automation software.		
Able to explain purposes of library automation software.		
Able to identify benefits of using library automation software.		

2.3 Function of LAS

In an automated library system, all kind of the tasks are performed through the LAS. It can perform housekeeping operations as well as information retrieval and dissemination. It can be applied in all sections of a library such as acquisition, cataloguing, OPAC, reference service, serial control and other services. It can also help library in its administration and management such as, planning, decision making, stock verification, statistical analyses, etc.

Use of LAS in Various Section of a Library

(a) Acquisition

The LAS has the provisions to undertake all the routine work under acquisition with the wide range of outputs, giving the librarian full control over acquisition process and budget. It supports in selection of library materials, ordering, receiving, accessioning, budgeting, fund management and other works of the section. The application of the LAS in acquisition section can be understood as follows:

(i) Collecting bibliographical information through various selection tools and managing the recommendations given by the members of the library.

(ii) Assuring the availability of proposed materials within the available or allotted budget.

(iii) Preparation of supply order to be sent to the vendors.

(iv) Maintaining online records of all materials, ordered, received, accessioned, pending, etc.

(v) Maintaining database of vendors.

(vi) Detection of delay in supply and sending reminders.

(vii) Checking in of item received, processing of invoice, accessioning of materials.

(viii) Accounting fund for payment of bills, and controlling the funds for books and other materials.

All the tasks of acquisition section can be done accurately and efficiently with less human resources and in less time compared to manual system.

(b) Serial Control

Serial acquisition is completely different from acquiring books. Serial subscription is being paid in advance and issues are received continuously within the period of subscription. Each periodical is being subscribed separately and because of different frequency, each issue is received and recorded separately. Payments details of each title is recorded and maintained separately. The records of the serial section are very important and necessary to keep up to date. Therefore, serial control in a library needs separate set of functions to manage the serial section.

The LAS can help in subscription, keeping payment records, receiving and maintaining issues, claiming missing issues and sending reminders, renewal of subscriptions, updating list of current holdings and managing bound volumes, as well as other functions of the section.

(c) Technical Section

The LAS can make possible the computerized classification and cataloguing of books, which reduces the manpower and save the time of the library staff. Computerized classification has been experimented by DRTC Bangalore, in India. Classification needs much human intelligence to decide a class number for a material therefore, difficult in implementing.

A library can create its own catalogue or can get help from other libraries, or cataloguing service providers. Library of Congress(USA) is one of the largest catalogue holders in MARC format from which a catalogue can be imported directly in to own library database. Today there is a number of software for example KOHA, in which data can be imported directly from the catalogue database of other libraries if they are Z39.50 standard compatible and online. The LAS provides tools to create, edit, delete catalogue and make them searchable.

(d) Circulation Section

The LAS makes the functions of circulation section easy and fast. It also helps library in saving time and space as there is no need to keep members borrowing cards and book cards at the circulation counter in different trays.

The software helps the library staff in issue, return and renewal of the library resources and also in maintaining the records. With the help of software the circulation work can be made automated to the extent that there would no need of staff for issue and return. This can be done with the help of RFID.

LAS give the facility of reservation of books and other materials. The members of the library can reserve the issued materials online which, leads to save the time of the users and staff both.

The software helps in preparing different reports and statistics of the circulation section like, issue-return, fine, membership granted and terminated number of users/readers, etc.

(e) Interlibrary Loan

The Interlibrary loan is one of the services provided by libraries in which required resources, (if not available in the library) can be traced and brought from other libraries into own library and issued to the needed member. Similarly, if needed, materials can be issued to other libraries too.

Locating resources and their availability is easy through online catalogue. For this purpose, generating request letter to holding library, issue-return process (with the member who has demanded), again returning the material to holding library and maintaining the records, all are done through the LAS.

(f) Library Catalogue

The library catalogue is being created through LAS. Once, the database of catalogue created and uploaded for online access, it becomes easy to search required materials and to know their availability status. It provides full bibliographic details of the materials and depending upon the library, image, content page, reviews, etc, of the materials may be provided also.

(g) OPAC/Web OPAC

The online access of a catalogue is known as OPAC (Open Public Access Catalogue). It provides the library collection on a computer system to its user in the form of searchable catalogues. It is a tool which makes user self-dependent in searching required materials. All the LAS have the provision to provide OPAC.

The OPAC accessible through Internet is being known as Web OPAC. The Web OPAC saves the time of the user and the staff of the library. It is a tool which makes the users self-dependent in exploring the resources of the library remotely.

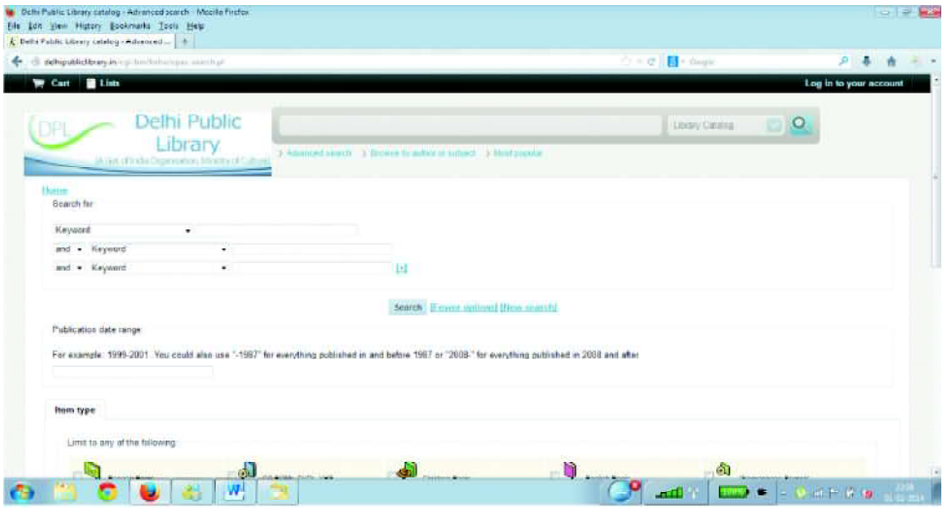

Figure 2.2: OPAC of Delhi Public Library

(h) Reference Section

The LAS provides tools for reference service to the users. It helps in locating required materials in own library and if needed it can search other library also.

Preparing study list and compiling bibliography on a given topic, bringing out new addition list, providing Current Awareness Service (CAS), Selective Dissemination of Information (SDI), or other activities of the section become easy through LAS.

(i) Maintenance Section

Maintenance of records, statistics, pre-defined and customized reports can be taken out with maximum accuracy through LAS. Planning for future, data analyses and decision making information is easy through proper utilization and timely updating different databases of the LAS.

Analysis of data and comparison with the data of previous years are easy and accurate through LAS which enhance the efficiency of a library.

Review Questions

A. Fill in the blanks

1. Library automation software can apply in all most all _____ of a library.
2. Library automation software can maintain the _____ of vendors.
3. The Library of Congress is the largest catalogue holders in _____ format.

B. Multiple Choice Questions

Tick the correct answer

1. Online access of catalogue of a library is known as:
   - (a) OPAC
   - (b) COPAC
   - (c) WEBPAC
   - (d) Internet
2. What are different categories of reports generated through library automation software?
   - (a) Defined and undefined
   - (b) Customized and creative
   - (c) Predefined and customized
   - (d) Manual and automated

C. Short Answer Questions

1. List the different sections of a library which can be automated through LAS.
2. How LAS provides searching facilities to the users?

3. What are the functions of acquisition which can be automated through LAS?
4. What are different tools provided by LAS for reference services?
5. How does the LAS saves time and space in circulation section?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for Assessment Activities.

Part-A

1. Explained functions of different sections of library.
2. Understood utility of library automation software in different sections of a library.

Part-B

1. What are different sections of a library?
2. Identify different functions of each section of a library where library automation software can be used.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to identify different sections of a library.		
Able to identify functions of each section of a library where library automation software can be used.		

2.4 Types / Kinds of Library Automation Software Packages

The LAS can be categorized on the basis of different characteristics of the software. Here, we are discussing the types of LAS on the basis of licensing. There are two types of Library automation software available in the market. Those are:

(i) Proprietary Software

(ii) Open Source Software

(i) Proprietary Software

The proprietary software is a kind of software for which ownership remains with the creator under the provisions of copyright. The owner or proprietor provides license to the user, for using its applications on certain terms and conditions. Users are not being given the right to open, modify or further distribute the source code of such software. Because of this, the software of this category is being called closed source software also. The owner of the software takes fees for granting the license for using its applications, sometimes, some of the software may be free from charges for using its applications but the source code of the software remains closed.

The proprietary software is most of the times a paid software but sometimes it can be made available free of cost, on the basis of some terms and conditions decided by the owner whereas. Whether such software are being purchased or made available free of cost, but the source code of such software remains closed. We have a number of Library automation software in this category. For example : LIBSYS, VIRTUA, TRUDAN, etc.

(ii) Open Source Software

The Open Source Software (OSS) is a software for which source code is open. The users are granted license to use, study, modify and further redistribute it. Such software is usually the product of collective efforts of the professionals to provide free and also the right of customization as per need of the user.

There are a number of open source Library automation software available and being used worldwide. For example, KOHA, New Gen Lib, ABCD, etc, are a few open source LAS available worldwide.

Here, we are going to discuss KOHA, which is one of the popular and worldwide used open source LAS.

2.5 KOHA: A Library Automation Software

KOHA is one of the most popular, free and open source Integrated LAS in the world. The package was developed by Katipo Communication Limited , wellington, New Zealand for the Horowwhenua Library Trust(HLT). The HLT is a regional library system located in Levin, near Wellington. The developer of KOHA proposed to develop a new system for HLT using open source tools as, Perl, My SQL and Apache which run on LINUX platform and use telnet to communicate with the branches.

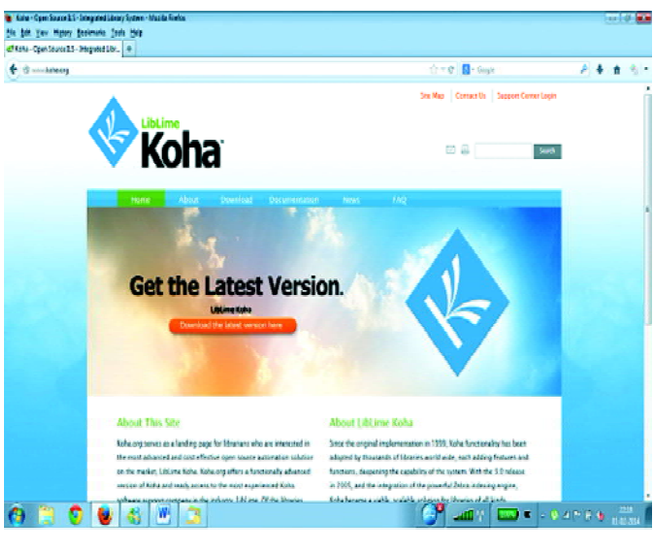

Figure 2.3: http://koha-community.org

The KOHA software was first released in July 2000 under the general public licensing for public. The whole world took interest in this software and a global community of users and developers of KOHA got created. From its first Version to Version 2.9, the package was available for both Linux and Windows operating systems. Since the KOHA community is promoting the concept of open source software therefore, only Linux version was being developed and distributed, from version 3 onwards. Hence, KOHA version 3 onwards is available for LINUX environment only.

(a) Features of KOHA

KOHA is an open source, web centric Integrated Library automation software, free to

download from its official website: **http://koha-community.org/**, without any fees for licensing, customizing, using and further distributing. It has a strong user community worldwide to provide documentation and technical support. Technical details and operating guidelines have been given in the manual of the software. The manual is available online as well as in PDF form. It is suggested that download a PDF version of the manual of a particular version of KOHA you are going to work with. It has been observed that the website of the KOHA Community maintains the manual of latest and few previous versions of the software.

The Salient Features of KOHA can be Listed as Follows:

(i) **Centralized Vs Decentralized Library:** The software provides facility to create different branches of a library and share their resources and members. It has provisions to restrict interoperability among branch libraries. This feature is very much useful for universities or public library system which has branches to control. With the help of the software, control can be centralized and real time monitoring system of the library operations can be developed.

(ii) **Administration:** The software has very strong administration tools. It can restrict its users or staff from accessing its certain areas of activities. The access can be linked with IP address. It gives control over each and every operation within the software. All the parameters which are needed to operate the software and keep the possible security measures under control are given in administration module.

(iii) **Tools:** The software provides tools to create different reports, notice, circular, members comments, imports patron profile in bulk, and a number of templates to be used.

(iv) **Patrons:** The software provides separate module for managing information of members, its addition, editing, import in bulk, etc.

(v) **Circulation:** The software provides facilities for issue-return, renewal, and reservation of the library resources, fine collection, using barcode, and generating overdue list for reminder.

(vi) **Cataloguing:** The software provides facility to create bibliographic database in popular fields like author, title, ISBN, and other attributes. KOHA supports MARC and its different forms. One of the best features of the KOHA is Z39.50 compatibility. With the help of Z39.50 feature one can easily import MARC records in own database from the databases of other libraries like the Library of Congress, RMIT Library, etc, modify them as per needs and make its own record. It is also a Unicode compatible LAS hence, multilingual catalogue can be created in it.

(vii) **Serials:** The software provides separate module for serials management. Under this module, serial subscription process, renewals of old subscriptions, receiving of issues, reminders of non-receipt of issues, are the key features.

(viii) **Acquisitions:** The software provides facility to manage real time budget, vendor profile, ordering, receiving, suggestions to purchase, and other routine works of the acquisition.

(ix) **Lists and Cart:** The software provides facility to save a collection of content on a

specific topic or for a specific purpose under list and session specific storage space under cart.

(x) **Reports:** The software provides facility to create customized reports and standard statistical reports needed for decision making and records.

(xi) **Searching:** KOHA software provides searching of the library resources of own library as well as the associated libraries. It has options of basic and advance searches.

(xii) **OPAC:** The software provides facility to search library catalogue online and to reserve or put comment against a record under its OPAC module. The OPAC created with the KOHA can be made accessible globally through internet.

(xiii) **Customization:** KOHA provides facility to customize it as per the need of the library. The library staff, with the knowledge of HTML or XML can make changes easily. As the source code of the software is open and the schema of database and coding instructions are given on the community website, with the help of those person having knowledge of coding can change in programme of the software as per need and vision to create a better version.

Apart from above mentioned features, there are a number of other features of the software which can be learnt from the documentation section of the KOHA Community website.

(b) System Requirements

The KOHA can run on any personal computer (under LINUX operating system) but it is recommended to install it on web server to get better result. It is to be remembered that the LINUX is having different versions. Two versions of LINUX namely Ubuntu and Dabian are popular. Hence, KOHA is available for these versions of LINUX.

In addition to the server, barcode printer and barcode reader as well as normal printer to print different labels and reports, should be connected to the system. With these machines and equipments a library can operate its automated systems with KOHA.

(c) Software Requirements for Installing and Running KOHA are as Follows:

(i) **Operating System:** A Linux server – The software can run on any version of Linux, Debian or Ubuntu.

(ii) **Apache:** This is a web server software on which Koha runs.

(iii) **MySQL:** This is an RDBMS software which provides back end support to KOHA.

(iv) **Perl:** This software provides web interface.

(v) Root access to the server.

(d) Other Skills

(i) A reasonable level of comfort with the command line.

(ii) Database administration skills.

The KOHA and other required software to run KOHA are listed above. They can be downloaded from the KOHA community website where links of the download page of different software have been provided. All this software is licensed under the GNU General Public License, either version 2 of the License, or (at your option) any later version. Instead

of downloading different software separately, complete bundle of KOHA with related software can be downloaded from the CD or DVD version which is known as CD or DVD image or KOHA Live CD/DVD. After downloading CD or DVD image or can say ISO file, burn it on CD or DVD and boot your system with this CD or DVD and follow the instructions. All the software gets installed and after setting the parameters, KOHA runs.

As we know that the KOHA runs on Linux operating system, therefore, if you are running any other operating system and rebooting the system with the KOHA, CD or DVD then you may lose your previous operating system and data as it may format the hard disc and then install the software. Hence, it is recommended that, before installing KOHA especially from CD or DVD, save your important data and then install it. If you wish to run KOHA on your personal computer or laptop for practice purposes then, install KOHA in another partition of the Hard Disk of your Computer system. This will facilitate you to boot your computer system with the operating system you wish to work.

It is recommended that you download the KOHA Manual of that particular version of KOHA you have installed in your computer system and follow the instructions. For example, if you have installed KOHA 3.10 then download the Manual for KOHA 3.10. With the help of the manual and documentations available at the KOHA community web site (http://koha-community.org/), you would be able to operate the software and execute the functions of your library smoothly.

Review Questions

A. Fill in the blanks

1. The owner of proprietary software provides _____ to the user for using software on certain terms and conditions.
2. Open sources software is such a software which _____ is open.
3. KOHA runs on _____ operating system.

B. Multiple Choice Questions

Tick the correct answer

1. Which kinds of library automation software KOHA is?
   - (a) Proprietary software
   - (b) Open sources software
   - (c) Anti-virus software
   - (d) Non of the above
2. Which version of KOHA runs on LINUX?
   - (a) Up to 2.9 version
   - (b) Version 3.0 onwards
   - (c) Version 4.0 onwards
   - (d) From version 1.0 to 2.9

C. Short Answer Questions

1. Define proprietary software.
2. Define open source software.
3. What are the different software required to run KOHA?
4. Name a few proprietary LAS available in India.
5. Name different versions of LINUX.

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Explained open source and proprietary software.
2. Explained features of KOHA.
3. Explained system requirements of KOHA.
4. Install and work with KOHA.

Part-B

1. Differentiate open source and proprietary software.
2. What are different features of KOHA?
3. What are system requirements of KOHA?
4. How can KOHA be installed?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to differentiate open source and proprietary software.		
Able to identify features of KOHA.		
Able to identify system requirements of KOHA.		
Able to install and work with KOHA.		

2.6 Summary

The library automation has become necessary to provide fast and accurate services to the library uses. Computers and some other equipment along with automation software are needed to automate a library. With the help of LAS almost all the functions of a library can be automated.

Library automation software is an important tool for creating an automated library system. There are two types of LAS available in the public domain namely proprietary and open source software. Most of the time, the proprietary software is paid and sometime it may be free too but, whether

paid or free, the owner of such software only provides the license to use its applications only. The users of the proprietary software cannot get access of its source code hence, cannot customize it as per their needs. The open source software is licensed to use its applications and make changes in programme as the source code of such software is open. It also provides licence to bring different version after changing in the programme and further distribute it to others.

The KOHA is one of the popular open source LAS worldwide. It runs in the LINUX environment and is completely web compatible. Allmost all the functions of a library can be automated through KOHA. A number of features of KOHA have been discussed in this chapter. The KOHA and its supporting software can download from http://koha-ommunity.org and associated links and can install in any computer.

Using KOHA can save the financial resources of a library and make the library service efficient and effective. The documentation and technical support can be obtained from the above mentioned website of the KOHA to run the system smoothly.

2.7 Exercise

1. What do you mean by a Library Automation Software?
2. Why automation of a library is needed?
3. What are the salient features of KOHA?
4. Write down the process of installing KOHA.
5. Write down the purpose of Library automation in 1000 words.

2.8 Practical

1. Download KOHA and other required software from http://koha-ommunity.org and install it.
2. Download a KOHA manual from http://koha-ommunity.org/documentation and make a short note on each module given in the manual.
3. Verify your short note made for each module of KOHA from KOHA software.
4. Create catalogues in KOHA for five books.
5. Create five patrons in KOHA.
6. Create five Catalogue through importing data from Library of Congress.
7. Create budget in KOHA and order five books to a vendor.

2.9 Glossary

- **Apache:** The Apache is an open source web server.
- **Coding:** Process of writing a computer programme in a specific programming language.
- **DRTC:** Documentation Research and Training Centre, Bangalore, Karnataka, India.
- **Information Explosion:** Rapid growth in the amount of published information.

- **Inter-Operability:** Ability to exchange information in a heterogeneous network.
- **LINUX:** It is an open source operating system.
- **MySQL:** MySQL is a relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases.
- **OPAC:** Online Public Access Catalogue, the Library Catalogue available to users for searching on computer.
- **Perl:** The Perl programming language is an open-source computer programming language. It is a high-level, general-purpose, interpreted, dynamic programming languages works specially in UNIX environment.
- **RDBMS:** Relational Database Management System.
- **Schema of Database:** It is a graphical depiction of the database structure.
- **SDI:** Selective dissemination of information, a customized service to an individual library member specially on current publications.
- **Source Code:** A text listing of commands to be compiled or assembled into an executable computer program.
- **Stock Verification:** It is a process of verifying the library resources accessioned by the library on record and physically available in the library. It ascertain the loss and the gain of the library resources in a given period of time.
- **UNICODE:** Unicode is a computing industry standard for the consistent encoding, representation and handling of text expressed in most of the world's writing systems.
- **Windows:** The Windows is a proprietary operating system developed and distributed by the Microsoft Corporation, USA.

Resource Material

(i) Brown-Syed, Christopher (2011). Parents of Invention: The Development of Library Automation Systems in the 20th Century. Santa Barbara, California: ABC-CLIO.

(ii) Engard, Nicole C (2012). Koha 3.8 Manual (en). http://koha-ommunity.org/documentation.

(iii) Neelakandan, B, etc.(2010). Implementation of Automated Library Management System in the School of Chemistry Bharathidasan University using Koha Open Source Software. International Journal of Applied Engineering Research. Volume 1, No1. Pp 149-167. Available at http://www.ipublishing.co.in/jarvol1no12010/EIJAER1014.pdf

(iv) Pandey, S. K. (Ed.) (1999). Encyclopedia of library automation systems and network. 6V. New Delhi, India: Anmol Publications.

(v) Sirohi, Savitra and Gupta, Amit (2010). Koha 3 Library Management System. Birmingham, UK: Packt Publishing.

UNIT-3

Introduction to Networking

Location	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
• Class room, library or computer laboratory.	• Understanding networking.	• Networking basic. • Concept and definition. • Sharing devices and peripherals. • Sharing data and files.	• Explain networking concept and definition. • Explain sharing of devices and peripherals. • Explain data and file sharing.	• **Interactive lecture:** Basic of networking, concept, definition, sharing devices and peripherals, sharing data & information. • **Activity:** Visit computer laboratory, show students computer network and sharing printer, scanner, etc., and share information from one computer to another.
	• Types of networking and their utility.	• Areas local area network or LAN. • Metropolitan area network or MAN. • Wide area network or WAN. • Personal area network or PAN. • Internet.	• Explain different types of network with examples. • Explain internet and intranet. • Benefit of internet.	• **Interactive lecture:** Explain different types of network & their purposes with examples. • **Activity:** Visit computer laboratory and show students different types of network through images and multimedia, help may be taken from internet.
	• Understanding server.	• Client / server. • Peer-to-peer.	• Explain server and different models, client-server and peer-to-peer.	• **Interactive lecture:** Explain server and different models, client-server and peer-to-peer. • **Activity:** Visit computer laboratory and show students server through images and multimedia, help may be taken from internet.

	a) Switching technique.	• Circuit switching. • Packet switching. • Message switching.	• Explain types of switching techniques.	• **Interactive lecture:** Explain switching techniques with examples. • **Activity:** Visit computer laboratory & show students switching through images and multimedia, help may be taken from internet.
	• Networking and communication protocols.	• OSI reference model. • TCP/IP Model. • CDMA. • GSM. • GPRS.	• Explain reference models and protocols.	• **Interactive lecture:** Explain reference models and communication protocols. • **Activity:** Visit computer laboratory and show students reference models through images and multimedia, help may be taken from internet.
	• Networking topology.	• Linear or Bus. • Star. • Ring. • Mesh. • Tree. • Hybrid.	• Explain networking topology.	• **Interactive lecture:** Discuss networking topologies. • **Activity:** Visit computer laboratory & show students networking topologies through images and multimedia, help may be taken from internet.
	a) Transmission channels and networking.	• Twisted pair cables. • Coaxial pair cable. • Fiber optic cable. • Micro waves. • Radio waves. • Communication satellites. • Bluetooth. • WiFi.	• Explain different transmission channels.	• **Interactive lecture:** Discuss transmission channels with example of day to day life. • **Activity:** Make them transfer data through Bluetooth & WiFi. Visit computer laboratory take help of Internet in

	b) Benefits of networking.	• Resource sharing. • Information exchange. • Cost reduction. • Reliability. • Easy communication. • Flexible working environment.	• Explain resource sharing, cost reduction, flexible working environment, etc.	explaining channels. Interactive lecture: Discuss resource sharing, cost saving, etc. • **Activity:** Transfer file photo through network with the help of email, whatsapp, etc.
	• Practical.	• Connecting computer and peripherals as printer, scanner, etc. • Sharing data and information.	• Able to connect computers and peripherals like printer, scanner, etc. • Able to take print from printer installed at another computer. • Transfer file or data from one computer to another computer.	• **Interactive lecture:** Explain how to connect computers and peripherals & share data from one to another terminal. • **Activity:** Connect computer, printer, etc. and take print.

3.1 Understanding Networking

The modern technological world needs faster communication channels to communicate frequently from one place to another. There is a frequent need of data transmission over varied distances. To share data or to communicate quickly from one place to another, the concept of networking has been introduced. Networking is a mechanism through which two or more independent computers of communication devices communicate with each other to share the data or information.

Networking: Concept and Definition

Networking is a concept, where two or more than two computers are joined together to share information. This sharing can be in the form of files among computers and peripherals such as printers, modems, CD-ROM or DVD-ROM drives. These computers can be within a walking distance or in the same building of the office or in the same city or even across the cities.

There are various definitions given for networking. The Merriam Webster Dictionary defines it as “the establishment or use of a computer network”. A computer network is a collection of two or more connected computers to share the information. So, a network allows the computer to share its equipments, files, data and programs. When networks at multiple locations are connected, people can send messages (SMS), e-mail, can share links to the worldwide Internet, or conduct video conferences in real time with other remote users.

In networking, several computers together allows data to be transmitted from one machine to another in rapid and easily managed data streams. The sharing of data allows many of the

resources that are located on a single machine to effectively become available to all other machines on the network.

The resources can be physically located on one machine e.g., as files on the hard disk, or the devices as printer connected locally to one machine. Such resources as files, printer, located or connected with one machine (computer) remain available over the network to other machines of that network.

An alternate situation would be where access to the Internet is available to all the computers on a network through a special communication devices attached to the network. Access to all external and internal resources are thus made available to the users on the network.

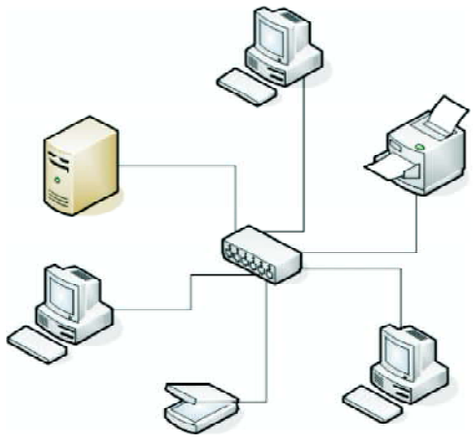

Figure 3.1: Networked Computers

Source: http://www.functionx.com/illustrations/network2a.gif)

A network server provides network services to a user workstation (client) on the network. Services can range from sharing database and files to printers, scanner, and so many other devices and network resources. Thus, the network servers are also called file servers, print servers, communication servers, etc, on the basis of the task it performs.

Need for Networking

Networking is a need of modern technological era. Have you ever found yourself rushing from one computer to another in your school or home, attending to several different joints at various locations to share the information or do you often find yourself moving files that need printing from your computer to the other computer that is connected to the printer? All of these situations can be made easier by allowing two or more computer systems to communicate with each other over a shared network medium. A computer network enhances the reliability of available computer resources and resource sharing between two or more computers.

Networking is Necessary Due to Following Reasons:

- **To Enable Two or More Computers to Communicate with Each Other:** Through networking, two or more computer can communicate with each other or one another for data storage and sharing resources irrespective of their operating environment. For example, a UNIX based computer can communicate with a Windows or LINUX without any problem.
- **To Share Computer Files, Data and Programs:** Through networking, we can share any file or programs to all connected computers. Such as in schools if one file has to be shared with all departments, this file can be placed on network system.
- **To Share Computer Peripheral and Devices:** One device, connected to a network can be made available for all other computers through networking. For example, a single printer can be used by whole network if it is connected to a network and configured for sharing purpose.
- **Cost Reduction in Terms of Devices and Data Transfer:** Computer devices such as

printers, scanners, large hard disks are very costly. Through networking we can link a single printer to two or more computer systems. The same goes for other devices like Scanner, CD/DVD Drive, etc.

- **To Make Resource Sharing Easier and Faster:** Through networking, computer resources can be shared quickly and accurately irrelevant to their size and travel distance. Hence, it saves the time and efforts involved in sending data from one place to other places.
- **Access Control:** The networking tools and techniques provide mechanism to control the resources available on network. For example, a file available or a device on network can be restricted for the limited users.

Review Questions

A. Fill in the blanks

1. In _____ server provides network services to a user workstation.
2. Networking allows two or more than two computer to _____.
3. Networking tools and techniques provide mechanism to control the _____ available on network.

B. Multiple Choice Questions

Tick the correct answer

1. Networking makes resources sharing _____
   (a) Slow and difficult
   (b) Quick and accurate
   (c) Expensive
   (d) Resistible
2. How can devices and peripheral installed at one computer be shared easily?
   (a) With networking
   (b) Without networking
   (c) Manually
   (d) Impossible

C. Short Answer Questions

1. What is the networking?
2. What is a server?
3. What is a client?
4. What do you mean by access control?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Defined network.
2. Understood need of networking.

Part-B

1. What is computer network?
2. What is the need of networking?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain network.		
Able to identify the need of networking.		

3.2 Types of Networking and Utility

The network can be classified on the basis of it size and applications. On the basis of the two characteristic, the network can be categorized as:

1. Local Area Networks or LAN
2. Wide Area Network or WAN
3. Metropolitan Area Network or MAN
4. Personal Area Network or PAN
5. Internet

3.2.1 Local Area Network

A Local Area Network (LAN) connects computers and devices spread in an area of short distance. It can be a small well-defined area such as a room, building, or group of closely placed buildings. Maximum distance between two computers should be within one kilometer for getting best performance and managing it too. For example, your school campus might have its own LAN for administration and teaching and learning process.

Nowadays, a LANs can operate at the speed of up to 10Gbps whereas, traditional LANs works at a speed of 10Mbps to 100Mbps. In this technological era, Wireless LANs have also introduced which uses wireless transmission technology and gives a new dimension to the traditional wire transmission technology.

LAN has some characteristics which differentiate it from other types of networks. These are:

- Geographic Area: LAN covers relatively short distance which usually ranges from 100m to 1 km.
- Size: LANs are restricted in size.
- Error rates are very low in LAN.
- Generally, owned by a single organization.

Wireless Local Area Network (WLAN)

WLAN is a LAN which is based on wireless transmission technology. This technology is termed

as Wi-Fi. It is the most popular wireless technology that allows an electronic device, (a computer or a tab or mobile phones) to exchange data or connect to the network using radio waves. Various shopping malls and eating hubs are providing Wi-Fi facilities to their customers.

3.2.2 Wide Area Networks or WAN

A Wide Area Network or WAN covers a large geographical area usually a country or a continent. This type of network is usually limited to use by large corporations and government agencies because of the high cost involved in terms of infrastructure and maintenance. It uses a variety of commercial and private communication lines. Telephone exchange system is a good example of WAN.

Characteristics of WAN are:

- It covers a huge geographical area as of a country or continent which can be more than 1000 kms.
- It uses satellite transmission lines and switching elements as its transmission technology.
- It uses different types of serial connections to provide access to bandwidth over a large geographic area.

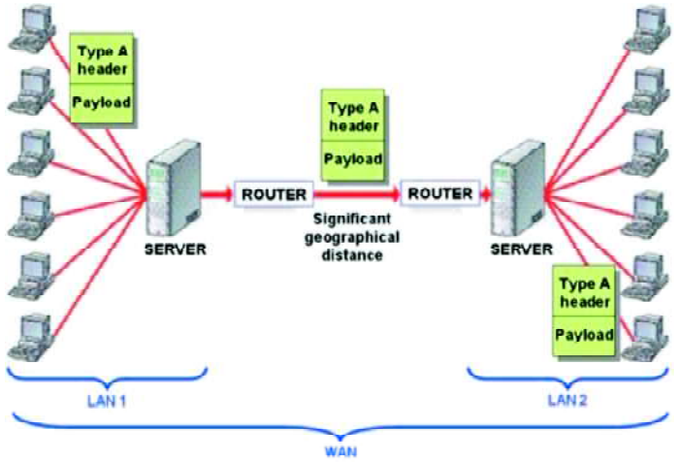

Figure 3.2: Wide Area Network (WAN)

Source: http://computer.atlas4e.com/Project_E1/chapter04/Network.jpg)

Types of Wide Area Networks

There are mainly two types of WAN:

- **Public Networks**

  Public networks are established and run by a group of people under a consortium or by a single owner or telecommunication authorities. They sell their services to any organization or individual who pay for them.

- **Private Networks**

  The private networks are based on private IP addresses which govern on some specified standards. These networks allow the user to access the system by some unique address that cannot be accessible publicly, or in global domain. It provides a private IP address to

a computer.The first WAN was a private network designed and developed by ARPANET in USA.

3.2.3 Metropolitan Area Network or MAN

A metropolitan Area Network or MAN covers larger area than LAN but smaller than WAN. It usually covers a city which can be more than 10 kms in its geographic area. One of the best well-known examples of MAN is the cable TV network of a city. The main characteristics of MAN are as follows:

- MANs coverage area is larger than LAN and smaller than WAN.
- It usually covers a city within the range of 10 kms or few more.
- It is generally owned by a consortium or a single owner or service provider who sells their services.

3.2.4 Personal Area Network

PAN is a computer network created around an individual. A cell phone, tablet or any hand held computer device comes under this network. It creates a network which provides interconnection of the devices within an environment of an individual person. PANs transmitted data by using cable wires and it can go wireless as well. USBs and Fire Wire technologies mostly connected through wires, whereas Bluetooth goes wireless. Connection through USBs, Pen drives, and Bluetooth are some fine examples of Personal Area Network.

3.2.5 Internet

Internet is a global network defined as the network of networks. It is spread globally over countries and continents and is the largest communication network throughout the world. It allows all types of networks from all over the world to get connected and share or exchange data with any other system or network faster than any other communication system. Internet follows TCP/IP (Transmission Control Protocol / Internet Protocol which provides end-to-end connectivity. The salient feature of Internet is that due to its global coverage, it is not in control of a single body or organization. Hence, anyone can get connected or disconnected on their own or as and when required.

Figure 3.3: www.internet.org

History of Internet

In 1960s a project was undertaken by the U.S. Defense Advance Research Projects Agency (DARPA). It was in fact looking for some technology that could enable it to maintain its strategic military-based communication worldwide in case of a nuclear attack. This can be said as the main conception of the Internet.

Later, these developments led to the establishment of the Advanced Research Projects Agency Net (ARPA Net). The main interest of this was looking for a technology that could link computers in various locations by using a new technology called Packet Switching Technology. This new technology enabled several users to simultaneously share a single communication line. This technology was then used by U. S. National Science Foundation (NFS) to create its own network and called it NSFNET. The project met with a large success in achieving its objectives.

Since, the users were mostly scientists and researchers, the demand went on increasing endlessly. The NSF found it unable to cope with the demand. In 1990, a non-profit organization Advance Networks and Service (ANS) created by MERIT, MCI and IBM took over the NSFNET, upgraded it to the speed of 45 MBPS and formed ANSNET. Now the network become commercial and opened to the public. The ANSNET worked for five years and later sold to America Online. By the time, several companies started to offer IP services. Today in fact, anybody with a number of devices as computer, tablet, smart phone, etc. can access Internet with the help of some service provider.

Some Salient Features of Internet are:

- It is a network of networks, that can be called as Internetworks.
- It is the largest communication network in the world.
- It uses TCP/IP protocols to communicate with other systems.
- It is a collection of LANs connected by a WAN.
- It can transmit data from one part of world to another part in real time.
- Anyone with individual device or any network can get connected or disconnected at any time.

Internet and Intranet

Internet should not be confused with Intranet. Intranet is a private network within a company or an organization using internet technology within the network. It can be understood as private network using all the protocols used on internet for the operation of organization. It uses the same kinds of software that you may find on the Internet. Internet essentially used to exchange confidential information between the officials at certain levels, information that is not meant to share with others in the rest of that organization's overall network. Such network is created for security reasons. For example, within the organization Microsoft Outlook can be used for e-mail and messaging among the staff.

Review Questions

A. Fill in the blanks

1. LAN connects computers and devices spread in an area of _____ distance.
2. WLAN is based on _____ transmission technology.
3. WAN is spread in _____ area, usually a country or a continent.

B. Multiple Choice Questions

Tick the correct answer

1. Global network is known as:
   - (a) Internet
   - (b) MAN
   - (c) WLAN
   - (d) Intranet
2. With the help of which protocol systems communicate with each other on Intenet?
   - (a) TCP/IP
   - (b) Personal protocol
   - (c) Wire protocol
   - (d) Twisted protocol

C. Short Answer Questions

1. What is a LAN?
2. What is a WAN?
3. What do you mean by Internet?
4. What do you mean by Intranet?
5. What is a public network?
6. What is a private network?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood different types of network.
2. Differentiated internet and intranet.
3. Explained evolution of internet.
4. Indentified features of internet.

Part-B

1. What are different kinds of network?
2. Explain the evolution of internet.
3. Identify the feature of internet.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain different types of network.		
Able to explain the evolution of internet.		

3.3 Understanding Server

A server is a system that refers to the combination of both hardware and software applications or program, which manages access to centralized resources or services in a network. Depending upon its functionalities, servers are of different types, some important of them are such as; **web server, proxy server, application or database server, dedicated server** and **cloud server.** All these above servers are working on following two models of architectures namely **Client-Server based model** and **Peer-to-peer based system.** The client server model is based on a computer network architecture in which each computer on the network is either a client or a server. The server computer system is managing all applications such as disk drives, printer, traffic, etc., to run the various applications within any workstation (or client) computer over a network. Where as peer to peer model is decentralized in nature, which enables each computer works as client and server both, mean all computers have equivalent capabilities and responsibilities. Today, both models are in wide use depending upon their business requirements.

3.3.1 Networking Switching Techniques

The switching technique provides path for data movement on network from source to destination as well as fragments the message before passing to the network. It is an essential component of all types of network whether computer, telephone, or any other network. There are three types of switching techniques which have been given below:

(i) Circuit Switching

(ii) Message Switching

(iii) Packet Switching

(i) Circuit Switching

The circuit switching is a transmission system of a network in which a physical path from source to destination is established and it remains dedicated till the transmission gets completed. For example, when you talk on a telephone then the telephone network establish path (circuit) from your phone to destination phone. It remains dedicated till you finish the talk.

(ii) Message Switching

The message switching is a transmission technique in which whole message is being made a block of data, bundled with destination address and forwarded to the first switching office (i.e. router) and then forwarded towards the destination. The block remained stored in the buffer, available with the router and when the router finds the vacant path towards the destination, it forwards the block. The block of data get stored and forwarded at different routers in the network till it reaches the destination. Hence, a network using this technique of switching is called a Store-and-Forward Network.

In this techniques, dedicated path from source to destination does not get established in advance rather uses the available path in the network in segments. But, once a router starts transmitting a particular block to the next router, it occupies the channel between the two routers till it transmit whole block. If the data size of a particular block is very large, in that case it capture the channel for longer period. Because of this that segment of channel remains unavailable for other transmissions and creates obstacles in interactive traffic.

(iii) Packet Switching

The packet switching is transmission techniques in which message get broken into packets of a certain size depending upon the upper limit of the size of the packet set by the network and then these packets are forwarded towards the destination. Since the whole block of message broken into packets hence the network put the packet number and destination address on each packet. When these packets reach the destination, there they get assembled according to packet number and whole message become available to the user. The transmission of packets, follow the same process for transmission as follows by message switching. But as the size of the blocks is limited here hence, the channels between two routers get free after sending one packet. Hence, this technique overcome the problem faced by store-and-forward network and becomes suitable for interactive traffic of data. All most all the computer networks use this technique for transmission of data over the network.

Review Questions

A. Fill in the blanks

1. There are two types of web server models namely, client-server and _____.
2. Switching techniques provides path for _____ movement from source to destination.

B. Multiple Choice Questions

Tick the correct answer

1. Which kind of path gets established in circuit switching?
   (a) Fragmented physical path
   (b) Dedicated physical path

(c) Store and forward path

(d) All of the above

2. How does packet switching works?

(a) Message is broken into packets

(b) Whole message gets bundled in one packet

(c) Sounds and text are sent in separate packets

(d) None of the above

C. Short Answer Questions

1. What do you mean by Client-Server Model?
2. What do you mean by Peer to Peer system?
3. What is a circuit switching?
4. What is a store-and-forward network?
5. What do you mean by packet switching?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood different models of web server.
2. Understood different switching techniques.

Part-B

1. What are different models of web server?
2. What are different switching techniques?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain different web server models.		
Able to explain different switching techniques.		

3.4 Networking and Communication Protocols

Protocol is a set of rules, used by the computers to communicate with each other under a shared network. It is an agreement between two or more communicating parties as on which principles communication will proceed. It provides a common language for the computer

networking to maintain consistency in the network system. Depending upon the structure of the network, different types of protocols are being used at different layers. To understand different layers of the network, we will have to understand the reference models of networking under which different layers are defined. There are two networking reference models, on which all the networks run.

1. The OSI Reference Model
2. The TCP/IP reference Model

3.4.1 OSI Reference Model

The OSI stands for Open System interconnection. It is a step towards the international standardization of protocols in networking system which mainly deals with connecting open systems of networking. This model is designed and developed by International Standard Organization (ISO).

The OSI reference model has seven working layers. Each layer has its well-defined function to perform. These seven layers are as follows:

1. The Physical Layer
2. The Data Link Layer
3. The Network Layer
4. The Transport Layer
5. The Session Layer
6. The Presentation Layer
7. The Application Layer

We can understand these layers with the help of the following diagram:

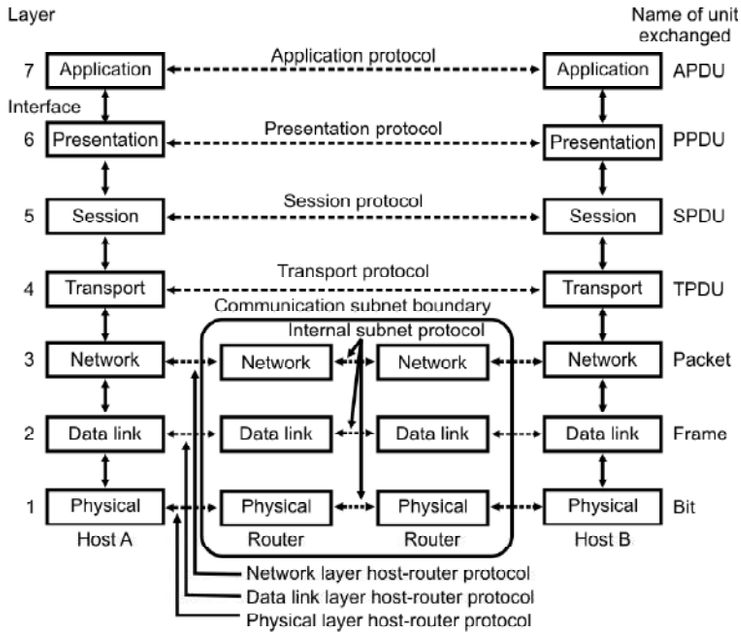

Figure 3.4: An OSI Reference Model

(Source: https://fmfi-uk.hq.sk/Informatika/Distribuovane%20Systemy/knihy/ICN/ch1s4.htm)

The Physical Layer : It is concerned with the transmission of raw bits over a communication channel. This first layer concentrates on proper transmission of bits to its destination.

The Data Link Layer : It is a higher layer concerned on error free data transmission. It transmits the raw bits to the network layer into a frame line. It transforms bits into a frame. It also works to control access to the shared channel.

The Network Layer : It controls the flow and operation of subnet. Subnet is the collection of communication lines and routers. It transforms frame lines into large or small packets and determines proper routing of these packets (free from all kinds of errors and congestion) from their source to destination.

Above three layers comes under Communication Subnet Boundary Line.

Transport Layer accepts data from network layer and split it into small units and ensures the complete and accurate data transmission. It exchanges Transport Protocol Data Unit and provides an error free and point- to- point services to the session layer.

Session Layer exchanges Session Protocol Data Unit (SPDU) and allows establishing sessions between different computers. It provides several services such as synchronization, dialog control and token management.

The Presentation Layer is a lower layer deals with the syntax and semantics of data transmission. It exchanges Presentation Protocol Data Units (PPDU) and maintains the actual required format of exchanged data.

The Application Layer is the last and most important layer of this model. It contains various application protocols which are in use throughout the world. FTP, HTTP are two most commonly used protocols.

3.4.2 The TCP / IP Reference Model

TCP / IP stands for Transmission Control Protocol / Internet Protocol is an international standard of internetworks. It is a commonly used protocol in IP networks to transport data and information. This model is set by a computer research network ARPANET.

Besides OSI reference model, this model consists only the most important and useful layers in its structure. These are:

1. Host to Network Layer
2. The Internet Layer
3. The Transport Layer
4. The Application Layer

Through this model anyone can create their own network servers and clients. We may compare

and easily understands the TCP/IP concept through the following diagram:

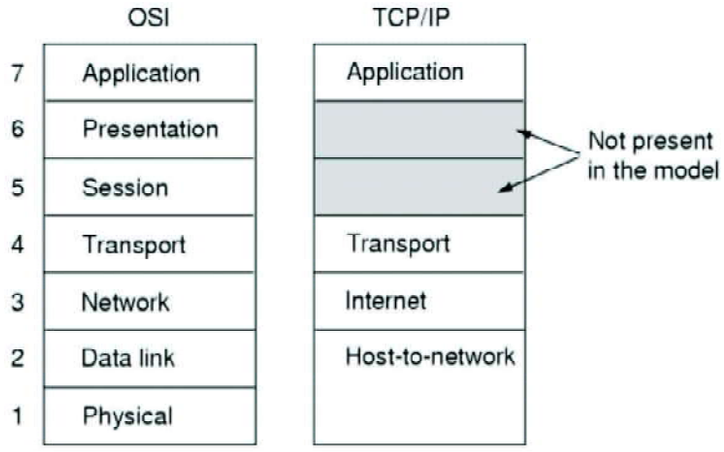

Figure 3.5: A TCP / IP Reference Model Comparing to OSI Reference Model

(Source: *Tanenbaum, Andrew S. Computer networking. 4th edition*)

Here, the Host-to-Network layer has not any defined protocol. It may vary from host to host and networks to networks.

The Internet Layer defines a protocol called Internet Protocol (IP) and an official packet format. This mainly deals with delivering of IP packets to their proper destination. It works almost similar to OSI network layer.

The Transport Layer in TCP/IP models works same as of OSI model. It transmits data accurately, avoiding all congestion and errors and handles flow of data in a faster speed. This layer contains two end-to-end transport protocols i.e. TCP and UCP (User Datagram Protocol).

Application Layer is the topmost layer of TCP/IP model. It includes all higher level protocols such as HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), NNTP (Network News Transfer Protocol), DNS (Domain Name System), SMTP (for e-mail), SLIP (Serial Line Internet Protocol) now superseded by PPP (Point-to-Point Protocol).

Protocols

WWW

WWW stands for World Wide Web. It was invented by Tim Berners – Lee, a physicist of CERN Laboratory. It uses three technologies namely (i) HTML, (ii) HTTP and (iii) Web Server and Web Browser which governs whole resources on Internet. The data of any kind as text, audio, video, etc, are converted into web resources with the help of HTML and stored at the Web Server. The HTTP provides transfer of data and the browser provides access to the users. With the help of HTML or its next generation as XHTML, XML, etc, web resources are created which are known as websites. The websites are the collection of web pages organized in logical manner. These web pages are supported with the embedded links within the resource or outside the resource. The embedded links make the web resources non-sequential in nature. With the help of these embedded links, a user can directly go to another web resource (webpage or applications) just by clicking on them. With the help of WWW the internet become the technology of common

man for communication and resources sharing. WWW brings a boom in the field of information technology with the establishment of new rules in the world of Internet.

HTTP

HTTP stands for Hypertext Transfer Protocol. It is the protocol to exchange or transfer hypertext between two or more computers. Hypertext is text in a code language called as HTML (Hypertext Multimedia Language). All the websites and web resources are created using this language and made available through HTTP and web server and browser.

FTP

FTP stands for File Transfer Protocol. It is a part of TCP/IP protocol. It allows easy and accurate transfer of files from one computer to another irrelevant of its type and structure.

PPP

PPP stands for Point-to-Point Protocol which allows a computer to work with TCP/IP protocol to get directly connected with internet. It uses telephone line or a modem device to transmit the information. Earlier, SLIP (Serial Line Internet Protocol) was in use which has been superseded by PPP.

NNTP

Network News Transfer Protocol (NNTP) is a protocol for news groups networking which provides a set of rules as how to get a public forum or news group over on internet.

TELNET

Telnet is a protocol which provides remote login. By using TELNET, one can login from one computer on the Internet to another computer. It provides network connection at a remote station, through remote log in.

SMTP

Simple Mail Transfer Protocol is an e-mail protocol which allows easy and error free transfer of e-mails and messages over the internet.

POP

POP is an abbreviation for post office protocol. It is a protocol used to retrieve an e-mail from the server.

IMAP

Internet Mail Access Protocol is a protocol used where multiple computers are in use to access information. It works as a repository that can be accessed from anywhere and from any computer. Such as in offices from office computer at home from laptop or PC, while travelling access from tablets or mobile phones.

3.4.3 Wireless Communication Protocols

In this modern era of advanced communication, wireless communication protocols have also emerged which set up the rules for wireless transmission of information. Wireless communication protocol allows one mobile network to transmit information to another network with their

permanent IP address. Global System for Mobile (GSM), Code Division Multiple Access (CDMA), General Packet Radio Services (GPRs), 3G, 4G, all is the wireless communication protocol.

Review Questions

A. Fill in the blanks

1. There are _____ layers in the OSI Reference model.
2. There are _____ layers in the TCP/IP Reference model.

B. Multiple Choice Questions

Tick the correct answer

1. What is the function of session layer?
   - (a) Using application protocol
   - (b) Establishing session between two computers
   - (c) Establishing physical connectivity using channels
   - (d) None of the above
2. HTTP stands for:
   - (a) Hypertension and Treatment Protocol
   - (b) Hypertext Transfer Protocol
   - (c) Hyperlink and Text Transfer Protocol
   - (d) All of the Above

C. Short Answer Questions

1. How many layers are in OSI Reference model?
2. How many layers are in TCP/IP Reference Model?
3. What does the physical layer do in OSI Reference Model?
4. What are different components of WWW?
5. Define HTTP.

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activities.

Part-A

1. Understood the OSI Reference model.
2. Understood the TCP/IP Reference model.
3. Understood different protocols.

Part-B

1. Differentiated OSI and TCP/IP Reference models.
2. Identified functions of different layers of TCP/IP Reference models.
3. Identified functions of different protocols.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to differentiate OSI and TCP/IP Reference models.		
Able to identify functions of differentiate layers of OSI and TCP/IP reference models.		
Able to explain functions of different protocol.		

3.5 Networking Topology

Networking Topology is a layout of interconnection of nodes and their workflow in a network. It defines both the physical and logical structure of a network and gives a blue print of how the nodes are interconnected with each other and how they communicate with each other. There are various types of network topologies. Topology decides the structure of a network, so it must be chosen carefully.

Various types of network topologies are Linear, Star, Ring, Tree, Mesh and Hybrid Topology. Let us discuss them in brief:

(a) Linear or Bus Topology

Linear is one of the most common types of topology. It is also called as bus topology. It consist of a series of nodes that work on a common path at a single length in which each node is directly attached to a segment which connects all the computers in a network. This segment is known as backbone cable. It is an easiest and most reliable topology, which best deals with a smaller network. It works well in a network of 10-15 computers.

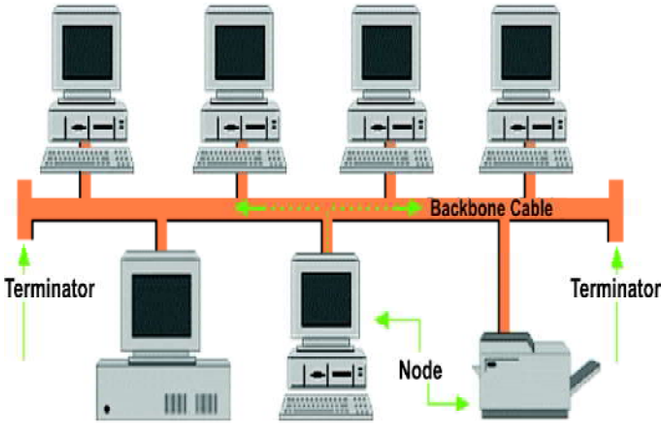

Fig 3.6: Diagram of Bus Topology

(Source: http://www.lahitech.com/images/lin_bus.gif)

Merits of Linear Topology

1. It requires short cable wire.
2. Installation and setup is very easy.
3. It is the most cost-reducing topology as comparable to other topologies.
4. Flexibility is high. It is easy to enlarge or to add computers in this topology.

Demerits of Linear Topology

1. Error detection is quiet difficult.
2. Needs re-configuration.
3. If any fault arises in central cable, that will disconnect the whole network.

(b) Star Topology

It is the most common topology used for Local Area Network (LANs). It is also known as radial topology. In this topology, all the computers are connected to a central hub through a dedicated link or a common path. A central hub is the router or switches which routes the information to its destination. All connected computers have their own functionality.

Merits of Star Topology

1. Error detection is very easy.
2. Set up is very simple and provides easy re-configuration of the network.
3. Fault can be isolate separately for each device. It did not disturb the whole network.
4. More reliable than bus topology and ideal for LANs.

Demerit of Star Topology

1. It requires long cable length as for each computer to connect them to central hub.
2. All the computers are dependent on central hub.
3. Expansion or to add computers is quiet difficult.
4. High cost as comparable to bus or linear topology.

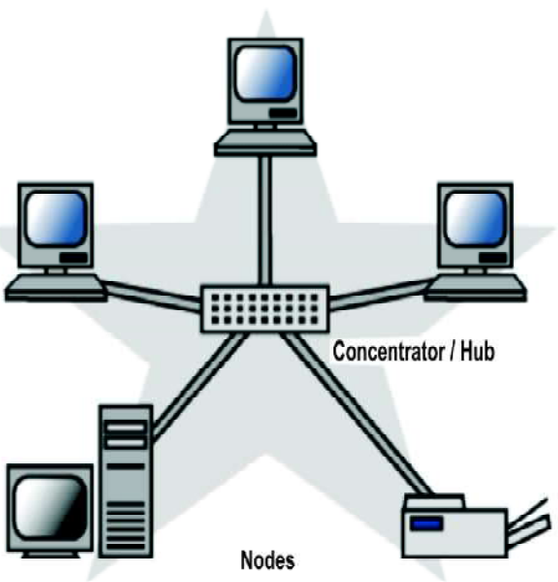

Fig 3.7: Diagram of Star Topology
(Source: http://fcit.usf.edu/network/chap5/chap5.htm)

(c) Ring Topology

It is also known as circular or loop topology. In this topology, every node gets connected to its neighbouring nodes on both the sides. The information flows in a circular form whether clock-wise or anti-clock wise. From the sources node the information flows to the next node and so on until it reaches to the destination. This topology is very simple for operation and maintenance but is prone to break down as fault in any node can disrupts the whole network.

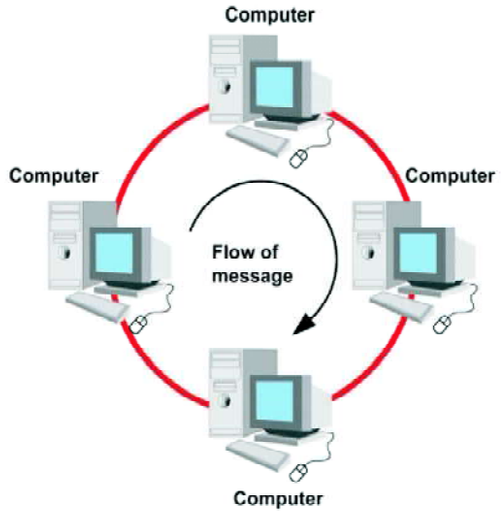

Fig 3.8: Diagram of Ring Topology

(Source: http://www.techiwarehouse.com/engine/e96bb2f2/Understanding-Ring-Topology)

Merits of Ring Topology

1. It requires less cable wire than star topology.
2. It requires less space for wiring closets.

Demerits of Ring Topology

1. Error detection is highly difficult.
2. Re-configuration of network is quiet difficult.
3. An error in any node can cause disruption of the whole network.
4. Isolation of fault is also very difficult.

(d) Mesh Topology

It is a variation of linear topology. In this topology, all the computers are directly connected to each other instead of a central segment or backbone and each of them can work as a router or switches to flow the information until the destination. This topology is mainly used on Wide Area Network (WAN).

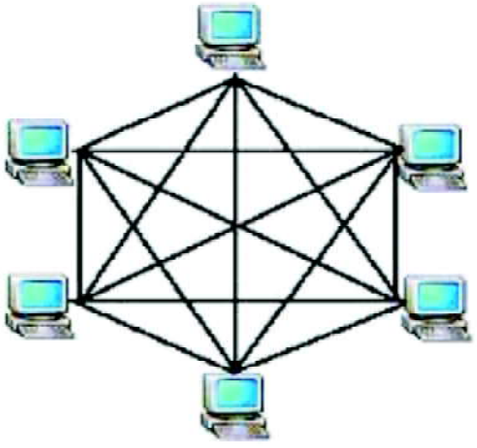

Fig 3.9: Diagram of Mesh topology

(Source: http://brebru.com/aplusstudyguides/mesh.gif)

Merits of Mesh Topology

1. Error detection and isolation is very easy.
2. Network disruption is negligible due to interconnection of each computer.
3. Much secure and reliable.
4. It is ideal for WANs.

Demerits Mesh Topology

1. Architectural structure is more complex and requires lots of space.
2. Re-configuration is quiet difficult.

e) Tree Topology

Tree topology comprised multiple star topologies on a linear or bus network. It comprises the features of star topology and a modified form of linear or bus topology. In this topology, the central hub of each star topology is directly connected to the central backbone of bus and every individual hubworks as a root of tree for all computers.

Television cable networks can be a good example of tree topology.

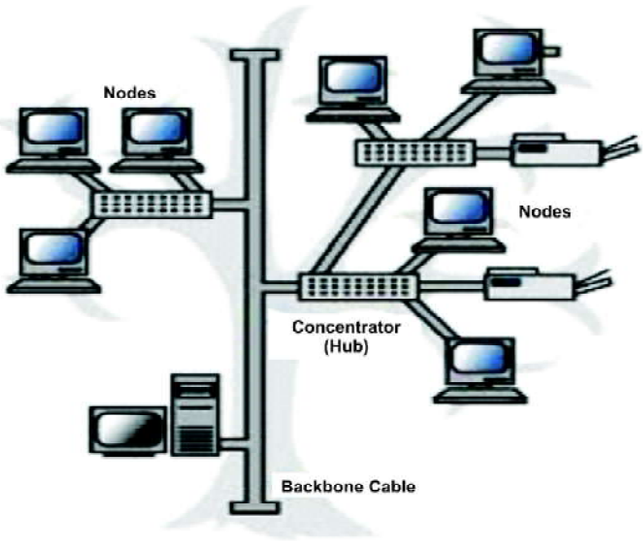

Fig 3.10: Diagram of Tree Topology
(Source: http://vceit.com/networks/tree.gif)

Merits of Tree Topology

1. Expansion is very smooth and easy.
2. Fault detection and isolation is very easy.
3. It provides linear connection to its nodes.

Demerits of Tree Topology

1. Maintenance cost is very high.
2. Failure of backbone can cause total disruption of network.
3. Depends upon the root of trees.

f) Hybrid Topology

This topology is a combination of two or more topologies. It works together comprising the characteristics of multiple topologies. Hybrid topology usually combines bus, star and ring topologies together. Two major examples of hybrid topology are:

(a) **Star Ring Topology:** It comprises two or more star topologies connected through a centralized hub using a multi-station access unit.

(b) **Star Bus Topology:** It comprises two or more star topologies connected through linear or bus servers as the network's backbone.

3.5.1 Transmission Channels and Networking

Transmission channels are the media through which the data get transmitted from one point of network to another point of network. They can be categorized as:

1. Wire Technology
2. Wireless Technology

Wire Technology

Wire technology is the traditional transmission technology comprises a network of wires where data transmits through cable wiring. Its various types are as follows:

1. **Twisted Pair Cables:** This cable wiring mostly used for telephone lines. It consists of two identical wires having same features which maintain the balance.
2. **Coaxial Cables:** It consists of a hollow cylindrical conductor made up of copper tube or wire, and an insulator of long diameter made up of copper tubes.
3. **Fiber Optical Cables:** These cables are made up of thin strands of glass arranged in bundles called optical cables.

Wireless Technology

Wireless technology is the technology in which data travels or transmits through the rays or waves. It uses radio or microwaves as transmission channel. This technology is cost benefitting rather than wireless technologies in terms of space and structure.

1. **Microwaves:** This wireless technology is mainly used for long distance networking. It uses micro rays to send signals. It is commonly used in broadband system. Television network, dish TV, Tata sky all works on this technology.
2. **Radio Waves:** These rays travels in a vacuum same as infrared rays, ultraviolet rays etc. These transmit the audio, music, pictures, and other data through the invisible air. Radio stations, FM, mobile phones use this technology.
3. **Communication Satellites:** This technology is used in television network which used satellites to broadcast the information. Cable TV network, dish TV, Tata sky all are using this technique. It can cover an extra large area easily, and provide access even to remote areas. It requires a high cost and feasible for extra large network areas.

4. **Bluetooth:** It is a very short range wireless technology commonly used in mobile phones. It connects and transmits the data from one device to other within the short range and limited time period. Mobile phones, android phones, laptops, digital cameras are using this technology.

5. **Wi-Fi:** It stands for Wireless Fidelity. It is a kind of wireless LAN which covers a small area such as a home, a school rooms or a public hotspot. This technology is very much famous nowadays and this facility is now available in various public hotspots, libraries and eating hubs, etc.

3.5.2 Benefits of Networking

Networking is essential and required in all the sectors. Networks are facilitating colleges, schools, universities, libraries or research centers, banking and business sector, government organizations and many other organizations and take them in a new dimension. It applies to facilitate as follows:

- Resource sharing of data and information in between two or more computers and also to share their peripheral devices.
- To reduce cost in terms of infrastructure, assets and maintenance. A single device can be used for several computers under networking.
- To exchange data and information in between two different types of systems irrelevant of their processing system.
- Communication becomes easy and smooth. One can connect even in remote area.
- Increased reliability in data transmission as there is hardly any scope of loss of data while transmitting.
- Time saving- It saves the time in transmitting data as with the help of network the data can travel one part of world to another part within a few second.
- Real time access worldwide- one part of world can access real time events of another part of world. The video conferencing is an example of this characteristic.
- Provides flexible working environment. A system in network can be accessed from anywhere and at any time.

Review Questions

A. Fill in the blanks

1. Network topology is a layout of _____ of nodes and their workflow in a network.

2. Transmission channels are the _____ through which data gets transmitted.

B. Multiple Choice Questions

Tick the correct answer

1. What is the name of the cable which connects all nodes in bus topology?
   (a) Backbone cable
   (b) Electric wire
   (c) Front cable
   (d) None of the above
2. WiFi stands for:
   (a) Wireless frequency
   (b) Wireless fidelity
   (c) Wire and filter
   (d) Wire and filler

C. Short Answer Questions

1. What do you mean by topology?
2. What is a star topology?
3. What is a tree topology?
4. Define a hybrid topology.
5. What is a transmission channel?
6. What are the different categories of transmission channels?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood different types of topology, their advantages and disadvantages.
2. Understood different transmission channels and their utility.
3. Explained benefits of networking.

Part-B

1. Explain different topology.
2. Explain different transmission channels.
3. Identify benefits of networking.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain different topology, their advantages and disadvantages.		
Able to explain different transmission channels and their utility.		
Able to identify benefits of networking.		

3.6 Summary

In this chapter we have studied networking in depth beginning from its introduction, need and purpose till networking benefits and application. Networking is a concept, where two or more than two computers are joined together to share information. This sharing can be in the form of data and files and peripherals such as printers, modems, CD-ROM or DVD-ROM drives. Nowadays, networking become essential and needed for resource sharing, cost reduction and to exchange information and devices.

There are various types of networks based on their geographical coverage area. These are LAN, MAN, WAN, PAN and internet. Internet is a global network defined as network of networks. Network Web Servers are Client / server and peer-to peer. In networking, circuit, packet and message switching techniques are used to transmit data. There are a few set of rules or agreements between two or more communicating parties as on which principles communication will proceed called as network protocols. These provide a common language for the computer networking to maintain consistency in the network system. There are two networking reference models i.e., OSI reference model and TCP / IP model available on which all the networks run. Nowadays, few wireless communication protocols are also in used for wireless networks. Network Topology is a layout of interconnection of nodes and their workflow in a network. It defines both the physical and logical structure of a network and gives a blue print of how the nodes are interconnected with each other and how they communicate with each other.

3.7 Exercise

1. What are the needs of Networking?
2. Write a note on HTTP, FTP, TELENET and SMTP.
3. Write a short note on each types of Network.
4. Discuss the evolution of internet (history of internet).
5. Write a short note www.
6. What are the functions of each layer of OSI Reference Model?
7. What are the functions of TCP/IP Reference Model?

8. Write a short note on each topology.

9. What are the merits and demerits of star topology?

10. Write down the benefits of networking.

3.8 Practical

1. Configure a printer on network and take print of a page from a computer other than the computer attached with the printer.

3.9 Glossary

- 1 G and 2G: 1G refers to the first generation of mobile telecommunications which an analogue telecommunication standard which provides data speed between 28kbps to 56kbps. The 2G refers to the second generation of mobile telecommunications which is a digital telecommunication standard which provides speed up to 153.6 kbps.
- 3G and 4G: 3G and 4G refers to 3rd and 4th generation mobile telecommunications standards which are digital telecommunication standard and provides maximum data speed up to 2 mbps and 1 gbps respectively.
- Bandwidth: Bandwidth in computer networking refers to the transmission capacity of a channel in bit per second which is proportional to the bandwidth in hertz (Hz).
- GPRS: General Packet Radio Service.
- IBM: International Business Machine Corporation, an American company.
- MCI: MCI Communication Corp (1963-1998) was an American Telecommunication company.
- MERIT: A non-profit organization of USA, pioneer of networking in the initial phase of development of Internet.
- Switching Elements: Special computer or device which connect three or more transmission lines, responsible for data transmission across the network router and handle the congestion.

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UNIT-4

E-Resources

Location	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
• Class room, library or computer laboratory.	• Introduction: Understanding E-resources.	• Meaning, definition, need and purpose.	• Explain E-resources. • Able to define E-resources. • Able to identify need and purpose.	• **Interactive lecture:** Explained E-resources.
	• Categories of E-resources on the basis of content.	• E-Book. • E-Journal. • E-Newspaper. • E-Databases. • Subject gateways. • Other E-resources.	• Explain E-book. • Explain E-journal. • Explain E-newspaper. • Explain subject gateway. • Explain other E-resources.	• **Interactive lecture:** Discuss different categories of E-resources with example. • **Activity:** Visit computer laboratory show students different types of E-resources available on Internet.
	• Categories of E-resources on the basis of accessibility.	• On-line E-resources. • Off-line E-resources.	• Explain on-line E-resources. • Explain off-line E-resources.	• **Interactive lecture:** Discuss on-line & off-line E-resources. • **Activity:** Visit computer laboratory & show students on-line & off-line E-resources.
	• Advantage and disadvantage of E-resources.	• Advantage and disadvantage.	• Explain advantage and disadvantage of E-resources.	• **Interactive lecture:** Discuss advantage and disadvantage of E-resources. • **Activity:** Visit computer laboratory, show students advantage and disadvantage of E-resources on internet.

	• Practical.	• Different kind of E-databases. • Downloading of E-books in different format. • Downloading of articles from the E-journals databases. • Visit to the various subject gateways.	• Explain different kinds of database. • Able to locate and download E-book, articles. • Able to access subject gateways.	• **Interactive lecture:** Discuss the process of downloading E-book, articles and process of accessing subject gateways. • **Activity:** Visit computer laboratory, download E-book, articles from internet, access subject gateways searches.

4.1 Introduction: Understanding of E-resources

The electronic resources, also known by its acronym as e-resources are any information resources consist of data (information representing numbers, text, graphics, images, maps, moving images, music, sounds, etc.), programs (instructions, etc., that process the data for use), or combinations of data and programs in electronic or digital form. This resource can be born digital or digitised from other forms of information resource as print books, journal, photographs, etc. Such resources are becoming more and more dominant and will continue to do so in the future because of its characteristics of easy and quick retrieval and dissemination.

The E-resources requires computer for processing, storing, retrieving and disseminating. The most important characteristics of this category of resources from the service point of view is that it can be accessible through a personal computer, mainframe or handheld mobile devices, etc. These resources can be accessible to the users remotely via the internet or locally on intranet.

There are many factors that attract the users towards the E-resources. The technological advancements and the acceptance of technology by the mass are two major factors in the growth of E-resources. E-ink technology has made reading on screen comparable to reading on paper. The desktop computer, laptop, smart phone, iPods, etc., have become essential accessories of the mass. Such portable technology and easy access of internet have trained people use the E-resources.

The unprecedented penetration of electronic content presently in the libraries is amazing. Today, the collection of information resources of a library includes various types of E-resources as E-journals, E-books, scholarly databases (abstract, index and full text), etc.

Categories of E-Resources

The E-Resources can be categorized in various types on the basis of certain characteristics. Those characteristics are:

A. Content

B. Accessibility

4.2 Categories of E-Resources on the Basic of Content

The E-Resources can be further grouped on the basis of their contents as follows:

a. E-Book
b. E-Journal
c. E-Newspaper
d. E-Database
e. Subject Gateways
f. Other E-Documents

(a) E-Book

An E-Book is the electronic version of a book covering its full contents (illustration, diagram, text, etc.). E-book can be viewed on a desktop computer, laptop, and smart phone or e-book reader. A large number of e-books can be stored in portable units, eliminating weight and volume compared to the print version.

These days, most of the books are published in print as well as in electronic form. It has been observed that some books are published in electronic form exclusively. Apart from these, a number of universities, corporate houses and national governments have converted their old collection of printed books in electronic format. Because of these factors, the volume of E-book is increasing day-by-day.

Worldwide, the libraries are acquiring E-books and making them available to their members. The e-books can be purchased online by an individual and can make his / her own collection as people use to make their own library of printed books.

Figure 4.1: http://www.securedgenetworks.com/Portals/80068/images/ebook03.jpg

A good numbers of E-books are also available on the internet free of cost in most of the subject areas. Some are available for browsing and many titles are for downloading. For experiencing yourselves, follow the links given bellow:

Classic Bookshelf is a website, having collection of classics. One can read the books online and make reading enjoyable with its customization features. The website address is (http://www.classicbookshelf.com/). **Computer Science Books (**http://freecomputerbooks.com), having collection of books on computers science from all over the world.

Project Gutenberg (http://promo.net/pg/) gives online access to full text of classic books on different subjects, which were published before 1923. The project covers the books which are free from copyright. One can download texts from this website.

E-Books versus Printed Books

The acceptance of the E-book in the society getting high but, the printed book has also not lost its own place. A comparison between these two forms of the same information source has been made you understand the differences. The comparison is as follows:

E-Book	Printed Book
• Reader can customize E-book while reading as the size of the font or complete display may be changed.	Customization is not possible as size and display is fixed.
• Full text is searchable, a single word, phrase, quotation, or anything can be searched by the search engine of the E-book software. Even, if the book is in simple PDF format, features of the PDF reader can used for search, etc.	User will have to search the text using his/her experience. The book has index, which is helpful in searching the content but full text search is not possible.
• E-book can be supported with multimedia as animation,video, etc and at the same time the effect can be experienced.	Print book cannot display or run multimedia on paper.
• The content of E-book can make note, bookmark page, highlight content and selected for own purpose and these content can be further copied and one can create own file for using as courseware, power point presentations, etc.	Content can be highlighted or marked with ink or ink based highlighters but it damages the book. For copying a person will have to write in notebook.
• The portability is very high The reader can store hundred and thousands of books in laptop, smart phone, handheld devices, etc. and can also carry can also carry while travelling.	The portability is very low as it has volume and weight both. Storing of printed books takes space and carrying a large number becomes difficult.

• Multiple reader can read same copy of an E-book simultaneously if, it is shared through network.	Same copy cannot be read simultaneously.
• Sending E-book worldwide through email or other mode on internet is easy, secure, time and cost saving. • The libraries can offer reading of E-book 24 hours and 365 day at the system of the readers through internet. There is no need to go and sit in the library for limited hours.	Only send through physical transportation mode which is costly, time consuming and unsecure (may be lost in the way) services in case of printed book.
• Loss, theft, degradation or damage in disaster is impossible.	Can be lost, theft degradation, or in case of disaster can be damaged.
• Multiple libraries can go for resource sharing easily in case of E-book and save the time and resources on Inter library loan.	Libraries can only share through Inter Library loan which expensive, time and resource consuming.
• Per unit cost to the library for providing reading service is lower.	Per unit cost to the library providing reading service is high.
• It always needs some skill and expertise to read through the machine or devices. It is difficult for children and semi literates to read E-book.	Simple skill to tuning page to read the content. Anyone can read easily.
• Devices always need electricity to run or charge their battery.	No need.
• Still poor section of the society cannot afford to by machines or devices.	No need.

These are some general observations but you can make comparison yourselves and find some more characteristics.

E-Book Format and Reader

The E-books come in different computer file format and a number of readers are available. Some of the popular format and readers are as follows:

- EPUB/ .epub- this format proposed by the International Digital Publishing Forum (IDPF).
- PDF / .pdf - portable document format (PDF) is widely available and readable on several types of devices.
- eReader/ .pdb- eReader software is available for many devices including iPhone/ Touch.
- Mobipocket / .prc / .mob
- Text/ .txt, Rich text/ .rtf, HTML / .html, .doc, JPEG Image/ .jpg etc.

E-Book Readers

Microsoft's free Reader, Amazon Kindle, Sony Reader, iPhone, etc.

Figure 4.2: E-book Reader

Review Questions

A. Fill in the blanks

1. The E-resources requires _____ for processing, storing, retrieving and disseminating.
2. A large number of E-book can be stored in a portable units, eliminating weight and volume compared to the _____ version.

B. Multiple Choice Questions

Tick the correct answer

1. Name the characteristic, on the basis of which E-resources can be categorize.

(a) Accessibility and dispatch
(b) Online and print
(c) Print and analogue
(d) Content and accessibility

2. Which special device is used for online reading, downloading, storing and off-line reading – E-books?
   (a) Card reader
   (b) PDF reading
   (c) Book reader
   (d) Optical Character Reader

C. Short Answer Questions

1. What do you mean by E-resources?
2. What is an E-book?
3. How one can read an E-book?
4. What are the main difference between E-books and printed books?
5. Which one you will prefer, either print or E-books, and why?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for Assessment Activities.

Part-A

1. Understood E-resources.
2. Understood different characteristics and categories of E-resources.
3. Differentiated E-book and printed book.
4. Identified different format of E-book.

Part-B

1. What is E-resources?
2. What are different characteristics of E-resources?
3. Differentiate E-book and printed book.
4. List different format of E-book.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain E-resources.		
Able to identify categories of e-resources.		
Able to understand difference between e-book and printed book.		
Able to list different format of e-book.		

(b) E-Journal

E-journal is the electronic form of its print counterpart and it possess numerous additional features. E-journal is often referred to interchangeably as “Electronic Serial”, “Online Journal” and “Electronic Periodical”. Lancaster (1995) defines an E-journal as “a journal created for the electronic medium and available only in this medium”. Electronic serial may be defined very broadly as any journal, magazine or newsletter which is available over the Internet (E-journal Miner).

According to CONSER (The Cooperative Online Serial cataloging program), a remote access electronic serial is a continuing resource that is accessed “via computer networks”. It is issued in a succession of discrete parts usually bearing numbering, and has no predetermined conclusion. This is in contrast to direct access electronic resource which is issued on a physical carrier such as CD-ROM, DVD or floppy disks, etc.

Most common format of E-journal is HTML and pdf. Each and every format having its own advantages and disadvantages. The HTML format provides option for hypertext linkage and flexible searching. The file size of this format is smaller in comparison to the PDF. But, the display of HTML format based Journals may change with different browser and the printing may also become troublesome.

The PDF provides familiar look for users, easy conversion of legacy print. But, this format requires additional plug in or software i.e. Acrobat Reader for displaying the content.

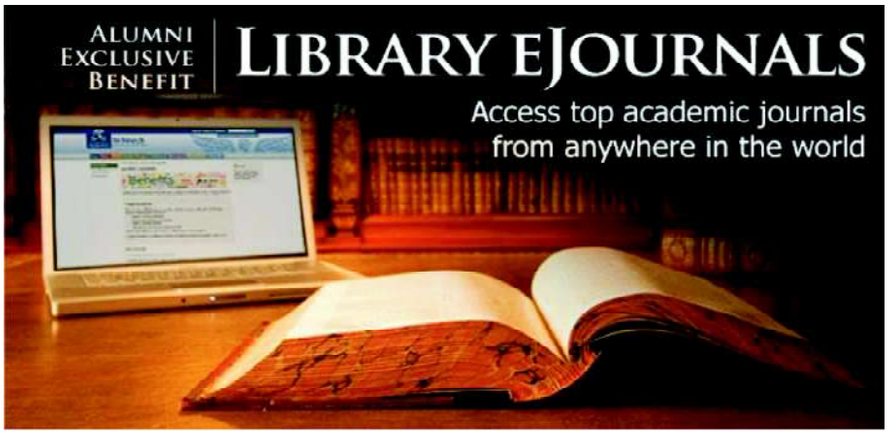


Figure 4.3: http://alumni.news.unimelb.edu.au/sites/alumni.news.unimelb.edu.au/files/images/2013/03/ejournals.jpg

Salient Features of E-Journals

According to Sreekumar (2005), the salient features of E-journals are as follows:

- Online access (endless outreach capability).
- Concurrent access by multiple users.
- Anytime, anywhere access and at a 24X7X365 formula.
- Support for multi-point searching capabilities.
- Unique features like hyperlinks to related items, reference linking, etc.
- Substantial saving in physical storage space.
- Support for multimedia information.

Benefits E-Journals to Libraries

The benefits of E-journal to the libraries are as follows:

- Superior resource delivery.
- Delivery of services based on E-journals is faster and at user's place.
- Improved service.
- Cost savings.
- Reduced shelving, binding, maintenance, claiming.
- Simultaneous access.

Benefit E-Journals to Users

The users are the most beneficiary from E-journal. The benefits can be described as:

- Independent of space and time as user can access the content any time from his/her own place.
- Interact with other electronic resources as user can follow the links and further get more related information on the subject.
- Save user's time as user can access from his/her own place hence, it saves time and efforts of the users as there is no need to visit library for this purpose.
- Accessible by multiple users simultaneously as hundreds and thousands of the users can access same content through network.
- Damage, stolen, lost, vandalize, etc is impossible as the content is in soft form and accessible through network..

Drawbacks of E-Journals

There are some drawbacks of E-journal also. Those can be listed as:

- **Authentication Issues:** E-journals are not always peer reviewed hence it poses questions over their authentication.
- **Archival issues and long term preservation:** E-journal subscription provides access of content for the period of subscription. It is not delivered as the print journals. Once library stop subscription, it loses the right of access of the journals of subscription period.
- **Technology does not Always keep up with E-Journal Technology:** The publishers adopt and upgrade the technology comes in the field of E-journal publishing. But, the technology available at users' end doesn't get changed or up-graded with same pace.
- **Temporary Unavailability due to Technical Reasons:** Sometimes, the accessibility of the content of E-journals become unavailable because of system failure, as failure of internet connection, problem at server end, etc.
- **Managing E-Journals Require much more Skilled Manpower:** A set of skills is required for managing E-journals. The libraries may be difficulties in hiring skillful human resources or upgrading the skills of existing resources with the pace of changing technology.

Printed verses Electronic Journals

There are a number of differences between electronic and printed version of journals. Some of them are as follows:

- The printed version of a particular journal may differ in its content, appearance and presentation from its electronic 'equivalent'.
- Some articles may not be available online.
- The electronic version may have added features such as links to related information or other articles.
- Most electronic versions are presented in PDF (Portable Document Format) format, which requires the Adobe Acrobat Reader software to be installed on the computer. This enables the article to appear exactly the same as the printed version including pictures, graphs, figures, etc.
- Some are also available in HTML format which appears as a normal web page. This has various advantages: extra links can be added to related material; it loads more quickly than Adobe; does not require Adobe to be installed.
- Often the electronic version of a journal is uploaded and made available before the printed version is received. The reason behind are printing or postal delays.

Open Access E-Journals

Open Access (OA) E-journals or free e-journals are those which are available free of cost to individuals or institutions for access. The user can read, download, copy, distribute, print, search, or provide links to the full texts articles of such E-journals.

Open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions. OA removes price barriers (subscriptions, licensing fees, pay-per-view fees) and permission barriers (most copyright and licensing restrictions). Because OA uses copyright-holder consent or the expiration of copyright, it does not require the reform, abolition, or infringement of copyright law. Some of the OA journal publishers are non-profit (e.g. Public Library of Science or PLoS) while some are for profit making (e.g. BioMed Central or BMC).

Figure 4.4: Screen of an Open Access Portal

Some of the OA proponents use a color code to classify journals. For example gold (provides OA to its peer-reviewed research articles, without delay), green (permits authors to deposit their peer-reviewed manuscripts in OA repositories), pale green (doesn't opposes, preprint archiving by authors), gray (none of the above).

For a list of OA journals in all the fields and languages, you can see the Directory of Open Access Journals at http://www.doaj.org.

Review Questions

A. Fill in the blanks

1. E-journal is the _____ form of its print counterpart.
2. Electronic serial is a continuing resource that is _____ via _____ network.

B. Multiple Choice Questions

Tick the correct answer

1. What does PDF stand for?
   - (a) Printable defined format
   - (b) Portable document format
   - (c) Printable document file
   - (d) Principal document format
2. Find out the most suitable feature of E-journal.
   - (a) Online access
   - (b) Access by multiple users
   - (c) Saves physical storage space
   - (d) All of the above

C. Short Answer Questions

1. What do you mean by E-journals?
2. What are pros and cons associated with the e-journals?
3. What are the main features of e-journals?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for Assessment Activities.

Part-A

1. Understood the basic concept of e-journal.
2. Understood features, benefits and drawbacks of E-journal.
3. Differentiated E-journal and printed journal.
4. Understood open access journal.

Part-B

1. What is an E-journal?
2. What are different features, benefits and drawbacks of E-journal?

3. Differentiate E-journal and printed journal.
4. What is an open access journal?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain E-journal.		
Able to identify different features, benefits and drawbacks of E-journal.		
Able to differentiate E-journal and printed journal.		
Able to explain an open access journal.		

(c) E-Newspaper

The E-newspaper is often associated with an existing print newspaper. These days all most all the newspapers publish their electronic version of the same newspaper which is being published in print form. One can access electronic version of any newspaper of the world on internet from anywhere in the world. This version of newspapers become helpful to all in general but specially to those persons who are away from their region or nation but wish to keep track on the news of the their region or nation. Here, a few newspapers from the world has given bellow with their website address for your convenience.

- The Guardian, http://www.theguardian.com
- The Hindu, www.thehindu.com
- The Hindustan Times,http://www.hindustantimes.com/
- The Times London, http://www.thetimes.co.uk
- The Times of India, http://timesofindia.indiatimes.com
- The Washington Post, http://www.washingtonpost.com

Figure 4.5: E-Newspaper

(d) E-Database

An E-database is an organized collection of information, on a specific subject or multidisciplinary subject area. The information of an E-database can be searched and retrieved electronically with the help of personal computers, tablets, mobile phone, etc. The type of database on the basis of its content may be:

- Bibliographic Database
- Full-text Database
- Numerical and Statistical Databases
- Images Database
- Audio Database
- Video Database
- Multimedia Database

Bibliographic Database

Bibliographic database is a database of bibliographic records, an organized digital collection of references to published literature, including journal and newspaper articles, conference proceedings, reports, government and legal publications, patents, books, etc. In contrast to library catalogue entries, a large proportion of the bibliographic records in bibliographic databases describe analytics (articles, conference papers, etc.) rather than complete monographs, and they generally contain very rich subject descriptions in the form of keywords, subject classification terms, or abstracts.

The Indexing and Abstracting Databases is one of the categories under the bibliographic databases. The database provides bibliographic information along with the abstract of the articles, published in different journals. Such databases are usually subject specific. There are a number of such databases in different subject area. For example, LISA i.e. Library and Information Science Abstract is an international database in the field of Library and Information Science, which index journals, conference proceedings, book reviews, and research reports of the subject from more than 68 countries and in 20 languages. In the field of biomedical science, the National Library of Medicine, United States of America maintains such database known as Medline. It is available on internet as PubMed (http://www.ncbi.nlm.nih.gov/pubmed). You can search the database and see the references. It is free of cost.

Examples:

- **INDMED: Index to Indian Biomedical Journals** (http://indmed.nic.in/) the ICMR-NIC Centre for Biomedical Information (Indian MEDLARS Centre) has designed and developed a bibliographic database from Indian biomedical literature. To start with 75 prominent Indian journals, have been selected to build up the database entitled IndMED. The coverage of database is from 1985.
- **ISID Index to Indian Social Sciences Journals** (http://isid.org.in/) indexes around 125+ Indian Social Science journals enabling users to search for references on the

basis of string (series of characters) either for author's name, or words in titles for selected journals. Most of the journals are indexed from the first volume. Also indexes press clippings taken out from 14 India's English dailies. Access is free with simple registration. [Click on Databases to go to login page].

- **AgEcon** (http://ageconsearch.umn.edu/) search collects, indexes, and electronically distributes full text copies of scholarly research in the broadly defined field of agricultural economics including sub disciplines such as agribusiness, food supply, natural resource economics, environmental economics, policy issues, agricultural trade, and economic development.
- **Agricultural Online Access** (Agricola) (http://agricola.nal.usda.gov/) is an index to all aspects of agricultural sciences.

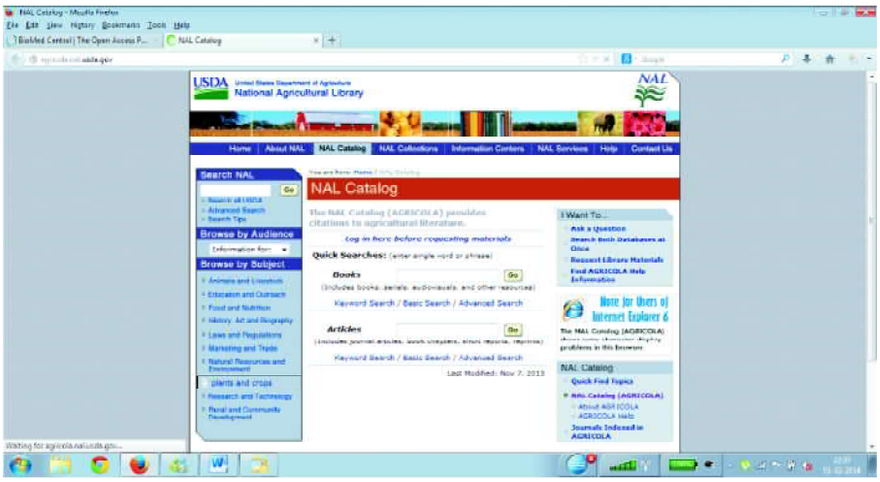


Figure 4.6: Bibliographic Database Access Portal

Full-Text Databases

The Full-text databases are databases that provide full text of articles published in the journals that they index. The availability of full-text articles depends on whether they are open access (free) or on the Library's subscription agreements with each publisher or aggregator.

Examples:

- **Economic History Encyclopedia Index** (http://eh.net/encyclopedia/) here search can be made for high quality full articles related the area of Economic and Business History.
- **Scientific Electronic Library Online** [SCIELO] (http://www.scielo.org/) is a model for cooperative electronic publishing of scientific journals on the Internet. Especially conceived to meet the scientific communication needs of developing countries, particularly Latin America and the Caribbean countries, it provides an efficient way to assure universal visibility and accessibility to their scientific literature, contributing to overcome the phenomena known as "lost science".

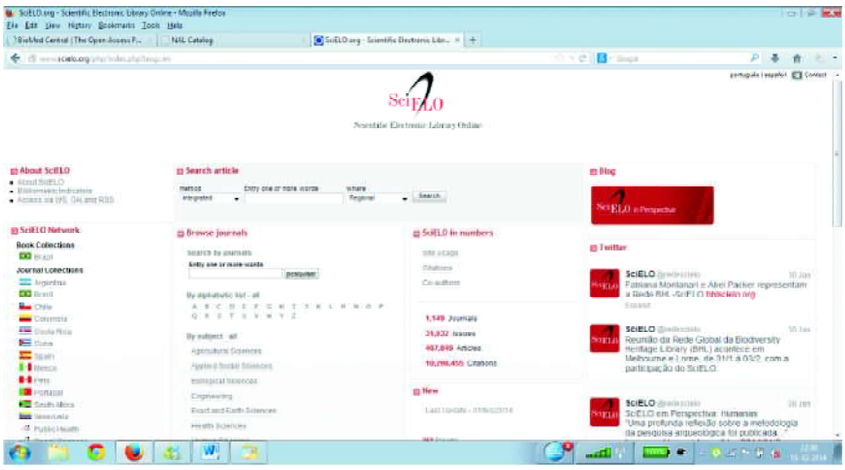


Figure 4.7: Full Text Database

Numerical and Statistical Databases

The numeric and statistic database contains the numeric data based on some characteristics. For example database census of a nation, database of accounts of an organization, database of the results of an experiment, etc. such databases are needed for reference, planning and decision making, analyses, etc.

Example:

Census of India (http://censusindia.gov.in/): The database is created and maintained by the Office of the Registrar General and Commissioner, India.

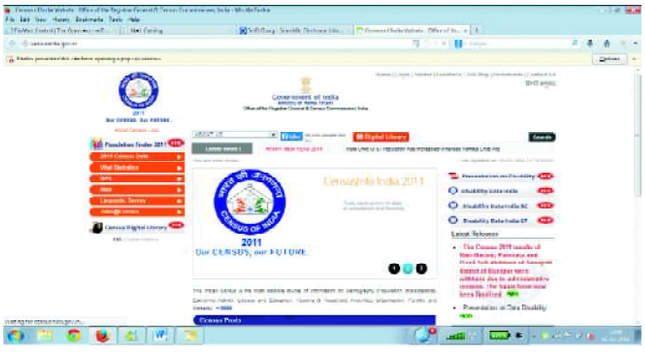


Figure 4.8: Numerical & Statistical Database

Images Database

The image database is a collection of images in digital form along with the description about the images. Such databases are being created on the basis of some characteristics and purposes. For example, the database of the images of slides, writers, leaders, sports persons, famous personalities, etc. Some of the libraries also maintain such databases for the members or official use.

Example:

- Kamat Research Database-Old Photographs of India (http://www.kamat.com/database/content/old_photo/).

- Families in British Indian Society, Image Gallery (http://www.gallery.fibis.org/).
- Oriental Bird Images-a database of the Oriental Bird Club (http://orientalbirdimages.org/).

Figure 4.9: Image Database

Audio Database

The audio database is the collection of audio materials as songs, sound of instruments, speeches of leaders, thinkers, scientists, etc, audio books and so on. Each and every record is being created with full details so it can be searched and retrieved from the database. You would oftenly downloading songs from the internet. The organizations providing downloading facilities, maintains the songs in the form of database with complete descriptions as in case of songs from movies then, lyricist, composers, singer, title of the movie, the song filmed on the characters, etc.

Example:

- Indian Music Library-Twaang- a database of Indian Music maintained by the Google play and is freely available for listening. (https://play.google.com/store/apps/details?id=com.twaang.app&hl=en).

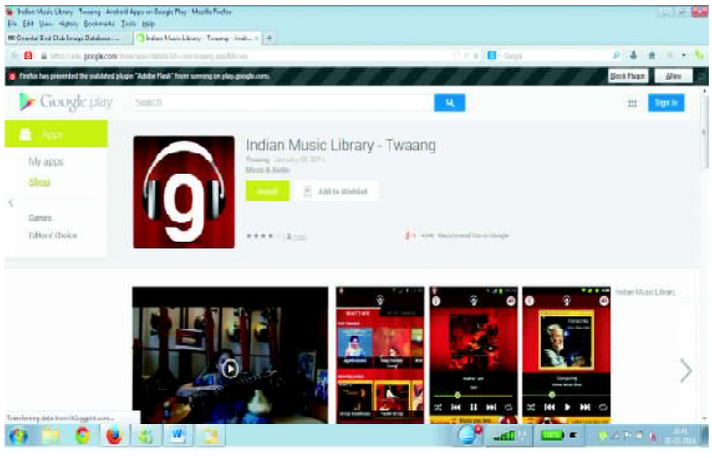


Figure 4.10: Music Database

Video Database

The video database is the collection of videos with descriptions and search ability. You might have seen, and uploaded as well downloaded video from internet. There are a number of organizations to create, maintain and provide access to video databases. For example, a database of Hindi films, documentaries on different subjects or themes, education ware, etc.

Example:

- YouTube (www.youtube.com)

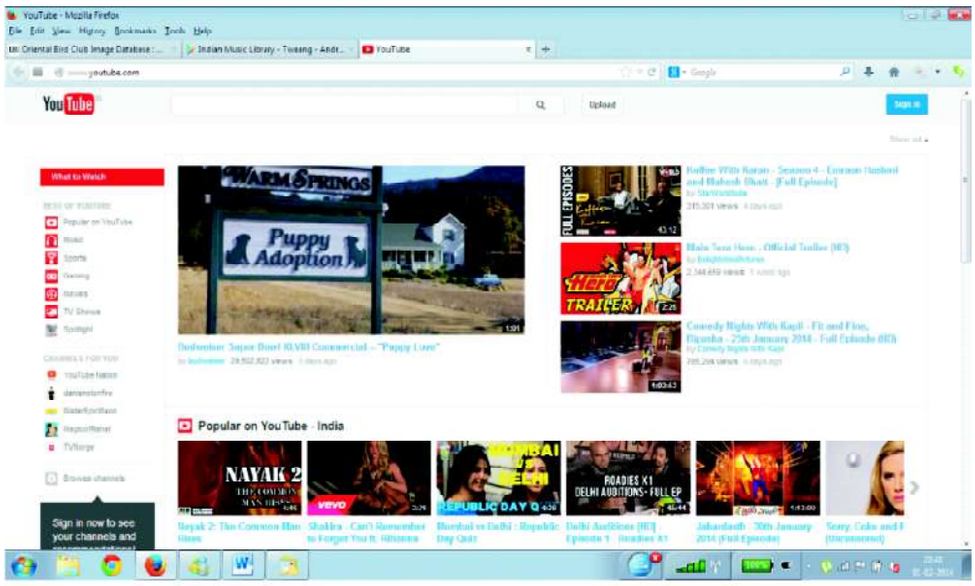


Figure 4.11: Youtube

Multimedia Database

The multimedia is such a content or document which uses media as audio, video, animation, text, images, graphics, drawings, etc. Some of these or all of them may be fussed for the purpose of creating content on a topic or subject. The database of such contents known as Multimedia database. Especially in education sector, such databases are created and provided for engaging students in better way. For example, the Indira Gandhi National Open University and National Council of Education Research and Training, create and maintains maintain such database in the field of education. You can also get such content on www.youtube.com.

Review Questions

A. Fill in the blanks

1. One can access electronic version of any newspaper which is being published in _____.
2. An e-database is an organized collection of _____ on a specific subject or multidisciplinary subject area.

B. Multiple Choice Questions

Tick the correct answer

1. Under which category of database, Indexing and abstracting database fall?
   (a) Video database
   (b) Audio database
   (c) Full text database
   (d) Bibliographic database
2. Identify a web portal which provides access to multimedia database.
   (a) www.youtube.com
   (b) http://isid.org.in
   (c) www.scielo.org
   (d) http://censusindia.gov.in

C. Short Answer Questions

1. What do you mean by E-database?
2. What do you mean by bibliographical databases?
3. What do you mean by full text database?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for Assessment Activities.

Part-A

1. Understood E-newspaper.
2. Explained different types of database.

Part-B

1. What is E-newspaper?
2. What are different kinds of database?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain E-newspaper.		
Able to explain different kinds of database.		
Accessed different kinds of database on internet.		

(e) Subject Gateways

Internet with its growing resource base, contains rich information on various subjects, one can even say that the Internet is a living library where one can find up-to-date information on various subject.

However, a major challenge faced by the internet user is lack of proper mechanism to spot the right information from an authentic source. When we search any information from a search engine such as Google (http://www.google.com), it display thousands of results. For reaching to the desired resources, weeding out the unnecessary sites that usually come out of the search process is tiring and time taking job.

One solution that has been developed to tame this kind of problem and facilitate the users, get the desired information with minimal efforts, is the service known as subject gateways. The common definition describes it as internet-based service; provide unified access to a collection of high quality, evaluated resources in a particular discipline at one place. The users find databases, digital libraries, selected web resources etc, on a given subject or discipline. Resources on subject gateways are selected by editorial review process hence, there is not any problem of authentication.

Salient Features of Subject Gateway

The salient features of the subject gateway may be described as:

Subject Specific: - gateways are subject-centric. They host information related to a particular subject only.

Quality of resources: - a significant feature of a subject gateway is that the selection of resources is based on the scope of the content and its relevance with the subject are of the gateway. The quality of the selected content is high as they are selected on the basis of some criteria such as originality, relevance, etc.

Scientifically organized data: - The resources collected by the gateway subject experts are properly catalogued and classified using data organization and classification schemes.

Example:

- Inflibnet-an Indian organization created by University Grant Commission of India to network the Libraries and Information Centers of Indian universities, institutions of higher studies, etc. It provides subject gateway which can be accessed at http:// infoport.inflibnet.ac.in/index.aspx
- North-Eastern Hill University Library at http://www.nehu.ac.in/library/sig.html

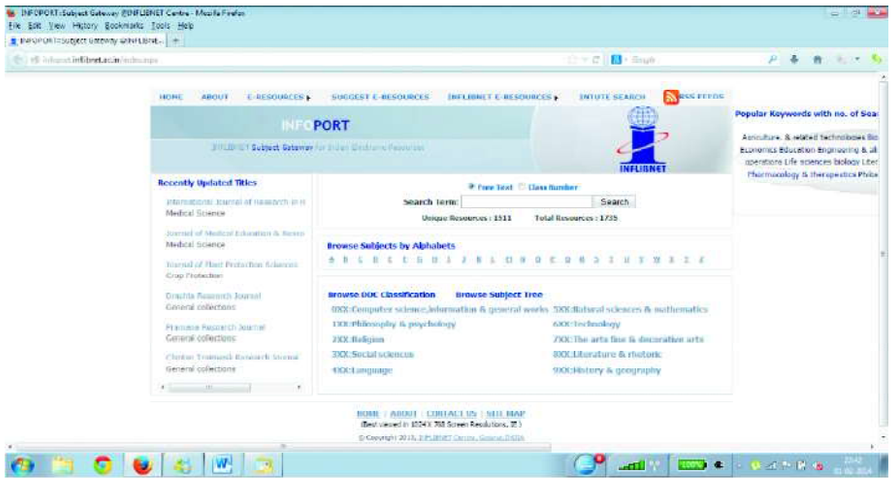


Figure 4.12: Subject Gateway

(f) Other E-resources

Other than the E-resources discussed above there are a number of documents which are available in electronic format. For example the theses submitted for Ph.D. degrees, Dissertations, different reports, government's documents, judgments of different courts, etc.

Review Questions

A. Fill in the blanks

1. Subject gateway provides access to a collection of high quality, evaluated resources in a particular _____ at one place.
2. The resource collected by the subject gateway are properly _____ and _____ using data organization and classification schemes.

B. Multiple Choice Questions

Tick the correct answer

1. How can a subject gateway be accessed?
   - (a) Through internet
   - (b) On CD-ROM/DVD ROM
   - (c) Through Newspaper
   - (d) Through journals

C. Short Answer Questions

1. What is a subject gateway?
2. What is the purpose of subject gateway?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for Assessment Activities.

Part-A

1. Understood subject gateways.
2. Accessed different subject gateways on internet.

Part-B

1. What is subject gateway.
2. Identify different features of subject gateway.
3. Access different subject gateway on internet.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain subject gateways.		
Identified different features of subject gateways.		
Access different subject gateways.		

4.3 Categories of E-resource on the Basis of Accessibility

On the basis of accessibility, the E-resources can be put in two groups:

(a) On-Line E-Resources

(b) Off-Line E-resources

(a) On-Line E-Resources

The electronic resources accessed with the help of internet or some other network are called On-line E-resources. Such resources could be any things as Books, Journals, Maps, Images, Sound files, Video files, Animation, or multimedia, etc. There are two types of online resources available on internet, one is paid or subscription based and other is open source. The paid resources are those for which the owner of the resources or their vendor charge certain amount for either downloading of browsing online. In the case of open sources, the users are provided the resources free of cost. The greatest feature of the online resources is that the same information can be accessed by many persons simultaneously. These days, the libraries are providing online information to their members through internet. The members log in to the web site of the library through their log in identifier (log in ID) and password and then get access to the on-line E-resources of the library whether they are at the web site of the library or at the vendor or publishers website.

(b) Off-Line E-Resources

The E-resources provided on CD-ROM, DVD or any other storage media for the purpose of access are known as off-line E-resources. These E-resources are accessible within the organization. Technologically, it is possible to provide the access of these off-line resources remotely but the moment it would do so, they will fall in the category of online E-resources.

4.4 Advantages and Disadvantages of E-Resources

Advantages of E-Resources

Under different categories of e-resources, we have discussed category specific advantages to the users as well as libraries. The advantages of the E-resources in comparison with print resources is high. The library gets much more benefits from such resources to provide better and efficient services to its members and also saves its own resources. Some of the benefits are as follows:

(i) **Multiple Access:** Same E-Resources can be accessed by many readers simultaneously.

(ii) **Remote Access:** A reader can read or download E-Resources from the compatible devices as Desktop Computer, Laptop, Tablets, Smart Phone, etc, from his/her own place through the Internet.

(iii) **Speed:** The delivery of E-Resources is fast. It can be accessed from anywhere in the world within a few second, if available on-line.

(iv) **Functionality:** Analysis of the content of E-Resources can be done with the click of mouse. The hyperlinked E-Resources have the facility to navigate through the associated materials, references, etc, if those are also available on-line. The navigation within the document becomes easy when proper hyperlinks are provided.

(v) **Content:** New genre of contents has become easy to design and publish because of this format. For example animation, multimedia, etc. E-Map is one of the important resources, helping people day and night in locating places, natural resources, etc, on the same window with the click of mouse.

(vi) **Space:** The E-Resources saves physical space to store as a large volume of

information can be stored in a very small storage devices like, Hard Disc Drive, Pen Drive, Secured Digital Memory Card(SD Card), etc. Because the storage devices, digital collections are being developed easily and offered to the users.

Disadvantage of the E-resources

The E-Resources having some disadvantages also as:

(i) **Copy Right:** The copyright is the legal right given to the creator of the content of the information resources, music chord, paintings, or any intellectual properties. This is being provided under the law of any nation. If any information resources, protected by the copyright, then it is always necessary to take permission from the owner of the resources to read, download or browse. If author has not put the resources in free of cost domain then a certain price is to be paid to the owner of the resources.

(ii) **Computer or other Device:** The computer, laptop, smart phone or any other suitable device is needed to read, browse or download E-Resources. Specially, a large population in the developing country are not able to get such devices.

(iii) **Access to Network:** E-Resources are accessible through internet or any other network but, especially in rural areas, a large population of developing countries are not able to get access to network.

(iv) **Skills:** Searching, retrieving and making use of E-Resources require a certain level of skill. Very large population in developing countries are not having such skills.

(v) **Cost of the Resources:** The cost of E-Resources is very high in comparison to printed resources.

(vi) **Language:** Very less E-Resources are available in vernacular languages.

Review Questions

A. Fill in the blanks

1. Online E-resources are accessed with the help of _____ or some other networks.
2. E-resources can be accessed by many readers _____.

B. Multiple Choice Questions

Tick the correct answer

1. What is the cost of proprietary E-resources in comparison of printed resource?
   (a) Very high
   (b) Very low
   (c) Equal
   (d) None of the above
2. The legal right given to the creator of content is known as:
   (a) Copyright
   (b) Selling right
   (c) Printing right
   (d) Mutual right

C. Short Answer Questions

1. What do you mean by multiple access?
2. Why does E-resources save physical storage place?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activities.

Part-A

1. Understood online and off-line E-resources.
2. Identified advantages and disadvantages of E-resources.

Part-B

1. Differentiate online and off-line resources.
2. Identify the advantages of E-resources over printed resources.
3. What are disadvantages of E-resources?

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain online and off-line E-resources.		
Able to identify advantages of E-resources over printed resources.		
Able to identify disadvantages of E-resources.		

4.5 Summary

Electronic resources are growing and taking and getting more and more acceptance by the mass. It has become an important resource of the wish list of libraries and the expectations of the users. E-resources and combined with communication technologies provides opportunity to the libraries for providing direct access to resources rather acquire and house them. Access can be directed to a user's home or workplace, allowing end users to make independent choices about what they want, from what sources, and how quickly. User gets more accurate and complete data with less effort in the electronic environment. It is up to librarians to make effective use of the data to provide the right information at the right time at the right cost.

For this purpose, the libraries has a numbers of E-resources to develop it electronic collection and provide better services. All most all the traditional information sources are coming in electronic format. Apart from the traditional sources, new genre of sources have born. These electronic sources has given users, the freedom from time and space in accessing library services.

4.6 Exercise

1. What are different devices through which the E-resources are accessible?
2. Write down the various E-book formats.

3. Write down the difference between E-book and printed book.
4. Write a brief note on advantage of an E-book to a user and a library.
5. How specialized Subject gateways are helpful to the information seekers?
6. Explain online and off-line E-resources.
7. What do you understand about the Open access-journals?
8. What are the advantage and disadvantage of E-resources to both users and a library? Explain.
9. What do you mean by phrase full text versus bibliographic database? Explain.

4.7 Practical

1. Search various kinds of e-databases, and give their name also give some description.
2. Download the freely available e-books in different format.
3. Search the subject gateways available on Internet and prepare a short note on them.
4. Survey some the e-book reader available in the market and write down their features.

UNIT - 5

Information Retrieval System

Location	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
• Class room, library or computer laboratory.	• Information Retrieval System: Concept.	• Meaning of IR system. • Functional aspects & types of IR system. • Key characteristics and features of IR system.	• Explain concept, characteristic, features and functions.	• **Interactive lecture:** Discuss concept of information retrieval system. • **Activity:** Visit computer laboratory and show students characteristics of IR on internet.
	• Search Strategy: The Action Plan.	• Search strategy: basic steps. • The searching process. • Methods to perform a search on the internet and finding information precisely.	• Explain Information searching process conducted by user and explore various methods toimprove search.	• **Interactive lecture:** Discuss search strategy, searching process and methods. • **Activity:** Visit computer laboratory and perform the search on the basis of strategy and methods. .
	• Search query formulation process for information retrieval on internet.	• Web information search process by search engines.	• Able to formulate search query and information retrieval on Internet.	• **Interactive lecture:** Discuss search query formulation and conducting search on internet. • **Activity:** Visit computer laboratory & show students formulation search query and conducting search.
	• Search technique and methods used.	• Know the varieties of ways and methods to search information on the web.	• Able to identify different technique and methods used for refining search.	• **Interactive lecture:** Discuss different methods or techniques for refining search.

				• **Activity:** Visit computer laboratory & show students methods and techniques of refining search and their results.
	• Practical.	• Enhance skills of searching the required information precisely using search process and techniques.	• Identify the different technique and methods used for searching and retrieving information from web. • Able to follow basic step to conduct searches to retrieve information.	• **Interactive lecture:** Discuss process of using different web tools. • **Activity:** Visit library and ask students to perform searches using techniques discussed to retrieve information & also refine search and find the difference in results.

5.1 Information Retrieval System: Concept

The concept of information retrieval system is self-explanatory from the terminological point of view and represents itself as a 'system which retrieves information'. The term "information retrieval" coined in 1952 and gained popularity in the research community from 1961 onwards. IR systems are concerned with two basic aspects:

a) How to store information

b) How to interpret its structure

One may simply denote such a system as one that stores and retrieves information. As a system, an IR system is therefore composed of a set of interacting components, each of which is designed to serve a specific function for a specific purpose and all these components are interrelated to achieve a goal. The concept of IR thus pre-supposes that there are some items of information, which have been keeping organized in any suitable order for easy retrieval.

According to Lancaster, "an information retrieval system does not inform (i.e. change the knowledge of) the user on the subject of his inquiry. It merely informs him of the existence (or non-existence) and where about of documents relating to his request".

According to Spark Jones, an IR system is a set of rules and procedures, for performing some or all of the following operations:

a) Indexing (or constructing of representations of documents);

b) Search formulation (or constructing of representations of information needs);

c) Searching (or matching representations of documents against representations of needs);

d) Index language construction(or generation of rules of representation).

So, information retrieval collectively is defined as a "science of search" or a process, method, and procedure used to select or recall recorded and/or indexed information from files of data.

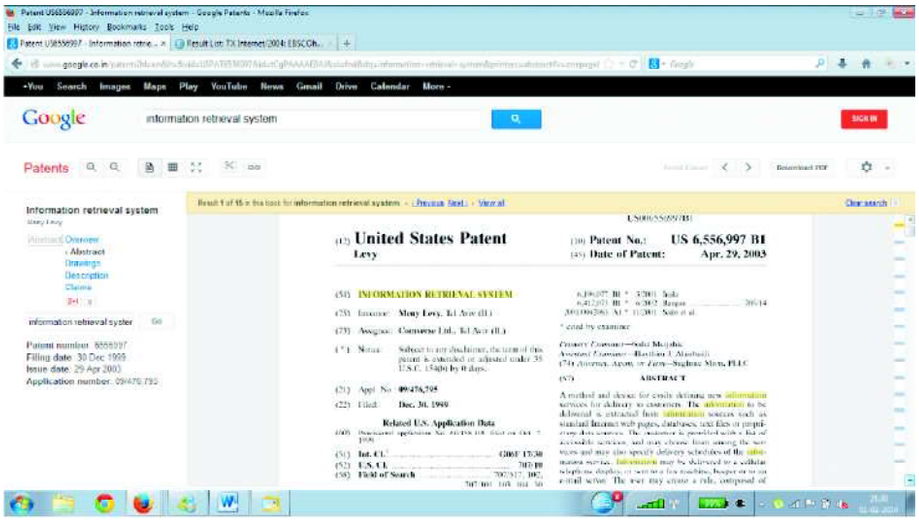


Figure 5.1: Information Retrieval System

5.1.1 Components of an IRS

Lancaster [1979] mentions that an IRS comprises of the following components:

a) The Document Subsystem

b) The Indexing Subsystem

c) Vocabulary Subsystem

d) Searching Subsystem

e) User-System Interface

f) The Matching Subsystem

(a) The Document Subsystem: it involves the location, selection, ordering and receipt of source materials for collection. This process emphasis on two aspects: Currency of information and Completeness of information, both consist of the following tasks :

- Determination of current and probable future requirements of potential users of IRS.
- Formulation of a policy acceptance of source material as defined by subject coverage, publication type, or other criteria.
- Comparison of available or incoming source materials with policy to determine which shall be included in the IRS.

(b) Indexing Subsystem and Vocabulary Subsystem: This system is for naming subjects in the way we have described called an indexing language and/or any other language. It consists of two parts (a) Vocabulary and (b) Syntax.

If we use term as they appear in documents without modification, we are using natural language. In this process, we face problems arising out of:

- The use of words/terms; or else.
- Use of the word order (syntax).

For example, “child psychology” may express as “psychology for children”. Therefore, a

controlled vocabulary is used. Vocabulary control involves the establishment of relationships among analytic, often an arbitrary basis, but most of them based on the prediction of those relationships that may facilitate identification of all source materials that have been indexed.

For example: Instead of **Children's libraries,** we use **libraries and children**

A controlled vocabulary is a part of an artificial indexing language. The notation of a classification scheme is an example of this artificial language. Therefore, it is necessary to know that all classification schemes controlled by the thesaurus based relationships. The thesaurus is a tool that shows explicitly the relationship among the words it contains. The relationships may be of synonym terms, Specific to generic (BT/ broader term), Generic to specific (NT/ narrower term) and General or non-specific relationship (RT/ related term).

(c) Searching Subsystem: Searching subsystem is one of the major subsystems of an information retrieval system. In this subsystem, at the beginning users' queries are being received and interpreted by the search system, then appropriate search statements are formulated, and the actual search (i.e., matching queries with the surrogates of information resources file) is conducted with a view to retrieving the required information.

(d) User-System Interface: The receiver of information bearing documents becomes a source, encoding the message in form of an inquiry when we discover any information in our store, which appears to match the inquiry, and we can pass them to the enquirer, who can decide whether they match his requirements.

(e) The Matching Subsystem: It matches the document representation against request representation that is when documents relevant to query have located, a match has achieved. Search engine acts as a giant matching device. The matching subsystem has no direct influence on effectiveness of the complete system. It plays a great role in overall system efficiency.

5.1.2 Functions of an IRS

The Major Functions of an IRS are:

- To identify the sources of information relevant to the areas of interest of the target users' community.
- To analyze the contents of the sources (documents).
- To represent the contents of the analyzed sources for matching with the users' queries.
- To match the search statement with the stored database.
- To retrieve information which are relevant.
- To make the necessary adjustments in the system based on feedback from the users.

5.1.3 Features of Information Retrieval Systems

Based on the functional aspects two broad categories of Information Retrieval System can be identified: I) In-house and II) Online.

In-house information retrieval systems are set up by a particular library or information centre to serve mainly the users within the organization. One particular type of in-house database is the library catalogue. Online public access catalogues (OPACs) provide facilities for library users to carry out online catalogue searches, and then to check the availability of the required information source.

Online information retrieval systems is one which have been designed to provide access to remote database(s) to a variety of users, via a computer terminal directly interrogate a machine readable database. The main features or characteristics of online IRs are:

- The terminal can be remote.
- Time sharing so several users can be online at one time.
- Information is communicated instantaneously.

There are a number of public as well as commercial databases available in the market and there are a number of vendors that handle this sort of service. With the development of optical storage technology, another type of information retrieval system appeared on CD-ROM (compact disc read-only memory). Information retrieval systems based on CD-ROM technology are available mostly on a commercial basis, though there have been some free and in-house developments too. Basic techniques for search and retrieval of information from the in-house or CD-ROM and online information retrieval systems are more or less the same, except that the online system links to users at a distance through the communication network.

Recent developments in computer and communication technologies have widened the scope of online information retrieval systems. The Internet and World Wide Web have made information accessible to anyone virtually anywhere with the help of an appropriate equipment. This has led to the concept of a digital global library system, where information can generate and made available in electronic form on the Web from any corner of the world. This of course involves a number of technical and management issues that need to be resolved in order to make the global digital library concept a reality.

5.1.4 Types of IR System

The IR system may be of different types depending upon the search conducted by the information seeker. As a whole it can be categorized namely as:

- **Reference Retrieval System:** Information related to specific questions is retrieved.
- **Document Retrieval System:** Information can retrieve by the attributes of documents such as author, title, subject, and so on. Nowadays, complete texts are also retrieved, so called text retrieval system.
- **Fact Retrieval System:** The specific data or facts are retrieved (viz., numerical databases).
- **Knowledge Retrieval System:** Is a rule-based system in which there is a knowledge base with capability for knowledge acquisition and an inference engine.

Review Questions

A. Fill in the blanks

1. Information retrieval system is a system of _____ information.
2. The document subsystem involves the location, selection, ordering and receipt of _____for collection.
3. The matching subsystem matches the document representation against _____ _____ representation.

B. Multiple Choice Questions

Tick the correct answer

1. Retrieval of information related to specific questions is known as:
   (a) Document retrieval system

(b) Reference retrieval system
(c) Fact retrieval system
(d) Knowledge retrieval system

2. What are the two categories of information retrieval system?
   (a) In-house and online
   (b) Off-line and book
   (c) Online and journals
   (d) None of the above

C. Short Answer Questions

1. What do you mean by the IRS?
2. What do you mean by indexing subsystem?
3. What do you mean by searching subsystem?
4. What do you mean by a document retrieval system?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part -A

1. Understood concept of information retrieval system.
2. Understood components of information retrieval system.
3. Discussed the features of information retrieval system.
4. Identified different functions of information retrieval system.
5. Identified different types of information retrieval system.

Part-B

1. What is information retrieval system?
2. Identify different components of information retrieval system.
3. Discussed features of information retrieval system.
4. Identified different functions of information retrieval system.
5. Identified different types of information retrieval system.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain information retrieval system.		
Able to identify different components of information retrieval system.		
Able to discuss features of information retrieval system.		
Able to identify different types of information retrieval system.		

5.2 Search Strategy: The Action Plan

Searching is an important function of an IRS. It may be search for information or for documents, such as books, periodicals, patents, theses, etc. Essentially, it is a problem solving exercise. The process of searching in an information retrieval system can be manual or on-line. In any case, the searcher needed information of the user verbalized and translated into a query posed to a search engine. At the end, the matching results produced by the searching process. The search result is heavily dependent upon the correct understanding of the users precise needs and translation of the need into the form of a query. Therefore, a cognitive aspect of interaction between human and search system has always been established to drive out the exact result. A diagram of an ideal search process has given below in the Figure-5.1.

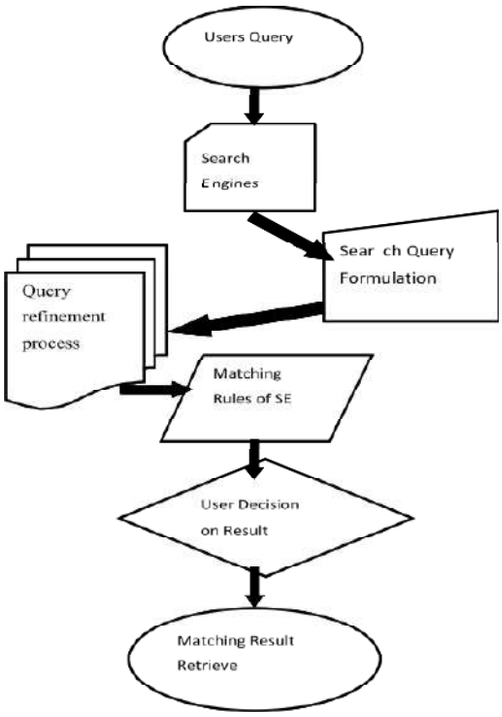


Figure 5.2: Information Search Model

5.2.1 Search Strategy and its Prerequisites

As stated above search strategy is the action plan, which is drawn to conduct a search. It encompasses several steps and levels of work in information retrieval process. Many issues need to be considered while formulating an appropriate search statement. These are:

a) The concepts or facets to be searched and their order.

b) The term(s) that appropriately represent(s) the search concept.

c) The feature(s) of the retrieval system concerned.

d) The measures to be taken in revising a search statement.

Developing a good search strategy requires knowledge about the nature and organization of target database(s) and the exact needs of the user. Knowledge of the users exact requirement can greatly affect the actual search and retrieval process. In some cases, the user may want only a few relevant items on a given topic, in this case the task of searching will obviously be limited. Conversely, the user may wish to obtain all the relevant items (obviously with as small a number of non-relevant items as possible), in this case the search must be exhaustive. Thus, an information search may fall into one of the following three categories [Chowdhury, 2004];

a) **High Recall Search :** When the user needs to find out all the relevant items on the stated topic.

b) **High Precision Search :** When the user needs only relevant items, i.e., as small a number of non-relevant items as possible.

c) **Brief Search:** When the user wants only a few relevant items as opposed to all the relevant items.

5.2.2 Search Strategy : The Basic Steps

While there are several methods of searching which depends on the information need, file organization and storage media. The basic steps involved in the search process are:

- **Recognise and State the Need** (Includes; developing a query statement and Specify the requirements for the search).
- **Develop the Search Strategy** (This is the query formulation steps, the specification of the conceptual entities and their relationships (based on the query statement) and select the source to be searched and arrange them in a search sequence and translation of the conceptual query into the language of each source or system).
- **Execution of the Search Strategy** (For executing the search, one has to have knowledge of the data structure and search mechanisms of the sources to be searched).
- **Review Search Results** (In reviewing search results, the criteria mentioned namely precision, recall, avoidance of redundancy, novelty, numerical precision, validity, accuracy and display are considered. It helps user to get the matching results or else provide scope for edit/modify the search for further results).
- **Edit Search Results** (By editing it is meant that the transformation of the search results into an usable format. This may involve arranging the results in a well- organised package, Highlighting the important entitles, Adding more information to the entitles and reformating of information to suit the users requirement or need).
- **Evaluation of the Results by the User** (This involves participation of the searcher and/ or the user to quantify his/her search results to use. Obiviosly the quality of the search is the dominant criteria on which one bases searcher' judgement).

However, searching is not a linear process that processes smoothly from one step to the next. There is a certain degree of overlap among the functions. The sequence of steps enumerated above may be followed for better results. At this point, it would be appropriate to mention that the real need of the user (which may be different from the expressed need) may surface only after he has scanned through the search result. In searching for information, the searcher is guided by his/her perception of the need expressed by the user. This perception, in its turn, is governed by the searcher's knowledge of the user and his background, the working situation giving rise to the need, his own knowledge of the subject of the search, the availabilty of information or entitles in general and individual sources-their coverage and searchability, etc.(Soergel,1985).

5.2.3 Search Strategy and the User

In web context, in fact search is pursued by the user; with the intention, intelligent and decision to meet the challenges of information retrieve. We can take the example of descriptions given by Broder, who, categorizes the intentions or purpose framing web query and conducting the search into three categories namely (3) clauses with respect to user intention. These are:

- **Navigational:** The purpose of such queries is to reach a particular site that the user has in mind either because they visited it in the past or because they assume that such a site exists. The immediate intention for such type of query is to reach the particular site at the first attempt.

- **Informational:** For such type query, the intention is to acquire information assuming it would be present on that webpage or related to that may available. The purpose of such queries is to find exact information assumed to be available on the web in static form so user need to interact or read out the content for getting out result.
- **Transactional:** The intention is to perform some web-mediated activities; the purpose of such queries is to reach a site where further interaction will happen. This interaction constitutes the transaction defining these queries. The main categories of such queries are finding various web-mediated services, downloading various type of file, accessing certain databases etc.

  Therefore, depending upon the approaches of users it would be essential for information designed to evaluate the behaviour patterns of information seekers before architect information for use in web.

5.2.4 Search Strategy: The Basic Steps

Step-I : State what you want to find?

- At the beginning, the user must choose some keywords, subject description, and/or sentences, what he/she wish to find one.

Step-II : Identify the keywords, terms, Phrase

- Next, underline the main concept in statement.

  For example; I want to find information on popular methods for losing weight.

Step-III : Select Synonyms and Variant words from the List

- Listing of synonyms, alternate spelling of each keywords.

  E.g., Popular – Common, Favorite;

  Method – Technique, Ways;

  Loosing – Loss, reduce

  Weight – fat, diet.

Step-IV : Combine Synonyms Keywords through operators (OR, NOT, AND)

- E.g. (Popular OR common OR Favorite).
- Use truncation methods (popular*)
- Popular AND (way OR methods).

Step-V : Check your Spelling

- In order to get the right results for the query.

5.2.5 Search Strategy: How to Improve

To improve the result of a search, one should follow different search technique (as discussed in 5.4 columns below). These techniques can be operational only when searchers review the query terms. It has been discussed above in search strategy action plan processes (5.2.2) as it may be broadened or narrowed down the search on the basis of the review.

Figure 5.3: Search Strategy

Review Questions

A. Fill in the blanks

1. At the end of the search process, matching _____ produced.
2. Developing a good search strategy requires knowledge about the nature and organization of target _____ and the exact needs of the users.

B. Multiple Choice Questions

Tick the correct answer

1. Finding out all the relevant items on the stated topic is known as:
   - (a) High precision search
   - (b) High recall search
   - (c) Brief search
   - (d) None of the above

2. Specify the requirements and developing query is known as:
   - (a) Recognize and state the needs
   - (b) Develop search strategy
   - (c) Review search result
   - (d) Evaluation of result

C. Short Answer Questions

1. What do you mean by search query?
2. What is needed for developing a good search strategy?
3. What is the statement of the need?
4. What do you mean by the development of a search query?
5. What are three different searching intentions of users?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part -A

1. Understood search strategy.
2. Identified basic steps of search strategy.

Part-B

1. What do you mean by search strategy?
2. Explain different steps of search strategy.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain search strategy.		
Able to explain different steps of conducting search.		

5.3 Search Query Formulation Process for Information Retrieval on Internet

While user focuses on “search”, the search and matching function are undergoing through the following four phases; that is

a. Document Processor

b. Query Processor

c. Search Matching Function

d. Ranking and Feedback

Each of these four phases may cause the expected or unexpected results that considered getting when they use a search engine.

a. **Document Processor:** During this phase, the robot/spider of a search engine crawls the mentioned query and allow user to locate information by specifying its relevancy. In addition to this, the phase of search query formulation, conflation procedure of Term Stemming (e.g., works, worker, worked, etc. into a single root "work"), and deleting Stop Word (like a, an, the) takes place. Then it extracts the list of terms for the next phase of query processor.

b. **Query Processor:** Query processing has six possible steps includes – tokenizing query stream, parsing to use operator (as such AND, OR, NOT), Index documents by sorting and calculating term weight value. Then, it proceeds to make a reverse index, which allows user to view the particular document with a comprehensive list of terms with their term weights. However, the process of computation during this phase has a myth, that is "a list of documents that contain a particular word would be much more useful, rather than a list of words for a particular document". Thus search system designers must choose "what is most important for their users", that is the time or quality. Mostly, the publicly available search engines choose time over quality, which leads to search too many documents against the query.

c. **Search Matching Function:** This is the process of computing to find out the relevancy of a document, by comparing the term weight or similar co-efficient term related to relevant document retrieved from web resources.

d. **Ranking:** Ranking is the analysis phase which analyses retrieved result and find out its relevancy to that particular query. It could be evaluated through the percentage of Recall and Precision value.

5.4 Search Technique and Methods Used

There are multiple methods to apply, to get a refined result from a query. These techniques or methods are available to conduct searches effectively so that, the maximum relevant information is retrieved according to users need. Some common techniques used for searching almost all types of search engine include:

1. Keywords or String Search
2. Phrase Search
3. Subject Search
4. Boolean Operator Used (AND, OR, NOT)
5. Truncation
6. Proximity Search
7. Limiting Search
8. Range Search

5.4.1 Keyword or String Search

Keyword search is the simplest form of search facility, offered by a search system. In this mode, the system searches the inverted file (the index) for each keyword/term forming the search expression. The search terms can be entered through the keyboard, or selected from an index or vocabulary control tool, such as lists subject headings or thesauri. More than one keyword, forming a search expression has to be combined using the Boolean or proximity operators (discussed below).

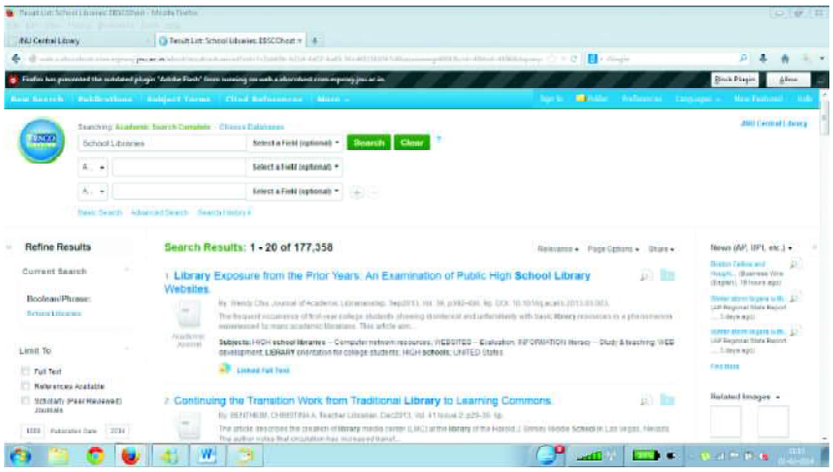


Figure 5.4: String Search

5.4.2 Phrase Search

In a phrase search, the system searches for the entire phrase rather than each individual keyword forming the phrase. Phrase searches can be conducted only on those fields that are phrase indexed. If the index file comprises only single terms, then phrase search cannot be conducted, except using the proximity operators (discussed later in this Unit). Usually, a few fields in a database are phrase indexed; hence, the phrase search can be conducted only in those fields. To search exact phrases, the phrase is being put under quotation mark. For example: **"e-learning", "library management"** and so on.

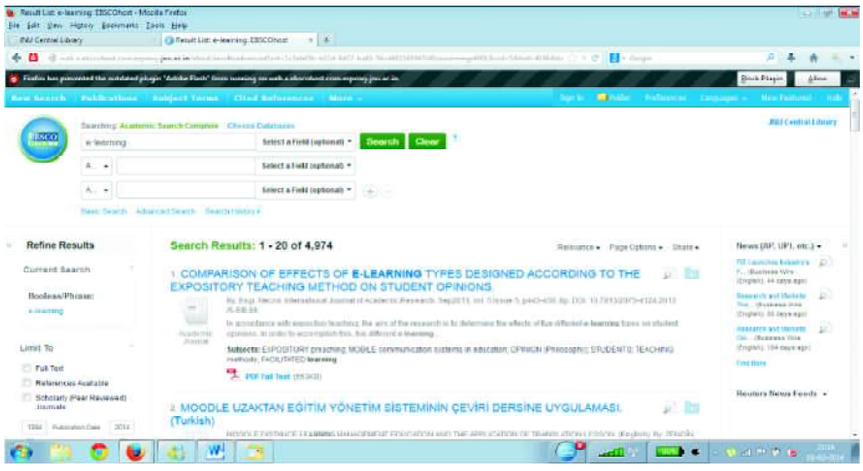


Figure 5.5: Phrase Search

5.4.3 Subject Search

Many bibliographic information retrieval systems provide two types of search facilities, i.e. keyword search and subject search. A keyword search allows users to enter one or more keywords pertaining to their query. Depending upon the requirements, the user can choose these keywords and combine them using different operators. There are a number of search operators that can be used to combine several keywords for formulating a search expression. The search keywords can appear anywhere, or in one or more chosen fields, in the records of the database.

A subject search is the one that allows the user to submit a subject expression that reflects his/her information requirement. Such a search is conducted on the subject field that contains one or more assigned subject headings entered by the indexer while creating the record in the database. Thus, a record will be retrieved only when user's subject search expression exactly matches the subject heading assigned by the indexer.

For Example: Physics, Library, Chemistry, etc.

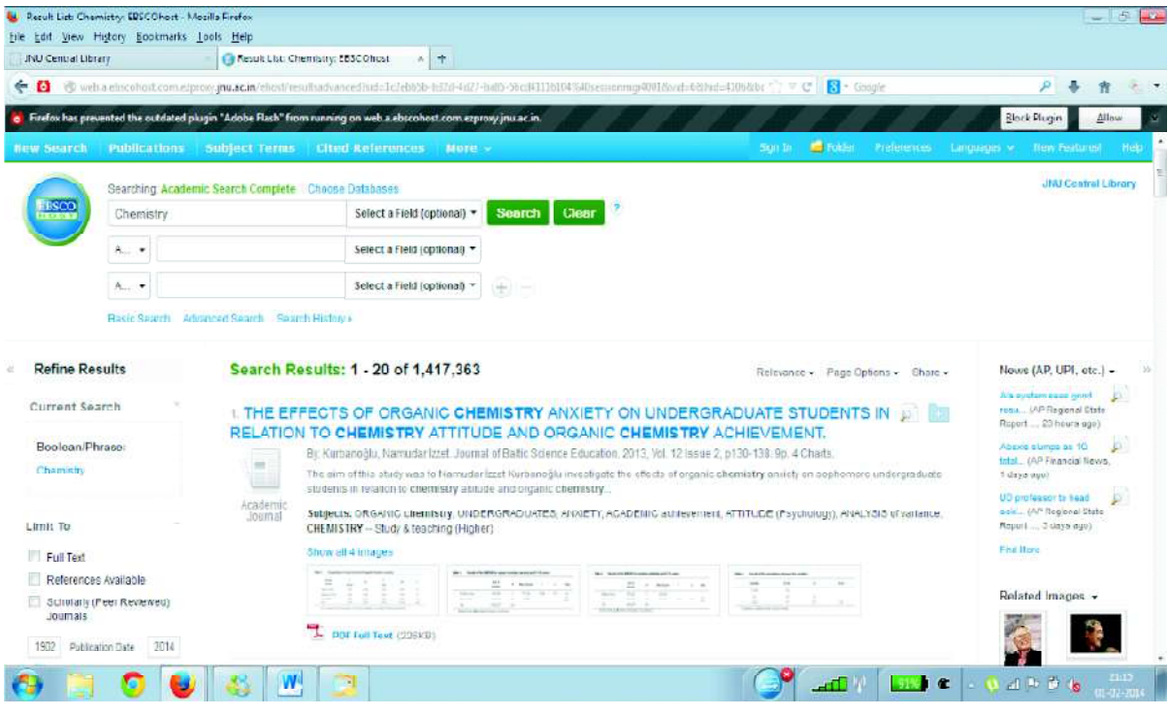


Figure 5.6: Subject Search

5.4.4 Boolean Search

George Boole (1815-1864) devised a system of symbolic logic in which he used three-operator viz. '+', 'x' and '-' to combine statements in symbolic form. John Venn later expressed Boolean logic relationships diagrammatically. The three operators of Boolean logic are the logical sum (+) - OR, logical product (x) - AND, and logical difference (-) - NOT. All most all the information retrieval system allows the users to express their queries by using these operators. (Choudhury; 1999).

The AND Operators: When two or more keywords/terms are combined using AND operator then the search engine retrieved this information that includes all the terms connected with this operator. Logical products or 'AND' logic allows the searcher to specify the coincidence of two or more concepts.

Example: In order to retrieve information on 'Computers and Information retrieval' the user may formulate the search statements as- (COMPUTERS) AND (INFORMATION RETRIEVAL) and the result will contain all the records having both the keywords.

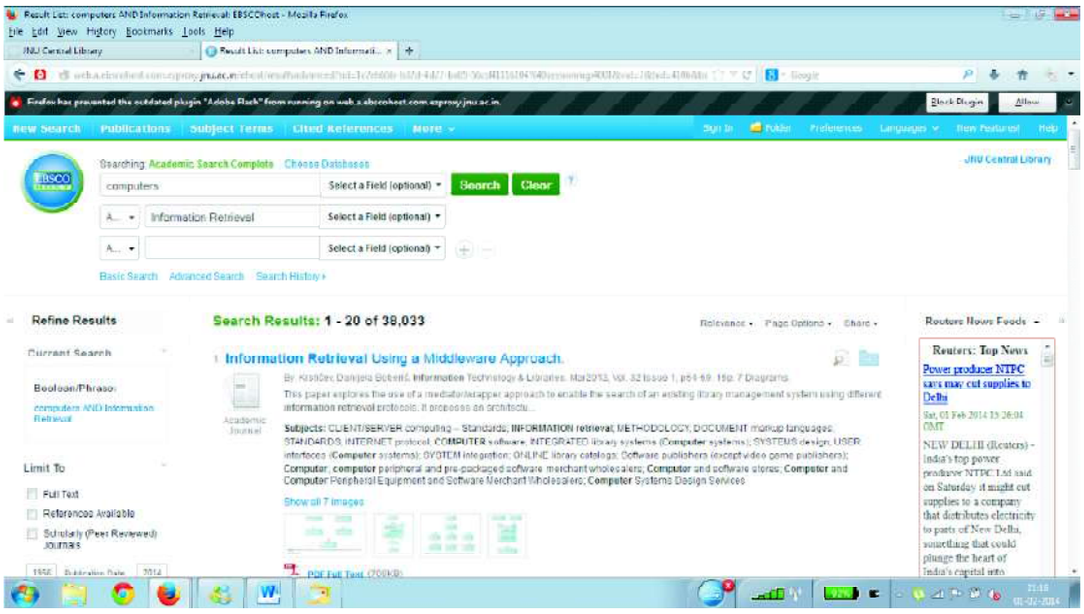


Figure 5.7: Search Through 'AND' Operator

The OR Operators: Logical sum or OR logic allows the searcher to specify alternatives among the search terms. When two terms are connected with 'OR' and searched then the search engines retrieve those records which have either of terms or both.

Example: The result of the search string "(COMPUTERS) OR (INFORMATION RETRIEVAL)" will contain the records having (COMPUTERS) or (INFORMATION RETRIEVAL) or (COMPUTERS) and (INFORMATION RETRIEVAL) both the set of keywords.

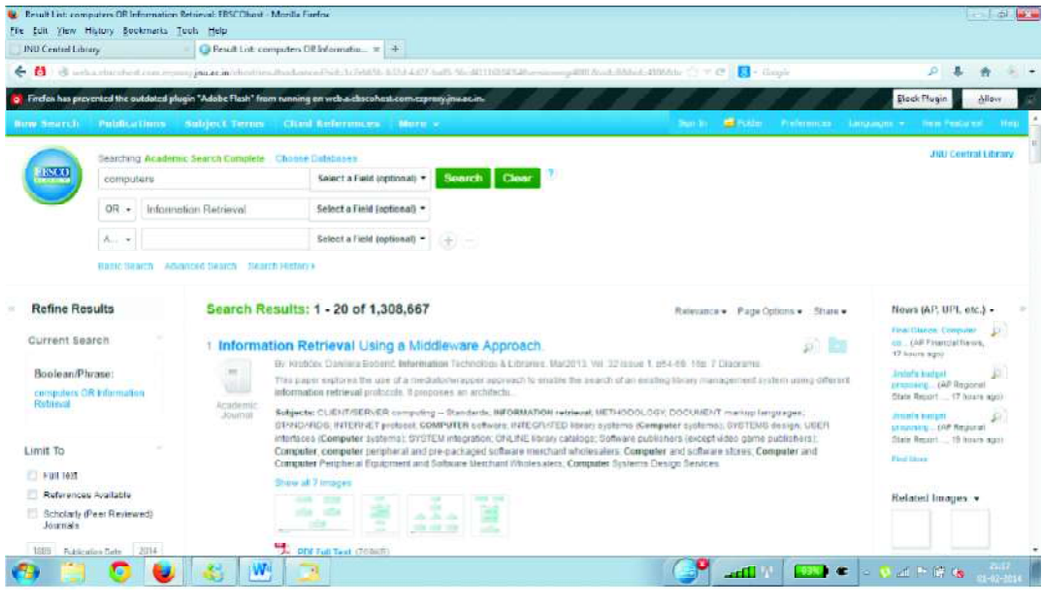


Figure 5.8: Search Through 'OR' Operator

NOT Operators: Logical difference, or NOT logic provide, facilities to exclude items from a set of items. When two terms are connected using the NOT operator and searched then, the search engines retrieve those records which do not have the second term. Example: The search result of "(INFORMATION RETRIEVAL) NOT (DBMS)" will contain only those records which have (INFORMATION RETRIEVAL) but not (DBMS).

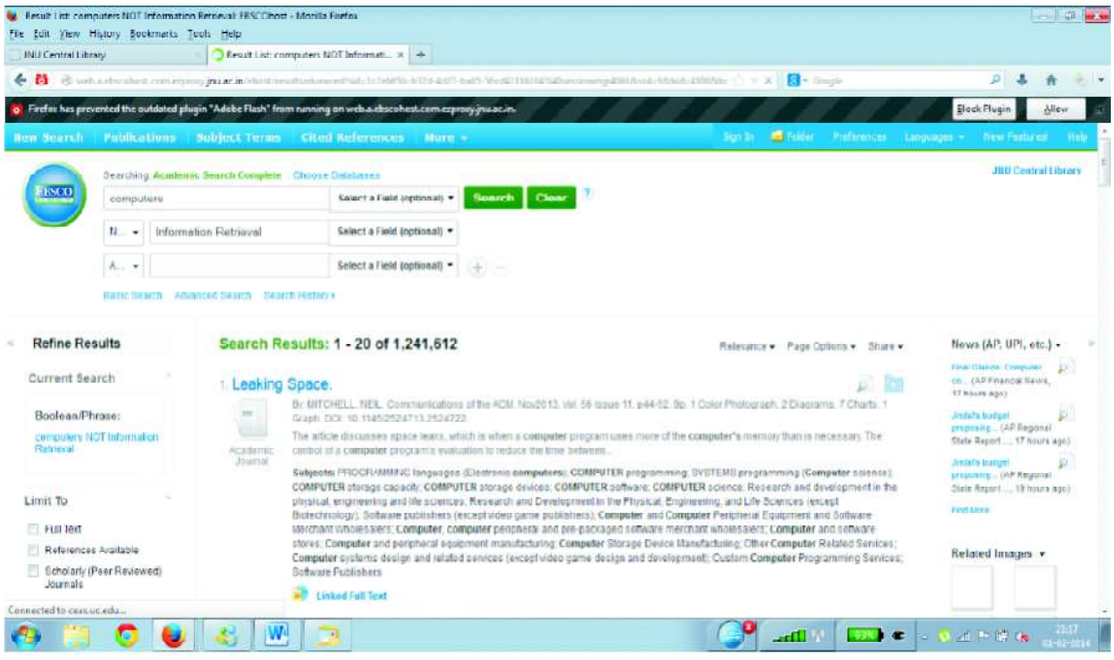


Figure 5.9: Search Through 'NOT' Operator

The graphical presentation of the Boolean logic may as follow:

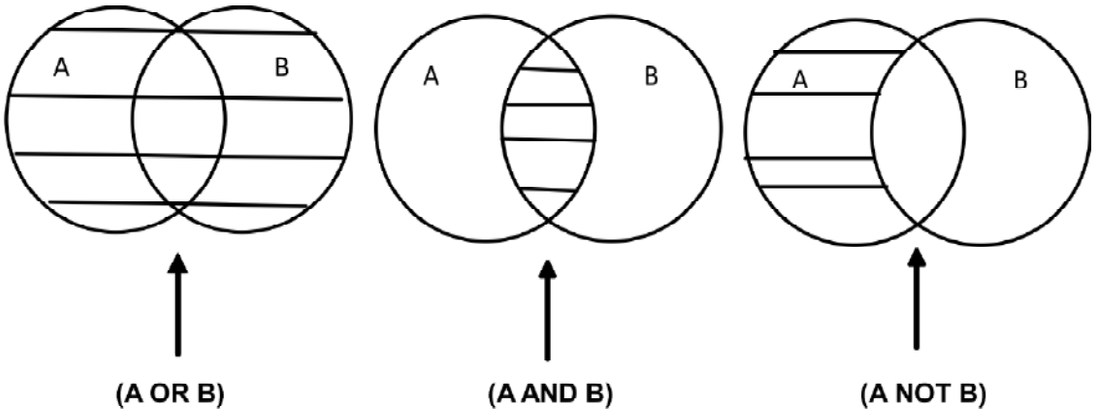


Figure 5.10: Graphic Presentation of Boolean Logic

Here, A and B are two different terms and connected with different operators. The shaded areas show the search results.

5.4.5 Truncation Search

Truncation allows a search to be conducted for all the different forms of a word having a same common root. It is one of the most widely adopted methods in an information retrieval system especially in searching. It means stripping of the uncommon parts of any terms which have the same portion in common in order to facilitate the process of searching. For e.g. the truncated word COMPUT* includes all terms beginning with COMPUT, whatever may the other letters; thus it covers terms like COMPUTER, COMPUTING, COMPUTATION, COMPUTATIONAL etc. The major advantage of truncation is to decide the root term. E.g. whether to use COMPUT or COMPUTE. In the former case the number of terms covered will be many more thus, the result output may be large. In the second case of relevant items, like computing, computation, computational etc. will be ignored which will affect the result output. Some systems provide facility, it is possible to define the limits of right-handed truncation by multiple use of single character truncation or by using a numerical value. Therefore, a number of different options are available for truncation, viz., right truncation, left truncation, and masking of letters in the middle of the word. Left truncation retrieves all words having the same characters on the right hand part, e.g., '*hyl' will retrieve words like 'methyl', 'ethyl', etc. Similarly, middle truncation retrieves all words having the same characters at the left and right hand part. For example, a middle truncated search term 'col*r' will retrieve both the terms 'colour' and 'color'. A 'wild card' is used to allow any letter to appear in a specific location within a word. Right truncation and character masking or wild cards are the most common truncation search facilities available in search systems. Operators used for truncation search vary from one information retrieval system to another. Most commonly used truncation operators are *, $, !, and ?.

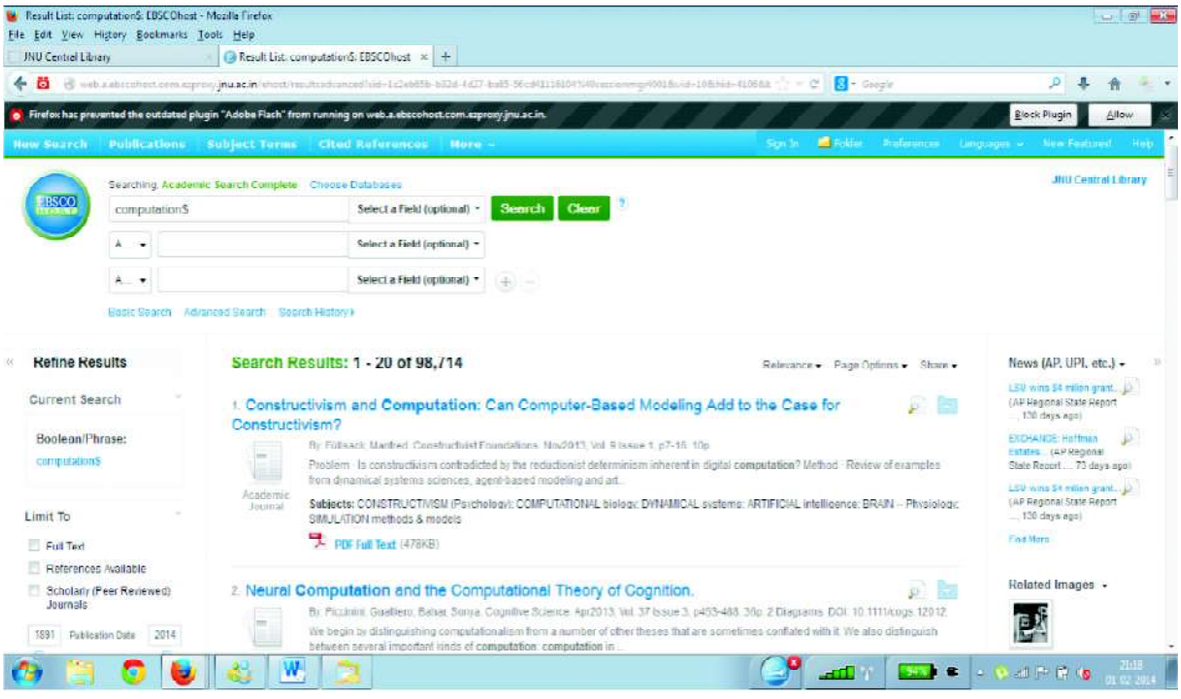


Figure 5.11: Truncation Search

5.4.6 Proximity Search

This search facility allow the users to specify (1) whether two search terms should occur adjacent to each other (2) whether one or more words occur in between the search terms (3) whether the search terms should occur in the same paragraph irrespective of the intervening words and so on. The operators used for proximity search and their meaning differ from one search system to the other. The purpose of proximity search is to refine the search statements by permitting the searcher to specify the context of a term. The following are some examples of proximity search:

- **FISH SAME CHIPS** will retrieve all records where the search terms, i.e. FISH and CHIPS occur in the same paragraphs.
- **FISH WITH CHIPS** will retrieve all records where FISH and CHIPS occur in the same sentence.
- **FISH ADJ CHIPS** will retrieve all records where FISH is followed by CHIPS in the same sentence.
- **FISH NEAR CHIPS** will retrieve all records where FISH is followed by CHIPS or CHIPS is followed by FISH in the same sentence.

Text retrieval software differs in the use of notation for representing various proximity operators. Before using any search engines, it is recommended to read the guidelines of the engine carefully and use the notations which are allowed by the engines only.

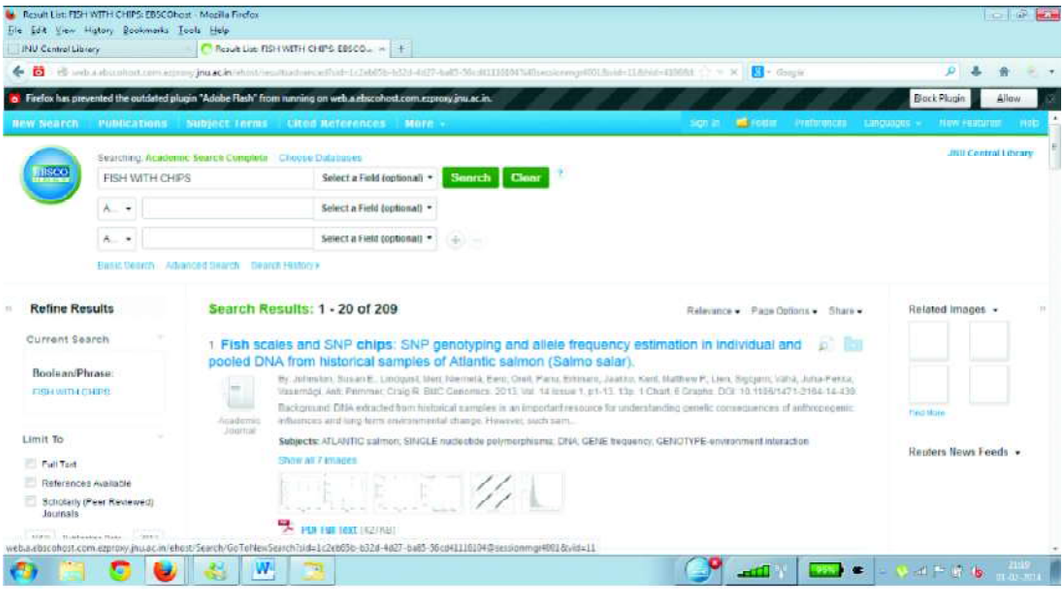


Figure 5.12: Proximity Search

5.4.7 Limiting Search

The database in a text retrieval system comprises different fields containing different items of information. The user in his or her query formulation should be able to limit the search in one or

more fields such as language, year of publication, type of information sources, and so on and the text retrieval software usually provides this facility. Parameters that can be used to limit a search are decided by the concerned database. This is also known as field searching, whereby the user can specify that the search terms are to be looked for in one or more fields.

Example: Gandhi in author field will bring the result containing records where Gandhi is an author but if the search directed to the title field then the result will contain the records where Gandhi is in the title means the documents written on Gandhi.

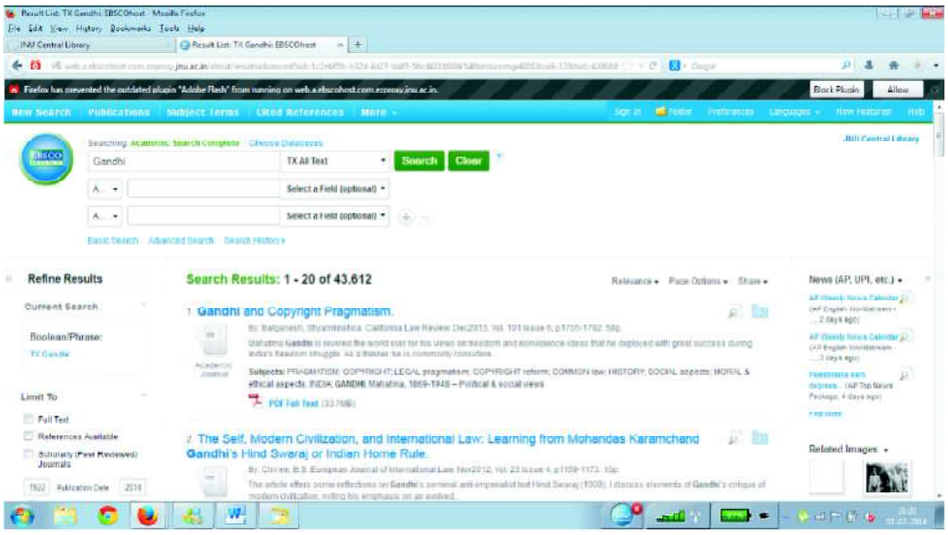


Figure 5.13: Limiting Search

5.4.8 Range Search

Range search is very useful with numerical information. It is important in selecting records within certain data ranges. The following options are usually available for range searching though the exact numbers of operators, their meaning etc., differ from one search system to another.

Greater than (>)

Less than (<)

Equal to (=)

Not equal to (|= or <>)

Greater than or equal to (>=)

Less than or equal to (<=)

These operators are used to prescribe a precise condition in a given search statement.

The following examples of range search are from DIALOG:

Publication Year	/yyyy	S Internet/2004
	/yyyy:yyyy	S Internet/2003:2004

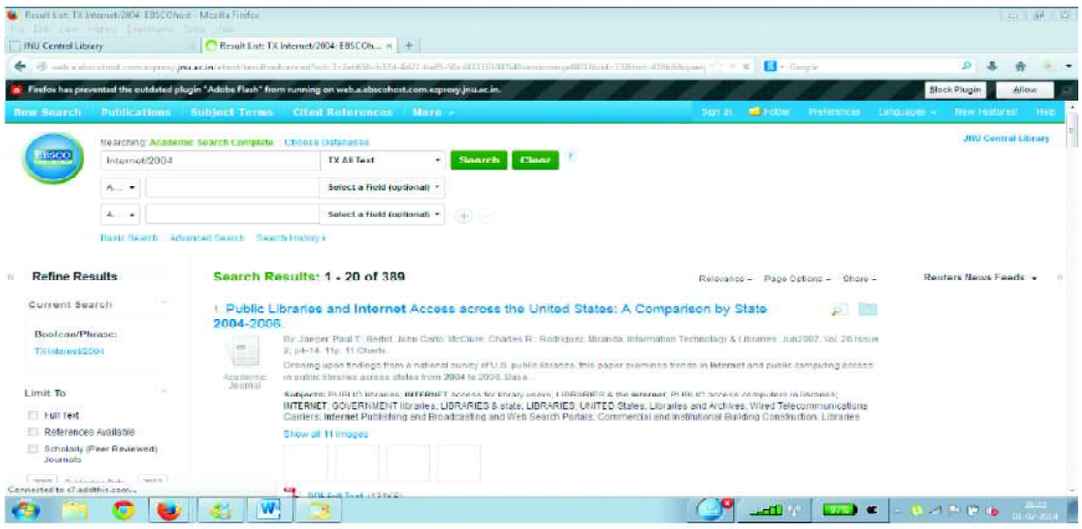


Figure 5.14: Range Search

Review Questions

A. Fill in the blanks

1. Ranking is the analysis phase which, analyses retrieved _____ and find out _____ to that particular query.
2. In the phrase search , the searches for the entire _____ rather than each individual keyword forming the phrase.

B. Multiple Choice Questions

Tick the correct answer

1. What are different Booolean operators?
   - (a) “OF”, “TO”, “NOT”
   - (b) “AND”, “OR”, “NOT”
   - (c) “AND”, “OR”, “OF”
   - (d) “OR”, “NOT”, “IN”
2. For searching which kinds of information, range search is usefull.
   - (a) Textual
   - (b) Images
   - (c) Numerical
   - (d) Multimedia

C. Short Answer Questions

1. What are the different phases of search and matching functions?
2. What do you mean by string search?

3. What is a phrase search?
4. What are different Boolean operators?
5. What do you mean by truncation search?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Gained skills of formulating search query for search on internet.
2. Explained different search techniques and their applications.
3. Performed search on internet using different search techniques.

Part-B

1. How to formulate search query for search on internet?
2. Explain different search techniques and their applications.
3. Perform search on internet using different search techniques.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to formulate search query for search on internet.		
Explained different search techniques and their applications.		
Performed searches on internet using different search techniques.		

5.5 Summary

Searching is an important function of an IRS. The process of searching in an information retrieval system can be manual or on-line. The search strategy is the action plan, which is being drawn to conduct a search to get better results. The Boolean operators provide tools to deal with the linguistic aspects of the terms and create search strings to represent the logic and meaning to the search engine. The notations of operators may differ from system to system but the concept remains same. The knowledge of search techniques and different types of search help searcher finding precise and relevant information from the information system.

5.6 Exercise

1. What is information Retrieval System in Web Information Environment, explain in brief?
2. Describe various functions of IRS system.
3. Write a brief note on the characteristics of IRS.
4. Write a short note on Subject search.
5. Give a brief description of truncation search.
6. What are the Key Components in an IRS system, explain in details?

7. Explain in details the types of Information retrieval system and their use.
8. What are the prerequisies to conduct a search for information explain?
9. Discuss in brief each step of the search strategy.
10. Describe different methods and technique for searching information?
11. How do the Boolean operators change the meaning of a query with it permutation and combination, explain with example?

5.7 Practical

1. Test the various methods and technique of search for information retrieval through following example: Library education in CBSE School.
2. Make search string and conduct search on internet using Google, Google Scholar and Google advance on the topic "ancient history of India" .

   Note:The Ancient India may include today's Afghanistan, Pakistan, Bangladesh, Myanmar.
3. Create a five search strings using Boolean operators and conduct searches on the Library of Congress catalogue of PubMed database which is available on the Internet.

5.8 Glossary

IRS (Information retrieval system): Defined as a "science of search" or a process, method, and procedure used to select or recall recorded and/or indexed information from files of data.

Search: An important function that pursue by the user; with the intention, intelligent and decision to meet the challenges of information retrieve.

Search Strategy: Search Strategy is the action plan, which is drawn to conduct a search.

Search Technique: The methods used to refine any search query; there are many techniques used as such phrase search, keyword search, Boolean operators search, and truncation and so on.

Resource Material

(i) Broder, A.(2000). A taxonomy of web-search, IBM research, 2000 <http://www.sigir.org/forum/F2002/broder.pdf>

(ii) Chowdhury, G.G. (2004). Introduction to modern information retrieval, 2nd Ed. London: Facet Publishing.

(iii) Chowdhury, G.G. and Chowdhury, S. (2001a). Information sources and searching on the World Wide Web, London: Library Association Publishing.

(iv) Chowdhury, G.G. and Chowdhury, S. (2001b). Searching CD-ROM and online information sources, London: Library Association Publishing.

(v) Sorgel, D. (1985). Organising Information: principles of database and retreival systems, London: Academic Press.Library and information science series.

(vi) Sullivan, D. (2003). How search engines rank web pages. <http://www.searchenginewatch.com/webmasters/article.php/2167961>.

(vii) Xie, M; Wang, H and Goh, T. N. (1998). Quality dimensions of Internet search engines. Journal of Information Science, October 1998. vol. 24(5).

UNIT - 6

Web Tools Used for Promoting Library Services

Location	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
• Class room, library or computer laboratory.	• Web Tools: The concept.	• Concept of web tools. • Various web tools used in library and their usage.	• Explain website or web portal, search engines and other web tools.	• **Interactive lecture:** Discuss concept of web tools various web tools used in library and their usage. • **Activity:** Visit computer laboratory and show students web tools used in library.
	• Web 2.0/ (Library 2.0): concept and characteristic.	• Concept of web 2.0 / Library 2.0 and its tools.	• Explain web 2.0: Key features and library 2.0 able to differ-entiate web/ library 1.0 and 2.0.	• **Interactive lecture:** Explain the concept of web 2.0 and library 2.0, their features. • **Activity:** Visit computer laboratory and show students difference between web/library 1.0 and 2.0.
	• Web tools and their applications.	• Web site/portal. • Email. • Instant messaging. • Listserv. • Forum. • Blogs. • Wikis. • RSS. • Flickr. • Bookmark. • Tags. • Podcast.	• Explain and able to use library web sites/portals. Email. Instant messaging. Listserv. Forum. Blogs. Wikis. RSS. Flickr. Bookmark. Tags. Podcast.	• **Interactive lecture:** Discuss different web tools and their applications. • **Activity:** Visit computer laboratory & show students different web tools and process of using them.

	• Information access devices.	• IPad. • IPod. • Mobile Phone. • E-Book Reader.	• Able to explain Ipod, Mobile Phone, E-Book Reader.	• **Interactive lecture:** Discuss information access devices & process of using for information access. • **Activity:** Use internet and show images and multimedia based content on these devices if actual devices are not available.
	• Practical.	• Using web tools.	• Create a library blog,user forum/ groups, bookmark, share photo using flickr and so on.	• **Interactive lecture:** Discuss process of using web tools. • **Activity:** Hands on practice of using different web tools.

6.1 Web Tools : The Concept

The web tools are the technology or mechanism which provides users the resources and capability to create, store, share and disseminate information on the web or the internet. In this globalization era, varieties of web tools have been emerged to fulfill the information need of users across the globe. These technological tools have not been extending the value added services to user only, playing an important role in teaching and learning processes. The key tools widely used for academic and research and development purposes are discussed here.

6.1.1 Web Site or Web Portal

The term Web Site/Portal is a place or (a site) on the internet that locates the presence of an organization, institution and individual on the World Wide Web. The Website consists of a collection of web pages, database and scripting (or HTML) that can be accessed using a web-browser. Therefore we say, "Website is the basic unit of information on web", which need following element for its creation.

- **Webpage:** A web page is a document (consisting of hypertext languages like html, php, asp, jsp etc.,) on the World Wide Web, usually containing hypertext links to other document on the web, identified by its URL. It can contain text, images sound and links to other pages.

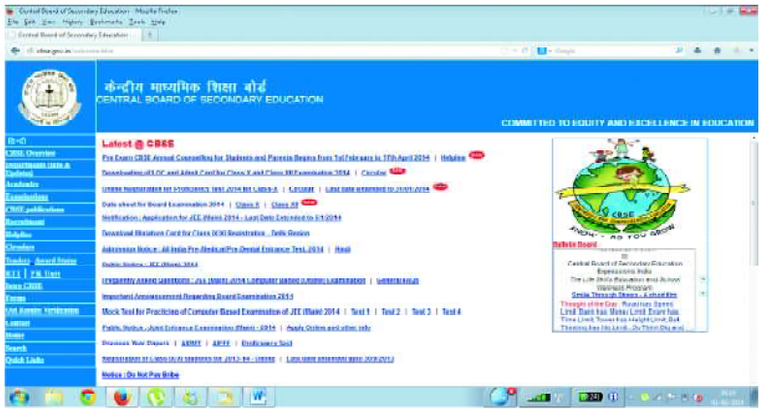


Figure 6.1: Web Page

- **Hypertext Language:** Web pages are created using hypertext markup language, which is a set of standardized codes or tags that have been derived from SGML (Standard Generalized Mark-up Language) standard. Website consist of static HTML pages or dynamic HTML using technologies such as Active server pages (ASP) or Java server pages (JSP), which define and describe the structure of a web page and is used to prepare documents for the world wide web. In addition, HTML documents are portable; they can be viewed with any web-browser on any types of computer.
- **Web Server:** A website also requires software known as an HTTP server, such as Apache and Microsoft's internet information server (IIS). A server is an application that stores web pages and associated files, databases and scripts and serves up the pages to the web-browser.
- **Web Browser:** It is a software program that acts as an interface between the user and the www. It sends requests for information that is available on the internet and displays the information for the user. It can be viewed in two formats: A text based browser, e.g. Lynx shows a user-text only, and a graphical browser, allows the user to see more of what WWW has to offer, such as image, graphics, text, photography and multimedia. For example: Internet Explorer, Netscape Navigator, Mozilla Firefox, Google Chrome, Web Surfer, and Spry Mosaic, etc.

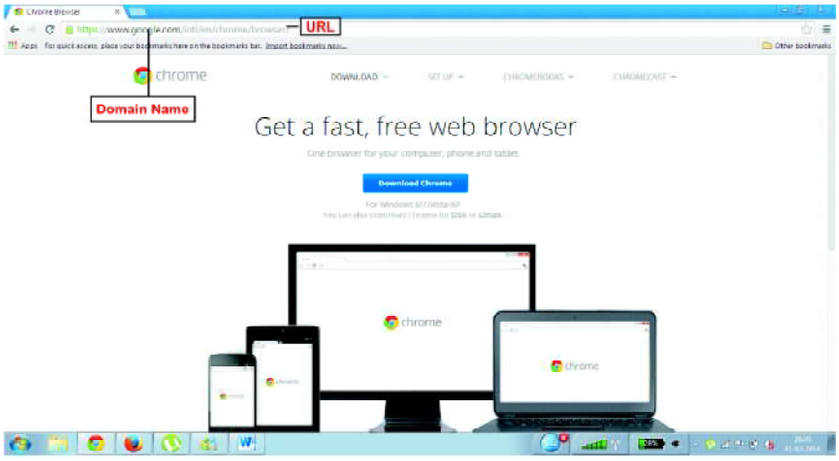


Figure 6.2: Web Browser

- **URLs:** Stand for uniform resource locator; it is the name or address of a site that helps to identify the location and type of resources on the web via an internet connection. It consists of ***Protocol: //Server name. Domain name/Path/File name.***

  Example: - *.http://www.cbse.gov.in/welcome.htm*

- **Domain Name:** It is a unique path of a website which generally points to some physical space on the hard-disk of servers. Servers are the computers which are logged on to the internet. ***http://www.yahoo.com*** is an example of one such popular domain or a website. Here ***http*** used to connect web client software with a web server to transfer information on the web and path and filenames help to connect the exact resources. Domain name convention and registration authority are required to address the site on the web, and a certain set of naming conventions has been evolved to identify the website. The naming conventions include:
  - **com** For commercial websites
  - **edu** Educational websites
  - **org** Organizations websites
  - **net** Net website
  - **ac** Academic institution
  - **res** Research institute
  - **in** Indian website
- **Databases:** Often websites also consist of content stored in one or more databases. Database is an organized set of data or information stored in a computer for retrieval purpose.
- **Plug-ins:** These are available for browsers which allow them to show active content such as Flash, Shockwave or applets. Such applications are being written in Java programming language.

6.1.2 Search Engine

Search Engine is a computing based application software or program, which enable users to search information on the web. It is basically having program called crawler or spider. It helps in locating information, index those information and produce result for the users for the submitted search query. There are a number of search engines available on internet. Some of the search engines popular among user communities are Google, Bing, Yahoo, etc.

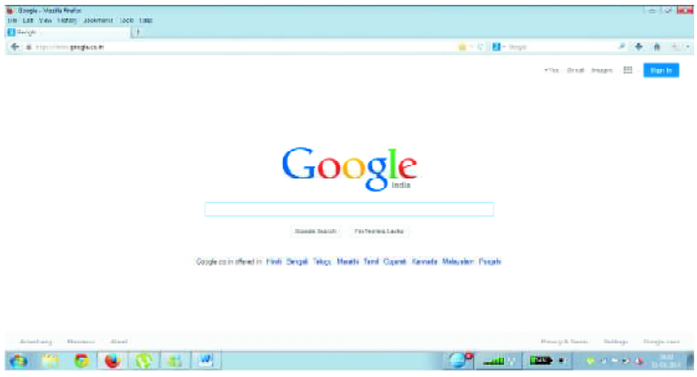


Figure 6.3: Search Engine, Google

6.1.3 Other Web Tools

There are a large number of web tools available for the users which make them capable of accessing and sharing information. These tools are extensively used for educational and research communications. Some of the popular web tools being used are namely; Emails, Listservs, Instant Messaging, Blogs, Wikis, YouTube, Digg, Furl, RSS, Twitter, Flicker, Forum, e-book reader, Bookmarks, Tags and so on. We have discussed about these tools and their use in library to promote library services in the later part of this Chapter.

Review Questions

A. Fill in the blanks

1. Web browser is a software that acts as an _____ between users and world wide web.
2. Search engine is a computing based application software which enable to _____ information on web.

B. Multiple Choice Questions

Tick the correct answer

1. What do we call the unique path of a website?
   - (a) Path name
   - (b) Domain name
   - (c) Dot com
   - (d) Portal
2. What does URL stand for?
   - (a) Uniform resource locator
   - (b) Unique reference loader
   - (c) Unique reference leader
   - (d) HTML

C. Short Answer Questions

1. Define a web tool.
2. What is a webpage?
3. What do you mean by Web Server?
4. Define a Web Browser.
5. What is a URL?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood the concept of web tools.
2. Explained website/web portal.
3. Understood search engine and its functions.

Part-B

1. What do you mean by web tools?
2. What are different components of websites/web portal?
3. Explain search engine and its functions.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain the concept off web tools.		
Able to identify different components of website/web tools.		
Able to explain search engine and its functions.		

6.2 Web 2.0 / (Library 2.0): Concept and Characteristic

In this participatory age of information, many web applications (so called web tools) have been made for socializing web and make internet based products and services more interactive, collaborative, engaging, attractive, creative and presentable. These social tools have greatly been empowered web user community and facilitated new opportunities for leveraging the web and users more effective ways. Therefore, Web 2.0 is the second phase in the Web's evolution that architect web information for use and reuse. The genesis show "Web 2.0" was reportedly first conceptualized and made popular by Tim O'Reilly and Dale Dougherty of O'Reilly Media in 2004 to describe the trends and business models that survived the technology sector market crash of the 1990s (O'Reilly, 2005)".

6.2.1 Web 2.0: Key Features

- **Dynamic Web Interface:** In traditional website, HTML based web has offered static page content browsing facilities and facilitated links to direct sources like site home page and succeeding pages whereas, Web 2.0 has multiple channels of linking to the sources, users can connect each piece of content from any parts of information sources; it also advances the presentation methodology from static web into dynamic web by using AJAX (Asynchronous JavaScript and XML applications). So users are experiencing attractive looks, feels, subscribe, share contents and facilitate permalinks to web contents. For example: Google Maps, Google Plus, weblog, view slideshow, Flicker, Mashup and so on.

- **Rich User Experience:** Before Web 2.0, users had one way communication gateway to information media (that is web information was often provided by site owner and user was always the receiver). But today, web 2.0 user is not only having the provision to receive information, but also they can review and comment on it. For example: E-Bay purchase, Amazon.com, Google page rank etc.
- **Participation and Collaboration:** With the help of Web 2.0, user can participate in content sourcing and writing (called crowd sourcing). For example: wide development of media as, wikis, Wikipedia, YouTube, social networks, etc.
- **Affinity and Groups:** Web 2.0 has become an avenue for web user to share their thoughts among networked web information communities through forum, discussion board, listservs, instant messaging, conferencing, polls, group emails, publish message via group posting, recommendation, likes and so on. For example: tweeter, Facebook, etc.
- **Open Web:** In Web 2, the content is made available to share, reuse, redistribute and edit. The majority of the open web is open source based under the license of open access as such Open content alliance, Creative Common and so on.
- **RDF:** (Resource Description Framework mechanism) For better understanding of its relationship and attribute, the Web 2.0 contents are enriched with metadata fields and taxonomical vocabulary based terms to make all content accessible through any search engine or aggregators based applications. For example: RSS feed, web blogs, etc.
- **Social Tagging:** It classifies and categorise the web based information (each information unit as key term) and share them. For example: social bookmarks (del.icio,us), Twitter, Facebook, Flicker, etc.

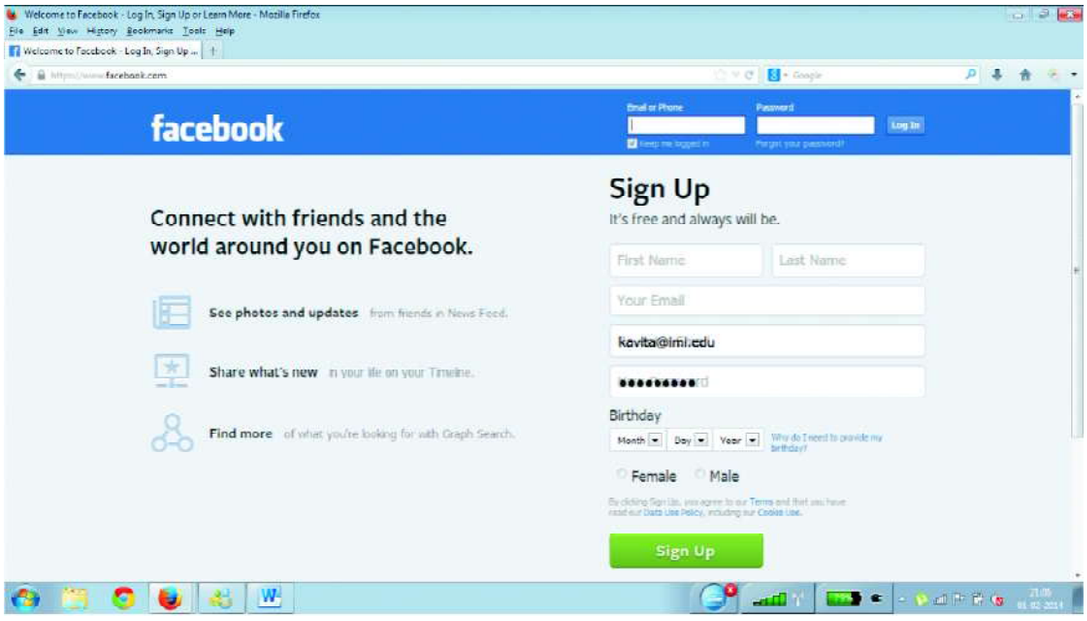


Figure 6.4: Social Media, Facebook

- **Multilingual Web:** With the help of Web 2.0, users are able to view the contents of their own languages through online translation mechanism. The online translation services are provided on the internet by a number of service providers. For example: Google at http://translate.google.com/, etc.
- **Semantic Web:** Web 2.0 is all about the web having meaning. The user can communicate with the web interactively. Semantic web provides a logical view of web information, so that the web user can access their desired information easily. Though, the concept of the semantic web is at the primary stage presently but bound to get popularity very soon. For example: swse.org.
- **Pay Per Use:** The traditional web has been just like retail business of a product, the revenue was being generated by selling/purchasing that product. But in Web 2.0, it offers service on demand and revenue can be generated through per unit consumption. For example: Google Apps and 3Plugins used in many android mobiles.

Review Questions

A. Fill in the blanks

1. Web 2.0 has multiple _____ of linking to sources.
2. Web 2.0 has become an avenue for web users to share their thoughts among networked web _____ information community.

B. Multiple Choice Questions

Tick the correct answer

1. The available content on web to share, reuse, redistribute and edit is known as:
   - (a) Open web
   - (b) Closed web
   - (c) Little web
   - (d) Proprietary web
2. How does user communicate in semantic web?
   - (a) Static
   - (b) Interactive
   - (c) Linear
   - (d) Robotic

C. Short Answer Questions

1. Define Web2.
2. What do you mean by Library2?
3. Define a dynamic web interface.

4. What is a Social Tagging?
5. Define Semantic Web?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Explained the concept of Web 2.0.
2. Identified key features of Web 2.0.

Part-B

1. What is web 2.0?
2. Identify key features of web 2.0.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain Web 2.0.		
Able to identify key features of Web 2.0.		

6.3 Web Tools and their Applications

Web tools are widely used by libraries for providing and promoting services. The library resources are available to its members 24 hours a day and 7 days of a week. These tools have brought the resources out of the library and with the help of these tools; they are available at the doorstep of the member. Let's discuss these web tools and their applications in promoting and providing library services.

6.3.1 Library Websites / Portals

Today, library website has become one of the academic and research library's most viable artifacts for communicating with users, (O Sorio; 2001) providing access to all information about library resources and services. Through the library web, user can access library e-collections and services easily. Also they are able to use the online catalogue getting knowledge of library latest news or events and access library data remotely. The key application of the library website is to publicize library activities and facilities by establishing a gateway to networked and local sources of information. It integrates resources and user communities via a single location.

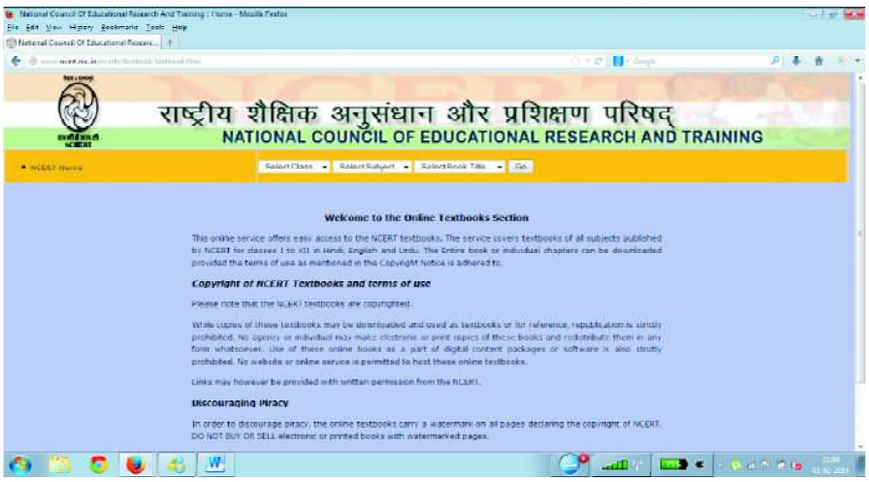


Figure 6.5: NCERT Portal

6.3.2 Email

The electronic mail is an internet protocol which allows computer users to exchange messages and data with other e-user via internet. All the email system having common application of e-messaging system such as inbox, sent folder, compose mail editor, attach documents, which allow users to send, receive, forward and store messages. It is faster, reliable, provide privacy setting and more convenient than other mode of information communication. Despite of these above features still it is having issues like spam mail, hacking of security and privacy, if user unknowingly replay back to spam mails which are sent by undisclosed sender. For this, the user must know the basic functions of email tools and their use to protect their mail from such spam.

Creating an email account is a very easy two step process. First step is to sign up and fill necessary personal information like user name, password, personal details, etc. After completion of this process a specified email account is being created. Then, a confirmation email is being sent to the secondary email account of the user. With the help of the confirmation email one can control the privacy setting like changing of user password further, etc. In case of opening first email account; the confirmation code may be sent to the mobile phone of the user. Secondly, the owner of the email account has to sign in (log in) to the account with user ID and password during the first step. The email account looks at<user name>@<server name>.

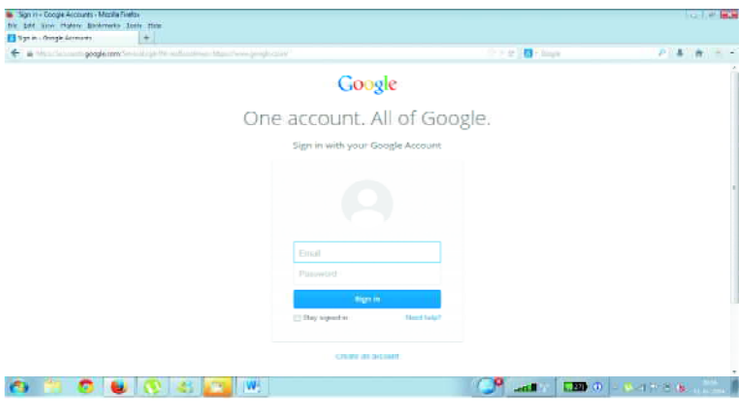


Figure 6.6: An Email Service Provider

For example xyz@gmail.com. Here “xyz” is the user name and gmail.com is the server name, the “@” character is used as a separator, it separates the user name from server name. Now a day, so many email providers are available on the internet with more advance features and tools. For Example Gmail, Yahoo mail, Rediffmail, Hotmail etc. Almost all above example are having feature like chat box, video chat, e-messaging groups, share photo, video and so on.

6.3.3 Instant Messaging

It is one of the applications of the e-messaging system (called computer conferencing system also) which enables user to chat online via internet. It allows to add other contact email via inviting others user. It has also notified the person whenever they log on to the network. For example, SKYPE, through which one can chat (both telephone based and video based) and message and exchange data files, images, etc. This system is very useful tool for libraries to deliver digital reference services to the remote user and helps in e-teaching and e-learning process.

Figure 6.7: Latest Messaging, Skype

6.3.4 Listserv

The listserv based software application is a mailing list management tool which control groups mailing list effectively. It is designed to scan incoming emails from subscriber and manage the lists of users subscribed to particular groups. Here the moderator can control all operations like power of granting permission whether the message is needed to be posted by the subscriber or not, who can read and/or write the message and so on. So, basically the Listserv facilitates e-mails discussion, newsletters lists operations, etc. Through this tool, an individual user can communicate (via email) to a list of user groups. There are a wide range of platforms available free of cost at present. Some of the mailing lists used these days are Sympa, GNU mailman, electronic mailing lists, Tile.Net, etc.

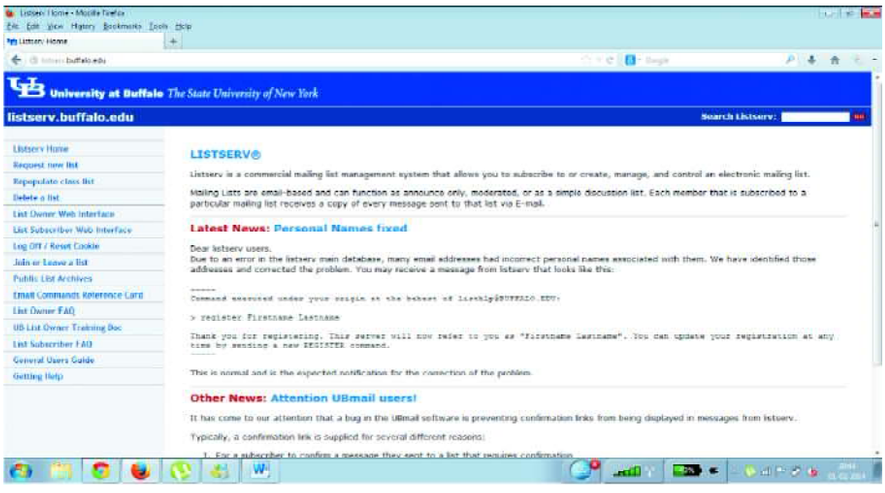


Figure 6.8: Listserv

6.3.5 Forum

The forum also known as message board is one of the discussion list web tools where user can hold their conversation by posting messages into it. It is one of the most common platforms to share information among the registered user of that forum through a single mail address of the forum list. A discussion forum has a certain characteristic that is common to each forum set up like all messages posted to a forum is needed to be approved by the moderator before it become visible to the groups. After moderation, it can be communicated to the groups of people via posting of that message. Today, there are several Library and Information Science forum, available to share various news and events taking place around the world. The discussion on such forums also helps professionals in solving many technical, professional issues of library such as technological challenges, issue of library services, skill development, etc. Some of them are LIS-Forum, DLRG DRTC groups, NMLIS Google groups, Corporate Librarian forum and so on.

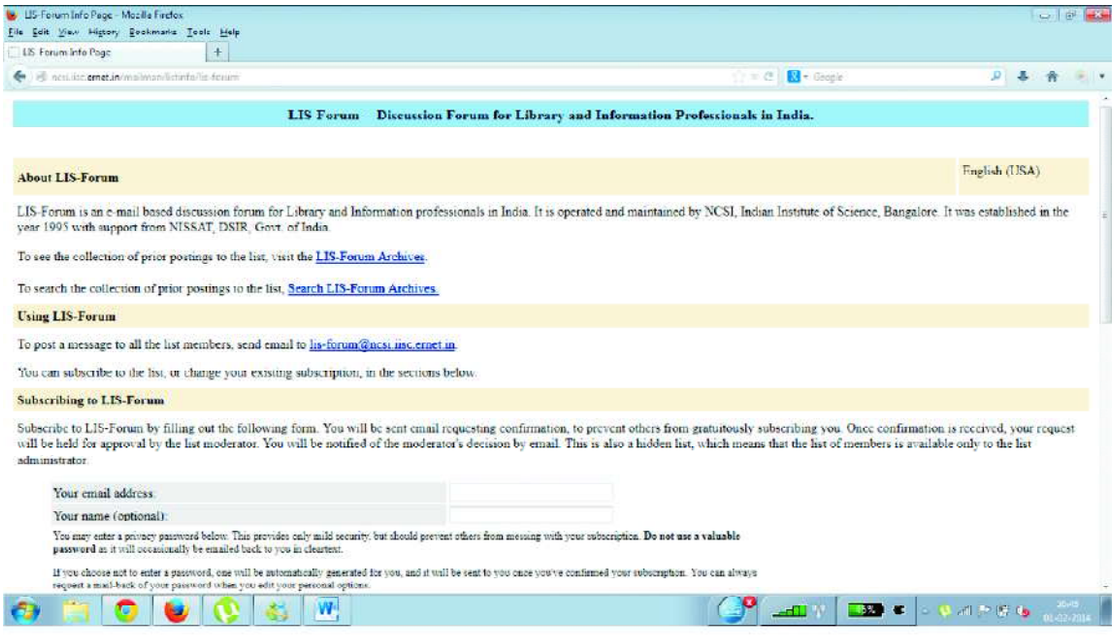


Figure 6.9: Forum

6.3.6 Blogs

The term “Blog” refers to a website which indicates a blending of words Web and Log. “Log” stands for describing the systematic / sequential recording of data processing event, often chronologically and “Web” points to material available on the World Wide Web. Based on this principle blog has evolved for publishing and posting data on the web. Various authors have defined blog differently however, the basic theme remains same. In the word of a few, like Peter Sepp, Chris, Ivan and Stephen Downes, “Blog is an online publishing press or an information transmission hub, news reporting networks, a catalogue with new contents, personal diary or a website ‘with new data’ and updated frequently with links, commentary and, contains brief entries arranged in reverse chronological order”.

In the context of library, a blog can be defined as a referring content management or distribution tool / system that helps to broadcast information to the end-user to promote awareness about the library programs and services. It is a communication agent or new publishing media for

those libraries which connect with the world online. Through the library blog, a library can assist users and keep them updated about its products and services such as new arrival of books, journals etc. With the help of a blog, the library can secure participation of user in various programs such as, book review, discussion forum, research tips, conferencing, book and other information source selection, etc. It provides as opportunity to build a virtual community, encourage feedback from patrons, extends or derives value addition to library services. It also enables rapid production and consumption of web based publications, archive and share those new documents automatically to establish an information social market place within the library. A few examples of blog service providers are Blogger, Typed, WordPress, etc.

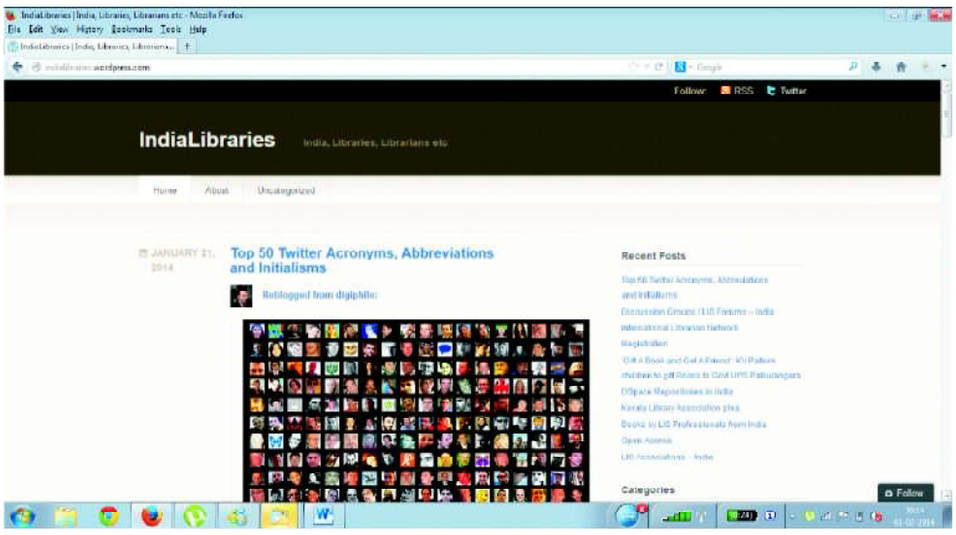


Figure 6.10: India Libraries

6.3.7 Wikis

The wikis are consider in an open publishing web pages through which any web user can register with them and write, publish contents, amend and change it as and when required. The wikis are also considered a publishing hub which provides users a new form of group study rooms. With the help of such tools, the library and its patrons can interact more effectively. The library and the users can write, amend, share, contents and make group discussion. It makes library services more users centred and interactive both ways.

Figure 6.11: Wikis

Source: http://msmathnzelearningwikis.wikispaces.com

6.3.8 RSS

RSS (Real Simple Syndication / RDF (Rich) Site Summary) is becoming one of the influential tools with growing number of tasks, such as headline syndication / news posting, eTocs, updating and locating content for websites. It allows a blog posting to be syndicated and fed into an aggregator. Generally RSS is a simple XML syntax, describing feed of recent additions to a website and/or weblog. Any web user can subscribe these feeds to initiate the subscriptions to that site. It can be done through entering the URL address into an RSS reader or by adding these feeds icon into the concern website and/or web browser. Through this subscribed RSS feed, the user can see the update posts on a regular basis and downloads any update and aggregates them for reading new contents from multiple sites without visiting those sites.

Fig 6.12: RSS Feeds

(Source: http://www.problogger.net/what-is-rss/)

6.3.9 Flicker

Flicker is an image / photo hosting and video hosting web tool that helps to organize images within the web. It was created by Ludicorp in 2004 and acquired by Yahoo in 2005. One can share, post images and photographs and can embed or tags in any social media sites.

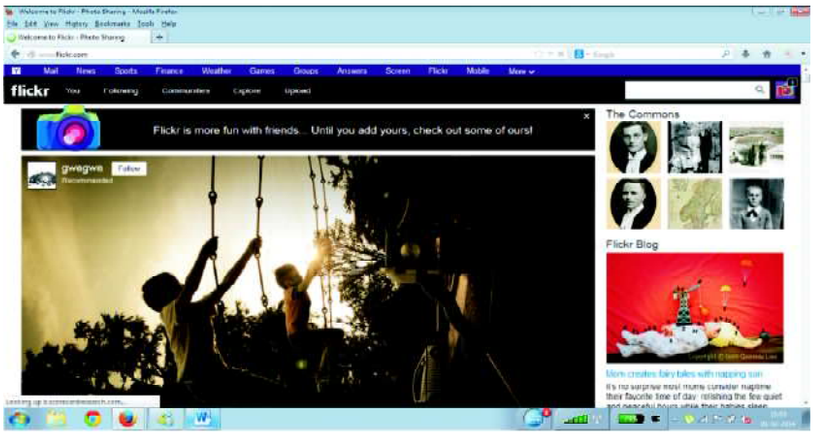


Figure 6.13: Flicker

6.3.10 Bookmark

To select and mark web documents for further use, all web browser software is having bookmarks tools or favorite options. It allows saving those documents permanently and facilitates users to

revisit the site without retyping the URL address of those linked pages. The favorite tools automatically save the link of an URL in each session of internet browsing in feed section and history tab section. The user can browse these resources directly from these tabs but it is temporary in nature so, the bookmark is necessary if one wishes to permanently archive it. Thus, bookmarks act as a guiding tool that greatly helps end users to archive the specific documents location permanently within their web browser for further search to those documents.

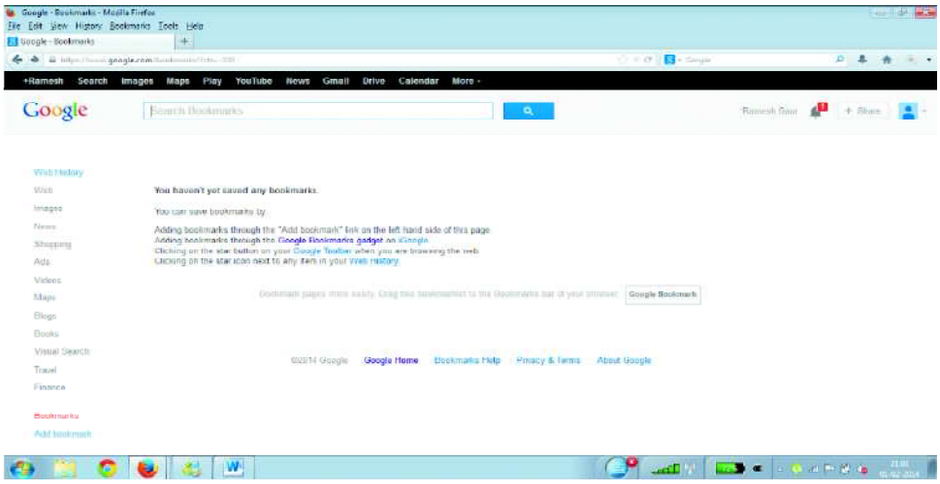


Figure 6.14: Bookmark

6.3.11 Tags

The “Tag” a collaborative tool also called “social tag or social bookmark” is basically a collection of terms or keywords which help the web users in categorizing or classifying web information by labeling them with a personalized set of descriptors (tags) and share them. The key characteristic of a tag consists user identity (so called tagger), the item URL, and the tag itself. By using the tag, user (tagger) can discover and share information with others taggers.

To create a social tag is very easy process as like email account creation. Many social tagging tools applications are available free of cost on internet. The tools are used for storing, sharing, and discovering online bookmarks. The most used social tagging tools are del.ici.ous (http://delicious.com), Digg (www.digg.com), Furl (www.furl.net), twitter (https://twitter.com) and so on. At the first step, a user can create a social tag account and then, within the user profile, a personal library folder to be created (available default also). The account holder can now add any number of bookmarks links with convenience and assign a key term to them for accessing it online by others. The account holder can assign as many tags as they wish to the linked sites. Since, it is stored online hence, is accessible to all via web networks.

There are many features based applications which make social tag more popular among web user. The majority of them like Rating (allow user to scale or rate the tags of their interest), Note Board (enables users to add comments), Bookmarklets (enables users to add multiple tags), and Tag Clouds (provide an aggregate view). Today, all most all social websites having tag clouds sections associated with numbers which indicate how many times a tag was applied. This feature greatly helps the user to identify which tags are being frequently used by the user and which are not through their different text size appearance. The most used tags are in large, bold text whereas less used tags appear in small text size.

6.3.12 Podcast

It is another digital media that act as an aggregator to syndicate new web feeds of audio, radio, video and so on from the web, a computer or mobile phone. It helps user to download live webcast via RSS feeds and listen with the help of any media players. Depending upon its functionality, it has been categorized into three categories; namely Vodcast (the video podcast), enhanced podcast (image with audio) and podcast novel (serialized audio book or podcast audio book). For example: BBC provides a wide range of programs as a Podcast which can be downloaded free of cost. Similarly, the Scientific American provides science podcast free of cost.

Figure 6.15: Podcast

(Source: http://redwhiteblue.co/category/podcast/)

Review Questions

A. Fill in the blanks

1. Email is _____ tool.
2. Messaging system enables users to _____ online via internet.

B. Multiple Choice Questions

Tick the correct answer

1. What is the function of Listserv?
   - (a) Managing mailing list
   - (b) Listing posts chronologically
   - (c) Blogging
   - (d) None of the above

C. Short Answer Questions

1. What are the components of an E-mail address?
2. Define a listserv.
3. What is a blog?
4. Define bookmark?
5. What do you mean by podcast?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Identified different Web tools and their application.
2. Explained the utility of Web tools for library.

Part-B

1. What are different Web tools and explain their application?
2. Explain the utility of Web tools for library.

Part-C

Performance Standards

The performance standards may include, but not limited to:

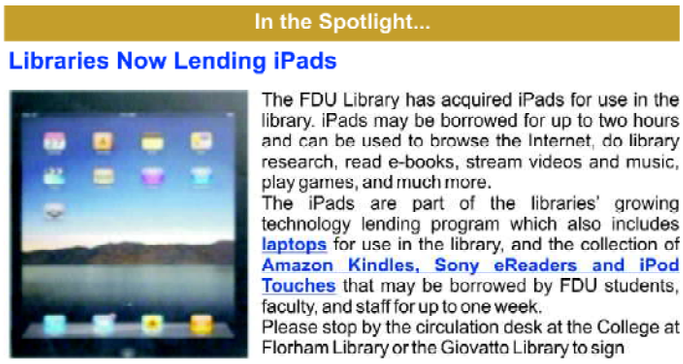
Performance Standards	Yes	No
Able to explain the application different Web tools.		
Able to explain the utility of Web tools for library.		

6.4 Information Access Devices

The information is available in a number of formats these days, as you have studied in Chapter-4. To access information in different formats, there are a number of gadgets available in the market. You can use these devices or equipments for accessing required information. Information can be downloaded on these devices either from your library or Internet. We are going to discuss a few popular devices here which can strengthen your learning process and make you a smart learner.

6.4.1 Ipad

It is a hand-held tablet computing device which can have almost all facilities like computers and laptops. The key features which make it separated from a computer is its light weight touch screen operations and portability. It has so many other features like it can help IPAD users to take snaps, pictures, shoot video, share video, voice and video chats with others, play music, mobile based applications, internet surfing and downloading apps from the Apps stores for many online applications. The user can play games, go for GPS navigations, Social Networks and so on. Hence, the features of the device empower the users for both infotainment and entertainment.


In the Spotlight...

Libraries Now Lending iPads

The FDU Library has acquired iPads for use in the library. iPads may be borrowed for up to two hours and can be used to browse the Internet, do library research, read e-books, stream videos and music, play games, and much more.

The iPads are part of the libraries' growing technology lending program which also includes laptops for use in the library, and the collection of Amazon Kindles, Sony eReaders and iPod Touches that may be borrowed by FDU students, faculty, and staff for up to one week.

Please stop by the circulation desk at the College at Florham Library or the Giovatto Library to sign

Figure 6.16: IPad used in the Library

(Source: http://view.fdu.edu/default.aspx?id=7467)

6.4.2 Ipod

The IPod is a portable handy music player device which carry music data and store those into its internal hard drive. With the help of the application software, the music data of various formats can be uploaded to it. It has all sorts of functions such as shuffling songs, playlist, FM radio channels and so on. Apart from being a music player, the iPod is able in taking backup of data from the device, work as pen drive or USB drive for data carrier, connect to computer for data, files or music transfer, automatically update the various programs from internet sources, work as a basic organizer or an alarm clock and many more. This device can be helpful in listening the content of any information, speeches talk, etc. for learning and education purposes.

Figure 6.17: IPod for Music

(Source: http://images.dailytech.com/nimage/iPod_nano_BLU_wPods_PRINT.jpg)

6.4.3 Mobile Phone

Today, with the advancements in technology and the rise in the use of smart phones, people are taking advantage of being connected to the Internet from wherever they are. So, the mobile phones are not only providing the facilities for talking but, also access e-mail, web searching, voice and video chat, play games, GPS navigation, etc. The Bluetooth feature of mobile phones allows users to transfer data (text, video, and image), install and download many apps, get connected to various social web tools and many more. Unlike Ipads and IPods, Mobile phones are very handy to operate, touch based screen, extendable memory, and software based technology through which many other devices can be connected with it. Due to above mentioned features and capabilities, various online libraries are using mobile technologies to offer library services to the users. Some of the major services which can be accessible through mobile phones are given in figure 6.18. The user can log in to the library gateway, browse library site, library's e-database, update about the newest addition to the library and search the OPAC and so on.

Figure 6.18: Mobile used in Library Services

(Source: http://www.slideshare.net/ellyssa/libraries-to-go-mobile-tech-in-libraries-presentation)

6.4.4 E-Book Reader

With the proliferation of internet and digital media, so many changes have taken place in the information world. Presently, the information is available in different formats and for accessing information about these different formats, format specific devices are available in the market. One such format is “E-Book”, and to read it, E-Book reader has emerged as a device to read e-Books. The key advantage of an e-books reader is its portability which requires very less space to carry. It accommodates and store huge number of e-Book which is impossible to carry in print. A good E-Book reader provides long battery backup without charging which helps users to use the device for long hours for interrupting study. The application software of the device provides crawl so one can go to any pages when it is required. There are a number of companies which produce E-Book reader. Some of the popular models are KOBO-Touch, Kindle 3G, Sony PRS-T1, Cybook Odyssey and so on.

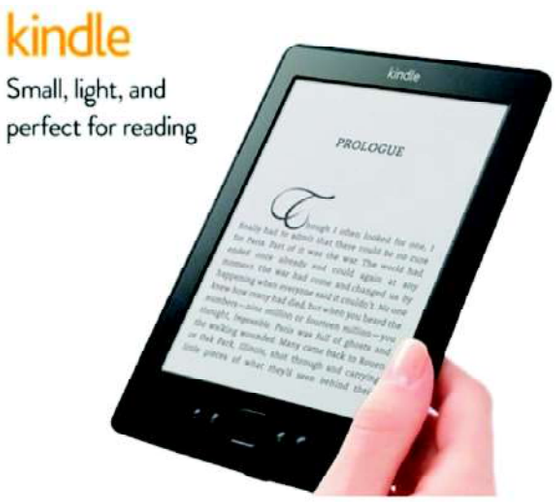


Figure 6.19: E-book Reader

(Source: http://www.amazon.in/Kindle-Ink-Display-Wi-Fi-Black/dp/B007HCFU90)

Review Questions

A. Fill in the blanks

1. Ipad is a hand-held _____ device.
2. Device specially designed for reading E-book is called _____.

B. Multiple Choice Questions

Tick the correct answer

1. What is an Ipad?
   - (a) Audio player
   - (b) Video player
   - (c) Book reader
   - (d) None of the above

2. Which kind of device is Kindle?
   (a) Book reader
   (b) Baking device
   (c) Message device
   (d) Notice board

C. Short Answer Questions

1. What is an information access device?
2. Write a note on Ipad.
3. What are the different Models of E-Book Reader?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part-A

1. Understood the information access devices.
2. Identified different types of information access devices and their applications.

Part-B

1. What do you mean by information access devices?
2. Explain the application of different information access devices.

Part-C

Performance Standards

The performance standards may include, but not limited to:

Performance Standards	Yes	No
Able to explain information access device.		
Able to explain the application of information access devices.		

6.5 Summary

The concept of Web2 has changed the information seeking and providing pattern of the users and Information providers both. Now, the advancement in technology and availability of different web tools has provided strength to the users to access the right information at the right time. The communication has become duplex because of these tools and techniques. The concept of Web 2 has applied in the file of library services too hence the Library2 has borne. By using this concept, libraries are becoming more interactive with their members and providing more personalized and customized services. There are a number of web tools to help people in accessing the web resources and use them effectively in their education, research and entertainment purpose. The Web2 provides a host of platform to the people as well as organizations to create organize and share the information with the world. The web user, individual or organizations can exploit the potentiality of these tools for their own benefits. These tools are emails, e-forum, discussion board, listservs, instant messaging, conferencing, blog posting, media wiki writing, participation in polls, group emails, group talks, comments posting, recommendation, and many more.

Besides these tools, there are a number of devices available in the market through which one can access different forms of information with ease and convenience. These devices and software like Ipad, IPod, mobiles, e-books readers and so on can enhance caliber of accessing digital information of the user. With the help of these devices one can access the information provided by a library through the Internet or resources available on the Internet.

The Web2, its tools and information access devices have broken the wall of the library and now the information resources of a library and other content available resources on the internet are available 24 hours a day and that also for whole week, month and year.

6.6 Exercise

1. What is a web tool? Describe the various web tools used in Library.
2. Explain in brief the characteristic and feature of web/library 2.0.
3. Write a short note on each of the following tools.

(i)	Pod	(vi)	Tags
(ii)	E-book Reader	(vii)	Podcast
(iii)	Flicker	(viii)	Email
(iv)	Bookmarks	(ix)	RDF
(v)	Social Tools	(x)	Blog

4. Write a short note on each of the following devices.

(i)	Smart Phone	(iii)	IPad
(ii)	E-Book Reader	(iv)	IPod

5. How library 2.0 helps to promote e-learning process? Explain.
6. Discuss the role of web 2.0 for the growth of CBSE school education.
7. How social web tools are effective for providing and promoting the library services?
8. What is a Forum? How is it useful to set up forum / groups in schools?
9. What is a RSS? Describe its role and use.
10. How mobile technology will help in e-learning and teaching at school?
11. How library website becomes the guiding tool for school education group? Explain.

6.7 Practical

1. Create a library blog for your school library, using blogger software applications.
2. Create Google groups based forum to share your thought and various awareness at your school.
3. Upload and share photo, video, etc. on social media as Facebook, Twitter, etc.
4. Subscribe latest news about CBSE Schools Education through RSS feed?
5. Download an E-book of your subject and read it on your computer, tablet, E-book Reader or smart Phone.

Resource Material

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