ST. JOSEPH'S COLLEGE OF ENGINEERING
IT2024 USER INTERFACE DESIGN
QUESTION BANK
UNIT – I
PART – A

1. Define user interface? What are the components of user interface?

It is a collection of techniques and mechanisms to interact with something. It has two components: Input & Output.

2. Define User Interface Design.

User Interface Design (UID) is a subset of a field of study called human-computer interaction (HCI). UID is the part of a computer and its software that people can touch, talk to, or otherwise understand.

3. Define Human Computer Interaction. (May/June 2012)

HCI is the study, planning and design of how people and computer work together so that a person needs are satisfied in the most effective way.

4. State some of the benefits of good user design. (May/June 2012)

Improve screen clarity and readability by making it less crowded, causes reduced decision making time, Training costs are lowered because training time is reduced, Support line calls are reduced because fewer assist calls are required.

5. What is meant by GUI?

Graphical User Interface (GUI) is a collection of techniques and mechanism to interact with pointing device of some kind. A user interface whose primary interaction mechanism is a pointing device is known as GUI. The pointing device acts as an electronic equivalent to human hand.

6. What are visually presented elements in a graphical system?

Windows, Menus, Icons, Screen based controls, Mouse point and cursor. **WIMP** means Windows, Icons, Menus, and Pointer interface; this is another term used to define a GUI.

7. Define pick and click interaction?

➢ Pick: To identify an element for a proposed action.
➢ Click: The signal to perform an action.

8. What is an object and its types?

Object is an entity. It can be manipulated as a single unit. Objects can be classified into 3 types: (l) Data object. (2) Container object. (3) Device object.

Data objects: objects which present information on screen. Container objects: objects that hold other object. Device objects: objects that represents physical objects in the real world.

9. Define property/attribute specification and explain its sequence.

Property / attribute specification action establish or modify the attributes or properties of objects. Property / attribute specification sequence (l) The user selects an object (ex) several words of text.

(2) The user then selects an action to apply to that object such as the action Bold.

(3)The actions effect persists until the action is deselected**.**

10. Define concurrent performance of functions.

Graphic system may do 2 or more things at one time. Multiple programs may run simultaneously.

11. What are the goals of web interface design?

It is to build hierarchy of menus and pages that well-structured. It is graphically rich environment.

12. What is meant by web interface design?

It is essentially the design of navigation and the presentation of information. Proper interface design is matter of properly balancing the Structure and relationships of menus, content and other linked documents or graphics.

13. What are the similarities between GUI and web interface design?

➢ They are interactive.   Both are used by people.
➢ Both are software design.

GUI design	Webpage design
Characteristics of interface such as monitor and modem are well designed.	The user device may range from handheld mechanism to high end work station.
It navigates through structured menus, lists, screens dialogs and wizards.	It navigates through links, book marks and typed URL's.

Printed page	Web pages
Layout is precise	Layout is approximation
They are presented as complete entities and their entire contents are available for reading or review immediately.	They are rendered slowly depending upon transmission speeds and page content.

14. Write any 2 differences between GUI and Webpage design.

15. Write any 2 differences between Printed pages versus Web pages?

16. Differentiate the term Internet, Intranet and Extranet.

Intranet: Within organization internal network over a shared infrastructure using dedicate connections.

Internet: It is a huge network of computer networks.

Extranet: An extranet is a Special set of intranet that can be accessed by authorized persons from outside

Intranet	Internet
It is used for an organization every day activities.	It is used to find information.
Need for cross-platform compatibility is minimized.	Need for cross-platform compatibility is maximized

an organization or company.

17. Mention any 2 difference between Intranet versus the Internet?

18. What is meant by transparency?

Permit the user to focus on the task or job without concern for the mechanics of the interface.

19. What are the advantages of graphical system?

Symbols recognized faster than text, faster learning, faster use and problem solving.

20. What are the five ways to provide simplicity?

Use progressive disclosure, hiding things until they are needed, Provide defaults, Minimize screen alignment points, Provide Uniformity & consistency.

21. List the various interaction styles.

Command language, Form filling, Menu selection and Direct manipulation.

22. What is a command line interaction style? Give the advantages of using it.

The concept of Interaction Styles refers to all the ways the user can communicate or otherwise interact with the computer system.

Advantages: Flexible, Appeals to expert users, Supports creation of user-defined "scripts" or macros, Is suitable for interacting with networked computers even with low bandwidth?

23. What is the use of UID?

User Interface Design aims to enhance the visual, usability and technological qualities of an interface. It adds to the satisfaction of the person using a product or a service.

24. List the advantages of GUI.

* Symbols are recognized faster than text.
* Faster learning.
* Faster use and problem solving.
* Easier to remember.
* More natural.
* Created and used by known and trusted sources
* Multiple viewable windows
* Windows, menus, controls, data, toolbars messages presented as specified by designer
* Documentation both offline and online provided.

25. List the disadvantages of GUI. (Nov/Dec 2012)

* Restricted navigation paths

- User hardware variations limited
- Visual creativity allowed but difficult
- Long time spent within an application.
- Greater design complexity.
• Inconsistencies in techniques and terminology due to copyright
- Legal issues and product differentiation.
• Human comprehension limitations.
• Inefficient for touch typists.

26. List the aspects that are to be considered while designing a web page.
Page size, page rendering, page layout, page resolution, user focus, page navigation, user focus, page navigation, sense of place, interactivity, page independence.

27. Give the characteristics of direct manipulation.(Nov/Dec 2012)
Acts as an extension of real word.
Provides continuous visibility.
Actions are rapid and incremental with visible display of results.
Actions are incremental and easily reversible.

28. What do you mean by indirect manipulation system?
User Interface System which uses world and texts instead of symbols and typing in place of pointing are known as indirect manipulation system.

29. Give some reasons for using indirect manipulation system.
1. Difficulty in conceptualizing graphically objects and concepts,
2. Limitation in graphics capabilities,
3. Space limitation to place controls.
4. Difficulty in learning to use GUI's.

30. State the conclusion derived from GUI vs other UI styles comparisons.
Design of an interface and not its style determines ease of use.
User preference must be considered.
In majority of cases, world are more meaningful than icons.
Content of graphical screen is critical.
GUI success depends on designer skills.

31. List some characteristics of GUI system.
Sophisticated visual presentation. Pick and click interaction.
Restricted set of interface options. Visualization.

32. Define WYSIWYG.
What You See Is What You Get is an acronym used to define GUI system**.**

33. What are the types of container objects?
workplace-storage area for all objects (Ex: desktop)
Folders-general purpose containers for long term storage.
Work area- temporary storage folders for objects currently being worked on.

34. Give some reasons for popularity of GUI.
There dimensional appearance Interaction using mouse, joysticks, etc.
Quick, dynamic, and meaningful, resembles appeal, charm, and customizability

35. Give the MS windows object classifications.(AU-NOV/DEC 2010)
Objects are classified as:
Collection-objects sharing common objects. Constraint-objects with stronger relationship. A change in one is reflected in another (EX: documents, pages).Composite-aggregation of objects identified as an object (Ex: calls make spread sheets). Container-holds another objects.
(Ex: folders) Can alter certain properties of objects within it.

36. Define properties or attributes of an object.
The unique characteristic of an object is known as properties or attributes. Example: font size, text style, back ground/for ground colors etc.

37. List the different types of actions that can be applied on an object. (NOV/DEC 2010)
Commands-actions that manipulate objects. There are executed immediately once executed, they cease to be relevant. Example: open / closing window.

38. State the difference between application orientation and object or data orientation.
*application orientation employs action: objects approach. For example,

Action> an application is opened (example: word processor).

Objects> file or other objects selected (example: memo).

*object orientation employs object: action approach.

Object> an object is chosen (example: a memo).

Action> an application is selected (example: word processor).

39. Define human computer interface(AU-APR/MAY 2011)

User interface design is a subset of a field of study called Human Computer Interaction (HCI). HCI is the study, planning and design of how people and computer work together.

40. List out few principles of UID (AU-APR/MAY 2011)

☐ The illusion of manipulable objects

☐ Visual order and viewer focus

☐ Revealed structure

☐ consistency

1 MARK QUESTIONS

1. System Study involves

a. study of an existing system **b.** documenting the existing system

c. identifying current deficiencies and establishing new goals **d.** All of the above

2. E primary tool used in structured design is a:

a. structure chart **b.** data-flow diagram **c.** program flowchart **d.** module

3. _____ one module of the new information system is activates at a time.

a. System Development Life Cycle **b.** CASE tool **c.** Phased Conversion **d.** Success factors

4. In Prototyping

a. BASIC is used **b.** COBOL is used **c.** 4GLs are used **d.** system is documented

5. The step-by-step instructions that solve a problem are called

a. An algorithm **b.** A list **c.** A plan **d.** A sequential structure

6. The approach used in top-down analysis and design is

a. to identify the top level functions by combining many smaller components into a single entity

b. to prepare flow charts after programming has been completed

c. to identify a top level function an d then create a hierarchy of lower-level modules and components.

   d. All of the above

7. Which of the following is not a factor in the failure of the systems developments projects?

a. size of the company **b.** inadequate user involvement

c. failure of systems integration **d.** continuation of a project that should have been cancelled

8.A Ring, refers to a record chain, the last of which refers to the first record, in the chain, is called a/an

a. addressing **b.** location **c.** pointer **d.** loop

9. The primary tool used in structured design is a:

a. data-flow diagram **b.** module **c.** structure chart **d.** program flowchart

10. A problem's _____ will answer the question, "What information will the computer need to know in order to either print or display the output times?"

a. Input **b.** Output **c.** Processing **d.** Purpose

11. Which of the following statements, is (are) not true for the lease option

a. Lease charges are lower than rental charges for the same period and are also tax deductible

b. Lease may be written to show higher payments is early years to reflect the decline in value of the system

c. Insurance, maintenance and other expenses are included in the rental charge

d. All of the above

12. The two classifications of inputs are

a. energies and maintenance **b.** maintenance and waste

c. maintenance and signal **d.** products and waste

13. Documentation is prepared

a. at every stage **b.** at system design

c. at system analysis **d.** at system development

14. System Implementation Phase entails

a. System check outs **b.** Pilot run **c.** Parallel runs **d.** All of the above

15. Which of the following is not true of the conversion phase of the development life cycle?

a. the user and systems personnel must work closely together.
b. steps must be taken to phase out the old system
c. documentation should be emphasized
d. the non machine components of the system should be considered.

16. Managers who are potential users of the MIS
a. select the optimum equipment configurations **c.** describe information needs
b. evaluate alternate equipment configurations **d.** None of the above.

17. Positive testing is
a. running the system with line data by the actual user
b. making sure that the new programs do in fact process certain transactions according to
Specifications   **c.** is checking the logic of one or more programs in the candidate system
d. testing changes made in an existing or a new program.

18. Data Definition Language (DDL)
a. describes how data are structured in the data base
b. specifies for the DBMS what is required; the techniques used to process data
c. determine how data must be structured to produce the user's view
d. All of the above

19. In phase 1 of the system development life cycle, which of the following aspects are usually analyzed?
a. outputs **b.** input (transactions) **c.** controls **d.** All of the above

20. During the maintenance phase,
a. System requirements are established **b.** System analysis is carried out
c. Programs are tested **d.** None of the above.

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Answers:

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
d a c c a c a c c a c   c   a   a   c   d   b   a   d   b

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PART B

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1. Compare and contrast GUI and web interface design.(Nov/Dec 2012, 2013, 2014) or

Characteristics	GUI	Web interface design
Interaction	Interactions such as clicking menu choices, pressing buttons, selecting list choices, and cut/copy/paste occur within context of active program.	Basic interaction is a single click. This can cause extreme changes in context, which may not be noticed.
Devices	User hardware variations limited. User hardware characteristics well defined. Screens appear exactly as specified.	User hardware variations enormous. Screen appearance influenced by hardware being used.
User Focus	Data and applications.	Information and navigation.
Data	Typically created and used by known and trusted.	Full of unknown content.
Information	Sources are trusted. Properties generally known. Typically placed into system by users or known people and organizations.	Source not always trusted. Often not placed onto the Web by users or known people and organizations. Highly variable organization.
User Tasks	Install, configure, personalize, start, use, and Open, use, and close data files. Familiarity with applications often achieved.	Link to a site, browse or read pages, fill out forms, upgrade programs. Register for services, participate in transactions, download and save things. Familiarity with many sites not established.
Presentation	Components: Windows, menus,	Two components: browser and page.

	controls, data, toolbars. Presented as specified by designer. Generally standardized by toolkits and style specifications. Guides.	Within page, any combination of text, images, audio, video, and animation. May not be presented as specified by the designer— dependent on browser, monitor, and user. Little standardization.
Navigation	Through menus, lists, trees, dialogs, and wizards.	Through links, bookmarks, and typed URLs.
Interaction	Interactions such as clicking menu choices, pressing buttons, selecting list choices, and cut/copy/paste occur within context of active program.	Basic interaction is a single click. This can cause extreme changes in context, which may not be noticed.
Response Time	Nearly instantaneous.	Quite variable, depending on transmission speeds, page content, and so on. Long times can upset the user.
System Capability	Unlimited capability proportional to sophistication of hardware and software.	Limited by constraints imposed by the hardware, browser, software, client support, and user willingness to allow features because of response time, security, and privacy concerns.
Task Efficiency	Targeted to a specific audience with specific tasks. Only limited by the amount of programming undertaken to support it.	Limited by browser and network capabilities. Actual user audience usually not well understood. Often intended for anyone and everyone.
Consistency	Major objective exists within and across applications. Aided by platform toolkit and design guidelines. Universal consistency in GUI products generally.	Sites tend to establish their own identity. Frequently standards set within a site. Frequent ignoring of GUI guidelines for identical created through toolkits and design guidelines. Components, especially controls.
User Assistance	Integral part of most systems and applications. Documentation, both online and offline, Customer service support, if provided, usually provided. Personal support desk also usually provided.	No similar help systems. Accessed through standard mechanisms. The little available help is built into the page oriented to product or service offered.
Integration	Seamless integration of all applications into the platform environment is a major objective.	Apparent for some basic functions within most Web sites (navigation, printing, and so on.) in accomplishing this objective. Sites tend to achieve individual distinction rather than integration.
Security	Tightly controlled, proportional to degree of willingness to invest resources and effort. Not an issue for most home PC users.	Renowned for security exposures. Browser-provided security options typically understood by average users. When employed, may have function-limiting side effects
Reliability	Tightly controlled in business systems,	Susceptible to disruptions caused by user, telephone proportional to degree of

		willingness line and cable providers, Internet service providers, to invest resources and effort. Hosting servers, and remotely accessed sites.

2 a) Compare characteristics of printed pages versus web pages. (May 2012) (10 marks)

Page size: Printed pages are generally larger than their Web counterparts. They are also fixed in size, not variable like Web pages. The visual impact of the printed page is maintained in hard-copy form, while on the Web all that usually exists are snapshots of page areas. The visual impact of a Web page is substantially degraded, and the user may never see some parts of the page because their existence is not known or require scrolling to bring into view. The design implications: the top of a Web page is its most important element, and signals to the user must always be provided that parts of a page lie below the surface.

Page rendering: Printed pages are immensely superior to Web pages in rendering. Printed pages are presented as complete entities, and their entire contents are available for reading or review immediately upon appearance. Web pages elements are often rendered slowly, depending upon things like line transmission speeds and page content. Design implications: Provide page content that downloads fast, and give people elements to read immediately so the sense of passing time is diminished.

Page layout: With the printed page, layout is precise with much attention given to it. With Web pages layout is more of an approximation, being negatively influenced by deficiencies in design toolkits and the characteristics of the user's browser and hardware, particularly screen sizes. Design implication: Understand the restrictions and design for the most common user tools.

Page resolution: the resolution of displayed print characters still exceeds that of screen characters, and screen reading is still slower than reading from a document. Design implication: Provide an easy way to print long Web documents.

Page navigation: Navigating printed materials is as simple as page turning. Navigating the Web requires innumerable decisions concerning which of many possible links should be followed. Design implications are similar to the above—provide overviews of information organization schemes and clear descriptions of where links lead.

Interactivity: Printed page design involves letting the eyes traverse static information, selectively looking at information and using spatial combinations to make page elements enhance and explain each other. Web design involves letting the hands move the information (scrolling, pointing, expanding, clicking, and so on) in conjunction with the eyes.

Page independence: Because moving between Web pages is so easy, and almost any page in a site can be accessed from anywhere else, pages must be made freestanding. Every page is independent. Printed pages, being sequential, fairly standardized in organization, and providing a clear sense of place, are not considered independent. Design implication: Provide informative headers and footers on each Web page.

2b) List the advantages and disadvantages of Pop-up Menus. (6 marks)
Pop-up Menus use to present alternatives or choices within the context of the task.
- The advantages of pop-up menus are:
  - They appear in the working area.
  - They do not use window space when not displayed.
  - No pointer movement is needed if selected by button.
  - Their vertical orientation is most efficient scanning.
  - Their vertical orientation most efficient for grouping.
  - Their vertical orientation allows more choices to be displayed.
  - They may be able to remain showing ("pinned") when used frequently.
  - They allow for display of both keyboard equivalents and accelerators.
- The disadvantages of pop-up menus are:
  - Their existence must be learned and remembered.
  - Means for selecting them must be learned and remembered.
  - They require a special action to see the menu (mouse click).
  - Items are smaller than full-size buttons, slowing selection time.
  - They may obscure the screen working area.
  - Their display locations may not be consistent.
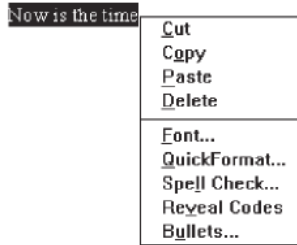
3.**Explain the concept of direct and indirect manipulation.**

Concept of Direct Manipulation

The term used to describe the style of interaction for graphical systems was called the "direct manipulation" systems and suggested that they possess the following characteristics:

- **The system is portrayed as an extension of the real world**: A person is allowed to work in a familiar environment and in a familiar way, focusing on the data, not the application and tools. The physical organization of the system, which most often is unfamiliar, is hidden from view and is not a distraction.
- **Continuous visibility of objects and actions**: objects are continuously visible. Reminders of actions to be performed are also obvious. Nelson (1980) described this concept as "virtual reality," a representation of reality that can be manipulated. Hatfield (1981) is credited with calling it "WYSIWYG" (What You See Is What You Get) and Rutkowski (1982) described it as "transparency,"
- **Actions are rapid and incremental with visible display of results**: The results of actions are immediately displayed visually on the screen in their new and current form. Auditory feedback may also be provided. The impact of a previous action is quickly seen, and the evolution of tasks is continuous and effortless.
- **Incremental actions are easily reversible**: Finally, actions, if discovered to be incorrect or not desired, can be easily undone.

Indirect Manipulation

- In practice, direct manipulation of all screen objects and actions may not be feasible because of the following:
  - The operation may be difficult to conceptualize in the graphical system.
  - The graphics capability of the system may be limited.
  - The amount of space available for placing manipulation controls in the window border may be limited.
  - It may be difficult for people to learn and remember all the necessary operations and actions.
- When this occurs, indirect manipulation is provided. Indirect manipulation substitutes words and text, such as pull-down or pop-up menus, for symbols, and substitutes typing for pointing.

4. **Discuss in detail about the characteristics of Graphical user interface. (May/June 2013,Nov/Dec2014)**

 a. *Sophisticated Visual Presentation*

- Visual presentation is the visual aspect of the interface. It is what people see on the screen. The sophistication of a graphical system permits displaying lines, including drawings and icons. It also permits the displaying of a variety of character fonts, including different sizes and styles.
- The meaningful interface elements visually presented to the user in a graphical system include windows (primary, secondary, or dialog boxes), menus (menu bar, pulldown, pop-up, cascading), icons to represent objects such as programs or files, assorted screen-based controls (text boxes, list boxes, combination boxes, settings, scroll bars, and buttons), and a mouse pointer and cursor.

The objective is to reflect visually on the screen the real world of the user as realistically, meaningfully, simply, and clearly as possible.

b. Pick-and-Click Interaction

- To identify a proposed action is commonly referred to as pick, the signal to perform an action as click.
- The primary mechanism for performing this pick-and-click is most often the mouse and its buttons and the secondary mechanism for performing these selection actions is the keyboard.

c. Restricted Set of Interface Options

- The array of alternatives available to the user is what is presented on the screen or what may be retrieved through what is presented on the screen, nothing less, and nothing more. This concept fostered the acronym WYSIWYG.

d. Visualization

- Visualization is a cognitive process that allows people to understand information that is difficult to perceive, because it is either too voluminous or too abstract.
- The goal is not necessarily to reproduce a realistic graphical image, but to produce one that conveys the most relevant information. Effective visualizations can facilitate mental insights, increase productivity, and foster faster and more accurate use of data.

e. Object Orientation

- A graphical system consists of objects and actions. Objects are what people see on the screen as a single unit.
- Objects can be composed of subobjects. For example, an object may be a document and its subobjects may be a paragraph, sentence, word, and letter.
- Objects are divided into three meaningful classes as Data objects, which present information, container objects to hold other objects and Device objects, represent physical objects in the real world.
- Objects can exist within the context of other objects, and one object may affect the way another object appears or behaves. These relationships are called collections, constraints, composites, and containers.
- **Properties or Attributes of Objects:** Properties are the unique characteristics of an object. Properties help to describe an object and can be changed by users.
- **Actions:** People take actions on objects. They manipulate objects in specific ways (commands) or modify the properties of objects (property or attribute specification).
- The following is a typical property/attribute specification sequence:
  o The user selects an object—for example, several words of text.
  o The user then selects an action to apply to that object, such as the action BOLD.
  o The selected words are made bold and will remain bold until selected and changed again.
- **Application versus Object or Data Orientation:** An application-oriented approach takes an action: object approach, like this:

      Action> 1. An application is opened (for example, word processing).
      Object> 2. A file or other object selected (for example, a memo).

  An object-oriented object:action approach does this:

      Object> 1. An object is chosen (a memo).
      Action> 2. An application is selected (word processing).

- **Views:** Views are ways of looking at an object's information. IBM's SAA CUA describes four kinds of views: composed, contents, settings, and help.

f. Use of Recognition Memory

- Continuous visibility of objects and actions encourages to eliminate "out of sight, out of mind" problem

g. Concurrent Performance of Functions

- Graphic systems may do two or more things at one time. Multiple programs may run simultaneously.
- It may process background tasks (cooperative multitasking) or preemptive multitasking.
- Data may also be transferred between programs. It may be temporarily stored on a "clipboard" for later transfer or be automatically swapped between programs.

5a)Compare the characteristic of internet, intranet and extranet.(April/May 2011)
Intranet versus the Internet
They differ in some important ways as

- **Users:** The users of intranets, being organization employees, know a lot about the organization, its structure, its products, its jargon, and its culture. Customers use Internet sites and others who know much less about the organization, and often care less about it.
- **Tasks:** An intranet is used for an organization's everyday activities, including complex transactions, queries, and communications. The Internet is mainly used to find information, with a supplementary use being simple transactions.
- **Type of information:** An intranet will contain detailed information needed for organizational functioning. Information will often be added or modified. The Internet will usually present more stable information: marketing and customer or client information, reports, and so forth.
- **Amount of information:** Typically, an intranet site will be much larger than an organization's Internet site. It has been estimated that an intranet site can be ten to one hundred times larger than its corresponding public site.
- **Hardware and software:** Since intranets exist in a controlled environment, the kinds of computers, monitors, browsers, and other software can be restricted or standardized. The need for cross-platform compatibility is minimized or eliminated; upgraded communications also permit intranets to run from a hundred to a thousand times faster than typical Internet access can. This allows the use of rich graphics and multimedia, screen elements that contribute to very slow download times for most Internet users.
- **Design philosophy:** Implementation on the intranet of current text-based and GUI applications will present a user model similar to those that have existed in other domains. This will cause a swing back to more traditional GUI designs—designs that will also incorporate the visual appeal of the Web, but eliminate many of its useless, promotional, and distracting features. The resulting GUI hybrids will be richer and much more effective.

Extranets

- An extranet is a special set of intranet Web pages that can be accessed from outside an organization or company.
- Typical examples include those for letting customers check on an order's status or letting suppliers view requests for proposals. An extranet is a blend of the public Internet and the intranet, and its design should reflect this.

5b) Discuss the Design Guidelines of Intranet and Extranet.
Intranet Design Guidelines

- Provide a single home page containing at least:
  — A directory hierarchy.
  — A search facility.
  — Current news.
- Present a visual style that is:
  — Different.
  — Distinguishing.
  — Unified.
- Orient the intranet Web site toward tasks.
- Include many options and features.
- Develop a strong navigational system.

Extranet Design Guidelines

- To distinguish the extranet from the Internet, provide a subtle difference in:
  — Visual style.
  — Navigation.
- Provide links to the public Internet site.

6. What are the general principles to be followed for UID? Explain in detail. (Nov/Dec 2011,2013)
General Principles

The design goals in creating a user interface are described below. They are fundamental to the design and implementation of all effective interfaces, including GUI and Web ones. These principles are general characteristics of the interface, and they apply to all aspects.

- Aesthetically Pleasing
  — Provide visual appeal by following these presentation and graphic design principles:
    - Provide meaningful contrast between screen elements.
    - Create groupings.
    - Align screen elements and groups.
    - Provide three-dimensional representation.
    - Use color and graphics effectively and simply.
- Clarity
  — The interface should be visually, conceptually, and linguistically clear, including:
    - Visual elements
    - Functions
    - Metaphors
    - Words and text
- Compatibility
  — Provide compatibility with the following:
    - The user
    - The task and job
    - The product
  — Adopt the user's perspective.
- Comprehensibility
  — A system should be easily learned and understood. A user should know the following:
    - What to look at
    - What to do
    - When to do it
    - Where to do it
    - Why to do it
    - How to do it
  — The flow of actions, responses, visual presentations, and information should be in a sensible order that is easy to recollect and place in context.
- Configurability
  — Permit easy personalization, configuration, and reconfiguration of settings.
    - Enhances a sense of control.
    - Encourages an active role in understanding.
- Consistency
  — A system should look, act, and operate the same throughout. Similar components should:
    - Have a similar look.
    - Have similar uses.
    - Operate similarly.
  — The same action should always yield the same result.
  — The function of elements should not change.
  — The position of standard elements should not change.
  — In addition to increased learning requirements, inconsistency in design has a number of other prerequisites and by-products, including:
  — More specialization by system users.
  — Greater demand for higher skills.
  — More preparation time and less production time.
  — More frequent changes in procedures.
  — More error-tolerant systems (because errors are more likely).
  — More kinds of documentation.
  — More time to find information in documents.
  — More unlearning and learning when systems are changed.
  — More demands on supervisors and managers.

— More things to do wrong.
- Control
  — The user must control the interaction.
    - Actions should result from explicit user requests.
    - Actions should be performed quickly.
    - Actions should be capable of interruption or termination.
    - The user should never be interrupted for errors.
  — The context maintained must be from the perspective of the user.
  — The means to achieve goals should be flexible and compatible with the user's skills, experiences, habits, and preferences.
  — Avoid modes since they constrain the actions available to the user.
  — Permit the user to customize aspects of the interface, while always providing a proper set of defaults.
- Directness
  — Provide direct ways to accomplish tasks.
    - Available alternatives should be visible.
    - The effect of actions on objects should be visible.
- Efficiency
  — Minimize eye and hand movements, and other control actions.
    - Transitions between various system controls should flow easily and freely.
    - Navigation paths should be as short as possible.
    - Eye movement through a screen should be obvious and sequential.
  — Anticipate the user's wants and needs whenever possible.
- Familiarity
  — Employ familiar concepts and use a language that is familiar to the user.
  — Keep the interface natural, mimicking the user's behavior patterns.
  — Use real-world metaphors.
- Flexibility
  — A system must be sensitive to the differing needs of its users, enabling a level and type of performance based upon:
    - Each user's knowledge and skills.
    - Each user's experience.
    - Each user's personal preference.
    - Each user's habits.
    - The conditions at that moment.
- Forgiveness
  — Tolerate and forgive common and unavoidable human errors.
  — Prevent errors from occurring whenever possible.
  — Protect against possible catastrophic errors.
- Predictability
  — The user should be able to anticipate the natural progression of each task.
    - Provide distinct and recognizable screen elements.
    - Provide cues to the result of an action to be performed.
  — All expectations should be fulfilled uniformly and completely.
  — When an error does occur, provide constructive messages.
- Recovery
  — A system should permit:
    - Commands or actions to be abolished or reversed.
    - Immediate return to a certain point if difficulties arise.
  — Ensure that users never lose their work as a result of:
    - An error on their part.
    - Hardware, software, or communication problems.
- Responsiveness
  — The system must rapidly respond to the user's requests.
  — Provide immediate acknowledgment for all user actions:

- Visual.
- Textual.
- Auditory.
- Simplicity
  — Provide as simple an interface as possible.
  — Five ways to provide simplicity:
    - Use progressive disclosure, hiding things until they are needed.
  — Present common and necessary functions first.
  — Prominently feature important functions.
  — Hide more sophisticated and less frequently used functions.
    - Provide defaults.
    - Minimize screen alignment points.
    - Make common actions simple at the expense of uncommon actions being made harder.
    - Provide uniformity and consistency.
- Transparency
  — Permit the user to focus on the task or job, without concern for the mechanics of the interface.
    - Workings and reminders of workings inside the computer should be invisible to the user.
- Trade-Offs
  — Final design will be based on a series of trade-offs balancing often-conflicting design principles.
  — People's requirements always take precedence over technical requirements.

7. Discuss advantages and drawbacks of graphical system in detail.(Nov/Dec 2012)

Graphical system advantages

The success of graphical systems has been attributed to a host of factors. The following have been commonly referenced in literature and endorsed by their advocates as advantages of these systems.

- **Symbols recognized faster than text**: symbols can be recognized faster and more accurately than text. An example of a good classification scheme that speeds up recognition is the icons. These icons allow speedy recognition of the type of message being presented.
- **Faster learning**: a graphical, pictorial representation aids learning, and symbols can also be easily learned.
- **Faster use and problem solving**: Visual or spatial representation of information has been found to be easier to retain and manipulate and leads to faster and more successful problem solving.
- **Easier remembering**: Because of greater simplicity, it is easier for casual users to retain operational concepts.
- **More natural**: symbolic displays are more natural and advantageous because the human mind has a powerful image memory.
- **Fewer errors**: Reversibility of actions reduces error rates because it is always possible to undo the last step. Error messages are less frequently needed.
- **Increased feeling of control**: The user initiates actions and feels in control. This increases user confidence
- **Immediate feedback**: The results of actions furthering user goals can be seen immediately. If the response is not in the desired direction, the direction can be changed quickly.
- **Predictable system responses**: Predictable system responses also speed learning.
- Easily reversible actions: This ability to reverse unwanted actions also increases user confidence
- **More attractive**: Direct-manipulation systems are more entertaining, cleverer, and more appealing.
- **May consume less space**: Icons may take up less space than the equivalent in words but this is not the case always.
- **Replaces national languages**: Icons possess much more universality than text and are much more easily comprehended worldwide.

- **Easily augmented with text displays**: Where graphical design limitations exist, direct-manipulation systems can easily be augmented with text displays. The reverse is not true.
- **Low typing requirements**: Pointing and selection controls, such as the mouse or trackball, eliminate the need for typing skills.

Graphical system disadvantages

The body of positive research, hypotheses, and comment concerning graphical systems is being challenged by some studies, findings, and opinions that indicate that graphical representation and interaction may not necessarily always be better. Indeed, in some cases, it may be poorer than pure textual or alphanumeric displays. Among the disadvantages put forth are these:

- **Greater design complexity**: Controls and basic alternatives must be chosen from a pile of choices numbering in excess of 50. This design potential may not necessarily result in better design unless proper controls and windows are selected. Poor design can undermine acceptance.
- **Learning still necessary**: The first time one encounters many graphical systems, what to do is not immediately obvious. A severe learning and remembering requirement is imposed on many users because meanings of icons or using pointing device have to be learned.
- **Lack of experimentally-derived design guidelines:** today there is a lack of widely available experimentally-derived design guidelines. Earlier only few studies to aid in making design decisions were performed and available for today now. Consequently, there is too little understanding of how most design aspects relate to productivity and satisfaction.
- **Inconsistencies in technique and terminology**: Many differences in technique, terminology, and look and feel exist among various graphical system providers, and even among successive versions of the same system. So the user has to learn or relearn again while shifting to next terminology.
- **Not always familiar**: Symbolic representations may not be as familiar as words or numbers. Numeric symbols elicit faster responses than graphic symbols in a visual search task.
- **Window manipulation requirements**: Window handling and manipulation times are still excessive and repetitive. This wastes time
- **Production limitations**: The number of symbols that can be clearly produced using today's technology is still limited. A body of recognizable symbols must be produced that are equally legible and equally recognizable using differing technologies. This is extremely difficult today.
- **Few tested icons exist**: Icons must be researched, designed, tested, and then introduced into the marketplace. The consequences of poor or improper design will be confusion and lower productivity for users.
- **Inefficient for touch typists**: For an experienced touch typist, the keyboard is a very fast and powerful device.
- **Not always the preferred style of interaction**: Not all users prefer a pure iconic interface. User will also prefer alternatives with textual captions.
- **Not always fastest style of interaction:** graphic instructions on an automated bank teller machine were inferior to textual instructions.
- **May consume more screen space**: Not all applications will consume less screen space. A listing of names and telephone numbers in a textual format will be more efficient to scan than a card file.
- **Hardware limitations**: Good design also requires hardware of adequate power, processing speed, screen resolution, and graphic capability.

8. **Write short notes on a) the Web User Interface and the popularity of it.**
   b) Visual Style in Web Page Design and Web Page Size.

- Web interface design is essentially the design of navigation and the presentation of information.
- Proper interface design is largely a matter of properly balancing the structure and relationships of menus, content, and other linked documents or graphics. The design goal is to build a hierarchy of menus and pages that feels natural, is well structured, is easy to use, and is truthful.
- The Web is a navigation environment where people move between pages of information, not an application environment. It is also a graphically rich environment.
- Web interface design is difficult for a number of reasons. First, its underlying design language, HTML. Next, browser navigation retreated to the pre-GUI era.

- Web interface design is also more difficult because the main issues concern information architecture and task flow, neither of which is easy to standardize. It is more difficult because of the availability of the various types of multimedia, and the desire of many designers to use something simply because it is available. It is more difficult because users are ill defined, and the user's tools so variable in nature.

The popularity of Web

- While the introduction of the graphical user interface revolutionized the user interface, the Web has revolutionized computing. It allows millions of people scattered across the globe to communicate, access information, publish, and be heard. It allows people to control much of the display and the rendering of Web pages.
- Web usage has reflected this popularity. The number of Internet hosts has risen dramatically.
- Users have become much more discerning about good design. Slow download times, confusing navigation, confusing page organization, disturbing animation, or other undesirable site features often results in user abandonment of the site for others with a more agreeable interface.

b) Visual Style in Web Page Design and Web Page Size

Visual Style in Web Page Design

- Maintain a consistent and unified visual style throughout the pages of an entire Web site.
- Base the visual style on:
  — The profile and goals of the Web site owner.
  — The profile, tastes, and expectations of the Web site user.

Web Page Size

- Minimize page length.
  — Restrict to two or three screens of information.
- Place critical or important information at the very top so it is always viewable when the page is opened.
  — Locate it within the top 4 inches of page.
- Determining an optimum page length will require balancing these factors. Arguments for shorter pages and against longer pages are that longer pages:
  o Tax the user's memory, as related information is more scattered and not always visible.
  o Can lead to a lost sense of context as navigation buttons and major links disappear from view.
  o Display more content and a broader range of navigation links making it more difficult for users to find and then decide upon what path to follow.
  o Require excessive page scrolling, which may become cumbersome and inefficient.
  o Are less conducive to the "chunking" information organization scheme commonly employed in Web sites.
- Arguments for longer pages are that they:
  o Resemble the familiar structure of paper documents.
  o Require less "clicks" for navigating through a Web site.
  o Are easier to download and print for later reading.
  o Are easier to maintain because they possess fewer category navigation links to other pages.

9. **Discuss about a) the principles of User Interface Design and Xerox STAR.**
   b) Phrasing the Menu.

a) Principles of User Interface Design

- It should be useful, accomplishing some business objectives faster and more efficiently than the previously used method or tool did. It must also be easy to learn, for people want to do, not learn to do.
- The interface itself should serve as both a connector and a separator: a connector in that it ties the user to the power of the computer, and a separator in that it minimizes the possibility of the participants damaging one another. We will begin with the first set of published principles, those for the Xerox STAR.

Principles for the Xerox STAR

- *The illusion of manipulable objects:* Displayed objects that are selectable and manipulable must be created. A design challenge is to invent a set of displayable objects that are represented

meaningfully and appropriately for the intended application. It must be clear that these objects can be selected,

- *Visual order and viewer focus:* Effective visual contrast between various components of the screen is used to achieve this goal. Animation is also used to draw attention, as is sound. Feedback must also be provided to the user.
- *Revealed structure:* The distance between one's intention and the effect must be minimized. The relationship between intention and effect must be tightened and made as apparent as possible to the user.
- *Consistency:* Consistency aids learning. Consistency is provided in such areas as element location, grammar, font shapes, styles, and sizes, selection indicators, and contrast and emphasis techniques.
- *Appropriate effect or emotional impact:* The interface must provide the appropriate emotional effect for the product and its market. Is it a corporate, professional, and secure business system? Should it reflect the fantasy, wizardry, and bad puns of computer games?
- *A match with the medium:* The interface must also reflect the capabilities of the device on which it will be displayed. Quality of screen images will be greatly affected by a device's resolution and color-generation capabilities.

9b) **Phrasing the Menu**
- A menu must communicate to the user information about:
  - o The nature and purpose of the menu itself.
  - o The nature and purpose of each presented choice.
  - o How the proper choice or choices may be selected.

Menu Titles
- Main menu:
  — Create a short, simple, clear, and distinctive title, describing the purpose of the entire series of choices.
- Submenus:
  — Submenu titles must be worded exactly the same as the menu choice previously selected to display them.
- General:
  — Locate the title at the top of the listing of choices.
  — Spell out the title fully using either an:
    • Uppercase font.
    • Mixed-case font in the headline style.
  — Superfluous titles may be omitted.

Menu Choice Descriptions
- Create meaningful choice descriptions that are familiar, fully spelled out, concise,and distinctive.
- Descriptions may be single words, compound words, or multiple words or phrases.
  — Exception: Menu bar items should be a single word (if possible).
- Place the keyword first, usually a verb.
- Use the headline style, capitalizing the first letter of each significant word in the choice description.
- Use task-oriented not data-oriented wording.
- Use parallel construction.
- A menu choice must never have the same wording as its menu title.
- Identical choices on different menus should be worded identically.
- Choices should not be numbered.
  — Exception: If the listing is numeric in nature, graphic, or a list of varying items, it may be numbered.
- If menu options will be used in conjunction with a command language, the capitalization and syntax of the choices should be consistent with the command language.
- Word choices as commands to the computer.

Menu Instructions
- For novice or inexperienced users, provide menu completion instructions.

— Place the instructions in a position just preceding the part, or parts, of the menu to which they apply.

> • Left-justify the instruction and indent the related menu choice descriptions a minimum of three spaces to the right.
> • Leave a space line, if possible, between the instructions and the related menu choice descriptions.

— Present instructions in a mixed-case font in sentence style.

- For expert users, make these instructions easy to ignore by:
  — Presenting them in a consistent location.
  — Displaying them in a unique type style and/or color.

Intent Indicators

- Cascade indicator:
  — To indicate that selection of an item will lead to a submenu, place a triangle or right-pointing solid arrow following the choice.
  — A cascade indicator must designate every cascaded menu.
- To a window indicator:
  — For choices that result in displaying a window to collect more information, place an ellipsis (. . .) immediately following the choice.
  > • Exceptions—do not use when an action:
  > > – Causes a warning window to be displayed.
  > > – May or may not lead to a window.
- Direct action items:
  — For choices that directly perform an action, no special indicator should be placed on the menu.
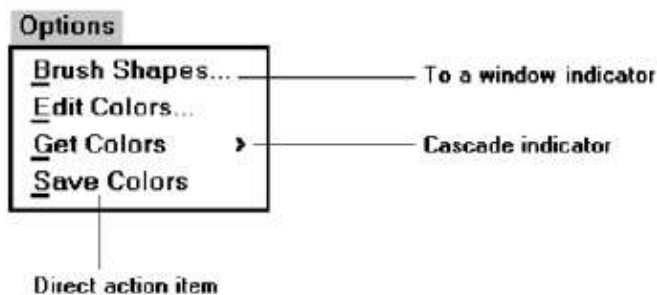
Keyboard Equivalents

- To facilitate keyboard selection of a menu choice, each menu item should be assigned a keyboard equivalent mnemonic.
- The mnemonic should be the first character of the menu item's description.
  — If duplication exists in first characters, use another character in the duplicated item's description.
  — Preferably choose the first succeeding consonant.
- Designate the mnemonic character by underlining it.
- Use industry-standard keyboard access equivalents when they exist.

Keyboard Accelerators

- For frequently used items, provide a keyboard accelerator to facilitate keyboard selection.
- The accelerator may be one function key or a combination of keys.
  — Function key shortcuts are easier to learn than modifier plus letter shortcuts.
- Pressing no more than two keys simultaneously is preferred.
  — Do not exceed three simultaneous keystrokes.
- Use a plus (+) sign to indicate that two or more keys must be pressed at the same time.
- Accelerators should have some associative value to the item.
- Identify the keys by their actual key top engraving.
- If keyboard terminology differences exist, use:
  — The most common keyboard terminology.
  — Terminology contained on the newest PCs.
- Separate the accelerator from the item description by three spaces.

- Right-align the key descriptions.
- Do not use accelerators for:
  — Menu items that have cascaded menus.
  — Pop-up menus.
- Use industry-standard keyboard accelerators

```
Style
  Normal
  Bold        Ctrl+B
  Italic      Ctrl+I
  Underline   Ctrl+U

  Outline
  Shadow
```

10.Describe about Selecting Menu Choices.

Initial Cursor Positioning

- If one option has a significantly higher probability of selection, position the cursor at that option.
- If repeating the previously selected option has the highest probability of occurrence, position the cursor at this option.
- If no option has a significantly higher probability of selection, position the cursor at the first option.

Choice Selection

- Pointers:
  — Select the choice by directly pointing at it with a mechanical device such as a mouse or trackball pointer, or light pen, or pointing with one's finger.
  — Visually indicate:
    • Which options can be selected.
    • When the option is directly under the pointer and can be selected.
  — Visually distinguish single- and multiple-choice menu alternatives.
  — If pointing with a mechanical device is the selection method used:
    • The selectable target area should be at least twice the size of the active area of the pointing device or displayed pointer. In no case should it be less than 6 millimeters square.
    • Adequate separation must be provided between adjacent target areas.
  — If finger pointing is the selection method used:
    • The touch area must be a minimum of 20 to 30 millimeters square.
    • The touch area must encompass the entire caption plus one character around it.
- Keyboard:
  — If moving the cursor to a menu choice:
    • The up and down arrow keys should move the cursor up or down vertically oriented menu options.
    • The left and right cursor keys should move the cursor left or right between horizontally oriented menu options.
  — If keying a choice identifier value within an entry field:
    • Locate the entry field at the bottom of the last choice in the array of choices.
    • Uppercase, lowercase, and mixed -case typed entries should all be acceptable.
- Selection/execution:
  — Provide separate actions for selecting and executing menu options.
  — Indicate the selected choice through either:
    • Highlighting it with a distinctive display technique.
    • Modifying the shape of the cursor.
  — Permit unselecting choice before execution.
    • If a menu is multiple choice, permit all options to be selected before execution.
- Combining techniques:

— Permit alternative selection techniques, to provide flexibility.

Defaults
- Provide a default whenever possible.
- Display as bold text.

Unavailable Choices
- Unavailable choices should be dimmed or "grayed out."
- Do not add or remove items from a menu unless the user takes explicit action to add or remove them through the application.

Mark Toggles or Settings
- Purpose:
  — Use to designate that an item or feature is active or inactive over a relatively long period of time.
  — Use to provide a reminder that an item or feature is active or inactive.
- Guidelines:
  — Position the indicator directly to the left of the option.
  — For situations where several nonexclusive choices may be selected, consider including one alternative that deselects all the items and reverts the state to the "normal" condition.

Figure 4.11 Mark toggles.

Toggled Menu Items
- Purpose:
  — Use to designate two opposite commands that are accessed frequently.
  — Use when the menu item displayed will clearly indicate that the opposite condition currently exists.
- Guidelines:
  — Provide a meaningful, fully spelled-out description of the action.
  — Begin with a verb that unambiguously represents the outcome of the command.
  — Use mixed-case letters, with the first letter of each word capitalized.

Explain the characteristics and principles used in web user interface design. (May/June2013, 2014)
Answer: 2nd and 7th.

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UNIT – II
PART – A

</div>

1. List the design commandments of UID. (Nov/Dec 2012)
- Provide a multidisciplinary design team.
- Solicit early and ongoing user involvement.
- Gain a complete understanding of users and their tasks.
- Create the appropriate design.
- Perform rapid prototyping and testing.
- Modify and iterate the design and as much as necessary.

2. Define usability.
It describes the effectiveness of human performance. It can be defined as the capability to be used by humans easily and effectively. Easily=to a specified level of subjective assessment.
Effectively=to a specified level of human performance.

3. What are the common usability problems?
Ambiguous menus and icons, Highlighting and selection limitations, Unclear Step sequence and Input and direct manipulation limits.

4. Identify human characteristics in design?
The important human characteristics in design are perception, memory, visual and peripheral vision, sensory Storage, information processing & skill and individual differences.

5. Differentiate between short-term and long-term memory.

Short –term	Long-term
Contains limited amount of information	Contains unlimited amount of information
Receives information from either the senses or long term memory	Receives information from short term through learning process.

6. List the advantages of cascading menu. (Nov/Dec 2012)
It provides simplicity in visual presentation & cleanness, Hierarchy view of menu.

7. What are the direct methods in requirement analysis?
Individual Face to Face interview, Telephone Interview or survey, Traditional Focus group, Facilitated team work group, Requirements Prototyping, Usability Laboratory testing.

8. What are the indirect methods in requirement analysis?
Paper survey, Electronic survey, Electronic focus group, Marketing and sales, Support Line, Email of Bulletin Board and System Testing.

9. Define mental model.
It is an internal representation of a person's current conceptualization and understands of something. Mental model are gradually developed in order to understand, explain and do something.

10. What are the guidelines for designing conceptual model?
Reflect the user's mental model, Provide proper and correct feedback, and provide action-response compatibility, Provide design consistency.

11. What are goals of interface design?
Reduce visual work, Reduce intellectual work, Reduce memory work, Reduce motor work.

12. What are the elements of screen?
Elements of a screen include control captions, data or information displayed on the screen & headings and headlines.

13. What are the components of a statically graphic?
They have at least 2 axes, 2 scales, an area to present the data, title, legend and key.

14. What are System Training tools? (APR/MAY 2011)
System training will be based on user's needs, system conceptual design, System learning goals and System performance goals.
Training may include tools such as video training, manuals, online tutorials, reference manuals, quick reference guides and online help.

15. What is test for a good design?
It simply involves the use of display techniques, consistent location of elements, the proper use of "white space" and groupings and an understanding of visually pleasing composition. The best interface makes everything on the screen easily seen.

16. How to achieve clarity?
Clarity is influenced by a multiple factors, such as consistency in design, visually pleasing composition, a logical and sequential ordering, and the presentation of the proper amount of information, groupings and alignment of screen items.

17. What are the qualities in visually pleasing composition?
Visually pleasing composition contains following qualities such as Balance, Symmetry, Regularity, Predictability, Sequentially, economy, unity, proportion, simplicity and groupings.

18. What is known as Tabbing?
When a screen is first presented, the cursor must be positioned in the first field or control in which information can be entered. Tabbing order must then follow the flow of information as it is organized on the screen.

19. What is necessary for ordering?
Ordering is necessary to facilitate search for an item, provide information about the structure and relationship among items, and provide compatibility with the user's mental model of the item structure.

20. Define pull down menu.

It is the first level menus used to provide access to common and frequently used application action that take on a wide variety of different windows.

21. Write the functions of menus.
Navigation to New Menus, Execute an Action or Procedure, Displaying Information, Data or Parameter Input.

22. Write the content of menus.
Menu Context, Menu Title, Choice Descriptions and Completion Instructions.

23. Mention the different ways of selecting menu choices.
Initial cursor positioning, Choice selection, Defaults, Unavailable choices, Mark toggles or settings, Toggled menu items.

24. Write the different ways of phrasing the menus.
Menu Titles, Menu Choice Descriptions, Menu Indicators, Keyboard Shortcuts

25. What are the psychological responses to poor design?
Confusion, Annoyance, Frustration, Panic or stress and Boredom.

26.List the common obstacles in the development path.
Nobody ever gets it right the first time. Development is chock-full of surprises.
Good design requires living in a sea of change. Designers need good tools.

27. List some common pitfalls in the development path
No usability testing. No early analysis and understanding of user need and expectations.
Little or no creation of design element prototypes.
No common design team vision of user interface design goals.

28.State some usability problem in using web interface.
i.Visual clutter. ii.Impaired information iii. Inefficient operations.
iv.readability: impaired information readability v.Inefficient navigation.

29. Give some practical measures of usability.
* Are people asking a lot of questions or often reaching for a manual?
* Are frequent exasperation responses heard?
* Are there many irrelevant actions being performed?
* Are there many things to ignore?

30. Give some objective measures of usability.
* How effective is the interface? How learnable is the interface?
* How flexible is the interface? What are the attitudes of the users?

31.Give the composition of a typical design team.
i.Development specialist. ii.Human factors specialist.
iii.Visual design specialist. iv.Usability assessment specialist.
v.Documentation expert. Vi.Training expert.

32. What are the things a designer must follow to develop a truly usable system? (AU-NOV/DEC 2010)
* Understand how people interact with computer.
* Understand the human characteristics important in design.
* Identify user's level of knowledge and experience.
* Identify the characteristics of user's needs, task, and jobs.
* Identify the user's psychological characteristics.
* Identify the user physical characteristics.

33. Give some physical responses to poor design.
i.Abandonment. ii.Partial use. iii.Indirect use. iv.Modification of task.

34. List some important human characteristics in design.
i.Perception. ii.Memory. iii.Sensory storage. iv.Visual acuity.

35.List some perceptual characteristics.
i.Proximity. ii.Similarity. iii.Succinctness. iv.Closure.

36. What are the structures of menu?
i.Single menus. ii.Sequential linear menus. iii.Simultaneous menus.
iv.Hierarchicalmenus. v.Connected menus. vi.Event-trapping menus.

1 MARK Questions

50. To run the old system and the new system at the same time for a specified period, the system implementation approach used is

a. pilot **b.** phased **c.** parallel **d.** direct

51. The mistake, committed by interchanging two digits in a numeric held, during data entry, is called

a. transposition error **b.** transcription error **c.** Beta testing error **d.** Alpha testing error

52. Decision tree uses

a. pictorial deputation of alternate conditions **b.** nodes and branches

c. consequences of various depicted alternates **d.** All of the above

53. Problem analysis is done during

a. system design phase **b.** systems analysis phase **c.** before system test **d.** All the above

54. Top-down programming is

a. a group of related fields **b.** a map of the programmer's view of the data

c. an approach in which the top module is first tested then program modules are added from the highest level to the lowest level

d. a series or group of components that perform one or more operations of a more complex system

55. A decision table facilitates conditions to be related to

a. actions **b.** programs **c.** tables **d.** operation

56. On the feasibility committee, department representatives serve as:

a. direct users of the new system **b.** liaison to their departments

c. ready sources of information **d.** All of the above

57. A _____ is an outline of a process that keeps develop successful information systems

a. System Development Life Cycle **b.** CASE tool

c. Phased Conversion **d.** Success Factors

58. A branch office, location or other data processing centres, where a newly developed system is used under normal operating conditions for several months, to test it, is called

a. beta test data **b.** alpha test data **c.** string test data **d.** system test data

59. An appraisal, of a system's performance after it has been installed, is called system

a. planning **b.** review **c.** maintenance **d.** batch Processing

60. Elapsed time, between initiating a query and receiving a response is called

a. response time **b.** waiting time **c.** processing time **d.** Turnaround time

61. During the system study, the executive vice-president and the other managers exercise their responsibility of

a. planning **b.** controlling **c.** directing **d.** organizing

62. Which of the following is (are) not a tool for Application Prototyping?

a. Application generators **b.** third generation language

c. screen generators **d.** report generators

63. Data manipulation language (DML)

a. describes how data are structured in the data base

b. specifies for the DBMS what is required; the techniques used to process data

c. determine how data must be structured to produce the user's view **d.** All of the above

64. The set of instructions for how to tie a bow is an example of the _____ Structure.

a. Control **b.** Repetition **c.** Selection **d.** Sequence

65. Which of the following appropriately explains the desirable characteristic of good system design?

a. Modular approach **b.** Proper documentation **c.** Conversion **d.** Long discussions

66. An example of a hierarchical data structure is

a. array B .link list C .Tree d. All of the above

67. On a systems flowchart, the online manual keeping of input data is identified by using the

a. online storage symbol **b.** Online keyboard symbol

c. keeping operation symbols **d.** manual operation symbols

68. Which of the following is not a characteristic of good test data?

a. users do not participate at this preliminary stage **b.** should be comprehensive

c. every statement should be executed **d.** All of the above

69. In the system concepts, term Integration

a. implies structure and order

b. refers to the manner in which each component functions with other components of system.

c. means that parts of the computer system depend on one another.

d. refers to the holism of systems

Answers

50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69

c a d b c a d a a b d b b b a a c b a d

PART B

1. **Discuss in detail about the impact of human characteristics in design.(April/May 2011)**

Perception

- Perception is our awareness and understanding of the elements and objects of our environment through the physical sensation of our various senses, including sight, sound, smell, and so forth. Perception is influenced, in part, by experience.
- Other perceptual characteristics include the following:
    - Proximity. Our eyes and mind see objects as belonging together if they are near each other in space.
    - Similarity. Our eyes and mind see objects as belonging together if they share a common visual property, such as color, size, shape, brightness, or orientation.
    - Matching patterns. We respond similarly to the same shape in different sizes. The letters of the alphabet, for example, possess the same meaning, regardless of physical size.
    - Succinctness. We see an object as having some perfect or simple shape because perfection or simplicity is easier to remember.
    - Closure. Our perception is synthetic; it establishes meaningful wholes. If something does not quite close itself, such as a circle, square, triangle, or word, we see it as closed anyway.
    - Unity. Objects that form closed shapes are perceived as a group.
    - Continuity. Shortened lines may be automatically extended.
    - Balance. We desire stabilization or equilibrium in our viewing environment. Vertical, horizontal, and right angles are the most visually satisfying and easiest to look at.
    - Expectancies. Perception is also influenced by expectancies; sometimes we perceive not what is there but what we expect to be there. Missing a spelling mistake in proofreading something we write is often an example of a perceptual expectancy error; we see not how a word is spelled, but how we expect to see it spelled.
    - Context. Context, environment, and surroundings also influence individual perception. For example, two drawn lines of the same length may look the same length or different lengths, depending on the angle of adjacent lines or what other people have said about the size of the lines.
    - Signals versus noise. Our sensing mechanisms are bombarded by many stimuli, some of which are important and some of which are not. Important stimuli are called signals; those that are not important or unwanted are called noise.

Memory

- Memory is viewed as consisting of two components, long-term and short-term (or working) memory.
- Short-term, or working, memory receives information from either the senses or long-term memory, but usually cannot receive both at once, the senses being processed separately. Within short-term memory a limited amount of information processing takes place. Information stored within it is variously thought to last from 10 to 30 seconds, with the lower number being the most reasonable speculation. Knowledge, experience, and familiarity govern the size and complexity of the information that can be remembered.
- Long-term memory contains the knowledge we possess. Information received in short-term memory is transferred to it and encoded within it, a process we call learning. It is a complex process requiring some effort on our part. The learning process is improved if the information being transferred from short-term memory has structure and is meaningful and familiar. Learning is also improved through repetition. Unlike short-term memory, with its distinct limitations, long-term memory capacity is thought to be unlimited. An important memory consideration, with significant implications for interface design, is the difference in ability to recognize or recall words.

Sensory Storage

- Sensory storage is the buffer where the automatic processing of information collected from our senses takes place. It is an unconscious process, large, attentive to the environment, quick to detect changes, and constantly being replaced by newly gathered stimuli. In a sense, it acts like radar, constantly scanning the environment for things that are important to pass on to higher memory.
- Repeated and excessive stimulation can fatigue the sensory storage mechanism, making it less attentive and unable to distinguish what is important (called habituation). Avoid unnecessarily stressing it.
- Design the interface so that all aspects and elements serve a definite purpose. Eliminating interface noise will ensure that important things will be less likely to be missed.

Visual Acuity

- The capacity of the eye to resolve details is called visual acuity. It is the phenomenon that results in an object becoming more distinct as we turn our eyes toward it and rapidly losing distinctness as we turn our eyes away—that is, as the visual angle from the point of fixation increases.
- It has been shown that relative visual acuity is approximately halved at a distance of 2.5 degrees from the point of eye fixation
- The eye's sensitivity increases for those characters closest to the fixation point (the "0") and decreases for those characters at the extreme edges of the circle (a 50/50 chance exists for getting these characters correctly identified). This may be presumed to be a visual "chunk" of a screen.

Foveal and Peripheral Vision

- Foveal vision is used to focus directly on something; peripheral vision senses anything in the area surrounding the location we are looking at, but what is there cannot be clearly resolved because of the limitations in visual acuity just described.
- Foveal and peripheral vision maintain, at the same time, a cooperative and a competitive relationship. Peripheral vision can aid a visual search, but can also be distracting.
- In its cooperative nature, peripheral vision is thought to provide clues to where the eye should go next in the visual search of a screen.
- In its competitive nature, peripheral vision can compete with foveal vision for attention. What is sensed in the periphery is passed on to our information-processing system along with what is actively being viewed foveally.

Information Processing

- The information that our senses collect that is deemed important enough to do something about then has to be processed in some meaningful way.
- There are two levels of information processing going on within us. One level, the highest level, is identified with consciousness and working memory. It is limited, slow, and sequential, and is used for reading and understanding.
- In addition to this higher level, there exists a lower level of information processing, and the limit of its capacity is unknown. This lower level processes familiar information rapidly, in parallel with the higher level, and without conscious effort.
- Both levels function simultaneously, the higher level performing reasoning and problem solving, the lower level perceiving the physical form of information sensed.

Mental Models

- A mental model is simply an internal representation of a person's current understanding of something. Usually a person cannot describe this mental mode and most often is unaware it even exists.
- Mental models are gradually developed in order to understand something, explain things, make decisions, do something, or interact with another person. Mental models also enable a person to predict the actions necessary to do things if the action has been forgotten or has not yet been encountered.
- A person already familiar with one computer system will bring to another system a mental model containing specific visual and usage expectations. If the new system complies with already-established models, it will be much easier to learn and use.
- The key to forming a transferable mental model of a system is design consistency and design standards.

Movement Control
- Particularly important in screen design is Fitts' Law (1954). This law states that:
- The time to acquire a target is a function of the distance to and size of the target.
- This simply means that the bigger the target is, or the closer the target is, the faster it will be reached. The implications in screen design are:
  - Provide large objects for important functions.
  - Take advantage of the "pinning" actions of the sides, top, bottom, and corners of the screen.

Learning
- Learning, as has been said, is the process of encoding in long-term memory information
- A design developed to minimize human learning time can greatly accelerate human performance. People prefer to stick with what they know, and they prefer to jump in and get started that is contained in short-term memory.
- Learning can be enhanced if it:
  - Allows skills acquired in one situation to be used in another somewhat like it. Design consistency accomplishes this.
  - Provides complete and prompt feedback.
  - Is phased, that is, it requires a person to know only the information needed at that stage of the learning process.

Skill
- The goal of human performance is to perform skillfully. To do so requires linking inputs and responses into a sequence of action. The essence of skill is performance of actions or movements in the correct time sequence with adequate precision.
- Skills are hierarchical in nature, and many basic skills may be integrated to form increasingly complex ones. Lower-order skills tend to become routine and may drop out of consciousness.

Individual Differences
- In reality, there is no average user. A complicating but very advantageous human characteristic is that we all differ—in looks, feelings, motor abilities, intellectual abilities, learning abilities and speed, and so on.
- Individual differences complicate design because the design must permit people with widely varying characteristics to satisfactorily and comfortably learn the task or job, or use the Web site.
- Multiple versions of a system can easily be created. Design must provide for the needs of all potential users.

2. **Explain the structure and content of menu. (Nov/Dec 2012)**
*Structures of Menus:* **a. Single Menus**
- In this simplest form of menu, a single screen or window is presented to seek the user's input or request an action to be performed
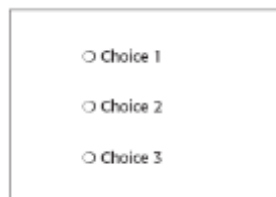
- A single menu may be iterative if it requires data to be entered into it and this data input is subject to a validity check that fails. The menu will then be represented to the user with a message requesting reentry of valid data.

b. Sequential Linear Menus
- Sequential linear menus are presented on a series of screens possessing only one path.
- The menu screens are presented in a preset order, and, generally, their objective is for specifying parameters or for entering data.
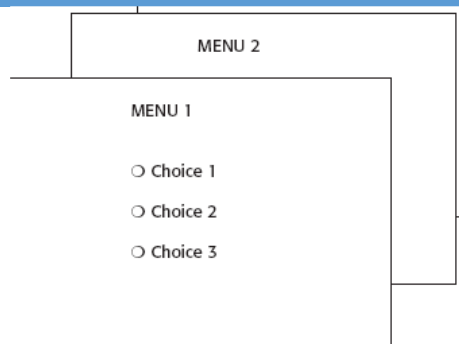
Sequential path menus have several shortcomings. A long sequence may become tedious as menu after menu is presented.

c. Simultaneous Menus

- Instead of being presented on separate screens, all menu options are available simultaneously.
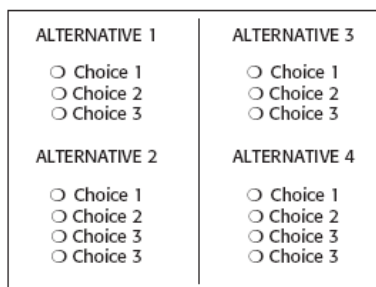
- Problems with simultaneous menus are that for large collections of menu alternatives screen clutter can easily occur, and screen paging or scrolling may still be necessary to view all the choices.
  - Presenting many menu dependencies and relationships on a screen, especially if poorly indicated, can also be very confusing.

d. Hierarchical Menus

- A hierarchical structure results in an increasing refinement of choice as menus are stepped through, for example, from options, to suboptions, from categories to subcategories, from pages to sections to subsections, and so on.
- A hierarchical structure can best be represented as an inverse tree, leading to more and more branches as one move downward through it.
- Common examples of hierarchical design today are found in menu bars with their associated pull-downs.

A disadvantage of a hierarchical scheme is that the defined branching order may not fit the users conception of the task flow.

- If users are not familiar with the hierarchical menu, or are unable to predict what suboptions lie below
- a particular choice, they may go down wrong paths and find it necessary to go back up the tree to change a choice, or perhaps even return to the top-level menu

e. Connected Menus

- Connected menus are networks of menus all interconnected in some manner. Movement through a structure of menus is not restricted to a hierarchical tree, but is permitted between most or all menus in the network.
- A connected menu system may be cyclical, with movement permitted in either direction between menus, or acyclical, with movement permitted in only one direction. These menus also vary in connectivity, the extent to which menus are linked by multiple paths.
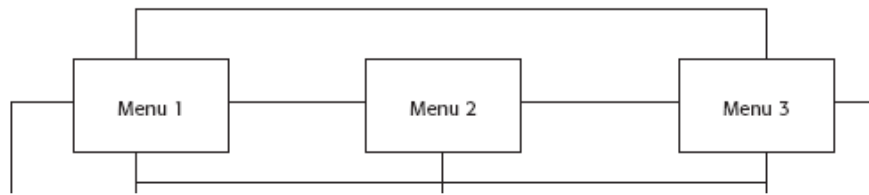
- The biggest advantage of a connected menu network is that it gives the user full control over the navigation flow. Its disadvantage is its complexity,

f. Event-Trapping Menus
- Event Trapping menus provide an ever-present background of control over the system's state and parameters while the user is working on a foreground task.
- Event-trapping menus generally serve one of three functions.
  (1) They may immediately change some parameter in the current environment (bold a piece of text),
  (2) they may take the user out of the current environment to perform a function without leaving the current environment (perform a spell check), or
  (3) they may exit the current environment and allow the user to move to a totally new environment (Exit).

Functions of Menus:
- A menu can be used to perform several functions, to navigate to a new menu, to execute an action or procedure, to display information, or to input data or parameters.

Navigation to a New Menu
- Each user selection causes another menu in a hierarchical menu tree to be displayed.
- The purpose of each selection is to steer the user toward an objective or goal.
- Selection errors may lead the user down wrong paths, and cost time and, perhaps, aggravation, but these errors are nondestructive and usually undoable.

Execute an Action or Procedure
- A user selection directs the computer to implement an action or perform a procedure.
- The action may be something like opening or closing a file, copying text, or sending a message.
- Accidental selection of critical irreversible actions must be prevented in interface design.

Displaying Information
- The main purpose of selecting a menu choice may simply be to display information.
- The user may be searching for specific information in a database or browsing the Web. The content material and the user's interests will determine the paths followed.
- The user's focus is primarily on the information desired and less on the selection function. Wrong turns in the process will again cost time and perhaps aggravation, but these errors are nondestructive and usually undoable.

Data or Parameter Input
- Each selection specifies a piece of input data for the system or provides a parameter value. Data or values may be input on a single menu or spread over a hierarchy of menus.

Content of Menus:
- A menu consists of four elements, its context, its title, its choice descriptions, and its completion instructions.

Menu Context
- A menu's context provides information to keep the user oriented.
- Feedback is necessary that tells users where they are in a process, what their past choices were, and possibly how much farther they still have to navigate
- Verbal linkage, spatial linkage, or both may be used to provide navigation feedback.
- Verbal linkage involves providing, on the current menu screen, a listing of choices made on previous menus that have led to this position. It also involves assuring the user that the displayed menu is the menu desired

- Spatial linkage can be accomplished by graphic methods. Each succeeding menu screen can be displayed overlapping the previous menu screen so a succession of choices can be seen in a single view.

Menu Title
- A menu's title provides the context for the current set of choices. The title must reflect the choice selected on the previously displayed menu.

Choice Descriptions
- Choice descriptions are the alternatives available to the user.
- These descriptions can range from a mnemonic, numeric, or alphabetized listing of choices to single words or phrases to full sentences or more.

Completion Instructions
- Completion instructions tell users how to indicate their choices
- Explicit instructions may be needed for first time or casual users of a system. Experienced users will find overly verbose instructions unnecessary.
- The needs of all system users, and the nature of the system, must again be considered in creating this kind of on-screen guidance.

3. a) List the common usability problems. Explain about the measures of Usability.

Mandel (1994) lists the 10 most common usability problems in graphical systems as reported by IBM usability specialists. They are:

1. Ambiguous menus and icons.
2. Languages that permit only single-direction movement through a system.
3. Input and direct manipulation limits.
4. Highlighting and selection limitations.
5. Unclear step sequences.
6. More steps to manage the interface than to perform tasks.
7. Complex linkage between and within applications.
8. Inadequate feedback and confirmation.
9. Lack of system anticipation and intelligence.
10. Inadequate error messages, help, tutorials, and documentation

Some Practical Measures of Usability
- Are people asking a lot of questions or often reaching for a manual?
- Are frequent exasperation responses heard?
- Are there many irrelevant actions being performed?
- Are there many things to ignore?
- Do a number of people want to use the product?

Some Objective Measures of Usability
- Shackel (1991) presents the following more objective criteria for measuring usability.
- How effective is the interface? Can the required range of tasks be accomplished:
  - At better than some required level of performance (for example, in terms of speed and errors)?
  - By some required percentage of the specified target range of users?
  - Within some required proportion of the range of usage environments?
- How learnable is the interface? Can the interface be learned:
  - Within some specified time from commissioning and start of user training?
  - Based on some specified amount of training and user support?
  - Within some specified relearning time each time for intermittent users?
  - How flexible is the interface? Is it flexible enough to:
  - Allow some specified percentage variation in tasks and/or environments beyond those first specified?
  - What are the attitudes of the users? Are they: Within acceptable levels of human cost in terms of tiredness, discomfort, frustration, and personal effort?
  - Such that satisfaction causes continued and enhanced usage of the system?

3b) Write short notes on Human Interaction Speeds.

The speed at which people can perform using various communication methods has been studied by a number of researchers. The following, are summarized as table below

Reading

Prose text:	250–300 words per minute.
Proofreading text on paper:	200 words per minute.
Proofreading text on a monitor:	180 words per minute.

Listening: 150–160 words per minute.

Speaking to a computer: 105 words per minute.

After recognition corrections:	25 words per minute.

Keying

Typewriter

Fast typist:	150 words per minute and higher.
Average typist:	60–70 words per minute.

Computer

Transcription:	33 words per minute.
Composition:	19 words per minute.

Two finger typists

Memorized text:	37 words per minute.
Copying text:	27 words per minute.

Hand printing

Memorized text:	31 words per minute.
Copying text:	22 words per minute.

4. **a) What are the guidelines for designing conceptual models?**
   - **Reflect the user's mental model not the designer's:** A user will have different expectations and levels of knowledge than the designer. So, the mental models of the user and designer will be different. The user is concerned with the task to be performed, the business objectives that must be fulfilled.
   - **Draw physical analogies or present metaphors:** Replicate what is familiar and well known. Duplicate actions that are already well learned. A metaphor, to be effective, must be widely applicable within an interface.
   - **Comply with expectancies, habits, routines, and stereotypes:** Use familiar associations, avoiding the new and unfamiliar. With color, for example, accepted meanings for red, yellow, and green are already well established. Use words and symbols in their customary ways.
   - **Provide action-response compatibility:** All system responses should be compatible with the actions that elicit them. Names of commands, for example, should reflect the actions that will occur.
   - **Make invisible parts and process of a system visible:** New users of a system often make erroneous or incomplete assumptions about what is invisible and develop a faulty mental model. As more experience is gained, their mental models evolve to become more accurate and complete. Making invisible parts of a system visible will speed up the process of developing correct mental models.
   - **Provide proper and correct feedback:** Be generous in providing feedback. Keep a person informed of what is happening, and what has happened, at all times, including:
     - Provide visible results of actions.
     - Display actions in progress.
     - Provide a continuous indication of status.
     - Present as much context information as possible.
     - Provide clear, constructive, and correct error messages.
   - **Avoid anything unnecessary or irrelevant:** Never display irrelevant information on the screen. People may try to interpret it and integrate it into their mental models, thereby creating a false one.
   - **Provide design consistency:** Design consistency reduces the number of concepts to be learned. Inconsistency requires the mastery of multiple models. If an occasional inconsistency cannot be avoided, explain it to the user.

- **Provide documentation and a help system that will reinforce the conceptual model:** Do not rely on the people to uncover consistencies and metaphors themselves. The help system should offer advice aimed at improving mental models.
- **Promote the development of both novice and expert mental models:** Novices and experts are likely to bring to bear different mental models when using a system.

4 b) Discuss about the methods for gaining an understanding of users.
- Gould (1988) suggests using the following kinds of techniques to gain an understanding of users, their tasks and needs, the organization where they work, and the environment where the system may be used.
  - Visit user locations, particularly if they are unfamiliar to you, to gain an understanding of the user's work environment.
  - Talk with users about their problems, difficulties, wishes, and what works well now. Establish direct contact; avoid relying on intermediaries.
  - Observe users working or performing a task to see what they do, their difficulties, and their problems.
  - Videotape users working or performing a task to illustrate and study problems and difficulties.
  - Learn about the work organization where the system may be installed.
  - Have users think aloud as they do something to uncover details that may not otherwise be solicited.
  - Try the job yourself. It may expose difficulties that are not known, or expressed, by users.
  - Prepare surveys and questionnaires to obtain a larger sample of user opinions.
  - Establish testable behavioral target goals to give management a measure for what progress has been made and what is still required.

5. **Elaborate on the techniques used for requirement analysis. (Nov/Dec 2012).**
   - The objective of this phase is to establish the need for a system. A requirement is an objective that must be met.
   - A product description is developed and refined, based on input from users or marketing. There are many techniques for capturing information for determining requirements.

DIRECT METHODS
Advantages
- The significant advantage of the direct methods is the opportunity they provide to hear the user's comments in person and firsthand.
- Person-to-person encounters permit multiple channels of communication (body language, voice inflections, and so on) and provide the opportunity to immediately follow up on vague or incomplete data.

Here are some recommended direct methods for getting input from users.
Individual Face-to-Face Interview
- A one-on-one visit with the user to obtain information. It may be structured or somewhat open-ended.
- A formal questionnaire should not be used, however. Useful topics to ask the user to describe in an interview include:
- The activities performed in completing a task or achieving a goal or objective.
- The methods used to perform an activity.
- What interactions exist with other people or systems?
- It is also very useful to also uncover any:
  - Potential measures of system usability
  - Unmentioned exceptions to standard policies or procedures.
  - Relevant knowledge the user must possess to perform the activity.
- **Advantages**
  - Advantages of a personal interview are that you can give the user your full attention, can easily include follow-up questions to gain additional information, will have more time to discuss topics in detail, and will derive a deeper understanding of your users, their experiences, attitudes, beliefs, and desires.

- **Disadvantages**
    - Disadvantages of interviews are that they can be costly and time-consuming to conduct, and someone skilled in interviewing techniques should perform them.

Telephone Interview or Survey

- A structured interview conducted via telephone.
- **Advantages**
    - Arranging the interview in advance allows the user to prepare for it.
    - Telephone interviews are less expensive and less invasive than personal interviews.
    - They can be used much more frequently and are extremely effective for very specific information.
- **Disadvantage**
    - It is impossible to gather contextual information, such as a description of the working environment, replies may be easily influenced by the interviewer's comments, and body language cues are missing.
    - Also, it may be difficult to contact the right person for the telephone interview.

Traditional Focus Group

- A small group of users and a moderator brought together to verbally discuss the requirements.
- The purpose of a focus group is to probe user's experiences, attitudes, beliefs, and desires, and to obtain their reactions to ideas or prototypes
- Setting up focus group involves the following:
    - Establish the objectives of the session.
    - Select participants representing typical users, or potential users.
    - Write a script for the moderator to follow.
    - Find a skilled moderator to facilitate discussion, to ensure that the discussion remains focused on relevant topics, and to ensure that everyone participates.
    - Allow the moderator flexibility in using the script.
    - Take good notes, using the session recording for backup and clarification

Facilitated Team Workshop

- A facilitated, structured workshop held with users to obtain requirements information. Similar to the traditional Focus Group
- Like focus groups, they do require a great deal of time to organize and run.

Observational Field Study

- Users are observed and monitored for an extended time to learn what they do.
- Observation provides good insight into tasks being performed, the working environment and conditions, the social environment, and working practices
- Observation, however, can be time-consuming and expensive.
- Video recording of the observation sessions will permit detailed task analysis.

Requirements Prototyping

- A demo, or very early prototype, is presented to users for comments concerning functionality.

User-Interface Prototyping

- A demo, or early prototype, is presented to users to uncover user-interface issues and problems

Usability Laboratory Testing

- Users at work are observed, evaluated, and measured in a specially constructed laboratory to establish the usability of the product at that point in time.
- Usability tests uncover what people actually do, not what they think they do a common problem with verbal descriptions
- The same scenarios can be presented to multiple users, providing comparative data from several users.

Card Sorting for Web Sites

- A technique to establish groupings of information for Web sites.
- Briefly, the process is as follows:
    - From previous analyses, identify about 50 content topics and inscribe them on index cards. Limit topics to no more than 100.
    - Provide blank index cards for names of additional topics the participant may want to add, and colored blank cards for groupings that the participant will be asked to create.

- o Number the cards on the back.
- o Arrange for a facility with large enough table for spreading out cards.
- o Select participants representing a range of users. Use one or two people at a time and 5 to 12 in total.
- o Explain the process to the participants, saying that you are trying to determine what categories of information will be useful, what groupings make sense, and what the groupings should be called.
- o Ask the participants to sort the cards and talk out loud while doing so. Advise the participants that additional content cards may be named and added as they think necessary during the sorting process.
- o Observe and take notes as the participants talk about what they are doing. Pay particular attention to the sorting rationale.
- o Upon finishing the sorting, if a participant has too many groupings ask that they be arranged hierarchically.
- o Ask participants to provide a name for each grouping on the colored blank cards, using words that the user would expect to see that would lead them to that particular grouping.
- o Make a record of the groupings using the numbers on the back of each card.
- o Reshuffle the cards for the next session.
- o When finished, analyze the results looking for commonalities among the different sorting sessions.

INDIRECT METHODS
- An indirect method of requirements determination is one that places an intermediary between the developer and the user. This intermediary may be electronic or another person

Problems of Indirect Method
- First, there may be a filtering or distortion of the message, either intentional or unintentional.
- Next, the intermediary may not possess a complete, or current, understanding of user's needs, passing on an incomplete or incorrect message.
- Finally, the intermediary may be a mechanism that discourages direct user-developer contact for political reasons.

MIS Intermediary
- A company representative defines the user's goals and needs to designers and developers.
- This representative may come from the Information Services department itself, or he or she may be from the using department.

Paper Survey or Questionnaire
- A survey or questionnaire is administered to a sample of users using traditional mail methods to obtain their needs.
- **Advantage**
  - o Questionnaires have the potential to be used for a large target audience located most anywhere, and are much cheaper than customer visits.
  - o They generally, however, have a low return rate
- **Disadvantage**
  - o They may take a long time to collect and may be difficult to analyze.
- Questionnaires should be composed mostly of closed questions
- Questionnaires should be relatively short and created by someone experienced in their design.

Electronic Survey or Questionnaire
- A survey or questionnaire is administered to a sample of users using e-mail or the Web to obtain their needs.
- In creating an electronic survey:
  - o Determine the survey objectives.
  - o Determine where you will find the people to complete the survey.
  - o Create a mix of multiple choice and open-ended questions requiring short answers addressing the survey objectives.
  - o Keep it short, about 10 items or less is preferable.
  - o Keep it simple, requiring no more than 5–10 minutes to complete
- **Iterative survey**

- o Consider a follow-up more detailed survey, or surveys, called *iterative surveys*. Ask people who complete and return the initial survey if they are willing to answer more detailed questions. If so, create and send the more detailed survey.
- o A third follow-up survey can also be designed to gather additional information about the most important requirements and tasks
- o Iterative surveys, of course, take a longer time to complete.

Electronic Focus Group
- A small group of users and a moderator discuss the requirements online using workstations.
- advantages
    - o advantages of electronic focus groups over traditional focus groups are that the discussion is less influenced by group dynamics; has a smaller chance of being dominated by one or a few participants; can be anonymous, leading to more honest comments and less caution in proposing new ideas
- **Disadvantages**
    - o The depth and richness of verbal discussions does not exist and the communication enhancement aspects of seeing participant's body language are missing.

Marketing and Sales
- Company representatives who regularly meet customers obtain suggestions or needs, current and potential.

Support Line
- Information collected by the unit that helps customers with day-to-day problems is analyzed (Customer Support, Technical Support, Help Desk, etc.).

E-Mail or Bulletin Board
- Problems, questions, and suggestions from users posted to a bulletin board or through e-mail are analyzed.

User Group
- Improvements are suggested by customer groups who convene periodically to discuss software usage. They require careful planning.

Competitor Analyses
- A review of competitor's products or Web sites is used to gather ideas, uncover design requirements and identify tasks.

Trade Show
- Customers at a trade show are presented a mock-up or prototype and asked for comments.

Other Media Analysis
- An analysis of how other media, print or broadcast, present the process, information, or subject matter of interest.

System Testing
- New requirements and feedback are obtained from ongoing product testing

Requirements Collection Guidelines
- Establish 4 to 6 different developer-user links.
- Provide most reliance on direct links.

6. What are the different kinds of graphical menus?(April/May 2011, May/June 2014, Nov/Dec 2014)

The best kind of menu to use in each situation depends on several factors. The following must be considered:
- o The number of items to be presented in the menu.
- o How often the menu is used.
- o How often the menu contents may change.

a.Menu Bar
- Proper usage:
  — To identify and provide access to common and frequently used application actions that takes place in a wide variety of different windows.
  — A menu bar choice by itself should not initiate an action.
- The advantages of menu bars are that they:

- o Are always visible, reminding the user of their existence.
- o Are easy to browse through.
- o Are easy to locate consistently on the screen.
- o Usually do not obscure the screen working area.
- o Usually are not obscured by windows and dialog boxes.
- o Allow for use of keyboard equivalents.
- The disadvantages of menu bars are that:
  - o They consume a full row of screen space.
  - o They require looking away from the main working area to find.
  - o They require moving pointer from the main working area to select.
  - o The menu options are smaller than full-size buttons, slowing selection time.
  - o Their horizontal orientation is less efficient for scanning.
  - o Their horizontal orientation limits number of choices that can be displayed.

Display
- All primary windows must have a menu bar.
- All menu bars must have an associated pull-down menu containing at least two choices.
- Do not allow the user to turn off the display of the menu bar.
- If all the items in its associated pull-down menu are disabled, then disable the menu bar item.
  — Display the disabled item in a visually subdued manner.
  — However, the disabled pull-down menu must always be capable of being pulleddown so that the choices may be seen.

Location
- Position choices horizontally over the entire row at the top of the screen, just below the screen title.
- A large number of choices may necessitate display over two rows.

Title
- The window title will be the menu bar title.

Item Descriptions
- The menu item descriptions must clearly reflect the kinds of choices available in the associated pull-down menus.
- Menu item descriptions will be the "titles" for pull-down menus associated with them.
- Use mixed-case letters to describe choices.
- Use single-word choices whenever possible.
- Do not display choices that are never available to the user.

Organization
- Follow standard platform ordering schemes where they exist.
  — Place application-specific choices where they fit best.
- Order choices left-to-right with:
  — Most frequent choices to the left.
  — Related information grouped together.
- Choices found on more than one menu bar should be consistently positioned.
- Left-justify choices within the line.
- When choices can be logically grouped, provide visual logical groupings, if possible.
- Help, when included, should be located at the right side of the bar.

File Edit Options Window	Help
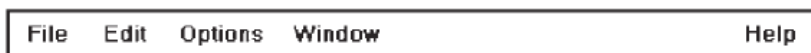
Layout
- Indent the first choice one space from the left margin.
- Leave at least three spaces between each of the succeeding choices (except for Help which will be right-justified).
- Leave one space between the final choice and the right margin.

Separation
- Separate the bar from the remainder of the screen by:
  — A different background, or

— Solid lines above and below.

Other Components
- Keyboard equivalent mnemonics should be included on menu bars.
- Keyboard accelerators, to a window indicators, and cascade indicators need not be included.

Selection Indication
- Keyboard cursor:
  — Use a reverse video, or reverse color, selection cursor to surround the choice.
  — Cover the entire choice, including one blank space before and after the choice word.
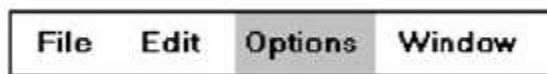
- Pointer:
  — Use reverse video, or reverse color, to highlight the selected choice.

b. Pull-Down Menu
- Proper usage:
  — To initiate frequently used application actions that take place on a wide variety of different windows.
  — A small number of items.
  — Items best represented textually.
  — Items whose content rarely changes.
- The advantages of pull-down menus are:
  o The menu bar cues a reminder of their existence.
  o They may be located relatively consistently on the screen.
  o No window space is consumed when they are not used.
  o They are easy to browse through.
  o Their vertical orientation is most efficient for scanning.
  o Their vertical orientation is most efficient for grouping.
  o Their vertical orientation permits more choices to be displayed.
  o They allow for display of both keyboard equivalents and accelerators.
- The disadvantages of pull-down menus are:
  o They require searching and selecting from another menu before seeing options.
  o They require looking away from main working area to read.
  o The require moving the pointer out of working area to select (unless using keyboard equivalents).
  o The items are smaller than full-size buttons, slowing selection time.
  o The may obscure the screen working area.
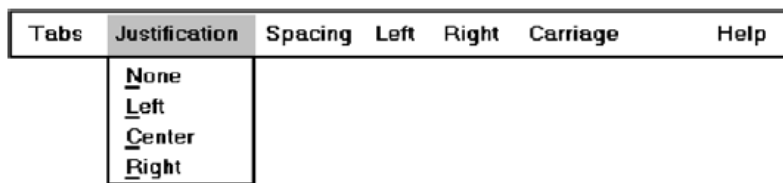
Display
- Display all possible alternatives.
- Gray-out or dim items that cannot be chosen due to the current state of an application.

Location
- Position the pull-down directly below the selected menu bar choice.

Size
- Must contain a minimum of two choices.
- Restrict to no more than 5 to 10 choices, preferably 8 or less.

Title
- Not necessary on a pull-down menu. The title will be the name of the menu bar item chosen.

Item Descriptions
- Use mixed-case, headline-style words to describe choices.

— If the choices can be displayed graphically, for example, as fill-in patterns, shades, or colors, textual descriptions are not necessary.
- Do not:
  — Identify a menu item by the same wording as its menu title.
  — Change the meaning of menu items through use of the Shift key.
  — Use scrolling in pull-downs.
  — Place instructions in pull-downs.

Organization
- Follow standard platform ordering schemes when they exist.
  — Place application-specific choices where they fit best.
- Place frequent or critical items at the top.
- Separate destructive choices from other choices.
- Align choices into columns, with:
  — Most frequent choices toward the top.
  — Related choices grouped together.
  — Choices found on more than one pull-down consistently positioned.
- Left-align choice descriptions.
- Multicolumn menus are not desirable. If necessary, organize top-to-bottom, then left-to-right.

Layout
- Leave the menu bar choice leading to the pull-down highlighted in the selected manner (reverse video or reverse color).
- Physically, the pull-down menu must be wide enough to accommodate the longest menu item description and its cascade or accelerator indicator.
- Align the first character of the pull-down descriptions under the second character of the applicable menu bar choice.
- Horizontally, separate the pull-down choice descriptions from the pull-down borders by two spaces on the left side and at least two spaces on the right side.
  — The left-side border will align with the left side of the highlighted menu bar choice.
  — The right-side border should extend, at minimum, to the right side of its highlighted menu bar choice.
  — Pull-downs for choices on the far right side of the menu bar, or long pull-down descriptions, may require alignment to the left of their menu bar choice to maintain visibility and clarity.

Groupings
- Provide groupings of related pull-down choices:
  — Incorporate a solid line between major groupings.
  — Incorporate a dotted or dashed line between subgroups.
  — Left-justify the lines under the first letter of the columnized choice descriptions.
  — Right-justify the lines under the last character of the longest choice description.
  — Display the solid line in the same color as the choice descriptions.

Mark Toggles or Settings
- If a menu item establishes or changes the attributes of data or properties of the interface mark the pull-down choice or choices whose state is current or active "on."
  — For nonexclusive items, display a check mark to the left of the item description.
    • If the two states of a setting are not obvious opposites, a pair of alternating menu item descriptions should be used to indicate the two states.
  — For exclusive choices, precede the choice with a contrasting symbol such as a diamond or circle.

Pull-Downs Leading to Another Pull-Down
- If a pull-down choice leads to another pull-down, provide a cascade indicator as follows:
  — Place an arrow or right-pointing triangle after the choice description.
  — Align the triangles to the right side of the pull-down.
  — Display the triangle in the same color as the choice descriptions.

Pull-Downs Leading to a Window
- For pull-down choices leading to a window:

— Place an ellipsis (three dots) after the choice description.
— Do not separate the dots from the description by a space.
— Display the ellipsis in the same color as the choice descriptions.

Keyboard Equivalents and Accelerators

- Provide unique mnemonic codes by which choices may be selected through the typewriter keyboard.
  — Indicate the mnemonic code by underlining the proper character.
- Provide key accelerators for choice selection.
  — Identify the keys by their actual key-top engravings.
  — Use a plus (+) sign to indicate that two or more keys must be pressed at the same time.
  — Enclose the key names within parentheses ( ).
  — Right-align the key names, beginning at least three spaces to the right of the longest choice description.
  — Display the key alternatives in the same color as the choice descriptions.

Separation

- Separate the pull-down from the remainder of the screen, but visually relate it to the menu bar by:
  — Using a background color the same as the menu bar.
  — Displaying choice descriptions in the same color as the menu bar.
  — Incorporating a solid-line border completely around the pull-down in the same color as the choice descriptions.
- A drop shadow (a heavier shaded line along two borders that meet) may also be included.

Selection Cursor

- Use a reverse video, or reverse color, selection cursor the same color as the menu bar to surround the choice.
- Create a consistently sized cursor as wide as the pull-down menu.

c. Cascading Menus

- Proper usage:
  — To reduce the number of choices presented together for selection (reduce menu breadth).
  — When a menu specifies many alternatives and the alternatives can be grouped in meaningful related sets on a lower-level menu.
  — When a choice leads to a short, fixed list of single-choice properties.
  — When there are several fixed sets of related options.
  — To simplify a menu.
  — Avoid using for frequent, repetitive commands.
- The advantages of cascading menus are that:
  o The top-level menus are simplified because some choices are hidden.
  o More first-letter mnemonics are available because menus possess fewer alternatives.
  o High-level command browsing is easier because subtopics are hidden.
- The disadvantages of cascading menus are:
  o Access to submenu items requires more steps.
  o Access to submenu items requires a change in pointer movement direction.
  o Exhaustive browsing is more difficult; some alternatives remain hidden as pull downs become visible.
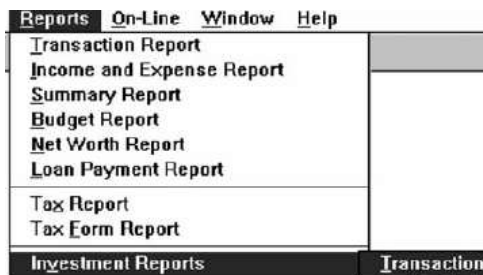
Cascade Indicator

- Place an arrow or right-pointing triangle to the right of each menu choice description leading to a cascade menu.
- Separate the indicator from the choice description by one space.

- Display the indicator in the same color as the choice descriptions.

Location
- Position the first choice in the cascading menu immediately to the right of the selected choice.
- Leave the choice leading to the cascading menu highlighted.

Levels
- Do not exceed three menu levels (two cascades).
 — Only one cascading menu is preferred.

Title
- Not necessary on the cascading menu.
  — The title will be the name of the higher-level menu item chosen.

d.Tear-off Menus
- It may also be called a pushpin, detachable, or roll-up menu. Its purpose is to present alternatives or choices to the screen user that are needed infrequently at some times
- Follow all relevant guidelines for pull-down menus.
- Advantages/disadvantages. No space is consumed on the screen when the menu is not needed. When needed, it can remain continuously displayed. It does require extra steps to retrieve, and it may obscure the screen working area.

e.Iconic Menus
- Use to remind users of the functions, commands, attributes, or application choices available.
- Create icons that:
  — Help enhance recognition and hasten option selection.
  — Are concrete and meaningful.
    — Clearly represent choices.
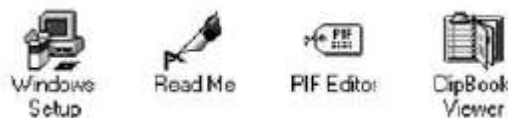
Advantages/disadvantages:
- Pictures help facilitate memory of applications, and their larger size increases speed of selection. Pictures do, however, consume considerably more screen space than text, and they are difficult to organize for scanning efficiency.
- To create meaningful icons requires special skills and an extended amount of time. Iconic menus should be used to designate applications or special functions within an application.
- Icons must be meaningful and clear. They should help enhance recognition and hasten option selection.

f.Pie Menus
- Consider using for:
  — Mouse-driven selections, with one- or two-level hierarchies, short lists, and choices conducive to the format.
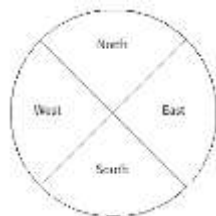
Table 4.4 Menu Proper Usage Summary

Menu Bar	To identify and provide access to: • Common and frequently used application actions. • Actions that take place in a wide variety of different windows.
Pull-Down Menu	For frequently used application actions that take place in a wide variety of different windows: • A small number of items (5–10). • Items rarely changing in content.
Cascading Menu	To simplify a higher-level menu. To provide easier browsing of a higher-level menu. For mutually exclusive choices. Restrict to 1–2 cascades.
Pop-Up Menu	For: • Frequent users. • Frequently used contextual commands. • A small number of items (5–10). • Items rarely changing in content. • Items that require a small amount of screen space.
Tear-Off Menu	For items: • Sometimes frequently selected. • Sometimes infrequently selected. • Small in number (5–10). • Rarely changing in content.
Iconic Menu	To designate applications available. To designate special functions within an application.

7. a) List the human considerations in the design of Business Systems.

The kinds of user/task characteristics that must be established are summarized in Table.

Knowledge/Experience

Computer Literacy	Highly technical or experienced, moderate computer experience, or none.
System Experience	High, moderate or low knowledge of a particular system and its methods of interaction.
Application Experience	High, moderate, or low knowledge of similar systems.
Task Experience	Level of knowledge of job and job tasks.
Other Systems	Use Frequent or infrequent use of other systems in doing job.
Education	High school, college, or advanced degree.
Reading Level	Less than 5th grade, 5th–12th, more than 12th grade.
Typing Skill	Expert (135 WPM), skilled (90 WPM), good (55 WPM), average (40 WPM), or "hunt and peck" (10 WPM).
Native Language or Culture	English, another, or several.

Job/Task/Need

Type of System	Use Mandatory or discretionary use of the system.
Frequency of Use	Continual, frequent, occasional, or once-in-a-lifetime use of system.
Task or Need Importance	High, moderate, or low importance of the task being performed.
Task Structure	Repetitiveness or predictability of tasks being automated, high,moderate, or low.
Social Interactions	Verbal communication with another person required or not required.
Primary Training	Extensive or formal training, self-training through manuals, or no training.
Turnover Rate	High, moderate, or low turnover rate for jobholders.
Job Category	Executive, manager, professional, secretary, and clerk.

| Lifestyle | For Web e-commerce systems includes hobbies, recreational pursuits, and economic status. |

Psychological Characteristics

Attitude	Positive, neutral, or negative feeling toward job or system.
Motivation	Low, moderate, or high due to interest or fear.
Patience	Patience or impatience expected in accomplishing goal.
Expectations	Kinds and reasonableness.
Stress Level	High, some, or no stress generally resulting from task performance.
Cognitive Style	Verbal or spatial, analytic or intuitive, concrete or abstract.

Physical Characteristics

Age	Young, middle aged, or elderly.
Gender	Male or female.
Handedness	Left, right, or ambidextrous.
Disabilities	Blind, defective vision, deafness, motor handicap.

7b) Discuss about design Standards.
- A design standard or style guide documents an agreed-upon way of doing something. It also defines the interface standards, rules, guidelines, and conventions that must be followed in detailed design.

Value of Standards and Guidelines
- Developing and applying design standards or guidelines achieve design consistency.
- This is valuable to users because the standards and guidelines:
  o Allow faster performance.
  o Reduce errors.
  o Reduce training time.
  o Foster better system utilization.
  o Improve satisfaction.
  o Improve system acceptance.
- They are valuable to system developers because they:
  o Increase visibility of the human-computer interface.
  o Simplify design.
  o Provide more programming and design aids, reducing programming time.
  o Reduce redundant effort.
  o Reduce training time.
  o Provide a benchmark for quality control testing.

Document Design
- Include checklists to present principles and guidelines.
- Provide a rationale for why the particular guidelines should be used.
- Provide a rationale describing the conditions under which various design alternatives are appropriate.
- Include concrete examples of correct design.
- Design the guideline document following recognized principles for good document design.
- Provide good access mechanisms such as a thorough index, a table of contents, glossaries, and checklists.

Design Support and Implementation
- Use all available reference sources in creating the guidelines.
- Use development and implementation tools that support the guidelines.
- Begin applying the guidelines immediately.

8. Explain the visually pleasing composition in screen design.(May 2013, Nov/Dec 2013)
Provide visually pleasing composition with the following qualities:
  o Balance
  o Symmetry
  o Regularity.
  o Predictability.

- o Sequentially.
- o Economy.
- o Unity.
- o Proportion.
- o Simplicity.
- o Groupings.

Regularity
- Create regularity by establishing standard and consistently spaced horizontal and vertical alignment points.
- Also, use similar element sizes, shapes, colors, and spacing.

Regularity

Balance
- Create screen balance by providing an equal weight of screen elements, left and right, top and bottom.

Balance

Symmetry
- Create symmetry by replicating elements left and right of the screen centerline.

Symmetry

Predictability
- Create predictability by being consistent and following conventional orders or arrangements.

Sequentiality
- Provide sequentiality by arranging elements to guide the eye through the screen in an obvious, logical, rhythmic, and efficient manner.
- The eye tends to be attracted to:
  — A brighter element before one less bright.
  — Isolated elements before elements in a group.
  — Graphics before text.
  — Color before black and white.
  — Highly saturated colors before those less saturated.
  — Dark areas before light areas.
  — A big element before a small one.
  — An unusual shape before a usual one.
  — Big objects before little objects.
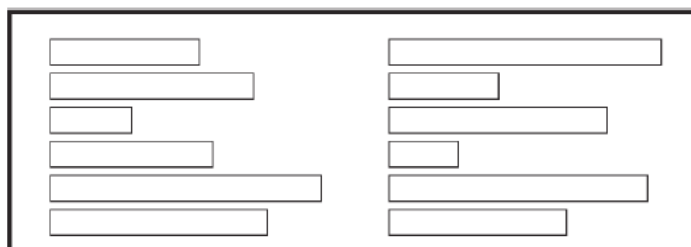
Sequentiality

Unity
- Create unity by:
  — Using similar sizes, shapes, or colors for related information.
  — Leaving less space between elements of a screen than the space left at the margins.
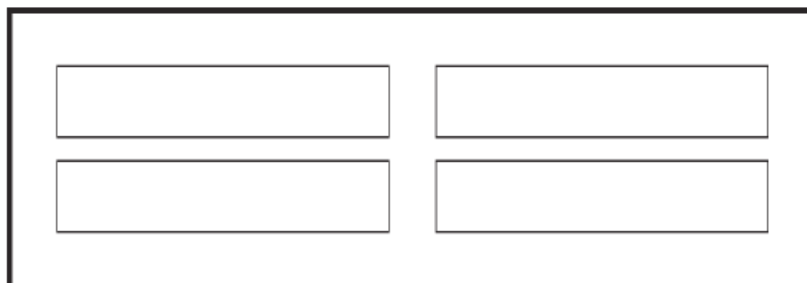
Unity

Proportion
- Create windows and groupings of data or text with aesthetically pleasing proportions.

  Pleasing proportions.

Square	1:1
Square-root of two	1:1.414
Square-root of three	1:1.732
Double square	1:2
Golden rectangle	1:1.618

Simplicity (Complexity)
- Optimize the number of elements on a screen, within limits of clarity.
- Minimize the alignment points, especially horizontal or columnar.
  — Provide standard grids of horizontal and vertical lines to position elements.
- complexity guidelines:
  o Optimize the number of elements on a screen, within limits of clarity.
  o Minimize the alignment points, especially horizontal or columnar.

Groupings
- Provide functional groupings of associated elements.
- Create spatial groupings as closely as possible to five degrees of visual angle (1.67 inches in diameter or about 6 to 7 lines of text, 12 to 14 characters in width).
- Evenly space controls within a grouping, allowing 1/8 to 1/4 inch between each.
- Visually reinforce groupings:
  — Provide adequate separation between groupings through liberal use of white space.
  — Provide line borders around groups.
- Provide meaningful titles for each grouping.

9. **Explain the guidelines for formatting menus.**
Formatting of Menus
- What follows is a series of guidelines for formatting menus.

Consistency
- Provide consistency with the user's expectations.
- Provide consistency in menu:
  — Formatting, including organization, presentation, and choice ordering.

— Phrasing, including titles, choice descriptions, and instructions.
— Choice selection methods.
— Navigation schemes.

Display

- If continual or frequent references to menu options are necessary, permanently display the menu in an area of the screen that will not obscure other screen data.
- If only occasional references to menu options are necessary, the menu may be presented on demand.
  — Critical options should be continuously displayed, however.

Presentation

- Ensure that a menu and its choices are obvious to the user by presenting them with a unique and consistent structure, location, and/or display technique.
- Ensure that other system components do not possess the same visual qualities as menu choices.

Organization

- Provide a general or main menu.
- Display:
  — All relevant alternatives.
  — Only relevant alternatives.
       • Delete or gray-out inactive choices.
- Match the menu structure to the structure of the task.
  — Organization should reflect the most efficient sequence of steps to accomplish a person's most frequent or most likely goals.
- Minimize number of menu levels within limits of clarity.
  — For Web sites, restrict it to two levels (requiring two mouse clicks) for fastest performance.
- Be conservative in the number of menu choices presented on a screen:
  — Without logical groupings of elements, limit choices to 4 to 8.
  — With logical groupings of elements, limit choices to 18 to 24.
- Provide decreasing direction menus, if sensible.
- Never require menus to be scrolled.
- Provide users with an easy way to restructure a menu according to how work is accomplished.
- In general, the more choices contained on a menu (greater breadth), the less will be its depth; the fewer choices on a menu (less breadth), the greater will be its depth.
- The advantages of a menu system with greater breadth and less depth are:
  o Fewer steps and shorter time to reach one's objective.
  o Fewer opportunities to wander down wrong paths.
  o Easier learning by allowing the user to see relationships of menu items.
- A broad menu's disadvantages are:
  o A more crowded menu that may reduce the clarity of the wording of choices.
  o Increased likelihood of confusing similar choices because they are seen together.
- The advantages of greater depth are:
  o Less crowding on the menu.
  o Fewer choices to be scanned.
  o Easier hiding of inappropriate choices.
  o Less likelihood of confusing similar choices since there is less likelihood that they will be seen together.
- Greater depth disadvantages are:
  o More steps and longer time to reach one's objective.
  o More difficulties in learning since relationships between elements cannot always be seen.
  o More difficulties in predicting what lies below, resulting in increased likelihood of going down wrong paths or getting lost.
  o Higher error rates.

Complexity

- Provide both simple and complex menus.
- Simple: a minimal set of actions and menus.
- Complex: a complete set of actions and menus.

Item Arrangement
- Align alternatives or choices into single columns whenever possible.
  — Orient for top-to-bottom reading.
  — Left-justify descriptions.
- If a horizontal orientation of descriptions must be maintained:
  — Organize for left-to-right reading.

Ordering
- Order lists of choices by their natural order, or
- For lists associated with numbers, use numeric order.
- For textual lists with a small number of options (seven or less), order by:
  — Sequence of occurrence.
  — Frequency of occurrence.
  — Importance.
  — Semantic similarity.
- Use alphabetic order for:
  — Long lists (eight or more options).
  — Short lists with no obvious pattern or frequency.
- Separate potentially destructive actions from frequently chosen items.
- If option usage changes, do not reorder menus.
- Maintain a consistent ordering of options on all related menus.
  — For variable-length menus, maintain consistent relative positions.
  — For fixed-length menus, maintain consistent absolute positions.
- A meaningful ordering is necessary to:
  o Facilitate search for an item.
  o Provide information about the structure and relationships among items.
  o Provide compatibility with the user's mental model of the item structure.
  o Enhance the user's ability to anticipate a choice's location.

Groupings
- Create groupings of items that are logical, distinctive, meaningful, and mutually exclusive.
- Categorize them in such a way as to:
  — Maximize the similarity of items within a category.
  — Minimize the similarity of items across categories.
- Present no more than six or seven groupings on a screen.
- Order categorized groupings in a meaningful way.
- If meaningful categories cannot be developed and more than eight options must be displayed on a screen, create arbitrary visual groupings that:
  — Consist of about four or five but never more than seven options.
  — Are of equal size.
- Separate groupings created through either:
  — Wider spacing, or
  — A thin ruled line.
- Provide immediate access to critical or frequently chosen items.

Line Separators
- Separate vertically arrayed groupings with subtle solid lines.
- Separate vertically arrayed subgroupings with subtle dotted or dashed lines.
- For subgroupings within a category:
  — Left-justify the lines under the first letter of the columnized choice descriptions.
  — Right-justify the lines under the last character of the longest choice description.
- For independent groupings:
  — Extend the line to the left and right menu borders.

10. Explain in detail about determining basic business functions.

A detailed description of what the product will do is prepared. Major system functions are listed and described, including critical system inputs and outputs. A flowchart of major functions is developed. The process the developer will use is summarized as follows:

- o Gain a complete understanding of the user's mental model based upon:
  - The user's needs and the user's profile.
  - A user task analysis.
- o Develop a conceptual model of the system based upon the user's mental model. This includes:
  - Defining objects.
  - Developing metaphors.

Understanding the User's Mental Model

- A goal of task analysis, and a goal of understanding the user, is to gain a picture of the user's mental model. A mental model is an internal representation of a person's current conceptualization and understanding of something.
- Mental models are gradually developed in order to understand, explain, and do something. Mental models enable a person to predict the actions necessary to do things if the actions have been forgotten or have not yet been encountered.

Performing a Task Analysis

- User activities are precisely described in a task analysis. Task analysis involves breaking down the user's activities to the individual task level. The goal is to obtain an understanding of why and how people currently do the things that will be automated.
- Knowing why establishes the major work goals; knowing how provides details of actions performed to accomplish these goals. Task analysis also provides information concerning workflows, the interrelationships between people, objects, and actions, and the user's conceptual frameworks. The output of a task analysis is a complete description of all user tasks and interactions.
- One result of a task analysis is a listing of the user's current tasks. This list should be well documented and maintained. Changes in task requirements can then be easily incorporated as design iteration occurs. Another result is a list of objects the users see as important to what they do. The objects can be sorted into the following categories:
  - o Concrete objects—things that can be touched.
  - o People who are the object of sentences—normally organization employees, customers,
  - o for example.
  - o Forms or journals—things that keep track of information.
  - o People who are the subject of sentences—normally the users of a system.
  - o Abstract objects—anything not included above.

b.Developing Conceptual Models

- The output of the task analysis is the creation, by the designer, of a conceptual model for the user interface. A conceptual model is the general conceptual framework through which the system's functions are presented. Such a model describes how the interface will present objects, the relationships between objects, the properties of objects, and the actions that will be performed.
- The goal of the designer is to facilitate for the user the development of useful mental model of the system. This is accomplished by presenting to the user a meaningful conceptual model of the system. When the user then encounters the system, his or her existing mental model will, hopefully, mesh well with the system's conceptual model.

Guidelines for Designing Conceptual Models

- **Reflect the user's mental model not the designer's:** A user will have different expectations and levels of knowledge than the designer. So, the mental models of the user and designer will be different. The user is concerned with the task to be performed, the business objectives that must be fulfilled.
- **Draw physical analogies or present metaphors:** Replicate what is familiar and well known. Duplicate actions that are already well learned. A metaphor, to be effective, must be widely applicable within an interface.

- **Comply with expectancies, habits, routines, and stereotypes:** Use familiar associations, avoiding the new and unfamiliar. With color, for example, accepted meanings for red, yellow, and green are already well established. Use words and symbols in their customary ways.
- **Provide action-response compatibility:** All system responses should be compatible with the actions that elicit them. Names of commands, for example, should reflect the actions that will occur.
- **Make invisible parts and process of a system visible:** New users of a system often make erroneous or incomplete assumptions about what is invisible and develop a faulty mental model. As more experience is gained, their mental models evolve to become more accurate and complete. Making invisible parts of a system visible will speed up the process of developing correct mental models.
- **Provide proper and correct feedback:** Be generous in providing feedback. Keep a person informed of what is happening, and what has happened, at all times, including:
    - Provide visible results of actions.
    - Display actions in progress.
    - Provide a continuous indication of status.
    - Present as much context information as possible.
    - Provide clear, constructive, and correct error messages.
- **Avoid anything unnecessary or irrelevant:** Never display irrelevant information on the screen. People may try to interpret it and integrate it into their mental models, thereby creating a false one.
- **Provide design consistency:** Design consistency reduces the number of concepts to be learned. Inconsistency requires the mastery of multiple models. If an occasional inconsistency cannot be avoided, explain it to the user.
- **Provide documentation and a help system that will reinforce the conceptual model:** Do not rely on the people to uncover consistencies and metaphors themselves. The help system should offer advice aimed at improving mental models.
- **Promote the development of both novice and expert mental models :** Novices and experts are likely to bring to bear different mental models when using a system.

Defining Objects
- Determine all objects that have to be manipulated to get work done. Describe:
    — The objects used in tasks.
    — Object behavior and characteristics that differentiate each kind of object.
    — The relationship of objects to each other and the people using them.
    — The actions performed.
    — The objects to which actions apply.
— State information or attributes that each object in the task must preserve, display, or allow to be edited.
- Identify the objects and actions that appear most often in the workflow.
- Make the several most important objects very obvious and easy to manipulate.

Developing Metaphors
- A metaphor is a concept where one's body of knowledge about one thing is used to understand something else. Metaphors act as building blocks of a system, aiding understanding of how a system works and is organized.
- Real-world metaphors are most often the best choice. Replicate what is familiar and well known. A common metaphor in a graphical system is the desktop and its components,
    - Choose the analogy that works best for each object and its actions.
    - Use real-world metaphors.
    - Use simple metaphors.
    - Use common metaphors.
    - Multiple metaphors may coexist.
    - Use major metaphors, even if you can't exactly replicate them visually.
    - Test the selected metaphors.

11.You have been assigned responsibility for designing the user interface of a new version of Indian government web facility that is used by tax payers to make their income tax returns online. what usability analysis procedures might you carry out to improve the usability of the system for these classes of user(Nov/ Dec 2013)

UNIT – III   PART – A

1. Define window.
A window is an area of the screen usually rectangular in shape, defined by a border that contains a particular view of some area of the computer. It can be moved and rendered independently on the screen.

2. What is known as split box?
A Window can split into 2 or more pieces or panes by manipulating a split box located above a vertical scroll bar or to the left of a horizontal scroll bar.

3. Define the merits of using track ball. (Nov/Dec 2012)
Track Ball is used for pointing, selecting & tracking.

4. What are the presentation styles of windows? (Nov/Dec 2012)
Tiled windows, Overlapping windows and Cascading windows.

5. What are the advantages of Tiled windows?
The system usually allocates and positions windows for the user, eliminating the necessity to make positioning decisions. Open windows are always visible, eliminating the possibility of them being lost and forgotten. Every window is always completely visible, eliminating the possibility of information being hidden.

6. What is known as cascading window?
A special type of overlapping window has the window automatically arranged in a regular progression. Each window is slightly offset from others.

7. What are the different features, of tiled & over lapping window?
Tiled window used for Single task activities - Data that needs to be seen simultaneously, Tasks requiring little window manipulation, Novice or inexperienced users.

0verlapping windows used for - Switching between tasks, Tasks necessitating a greater amount of window manipulation, Except or experienced users, Unpredictable display contents.

8. What are the various types of windows?
 l. Primary window: It is the one that appears on a screen when an activity or action is started.
 2. Secondary window: They are supplemental windows. It may be dependent or independent of primary window. It is used to obtain or display supplemental information related to the object in the primary windows.

Dialog boxes- to obtain additional information.
Property inspectors- to display the most common or frequency accessed properties.
Message boxes- to provide information about a particular situation or condition.

9. Differentiate between cascading and unfolding.
 Cascading: A cascade is used when advanced options at a lower level in complex dialog must be presented. Present the additional dialog box in cascaded form.
 Unfolding: To provide advanced options at the same level in a complex dialog. Provide a command button with an expanding dialog symbol.

10. What are the various window management schemes?
Single document interface, Multiple document interfaces, Workbooks and Projects.

11. Differentiate between SDI & MDI.

SDI	MDI
Single Document Interface	Multiple Document Interface
A single primary windows with asset of secondary windows	Managing set of windows
Object and window have simple one to one relationship	To represent multiple occurrence of an object.

12. What is meant by windows project?
 A project is a similar to MDI, but does not visually contain child windows. The objects held within the project window can be opened in primary windows that are peers with the project window.

13. How window is organized?

Organize windows to support user tasks. Support the most common tasks in the most efficient manner or fewest steps. Use primary windows to perform major interaction. Use secondary windows to obtain or display supplemental information, Related to the primary windows.

14. What are the advantages of frames in web systems?

They decrease the user's need to jump back and forth between screens, thereby reducing navigation related cognitive overhead. They increase the user's opportunity to request, view and compare multiple sources of information. They allow content pages to be developed independently of navigation pages.

15. What are device based controls? List some example for it.

Device based controls called input devices are the mechanism through which people communicate their desires to the system. Example: track ball, joystick, graphic tablet, light pen, voice, mouse, keyboard & touch screen.

16. What is meant by graphic tablet?

A graphic tablet is a device with horizontal surface sensitive to pressure, heat, light or the blockage of light. It may lie on the desk or may be incorporated on a keyboard and is operated with fingers & light pen.

17. Differentiate the usage of keyboard with mouse?

Keyboard	Mouse
Keying process becomes fast and well learned.	Mouse is slower and it has tendency to move about the desk.
It remains in the same spot. Its location can be memorized.	Its location cannot be memorized.

18. What is meant by spin box?

A spin box called spin button is a single field followed by 2 small vertically arranged buttons inscribed with up and down arrows. A selection entry is made by using the mouse to point at one of the directional buttons and clicking.

19. What is meant by slider?

A slider is a scale that exhibits the amount or degree of a quantity or quality. A slider incorporates the range of possible values and includes a shaft representing the range, the values with label and visual indication of the relative setting through the location of a sliding arm.

20. Differentiate between tooltip from balloon tips.

Tool tips	Balloon tips
It can be posted at any time only one the last posted will be possible.	It is used for task bar for specified minimum and maximum limits.
It has one or two words that identify button action.	It has a small pop up window that contain information presented in a word balloon.

21. What is web and the browser?

An entity called the browser is the user interface for the www.

The popular browsers are Internet explorer, Safari, Netscape, Firefox, Opera, etc.

22. List the advantages of check box.

Easy –to-access choices, Easy-to –compare choices, Preferred by users, Permits selection of more than one alternative.

23. List the window characteristics.

- A name or title, allowing it to identified.
- Presentation, that is, its arrangement in relation to other windows. It may be tiled, overlapping, or cascading.
- A size in height and width (which can very).

• A state, accessible or active, or not accessible.

• Visibility- the portion that can be seen.

• A location, relative to the display boundary.

• The function, task, or application to which to which it is dedicated.

24. List the components of a window. (Nov/Dec 2012)

1. Frame. 2. Title bar.

3. Title bar icon. 4. Windows sizing buttons.

5. Menu bar. 6. Status bar.

7. Scroll bar. 8. Split bar.

9. Tool box. 10. Command area
11. size grip. 12. Work area.

25. What are the considerations in choosing a screen?
Image, Colors, Size, Portability and Usage space.

26. **What are operable controls?**
Operable controls are those that permit the entry, selection, changing or editing of a particular value,or cause a command to be performed.
Classes include buttons, text entry / read only, selection, combination entry / selection, and other specialized controls.

27.List the various other operable controls.
Slider, Tabs, Date picker, Tree view, Scroll bar, Media controls, Presentation controls, Column Heading, Progress indicators and Sample box.

28. List out the advantages of windows.
• Presentation of different levels of information.
• Presentation of multiple kinds of information.
• Sequential presentation of levels of kinds of information.
• Access to different source of information.
• Combining multiple source of information.

29. **What are the various operation?**
i.Opening a windows ii.Sizing a window. Iii.Windows placement.
iv.Moving a window. V.Resizing a windows vi.Closing a window.

30. **What are the characteristics of devices- based controls? (AU-NOV/DEC 2010)**
• To point at an object on the screen.
• To select the object or identify it as the focus of attention.
• To drag an object across the screen.
• To tack or follow a moving object.
• To enter or manipulate data or information.

31. What are the guidelines for selecting the proper device- based control?
• Consider the user characteristics and preferences.
• Consider the characteristics of environment.
• Consider the characteristics of hardware.
• Provide flexibility.
• Minimize eye and hand movements between devices.

32. What are the guidelines for pointer?
• The pointer:
• -should be visible at all times.
• -should contrast well with its background.
• -should maintain its size across all screen location and during movement.
• -the hotspot should be easy to location and see.
• -location should not warp.

33.What are the structures of menus? (AU-APR/MAY 2011)
a) Single menus,
b) Sequential linear menus
c) Simultaneous menus
d) Hierarchical menus
e) Connected menus
f) Event-trapping menus.

34. List the advantages of spin boxes.
Consumes less screen space, Flexible, permitting selection or typed entry.

35.Write the difference between combo box & pop-up/drop- down combo box.

COMBO BOX	POP-UP/ DROP-DOWN COMBO BOX
1) Consumes some screen space.	1) Conserves screen space.
2) More screen space available	2) screen space limited.

1 MARK Questions and Answers

106. Indexed-Sequential organization
a. means storing records in contiguous blocks according to a key.
b. Stores records sequentially but uses an index to locate records
c. uses an index for each key type   **d.** has records placed randomly throughout the file

107. Management's decision to rent a computer system may be based upon
a. tax advantages **b.** desire to avoid a large one-time payment
c. operational flexibility in changing hardware   **d.** None of the above

108. The rule(s) to follow in constructing decision tables is (are):
a. a decision should be given a name
b. the logic of the table is independent of the sequence in which conditions rules are written, but the action takes place in the order is which the events occur.
c. standardized language must be used consistently.   **d.** All of the above

109. Which are the tools not used for System Analysis
a. System - test data b**.** Decision table **c.** Data Flow Diagram **d.** Flowcharts

110. Back-up procedure helps in
a. restoring the operation whenever there is a disk failure
b. restoring both application and system software whenever there is disk corruption.
c. restoring the data files whenever there is a system crash **d.** All of the above

111. The starting point for development of an MIS is;
a. identification of business processes that are the essence of the business
b. a distributed database management
c. the system has a large number of PCs and a LAN. **d.** purchase of a mini computers

112. The records in a file or magnetic tape
a. can only be accessed serially **b.** have to be arranged in a key sequence
c. are meant for backup **d.** cannot be transferred to a disk file

113. Acceptance testing is
a. running the system with line data by the actual user
b. making sure that the new programs do in fact process certain transactions according to Specifications.
       c. is checking the logic of one or more programs in the candidate systems
d. testing changes made in an existing or a new program

114. The __symbol is used in a flowchart to represent a step that gets information from the user.
a. Input/Output **b.** Process   **c.** Selection/repetition   **d.** Start/Stop

115. Which of the following interface design principles does not allow the user to remain in control of the interaction with a computer
a. allow interaction to interruptible **b.** allow interaction to be undoable
c. hide technical internals from casual users
d. provide 1 defined method for accomplishing a task

Answers

105	106	107	108	109	110	111	112	113	114
b	d	d	a	d	a	a	a	a	d

PART B

1. **Explain the Window Characteristics and its uses.**
   A window is seen to possess the following characteristics:
   - A name or title, allowing it to be identified.
   - A size in height and width (which can vary).
   - A state, accessible or active, or not accessible. (Only active windows can have their contents altered.)
   - Visibility—the portion that can be seen. (A window may be partially or fully hidden behind another window, or the information within a window may extend beyond the window's display area.)
   - A location, relative to the display boundary.

o Presentation, that is, its arrangement in relation to other windows. It may be tiled, overlapping, or cascading.
o Management capabilities, methods for manipulation of the window on the screen.
o Its highlight, that is, the part that is selected.
o The function, task, or application to which it is dedicated.

The Attraction of Windows

While all the advantages and disadvantages of windows are still not completely understood, windows do seem to be useful in the following ways.

i. **Presentation of Different Levels of Information:** A document table of contents can be presented in a window. A chapter or topic selected from this window can be simultaneously displayed in more detail in an adjoining window.

ii. **Presentation of Multiple Kinds of Information:** Variable information needed to complete a task can be displayed simultaneously in adjacent windows. For example in one window billing can be done and in one window stock maintenance can be done at the same time using windows. Significant windows could remain displayed so that details may be modified as needed prior

iii. **Sequential Presentation of Levels or Kinds of Information**: Steps to accomplish a task can be sequentially presented through windows. Key windows may remain displayed, but others appear and disappear as necessary. This sequential preparation is especially useful if the information-collection process leads down various paths.

iv. **Access to Different Sources of Information**: Independent sources of information may have to be accessed at the same time. Independent sources of information may have to be accessed at the same time

v. **Combining Multiple Sources of Information**: Text from several documents may have to be reviewed and combined into one. Pertinent information is selected from one window and copied into another.

vi. **Performing More Than One Task**: While waiting for a long, complex procedure to finish, another can be performed. Tasks of higher priority can interrupt less important ones and then the interrupted tasks can be preceded.

vii. **Reminding**: It can be used to provide remainder through messages or popup or menus.

viii. **Monitoring**: Data in one window can be modified and its effect on data in another window can be studied.

ix. **Multiple Representations of the Same Task**: the same task can be represented in two different ways in two windows. For example a report can be given as table in one window and as a chart in another window.

2. **Discuss in detail about the presentation controls.(Nov/Dec 2012) or explain the screen based presentation controls used in user interface design. (May/June 2013, 2014)**
   - Common presentation controls are *static text fields, group boxes column headings, ToolTips, balloon tips,* and *progress indicators*.

a.Static Text Fields
   - Description:
     — Read-only textual information.
   - Purpose:
     — To identify a control by displaying a control caption.
     — To clarify a screen by providing instructional or prompting information.
     — To present descriptive information.
   - Proper usage:
     — To display a control caption.
     — To display instructional or prompting information.
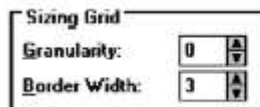   — To display descriptive information.

Static Text Field Guidelines
   - Captions:
     — Include a colon (:) as part of the caption.
     — Include a mnemonic for keyboard access.
     — When the associated control is disabled, display it dimmed.

— Follow all other presented guidelines for caption presentation and layout.

- Instructional or prompting information:
  — Display it in a unique and consistent font style for easy recognition and   differentiation.
  — Follow all other presented guidelines for prompting and instructional information.
- Descriptive information:
  — Follow all other guidelines for required screen or control descriptive   information.

b.Group Boxes

- Description:
  — A rectangular frame that surrounds a control or group of controls.
  — An optional caption may be included in the frame's upper-left corner.
- Purpose:
  — To visually relate the elements of a control.
  — To visually relate a group of related controls.
- Proper usage:
  — To provide a border around radio button or check box controls.
  — To provide a border around two or more functionally related controls.
- Guidelines:
  — Label or heading:
    - Typically, use a noun or noun phrase for the label or heading.
    - Provide a brief label or heading, preferably one or two words.
    - Relate label or heading's content to the group box's content.
    - Capitalize the first letter of each significant word.
    - Do not include and ending colon (:).
  — Follow all other guidelines presented for control and section borders.

c.Column Headings

- Description:
  — Read-only textual information that serves as a heading above columns of text or numbers.
  — Can be divided into two or more parts.
- Purpose:
  — To identify a column of information contained in a table.
- Proper usage:
  — To display a heading above a column of information contained in a table.
- Guidelines:
  — Heading:
    - Provide a brief heading.
    - Can include text and a graphic image.
    - Capitalize the first letter of each significant word.
    - Do not include an ending colon (:).
  — The width of the column should fit the average size of the column entries.
  — Does not support keyboard access.

Name ▲	Size
diff bwn udf and sp.doc	31 KB
EXAM-700.rar	2,114 KB
EXAM-703.rar	690 KB
Fundamentals of Stored Proc...	195 KB
IBMMAINFRAMES.zip	2,177 KB
Message001.eml	3,062 KB
PROC_LIB.zip	87 KB
triggers.rtf	18 KB
udfs.doc	48 KB

d.ToolTips
- Description:
  — A small pop-up window containing descriptive text that appears when a   pointer   is moved over a control or element either:
  - Not possessing a label.
  - In need of additional descriptive or status information.
- Purpose:
  — To provide descriptive information about a control or screen element.
- Advantages:
  — Identifies an otherwise unidentified control.
  — Reduces possible screen clutter caused by control captions and descriptive   information.
  — Enables control size to be reduced.
- Disadvantages:
  — Not obvious, must be discovered.
  — Inadvertent appearance can be distracting.
- Proper usage:
  — To identify a control that has no caption.
  — To provide additional descriptive or status information about a screen element.

ToolTip Guidelines
- Display after a short time-out.
- For toolbars, provide a brief word as a label.
  — Use mixed case in the headline style of presentation with no ending   punctuation.
- For other elements, provide a brief phrase presenting descriptive or status information.
  — Use mixed case in the sentence style of presentation.
- Present ToolTips at the lower-right edge of the pointer.
  — Display them fully on the screen.
  — For text boxes, display ToolTips centered under the control.
- Display them in the standard system ToolTip colors.
- Remove the ToolTip when the control is activated or the pointer is moved away.
- Don't substitute ToolTips for good design.
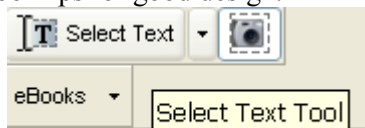
e.Balloon Tips
- Description:
  — A small pop-up window that contains information in a word balloon.
  — Components can include:
    - Title.
    - Body text.
    - Message Icons.
  — Appear adjacent to the item to which they apply, generally above or to left.
  — Only one tip, the last posted, is visible at any time.
  — Tips are removed after a specified time period.

- Purpose:
  — To provide additional descriptive or status information about a screen element.
- Advantages:
  — Provides useful reminder and status information.
- Disadvantages:
  — If overused they lose their attention-getting value.
  — If overused in situations the user considers not very important, their continual appearance can be aggravating.
- Proper usage:
  — To display noncritical:
    - Reminder information.
    - Notification information.
  — Do not use tips to display critical information.
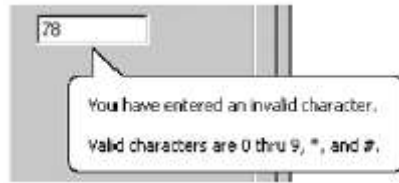
Balloon Tip Guidelines

- General:
  — Use a notification tip to inform the user about state changes.
  — Use a reminder tip for state changes that the user might not usually notice.
  — Point the tip of the balloon to the item it references.
  — Do not use them to replace ToolTips.
  — Do not overuse balloon tips.
- Content:
  — Restrict them to a length of 100 characters, including title and body text.
  — Title text should:
  • If the tip refers to an icon or other image representing a specific object,   include:
    — The object's name, using its normal capitalization.
    — The object's status, using sentence-style presentation without ending punctuation.
    • Be presented in bold.
  — Body text should:
    • Include a description of the situation in one or two brief sentences.
    • Include a brief suggestion for correcting the situation.
    • Be presented using mixed-case in the sentence style.

f.Progress Indicators

- Description:
  — A rectangular bar that fills as a process is being performed, indicating the percentage of the process that has been completed.
- Purpose:
  — To provide feedback concerning the completion of a lengthy operation.
- Proper usage:
  — To provide an indication of the proportion of a process completed.

```
                    RECORDS
Updating...

80% Complete
[████████████████        ]

          [ Stop ]
```

Progress Indicator Guidelines
- When filling the indicator:
    — If horizontally arrayed, fill it from left to right.
    — If vertically arrayed, fill it from bottom to top.
- Fill it with a color or a shade of gray.
- Include descriptive text for the process, as necessary.
- Place text outside of the control.

g.Sample Box
- Description:
    — A box illustrating what will show up on the screen based upon the parameter   or   parameters selected.
    — May include text, graphics, or both.
- Purpose:
    — To provide a representation of actual screen content based upon the parameter   or parameters selected.
- Guidelines:
    — Include a brief label.
    — Use mixed case in the headline style.
    — Locate it adjacent to the controls upon which it is dependent.

```
Sample
┌──────────────┐
│  AaBbYyZz    │
└──────────────┘
```

h.Scrolling Tickers
- Description:
    — Text that scrolls horizontally through a container window.
- Advantages:
    — Consume less screen space than full text.
- Disadvantages:
    — Hard to read.
    — Time-consuming to interpret.
    — Distracting.
- Guideline:
    — Do not use.

3. **Explain the various windows presentation styles.(Nov/Dec 2012)**
- The presentation style of a window refers to its spatial relationship to other windows.
- There are two basic styles, commonly called tiled or overlapping.

a.Tiled Windows
- Tiled windows derive their name from common floor or wall tile. Tiled windows appear in one plane on the screen and expand or contract to fill up the display surface, as needed.
- Most systems provide two-dimensional tiled windows, adjustable in both height and width.

Advantages:
  o The system usually allocates and positions windows for the user, eliminating the necessity to make positioning decisions.
  o Open windows are always visible, eliminating the possibility of them being lost and forgotten.
  o Every window is always completely visible, eliminating the possibility of information being hidden.
  o They are perceived as fewer complexes than overlapping windows, possibly because there are fewer management operations or they seem less "magical."
  o They are easier, according to studies, for novice or inexperienced people to learn and use.
  o They yield better user performance for tasks where the data requires little window manipulation to complete the task.
Disadvantages:
  o Only a limited number can be displayed in the screen area available.
  o As windows are opened or closed, existing windows change in size. This can be annoying.
  o As windows change in size or position, the movement can be disconcerting.
  o As the number of displayed windows increases, each window can get very tiny.
  o The changes in sizes and locations made by the system are difficult to predict.
  o The configuration of windows provided by the system may not meet the user's needs.
  o They are perceived as crowded and more visually complex because window borders are flush against one another, and they fill up the whole screen. Crowding is accentuated if borders contain scroll bars or control icons. Viewer attention may be drawn to the border, not the data.
  o They permit less user control because the system actively manages the windows.
b.Overlapping Windows
  • Overlapping windows may be placed on top of one another like papers on a desk.
  • They possess a three-dimensional quality, appearing to lie on different planes.
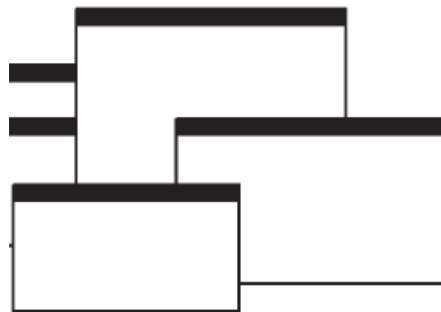
Advantages:
  o Visually, their look is three-dimensional, resembling the desktop that is familiar to the user.
  o Greater control allows the user to organize the windows to meet his or her needs.
  o Windows can maintain larger sizes.
  o Windows can maintain consistent sizes.
  o Windows can maintain consistent positions.
  o Screen space conservation is not a problem, because windows can be placed on top of one another.
  o There is less pressure to close or delete windows no longer needed.
  o The possibility exists for less visual crowding and complexity. Larger borders can be maintained around window information, and the window is more clearly set off against its background. Windows can also be expanded to fill the entire display.
  o They yield better user performance for tasks where the data requires much window manipulation to complete the task.

Disadvantages:
- o They are operationally much more complex than tiled windows. More control functions require greater user attention and manipulation.
- o Information in windows can be obscured behind other windows.
- o Windows themselves can be lost behind other windows and be presumed not to exist.
- o That overlapping windows represent a three-dimensional space is not always realized by the user.
- o Control freedom increases the possibility for greater visual complexity and crowding. Too many windows, or improper offsetting, can be visually overwhelming.

c.Cascading Windows
- A special type of overlapping window has the windows automatically arranged in a regular progression.
- Each window is slightly offset from others, as illustrated in Figure

Advantages:
- o No window is ever completely hidden.
- o Bringing any window to the front is easier.
- o It provides simplicity in visual presentation and cleanness.

Picking a Presentation Style
- Use tiled windows for:
    - o Single-task activities.
    - o Data that needs to be seen simultaneously.
    - o Tasks requiring little window manipulation.
    - o Novice or inexperienced users.
- Use overlapping windows for:
    - o Switching between tasks.
    - o Tasks necessitating a greater amount of window manipulation.
    - o Expert or experienced users.
    - o Unpredictable display contents.

4. **List the components of window and discuss its uses.** (May/June 2013)
Components of a Window:
a.Frame
- A window will have a frame or border, usually rectangular in shape, to define its boundaries and distinguish it from other windows.
- While a border need not be rectangular, this shape is a preferred shape for most people.

b.Title Bar
- The title bar is the top edge of the window, inside its border and extending its entire width.
- This title bar is also referred to by some platforms as the *caption, caption bar,* or *title area.*
- The title bar contains a descriptive title identifying the purpose or content of the window.

c.Title bar Icon
- Located at the left corner of the title bar in a primary window, this button is used in Windows to retrieve a pull-down menu of commands that apply to the object in the window.
- It is 16 X16 version of the icon of the object being viewed.

d.Window Sizing Buttons
- Located at the right corner of the title bar, these buttons are used to manipulate the size of a window.

- The leftmost button, the *minimize* button— inscribed with a short horizontal line toward the bottom of the button—is used to reduce a window to its minimum size, usually an icon. It also hides all associated windows.
- The *maximize* button—typically inscribed with a large box—enlarges a window to its maximum size, usually the entire screen. When a screen is maximized, the *restore* button replaces the maximize button, since the window can no longer be increased in size.
- When these buttons are displayed, use the following guidelines:
  - When a window does not support a command, do not display its command button.
  - The *Close* button always appears as the rightmost button. Leave a gap between it and any other buttons.
  - The *Minimize* button always precedes the *Maximize* button.
  - The *Restore* button always replaces the *Maximize* button or the *Minimize* button when that command is carried out.

e. What's This? Button
- The *What's This?* Button, which appears on secondary windows and dialog boxes, is used to invoke the What's This?

Windows command to provide contextual Help about objects displayed within a secondary window.

f.Menu Bar
- A menu bar is used to organize and provide access to actions. It is located horizontally at the top of the window, just below the title bar.
- A menu bar contains a list of topics or items that, when selected, are displayed on a pull-down menu beneath the choice.

g.Status Bar
- Information of use to the user can be displayed in a designated screen area or areas. They may be located at the top of the screen in some platforms and called a *status area*, or at the screen's bottom.
- Microsoft recommends the bottom location and refers to this area as the *status bar.* It is also referred to by other platforms as a *message area* or *message bar*.

h.Scroll Bars
- When all display information cannot be presented in a window, the additional information must be found and made visible.
- This is accomplished by scrolling the display's contents through use of a scroll bar.
- A scroll bar is an elongated rectangular container consisting of a scroll area or shaft, a slider box or elevator, and arrows or anchors at each end.
- For vertical scrolling, the scroll bar is positioned at the far right side of the work

i.Split Box
- A window can be split into two or more pieces or panes by manipulating a *split box* located above a vertical scroll bar or to the left of a horizontal scroll bar.
- A split box is sometimes referred to as a *split bar*.
- A window can be split into two or more separate viewing areas that are called *panes*

j.Toolbar
- Toolbars are permanently displayed panels or arrays of choices or commands that must be accessed quickly. They are sometimes called *command bars*.
- Toolbars are designed to provide quick access to specific commands or options. Specialized toolbars are sometimes referred to as *ribbons, toolboxes, rulers,* or *palettes*.

k. Command Area
- In situations where it is useful for a command to be typed into a screen, a command area can be provided.
- The desired location of the command area is at the bottom of the window.

l. Size Grip
- A size grip is a Microsoft Windows special handle included in a window to permit it to be resized.
- When the grip is dragged the window resizes, following the same conventions as the sizing border. Three angled parallel lines in the lower-right corner of a window designate the size grip.

m. Work Area

- The work area is the portion of the screen where the user performs tasks.
- It is the open area inside the window's border and contains relevant peripheral screen components such as the menu bar, scroll bars, or message bars.
- The work area may also be referred to as the *client area*.

Table 5.1 Microsoft Windows Components

COMPONENT	WINDOWS CONTAINING COMPONENT		
	PRIMARY	SECONDARY	DIALOG BOX
Frame or Border • Boundary to define shape. • If sizable, contains control points for resizing.	X	X	X
Title Bar Text • Name of object being viewed in window. • Control point for moving window.	X	X	X

Title Bar Icon
• Small version of icon for object
  being viewed.
• Access point for commands that apply
  to the object.
	X		

Title Bar Buttons • Shortcuts to specific commands.	X	X	X
Close	X	X	X
Minimize/Maximize/Restore	X		

What's This?
— Displays context-sensitive
  Help about any object displayed
  on window.
		X	X

Menu Bar • Provides basic and common application commands.	X		

Status Bar
• An area used to display status
  information about what is displayed
  in window.
	X		

Scroll Bar • Standard control to support scrolling.	X		
Size Grip • Control to resize window, located at right side of status bar.	X		

5. Explain the various types of windows with neat examples.(May/Jun 2012)
Types of Windows: i.Primary Window

Proper usage:
— Should represent an independent function or application.
— Use to present constantly used window components and controls.
• Menu bar items that are:
— Used frequently.

— Used by most, or all, primary or secondary windows.
   • Controls used by dependent windows.
— Use for presenting information that is continually updated.
   • For example, date and time.
— Use for providing context for dependent windows to be created.
— Do not:
   • Divide an independent function into two or more primary windows.
   • Present unrelated functions in one primary window.

- It has also been variously referred to as the *application* window or the *main* window. In addition, it may be referred to as the *parent* window if one or more *child* windows exist

ii.Secondary Windows
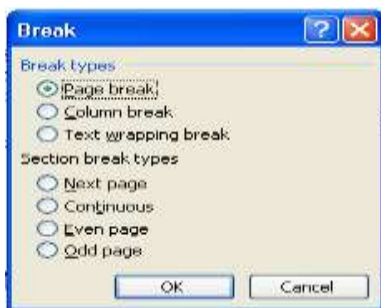
- Proper usage:
  — For performing subordinate, supplemental, or ancillary actions that are:
     • Extended or more complex in nature.
     • Related to objects in the primary window.
  — For presenting frequently or occasionally used window components.
- Important guidelines:
  — Should typically not appear as an entry on the taskbar.
  — A secondary window should not be larger than 263 dialog units x 263 dialog units.
- A *dependent* secondary window is one common type. It can only be displayed from a command on the interface of its primary window. It is typically associated with a single data object, and appears on top of the active window when requested. It is movable, and scrollable.
- An *independent* secondary window can be opened independently of a primary window—for example, a property sheet displayed when the user clicks the Properties command on the menu of a desktop icon.

Modal and Modeless
- Modal:
  — Use when interaction with any other window must not be permitted.
  — Use for:
     • Presenting information.
  — For example, messages (sometimes called a message box).
     • Receiving user input.
  — For example, data or information (sometimes called a prompt box).
     • Asking questions.
  — For example, data, information, or directions (sometimes called a question box).
  — Use carefully because it constrains what the user can do.
- Modeless:
  — Use when interaction with other windows must be permitted.
  — Use when interaction with other windows must be repeated.

Cascading and Unfolding
- Cascading:
  — Purpose:
     • To provide advanced options at a lower level in a complex dialog.
 — Guidelines:

• Provide a command button leading to the next dialog box with a "To a Window" indicator, an ellipsis (. . .).
• Present the additional dialog box in cascaded form.
• Provide no more than two cascades in a given path.
• Do not cover previous critical information.
— Title Bar.
— Relevant displayed information.
• If independent, close the secondary window from which it was opened.
• Unfolding:
— Purpose:
• To provide advanced options at the same level in a complex dialog.
— Guidelines:
• Provide a command button with an expanding dialog symbol (>>).
• Expand to right or downward.
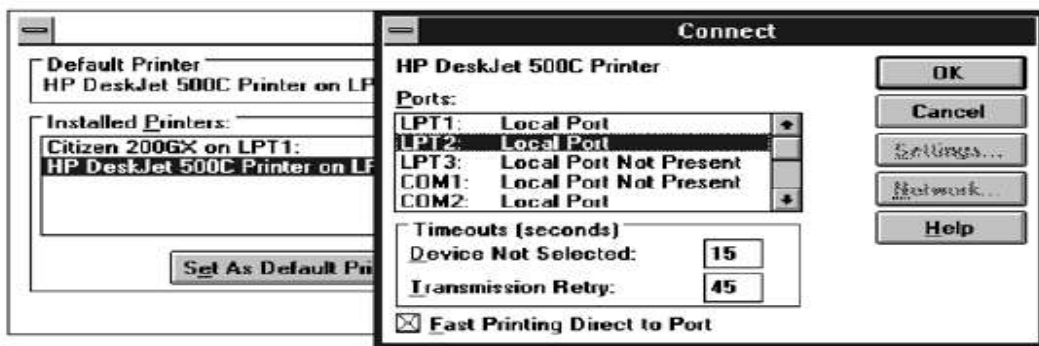
a.Cascaded Window
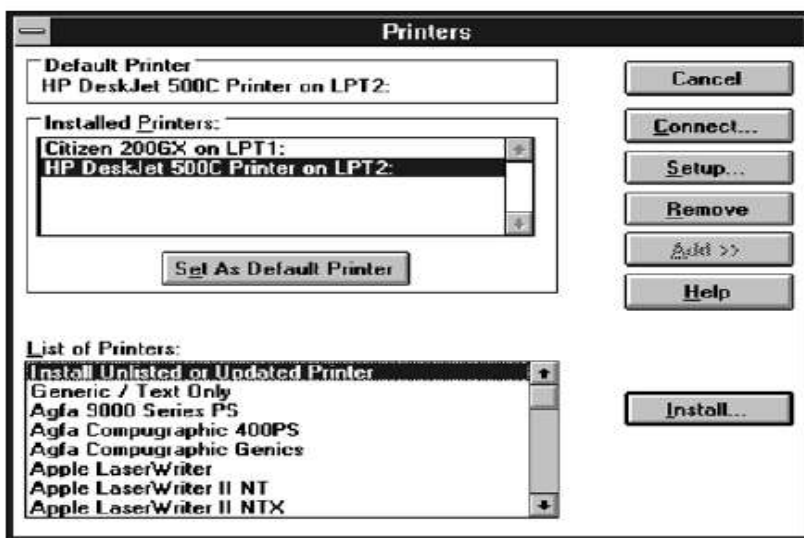
b.Unfolded Window
Dialog Boxes
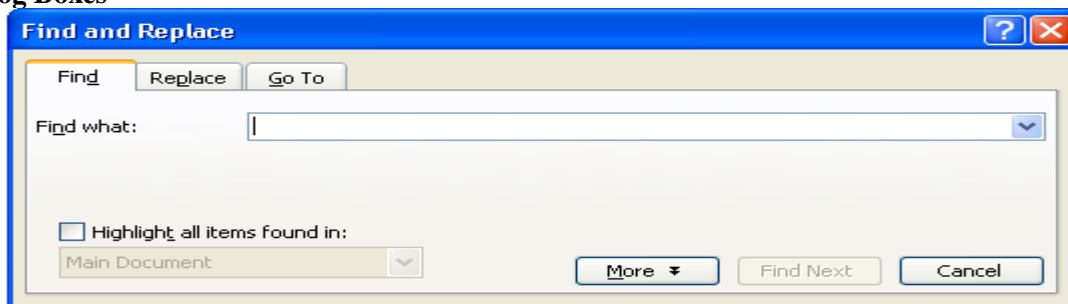
• Use for presenting brief messages.
• Use for requesting specific, transient actions.

- Use for performing actions that:
  — Take a short time to complete.
  — Are not frequently changed.
- Command buttons to include:
  — OK.
  — Cancel.
  — Others as necessary.

Property Sheets and Property Inspectors

Secondary windows provide two other techniques for displaying properties, *property sheets* and *property inspectors.*

c.Property Sheets
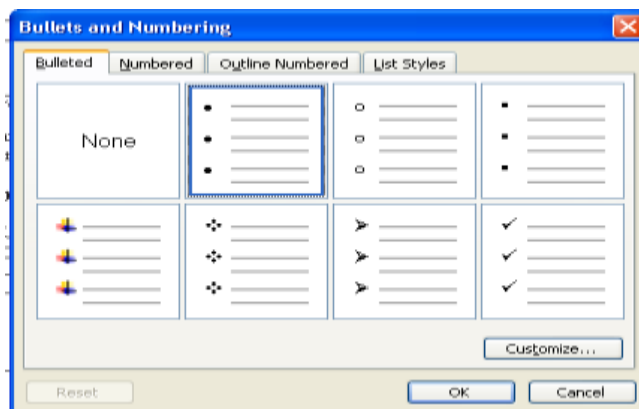
- Use for presenting the complete set of properties for an object.
- Categorize and group within property pages, as necessary.
  — Use tabbed property pages for grouping peer-related property sets.
  — The recommended sizes for property sheets are:
    • 252 DLUs wide x 218 DLUs high
    • 227 DLUs wide x 215 DLUs high
    • 212 DLUs wide x 188 DLUs high
  — Command buttons to include:
    • OK.
    • Cancel.
    • Apply.
    • Reset.
    • Others as necessary.
  — For single property sheets, place the commands on the sheet.
  — For tabbed property pages, place the commands outside the tabbed pages.

d.Property Inspectors

- Use for displaying only the most common or frequently accessed objects properties.
- Make changes dynamically.

e.Message Boxes
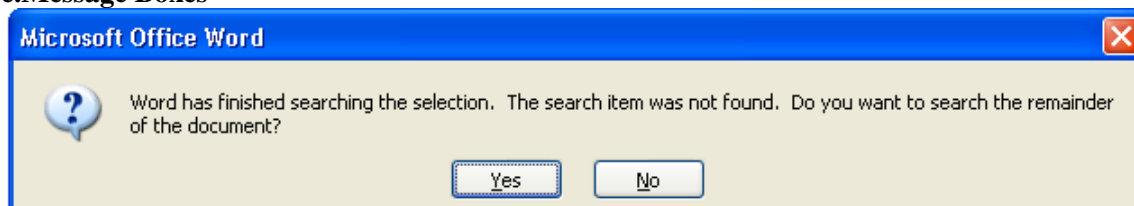
- Use for displaying a message about a particular situation or condition.
- Command buttons to include:
  — OK.

— Cancel.
— Help.
— Yes and No.
— Stop.
— Buttons to correct the action that caused the message box to be displayed.
- Enable the title bar close box only if the message includes a cancel button.
- Designate the most frequent or least destructive option as the default command

f.Palette Windows

- Use to present a set of controls.
- Design as resizable.
— Alternately, design them as fixed in size.

g.Pop-up Windows
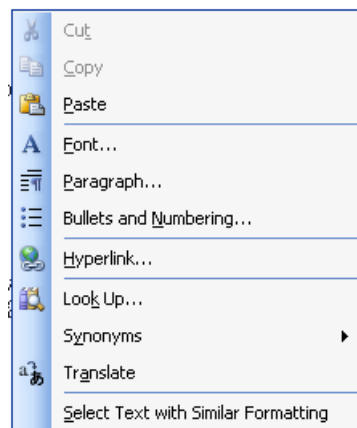
- Use pop-up windows to display:
— Additional information when an abbreviated form of the information is the main presentation.
— Textual labels for graphical controls.
— Context-sensitive Help information

6. a)How will you organize windows and the general rule for the number of windows?
Window Organization
- Organize windows to support user tasks.
- Support the most common tasks in the most efficient sequence of steps.
- Use primary windows to:
— Begin an interaction and provide a top-level context for dependent windows.
— Perform a major interaction.
- Use secondary windows to:
— Extend the interaction.
— Obtain or display supplemental information related to the primary window.
- Use dialog boxes for:
— Infrequently used or needed information.
— "Nice-to-know" information.

Number of Windows
The general rule:
   o   Minimize the number of windows used to accomplish an objective.

  o Use a single window whenever possible. Consider, however, the user's task.
  o Don't clutter up a single window with rarely used information when it can be placed on a second, infrequently used, window.

6b) Write down the comparison of GUI Controls.

DIRECT MANIPULATION

1. Drag and Drop On
   - The items are arrayed horizontally. An item is dragged to a new location above another item and released. The item in that position moves to the old location of the arriving item.

2. Drag and Drop Between
   - The items are arrayed horizontally. An item is dragged to a new location between two other items and released. The items are readjusted into new positions, including, when necessary, automatic wrap-around for items located at the end of the line.

SELECTION

3. Icons
   - The items are arrayed horizontally. Icons are positioned between each pair of items. Selecting an icon switches the positions of each adjacent item.

4. Radio Buttons
   - The items are presented in a matrix, item name along the left side, item position numbers across the top. Radio buttons in the matrix are selected to represent each item's position.

5. Menus (Drop-down List Boxes)
   - Items are positioned horizontally. A drop-down listing is activated, and the item for that location selected.

ENTRY

6. One Entry Area
   - A single text entry field is provided. A one-character mnemonic (F,N,S,D) is provided for each choice. The mnemonics are keyed in the order in which the items are to be arrayed.

7. Four Entry Areas
   - Four text entry fields, labeled with the item names are arranged vertically. A number (1-4) is keyed into each field, indicating the manner in which the items are to be ordered.

7. **State the different selection control mechanism in windows and explain any two. (Nov/Dec 2014) or Explain in detail about Radio buttons with suitable examples.(May/Jun 2012)**
- A selection control presents on the screen all the possible alternatives, conditions, or choices that may exist for an entity, property, or value.
- The relevant item or items are selected from those displayed.
- Selection controls include radio buttons, check boxes, list boxes, drop-down/pop-up list boxes, and palettes.

a.Radio Buttons
- Description:
  — A two-part control consisting of the following:
   • Small circles, diamonds, or rectangles.
   • Choice descriptions.
  — When a choice is selected:
   • The option is highlighted.
   • Any existing choice is automatically unhighlighted and deselected.
- Purpose:
  — To set one item from a small set of mutually exclusive options (2 to 8).
- Advantages:
  — Easy-to-access choices.
  — Easy-to-compare choices.
  — Preferred by users.

- Disadvantages:
  — Consume screen space.
  — Limited number of choices.
- Proper usage:
  — For setting attributes, properties, or values.
  — For mutually exclusive choices (that is, only one can be selected).
  — Where adequate screen space is available.
  — Most useful for data and choices that are:
    • Discrete.
    • Small and fixed in number.
    • Not easily remembered.
    • In need of a textual description to meaningfully describe the alternatives.
    • Most easily understood when the alternatives can be seen together and compared to one another.
    • Never changed in content.
  — Do not use:
    • For commands.
    • Singly to indicate the presence or absence of a state.
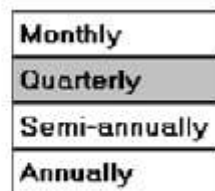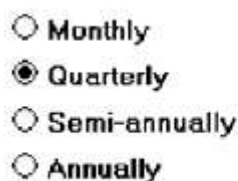
i. Choice Descriptions
- Provide meaningful, fully spelled-out choice descriptions clearly describing the values or effects set by the radio buttons.
- Display in a single line of text.
- Display using mixed-case letters, using the sentence style.
- Position descriptions to the right of the button. Separate them by at least one space from the button.
- When a choice is conditionally unavailable for selection, display the choice description grayed out or dimmed.
- Include none choice if it adds clarity.
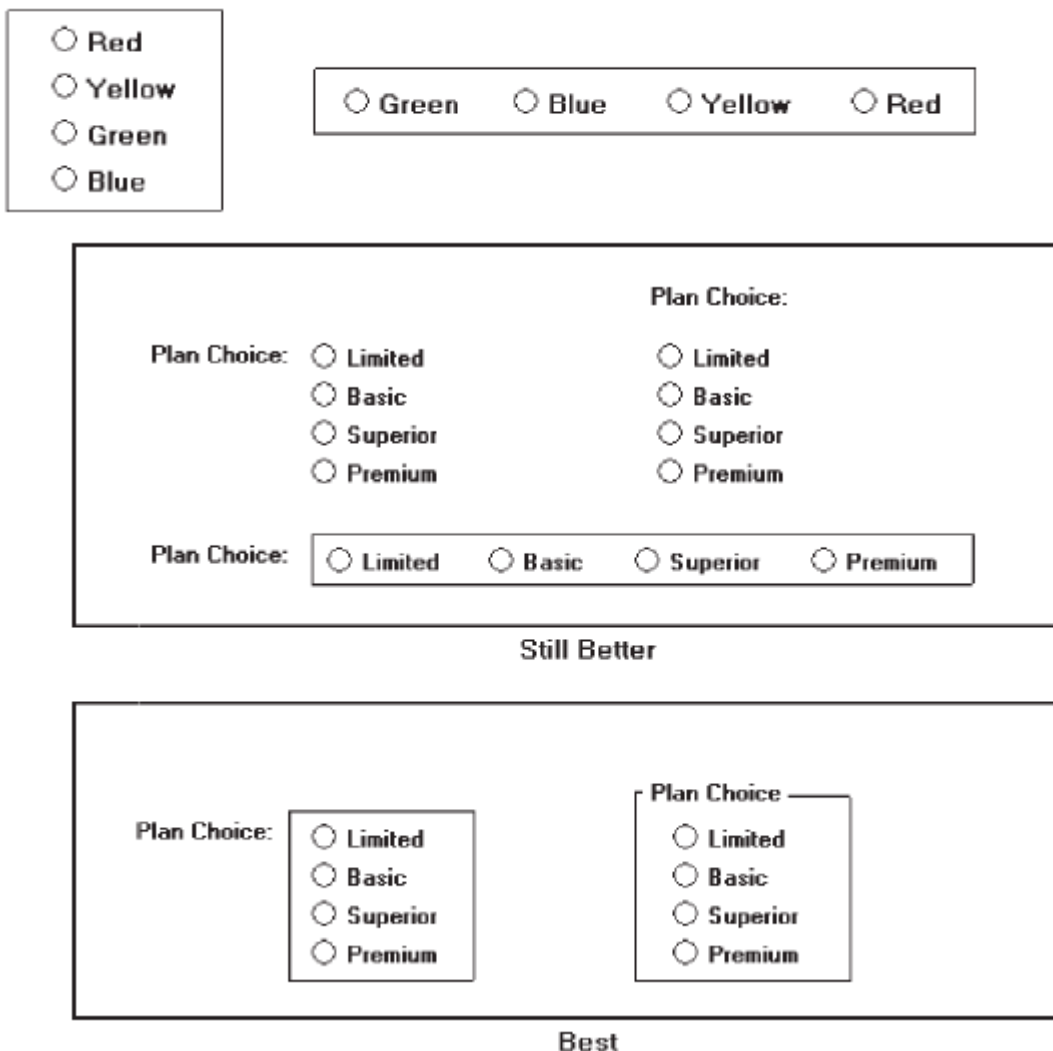
ii. Size
- Show a minimum of two choices, a maximum of eight.

iii. Defaults
- When the control possesses a state or affect that has been predetermined to have a higher probability of selection than the others, designate it as the default and display its button filled in.
- When the control includes choices whose states cannot be predetermined, display all the buttons without setting a dot, or in the *indeterminate* state.
- When a multiple selection includes choices whose states vary, display the buttons in another unique manner, or in the *mixed value* state.

iv. Structure
- A columnar orientation is the preferred manner of presentation.
- Left-align the buttons and choice descriptions.
- If vertical space on the screen is limited, orient the buttons horizontally.
- Provide adequate separation between choices so that the buttons are associated with the proper description.
  — A distance equal to three spaces is usually sufficient.
- Enclose the buttons in a border to visually strengthen the relationship they possess.

○ Red
○ Yellow
○ Green
○ Blue

○ Green   ○ Blue   ○ Yellow   ○ Red

Plan Choice:

Plan Choice: ○ Limited   ○ Limited
               ○ Basic   ○ Basic
               ○ Superior   ○ Superior
               ○ Premium   ○ Premium

Plan Choice: ○ Limited   ○ Basic   ○ Superior   ○ Premium

Still Better

Plan Choice: ○ Limited   ┌ Plan Choice ─┐
               ○ Basic   │ ○ Limited   │
               ○ Superior   │ ○ Basic   │
               ○ Premium   │ ○ Superior │
                                  │ ○ Premium   │

Best

v. Organization

- Arrange selections in expected order or follow other patterns such as frequency of occurrence, sequence of use, or importance.
  — For selections arrayed top to bottom, begin ordering at the top.
  — For selections arrayed left to right, begin ordering at the left.
- If, under certain conditions, a choice is not available, display it subdued or less brightly than the available choices.

vi. Related Control

- Position any control related to a radio button immediately to the right of the choice description.
- If the radio button choice description also acts as the label for the control that follows it, end the label with an arrow (>).

◉ Responsible Person > | Grandfather |

○ No Resposible Party
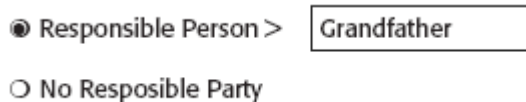
vii. Captions

- Structure:
  — Provide a caption for each radio button control.
    • Exception: In screens containing only one radio button control, the screen title may serve as the caption.
- Display:
  — Fully spelled out.
  — In mixed-case letters, capitalizing the first letter of all significant words.
- Columnar orientation:

— With a control border, position the caption:
  • Upper-left-justified within the border.

```
┌─ Color ─────────────┐
│   ○ Red             │
│   ○ Yellow          │
│   ◉ Green           │
│   ○ Blue            │
└─────────────────────┘
```

  • Alternately, the caption may be located to the left of the topmost choice description.
— Without an enclosing control border, position the caption:
  • Left-justified above the choice descriptions, separated by one space line.

Color:

◉ Red
○ Yellow
○ Green
○ Blue

• Alternately, the caption may be located to the left of the topmost choice description.

Color: ○ Red
        ○ Yellow
        ◉ Green
        ○ Blue

• Horizontal orientation:
— Position the caption to the left of the choice descriptions.

Color: ○ Green   ○ Blue   ○ Yellow   ○ Red

  • Alternately, with an enclosing control border, left-justified within the   border.

```
┌─ Color ───────────────────────────────────┐
│   ○ Green    ○ Blue    ○ Yellow    ◉ Red   │
└────────────────────────────────────────────┘
```
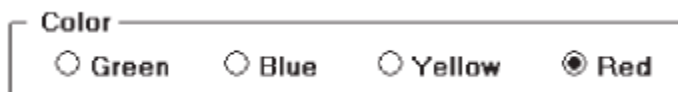
— Be consistent in caption style and orientation within a screen.

Keyboard Equivalents
• Assign a keyboard mnemonic to each choice description.

◉ Red

• Designate the mnemonic by underlining the applicable letter in the choice description.
viii.Selection Method and Indication
• Pointing:
— The selection target area should be as large as possible.
  • Include the button and the choice description text.
— Highlight the selection choice in some visually distinctive way when the cursor's resting on it and the choice is available for selection.
  • This cursor should be as long as the longest choice description plus one space at each end. Do not place the cursor over the small button.

○ Red

○ Yellow

○ Green

○ Blue

- Activation:
  — When a choice is selected, distinguish it visually from the unselected choices.
  - • A radio button should be filled in with a solid dark dot or made to look depressed or higher through use of a shadow.
  — When a choice is selected, any other selected choice must be deselected.
- Defaults:
  — If a radio button control is displayed that contains a choice previously selected or a default choice, display the selected choice as set in the control

b.Check Boxes

- Description:
  — A two-part control consisting of a square box and choice description.
  — Each option acts as a switch and can be either "on" or "off."
  - • When an option is selected (on), a mark such as an "X" or "check" appears within the square box, or the box is highlighted in some other manner.
  - • Otherwise the square box is unselected or empty (off).
  — Each box can be:
  - • Switched on or off independently.
  - • Used alone or grouped in sets.
- Purpose:
  — To set one or more options as either on or off.
- Advantages
  — Easy-to-access choices.
  — Easy-to-compare choices.
  — Preferred by users.
- Disadvantages:
  — Consume screen space.
  — Limited number of choices.
  — Single check boxes difficult to align with other screen controls.
- Proper usage:
  — For setting attributes, properties, or values.
  — For nonexclusive choices (that is, more than one can be selected).
  — Where adequate screen space is available.
  — Most useful for data and choices that are:
  - • Discrete.
  - • Small and fixed in number.
  - • Not easily remembered.
  - • In need of a textual description to describe meaningfully.
  - • Most easily understood when the alternatives can be seen together and compared to one another.
  - • Never changed in content.
  — Can be used to affect other controls.
  — Use only when both states of a choice are clearly opposite and unambiguous.

☒ Bold

☐ Italic

☐ Subscript

☒ Underline

| Bold |
| Italic |
| Subscript |
| Underline |

☐ Always Create Backup Copy
☑ Allow Fast Saves
☐ Prompt for Document Properties
☐ Prompt to Save Normal Template
☐ Save Native Picture Formats Only
☐ Embed TrueType Fonts
☐ Save Data Only for Forms
☑ Automatic Save Every:

i.Choice Descriptions
- Provide meaningful, fully spelled-out choice descriptions clearly describing the values or effects set by the check boxes.
- Display them in a single line of text.
- Display them using mixed-case letters in sentence style.
- Position descriptions to the right of the check box. Separate by at least one space from the box.
- When a choice is unavailable for selection under a certain condition, display the choice description visually dimmed.

ii.Size
- Show a minimum of one choice, a maximum of eight.

iii.Defaults
- When the control possesses a state or affect that has been preset, designate it as the default and display its check box marked.
- When a multiple selection includes choices whose states vary, display the buttons in another unique manner, or the *mixed value* state.

iv.Structure
- Provide groupings of related check boxes.
- A columnar orientation is the preferred manner of presentation for multiple related check boxes.
- Left-align the check boxes and choice descriptions.
- If vertical space on the screen is limited, orient the boxes horizontally.
- Provide adequate separation between boxes so that the buttons are associated with the proper description.
  — A distance equal to three spaces is usually sufficient.
- Enclose the boxes in a border to visually strengthen the relationship they possess.

v.Organization
- Arrange selections in logical order or follow other patterns such as frequency of occurrence, sequence of use, or importance.
  — For selections arrayed top to bottom, begin ordering at the top.
  — For selections arrayed left to right, begin ordering at the left.
- If, under certain conditions, a choice is not available, display it subdued or less brightly than the available choices.

vi.Related Control
- Position any control related to a check box immediately to the right of the choice description.
  — If a the check box choice description also acts as the label for the control that follows it , end the label with an arrow (>).

vii.Captions and Keyboard Equivalents
  Same as Radio Button

viii.Selection Method and Indication
- Pointing:
  — The selection target area should be as large as possible.
    • Include the check box and the choice description text.
  — Highlight the selection choice in some visually distinctive way when the cursor's resting on it and the choice is available for selection.

• This cursor should be as long as the longest choice description plus one space at each end. Do not place the cursor over the check box.

- Activation:
  — When a choice is selected, distinguish it visually from the non-selected choices.
  • A check box should be filled in or made to look depressed or higher through use of a shadow.
- Defaults:
  — If a check box is displayed that contains a choice previously selected or default choice, display the selected choice as set in the control.
- Select/deselect all:
  — Do not use *Select All* and *Deselect All* check boxes.
- Mixed-value state:
  — When a check box represents a value, and a multiple selection encompasses multiple value occurrences set in both the on and off state, display the check box in a *mixed value* state.

☐ Bold

☐ Italic

☐ Underline

• Fill the check box with another easily differentiable symbol or pattern.
— Toggle the check box as follows:
  • Selection 1: Set the associated value for all elements. Fill the check box with an "X" or "check."
  • Selection 2: Unset the value for all associated elements. Blank-out the check box.
  • Selection 3: Return all elements to their original state. Fill the check box with the mixed value symbol or pattern.

c.Palettes

- Description:
  — A control consisting of a series of graphical alternatives. The choices themselves are descriptive, being composed of colors, patterns, or images.
  — In addition to being a standard screen control, a palette may also be presented on a pull-down or pop-up menu or a toolbar.
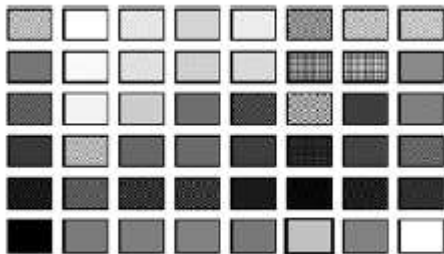
- Purpose:
  — To set one of a series of mutually exclusive options presented graphically or pictorially.
- Advantages:
  — Pictures aid comprehension.
  — Easy-to-compare choices.
  — Usually consume less screen space than textual equivalents.
- Disadvantages:
  — A limited number of choices can be displayed.
  — Difficult to organize for scanning efficiency.
  — Requires skill and time to design meaningful and attractive graphical representations.
- Proper usage:
  — For setting attributes, properties, or values.
  — For mutually exclusive choices (that is, only one can be selected).
  — Where adequate screen space is available.
  — Most useful for data and choices that are:

• Discrete.
• Frequently selected.
• Limited in number.
• Variable in number.
• Not easily remembered.
• Most easily understood when the alternatives may be seen together and compared to one another.
• Most meaningfully represented pictorially or by example.
• Can be clearly represented pictorially.
• Rarely changed in content.
— Do not use:
• Where the alternatives cannot be meaningfully and clearly represented pictorially.
• Where words are clearer than images.
• Where the choices are going to change.

i.Graphical Representations

- Provide meaningful, accurate, and clear illustrations or representations of choices.
- Create images large enough to:
  — Clearly illustrate the available alternatives.
  — Permit ease in pointing and selecting.
- Create images of equal size.
- Always test illustrations before implementing them.

ii.Size

- Present all available alternatives within the limits imposed by:
  — The size of the graphical representations.
  — The screen display's capabilities.

iii.Layout

- Create boxes large enough to:
  — Effectively illustrate the available alternatives.
  — Permit ease in pointing and selecting.
- Create boxes of equal size.
- Position the boxes adjacent to, or butted up against, one another.
- A columnar orientation is the preferred manner.
- If vertical space on the screen is limited, orient the choices horizontally.

iv.Organization

- Arrange palettes in expected or normal order.
  — For palettes arrayed top to bottom, begin ordering at the top.
  — For palettes arrayed left to right, begin ordering at the left.
- If an expected or normal order does not exist, arrange choices by frequency of occurrence, sequence of use, importance, or alphabetically (if textual).
- If, under certain conditions, a choice is not available, display it subdued or less brightly than the other choices.
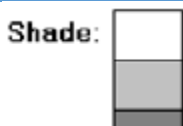
v.Captions

- Provide a caption for each palette.
  — On screens containing only one palette, the screen title may serve as the   caption.
- Display the caption fully spelled out using mixed-case letters.
- Columnar orientation:
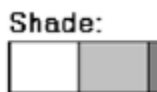 — The field caption may be positioned left-aligned above the palette.

Shade:

— Alternately, the caption may be positioned to the left of the topmost alternative.

- Horizontal orientation:
  — The field caption may be positioned above the palette.

 — Alternately, the caption may be positioned to the left of the alternatives.

vi. Selection Method and Indication
- Pointing:
  — Highlight the choice in some visually distinctive way when the pointer or cursor is resting on it and the choice is available for selection.
- Activation:
  — When a choice is selected, distinguish it visually from the unselected choices by highlighting it in a manner different from when it is pointed at, or by placing a bold border around it.
- Defaults:
  — If a palette is displayed with a choice previously selected or a default choice, display the currently active choice in the manner used when it was selected.

d. List Boxes
- Description:
  — A permanently displayed box-shaped control containing a list of attributes or objects from which:
    - A single selection is made (mutually exclusive), or
    - Multiple selections are made (non-mutually-exclusive).
  — The choice may be text, pictorial representations, or graphics.
  — Selections are made by using a mouse to point and click.
  — Capable of being scrolled to view large lists of choices.
  — No text entry field exists in which to type text.
  — A list box may be may be associated with a *summary list box* control, which allows the selected choice to be displayed or an item added to the list.
- Purpose:
  — To display a collection of items containing:
    - Mutually exclusive options.
    - Non-mutually-exclusive options.
- Advantages:
  — Unlimited number of choices.
  — Reminds users of available options.
  — Box always visible.
- Disadvantages:
  — Consumes screen space.
  — Often requires an action (scrolling) to see all list choices.
  — The list content may change, making it hard to find items.
  — The list may be ordered in an unpredictable way, making it hard to find items.
- Proper usage:
  — For selecting values or setting attributes.
  — For choices that are:
    - Mutually exclusive (only one can be selected).
    - Non-mutually-exclusive (one or more may be selected).
  — Where screen space is available.
  — For data and choices that are:
    - Best represented textually.

• Not frequently selected.
• Not well known, easily learned, or remembered.
• Ordered in an unpredictable fashion.
• Frequently changed.
• Large in number.
• Fixed or variable in list length.
— When screen space or layout considerations make radio buttons or check boxes impractical.
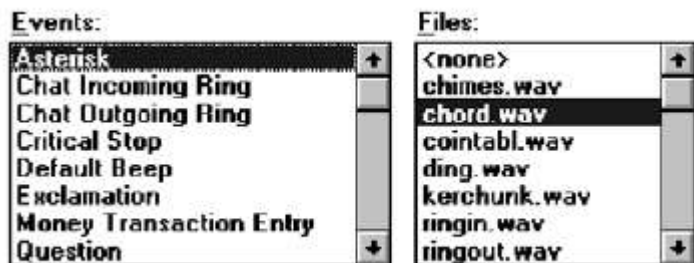
List Box General Guidelines
i.Selection Descriptions
* Clearly and meaningfully describe the choices available. Spell them out as fully as possible.
  — Graphical representations must clearly represent the options.
* Present in mixed case, using the sentence style structure.
* Left-align into columns.
ii.List Size
* Not actual limit in size.
* Present all available alternatives.
* Require no more than 40 page-downs to search a list.
  — If more are required, provide a method for using search criteria or scoping the options.
iii.Box Size
* Must be long enough to display 6 to 8 choices without requiring scrolling.
  — Exceptions:
  • If screen space constraints exist, the box may be reduced in size to display at least three items.
  • If it is the major control within a window, the box may be larger.
  — If more items are available than are visible in the box, provide vertical scrolling to display all items.
* Must be wide enough to display the longest possible choice.

  — When box cannot be made wide enough to display the longest entry:
  • Make it wide enough to permit entries to be distinguishable, or,
  • Break the long entries with an ellipsis (...) in the middle, or,
  • Provide horizontal scrolling.
iv.Organization
* Order in a logical and meaningful way to permit easy browsing.
  — Consider using separate controls to enable the user to change the sort order or filter items displayed in the list.
* If a particular choice is not available in the current context, omit it from the list.

— Exception: If it is important that the existence and unavailability of a particular list item be communicated, display the choice dimmed or grayed out instead of deleting it.

v.Layout and Separation

- Enclose the choices in a box with a solid border.
  — The border should be the same color as the choice descriptions.
- Leave one blank character position between the choice descriptions and the left border.
- Leave one blank character position between the longest choice description in the list and the right border, if possible.

vi.Captions

- Use mixed-case letters.
- The preferred position of the control caption is above the upper-left corner of the list box.

- Alternately, the caption may be located to the left of the topmost choice description.

- Be consistent in caption style and orientation within a screen, and related screens.

vii.Disabling

- When a list box is disabled, display its caption and show its entries as grayed out or dimmed.

viii.Selection Method and Indication

- Pointing:
  — Highlight the selection choice in some visually distinctive way when the pointer or cursor is resting on it and the choice is available for selection.
- Selection:
  — Use a reverse video or reverse color bar to surround the choice description when it is selected.
  — The cursor should be as wide as the box itself.

 — Mark the selected choice in a distinguishing way.
- Activation:

— Require the pressing of a command button when an item, or items, is selected.

1)Single-Selection List Boxes

- Purpose:
  — To permit selection of only one item from a large listing.
- Design guidelines:
  — Related text box
  • If presented with an associated text box control:
  — Position the list box below and as close as possible to the text box.
  — The list box caption should be worded similarly to the text box caption.

Destination: [   ]

Destination:
| Australia |
| Canada |
| **England** |
| France |
| Germany |
| New Zealand |
| Netherlands |
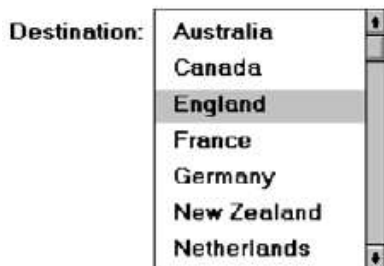
— If the related text box and the list box are very close in proximity, the caption may be omitted from the list box.

Destination: [   ]
| Australia |
| Canada |
| **England** |
| France |
| Germany |
| New Zealand |
| Netherlands |

— Use the same background color for the text box as is used in the list box.

- Defaults:
  • When the list box is first displayed:
  — Present the currently active choice highlighted or marked with a circle or d   diamond to the left of the entry.
  — If a choice has not been previously selected, provide a default choice and   display it in the same manner that is used in selecting it.
  — If the list represents mixed values for a multiple selection, do not highlight an entry.
- Other:
  —Follow other relevant list box guidelines.

2)Extended and Multiple-Selection List Boxes

- Purpose:
  — To permit selection of more than one item in a long listing.
      • Extended list box: Optimized for individual item or range selection.
      • Multiple-selection list box: Optimized for independent item selection.
- Design guidelines:
  — Selection indication:
  • Mark the selected choice with an X or check mark to the left of the entry.
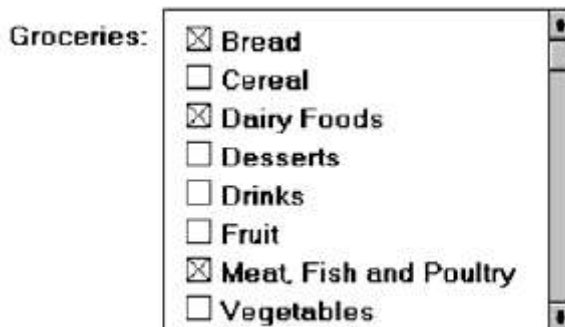
• Consider providing a *summary list box*.
— Position it to the right of the list box.
— Use the same colors for the summary list box as are used in the list box.
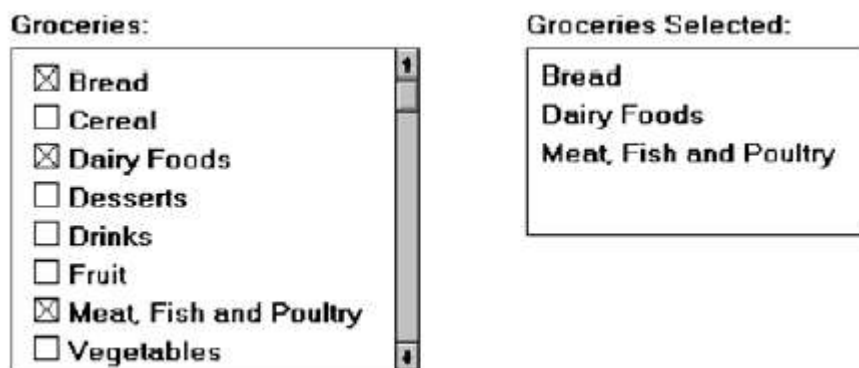
— Provide command buttons to *Add* (one item) or *Add All* (items) to the summary   list box, and *Remove* (one item) or *Remove All* (items) from the summary list box.

• Consider providing a display-only text control indicating how many choices have been selected.
    — Position it justified upper-right above the list box.

— Select all and Deselect All buttons
— Provide command buttons to accomplish fast *Select All* and *Deselect All*   actions,   when these actions must be frequently or quickly performed.
— Defaults:
    • When the list box is first displayed:
    — Display the currently active choices highlighted.
    — Mark with an X or check mark to the left of the entry.
    — If the list represents mixed values for a multiple selection, do not highlight an entry.
— Other:
    • Follow other relevant list box guidelines.

3)List View Controls
• Description:

— A special extended-selection list box that displays a collection of items, consisting of an icon and a label.

    — The contents can be displayed in four different views:

        • Large Icon: Items appear as a full-sized icon with a label below.

        • Small Icon: Items appear as a small icon with label to the right.

        • List: Items appear as a small icon with label to the right.

            — Arrayed in a columnar, sorted layout.

    • Report: Items appear as a line in a multicolumn format.

            — Leftmost column includes icon and its label.

            — Subsequent columns include application-specific information.

- Purpose and usage:
  — Where the representation of objects as icons is appropriate.
  — To represent items with multiple columns of information.

e.Drop-down/Pop-up List Boxes

- Description
  — A single rectangular control that shows one item with a small button to the right side.
  • The button provides a visual cue that an associated selection box is available but hidden.
  — When the button is selected, a larger associated box appears, containing a list of choices from which one may be selected.
  — Selections are made by using the mouse to point and click.
  — Text may not be typed into the control.

- Purpose:
  — To select one item from a large list of mutually exclusive options when screen space is limited.

- Advantages:
  — Unlimited number of choices.
  — Reminds users of available options.
  — Conserves screen space.

- Disadvantages:
  — Requires an extra action to display the list of choices.
  — When displayed, all choices may not always be visible, requiring scrolling.
  — The list may be ordered in an unpredictable way, making it hard to find items.

- Proper usage:
  — For selecting values or setting attributes.
  — For choices that are mutually exclusive (only one can be selected).
  — Where screen space is limited.
  — For data and choices that are:
    • Best represented textually.
    • Infrequently selected.
    • Not well known, easily learned, or remembered.
    • Ordered in a unpredictable fashion.
    • Large in number.
    • Variable or fixed in list length.
  — Use drop-down/pop-up lists when:
    • Screen space or layout considerations make radio buttons or single-selection list boxes impractical.
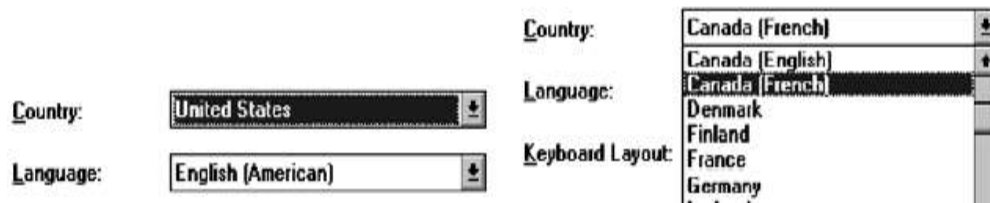   • The first, or displayed, item will be selected most of the time.
  — Do not use a drop-down list if it important that all options be seen together.

i.Drop Down List Box

        Before selection   After Selection

ii.Pop Up List Box

Prompt Button
- Provide a visual cue that a box is hidden by including a downward pointing arrow, or other meaningful image, to the right side of the selection field.
  — Position the button directly against, or within, the selection field.

Selection Descriptions
- Clearly and meaningfully describe the choices available. Spell them out as fully as possible.
  — Graphical representations must clearly represent the options.
  — Left-align them in columns.
  — Display the descriptions using mixed-case letters.

List Size
- Not limited in size.
- Present all available alternatives.

Box Size
- Long enough to display 6 to 8 choices without scrolling.
  — If more than eight choices are available, provide vertical scrolling to display all   items.
- Wide enough to display the longest possible choice.
- When a box cannot be made wide enough to display the longest entry:
  — Make it wide enough to permit entries to be distinguishable, or,
  — Break long entries with ellipses (...) in the middle, or,
  — Provide horizontal scrolling.

Organization
- Order in a logical and meaningful way to permit easy browsing.
- If a particular choice is not available in the current context, omit it from the list.
  — Exception: If it is important that the existence and unavailability of a particular list item be communicated, display the choice dimmed or grayed out instead of deleting it.

Layout and Separation
- Enclose the choices in a box composed of a solid line border.
  — The border should be the same color as the choice descriptions.
  — Leave one blank character position between the choices and the left border.
  — Leave one blank character position between the longest choice description in the list and the right border, if possible.

Captions
- Display using mixed-case letters.
- Position the caption to the left of the box.
  — Alternately, it may be positioned left-justified above the box.

Defaults
- When the drop-down/pop-up listing is first presented, display the currently set value.
- If a choice has not been previously selected, provide a default choice.

Disabling
- When a drop-down/pop-up list box is disabled, display its caption and entries as disabled or dimmed.

Selection Method and Indication
- Pointing:
  — Highlight the selection choice in some visually distinctive way when the pointer or cursor is resting on it and the choice is available for selection.
- Activation:
  — Close the drop-down/pop-up list box when an item is selected.

8. Explain the Combination Entry/Selection control with diagram and examples.

Combination Entry/Selection Controls is possible for a control to possess the characteristics of both a text field and a selection field.
- The types of combination entry/selection fields are spin boxes, attached combination boxes, and drop-down/pop-up combination boxes.

a.Spin Boxes
- Description:
  — A single-line field followed by two small, vertically arranged buttons.
    - The top button has an arrow pointing up.
    - The bottom button has an arrow pointing down.
  — Selection/entry is made by:
    - Using the mouse to point at one of the directional buttons and clicking.

    Items will change by one unit or step with each click.
    - Keying a value directly into the field itself.
- Purpose:
  — To make a selection by either scrolling through a small set of meaningful predefined choices or typing text.
- Advantages:
  — Consumes little screen space.
  — Flexible, permitting selection or typed entry.
- Disadvantages:
  — Difficult to compare choices.
  — Can be awkward to operate.
  — Useful only for certain kinds of data.
- Proper usage:
  — For setting attributes, properties, or values.
  — For mutually exclusive choices (only one can be selected).
  — When the task requires the option of either key entry or selection from a list.
  — When the user prefers the option of either key entry or selection from a list.
  — Where screen space is limited.
  — Most useful for data and choices that are:
    - Discrete.
    - Infrequently selected.
    - Well known, easily learned or remembered, and meaningful.
    - Ordered in a predictable, customary, or consecutive fashion.
    - Infrequently changed.
    - Small in number.
    - Fixed or variable in list length.

i.List Size
- Keep the list of items relatively short.

- To reduce the size of potentially long lists, break the listing into subcomponents, if possible.

ii.List Organization

- Order the list in the customary, consecutive, or expected order of the information contained within it.
  — Ensure that the user can always anticipate the next (not-yet-visible) choice.
- When first displayed, present a default choice in the box.

Iii.Other Spin Box Guidelines

- Box size:
  — The spin box should be wide enough to display the longest entry or choice.
- Caption:
  — Display it using mixed-case letters.
  — Position the caption to the left of the box.
    • Alternately, it may be positioned left-justified above the box.
- Entry and selection methods:
  — Permit completion by:
    • Typing directly into the box.
    • Scrolling and selecting with a mouse.
    • Scrolling and selecting with the up/down arrow keys.
  — For alphabetical values:
    • Move down the order using the down arrow.
    • Move up the order using the up arrow.
    • For numeric values or magnitudes:
    • Show a larger value using the up arrow.
    • Show a smaller value using the down arrow.

b.Combo Boxes

- Description:
  — A single rectangular text box entry field, beneath which is a larger rectangular   list box (resembling a drop-down list box) displaying a list of options.
  — The text box permits a choice to be keyed within it.
  — The larger box contains a list of mutually exclusive choices from which one   may be selected for placement in the entry field.
    • Selections are made by using a mouse to point and click.
  — As text is typed into the text box, the list scrolls to the nearest match.
  — When an item in the list box is selected, it is placed into the text box, replacing   the existing content.
  — Information keyed may not necessarily have to match the list items.
- Purpose:
  — To allow either typed entry in a text box or selection from a list of options in a permanently displayed list box attached to the text box.
- Advantages:
  — Unlimited number of entries and choices.
  — Reminds users of available options.
  — Flexible, permitting selection or typed entry.
  — Entries not necessarily restricted to items selectable from list box.
  — List box always visible.
- Disadvantages:
  — Consumes some screen space.
  — All list box choices not always visible, requiring scrolling.
  — Users may have difficulty recalling sufficient information to type entry,   making text box unusable.
  — The list may be ordered in an unpredictable way, making it hard to find items.
- Proper usage:
  — For entering or selecting objects or values or setting attributes.
  — For information that is mutually exclusive (only one can be entered or   selected).

— When users may find it practical to, or prefer to, type information rather than selecting it from a list.

  — When users can recall and type information faster than selecting it from a list.

  — When it is useful to provide the users a reminder of the choices available.

  — Where data must be entered that is not contained in the selection list.

  — Where screen space is available.

  — For data and choices that are:

    • Best represented textually.

    • Somewhat familiar or known.

    • Ordered in an unpredictable fashion.

    • Frequently changed.

    • Large in number.

    • Variable or fixed in list length.

Font Style: **Size:**

| Regular | | 8 |

Regular		8 ↑
Italic		10
Bold		12
Bold Italic		14
		18 ↓

Combo Box Guidelines

For the text box entry field, see "Text Box/Single Line" guidelines. For the list box, see "Drop-down/Pop-up List Box" guidelines.

c.Drop-down/Pop-up Combo Boxes

•   Description:

  — A single rectangular text box with a small button to the side and an associated hidden list of options.

    • The button provides a visual cue that an associated selection box is available but hidden.

  — When requested, a larger associated rectangular box appears, containing a scrollable list of choices from which one is selected.

  — Selections are made by using the mouse to point and click.

  — Information may also be keyed into the field.

  — As text is typed into the text box, the list scrolls to the nearest match.

  — When an item in the list box is selected, it is placed into the text box, replacing the existing content.

  — The information keyed does not necessarily have to match list items.

  — Combines the capabilities of both a text box and a drop-down/pop-up list box.

•   Purpose:

  — To allow either typed entry or selection from a list of options in a list box that may be closed and retrieved as needed.

•   Advantages:

  — Unlimited number of entries and choices.

  — Reminds users of available options.

  — Flexible, permitting selection or typed entry.

  — Entries not restricted to items selectable from list box.

  — Conserves screen space.

•   Disadvantages:

  — Requires an extra step to display the list of choices.

  — When displayed, all box choices may not always be visible, requiring scrolling.

  — User may have difficulty in recalling what to type.

  — The list content may change, making it hard to find items.

  — The list may be ordered in an unpredictable way, making it hard to find items.

•   Proper usage:

  — For entering or selecting objects or values or setting attributes.

— For information that is mutually exclusive (only one can be entered or   selected).
— When users may find it practical to, or prefer to, type information rather than selecting   it from a list.
— When users can recall and type information faster than selecting from a list.
— When it is useful to provide the users with an occasional reminder of the   choices available.
— Where data must be entered that is not contained in the selection list.
— Where screen space is limited.
— For data and choices that are:
  • Best represented textually.
  • Somewhat familiar or known.
  • Ordered in an unpredictable fashion.
  • Frequently changed.
  • Large in number.
  • Variable or fixed in list length.

Prompt Button
- Provide a visual cue that a list box is hidden by including a downward-pointing arrow to the right of the text box.
- Separate the button from the text box by a small space.

Other Guidelines
For the text box entry field, see the "Text Box/Single Line" guidelines. For the box and selection components, see the "Drop-down/Pop-up List Box" guidelines.
d.Slider
- Description:
  — A scale exhibiting degrees of a quality on a continuum.
  — Includes the following:
    • A shaft or bar.
    • A range of values with appropriate labels.
    • An arm indicating relative setting through its location on the shaft.
    • Optionally, a pair of buttons to permit incremental movement of the slider arm.
    • Optionally, a text box for typing or displaying an exact value.
    • Optionally, a detent position for special values.
  — May be oriented vertically or horizontally.
  — Selected by using the mouse to:
    • Drag a slider across the scale until the desired value is reached.
    • Point at the buttons at one end of the scale and clicking to change the value.
    • Keying a value in the associated text box.
- Purpose:
  — To make a setting when a continuous qualitative adjustment is acceptable, it is useful to see the current value relative to the range of possible values.
- Advantages:
  — Spatial representation of relative setting.
  — Visually distinctive.
- Disadvantages:
  — Not as precise as an alphanumeric indication.

— Consumes screen space.

— Usually more complex than other controls.

- Proper usage:

— To set an attribute.

— For mutually exclusive choices.

— When an object has a limited range of possible settings.

— When the range of values is continuous.

— When graduations are relatively fine.

— When the choices can increase or decrease in some well-known, predictable, and easily understood way.

— When a spatial representation enhances comprehension and interpretation.

— When using a slider provides sufficient accuracy.
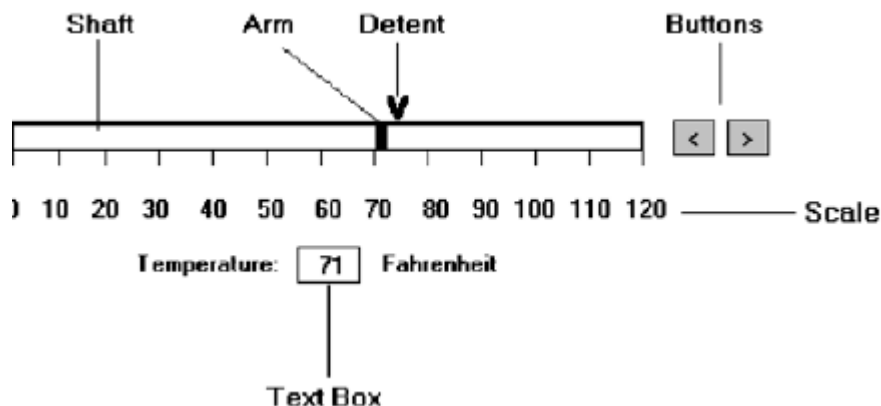
General

- Use standard sliders whenever available.

Caption and Labels

- Caption:

— Provide meaningful, clear, and consistent captions.

— Display them using mixed-case letters.

— Position the caption to the left of the box.

• Alternately, it may be positioned left-justified above the slider.

- Labels:

— Provide meaningful and descriptive labels to aid in interpreting the scale.

Scale

- Show a complete range of choices.
- Mark the low, intermediate, and high ends of the scale.
- Provide scale interval markings, where possible.
- Provide consistent increments.
- Permit the user to change the units of measure.
- If the precise value of a quantity represented is important, display the value set in an adjacent text box.

Slider Arm

- If the user cannot change the value shown in a slider, do not display a slider arm.

Slider Buttons

- Provide slider buttons to permit movement by the smallest increment.
- If the user cannot change the value shown in a slider, do not display slider buttons.

Detents

- Provide detents to set values that have special meaning.
- Permit the user to change the detent value.

Proportions

- To indicate the proportion of a value being displayed, fill the slider shaft in some visually distinctive way.

— Fill horizontal sliders from left to right.

— Fill vertical sliders from bottom to top.

e.Tabs

- Description:

— A window containing tabbed dividers that create pages or sections.

— Navigation is permitted between the pages or sections.

- Purpose:

— To present information that can be logically organized into pages or sections   within the same window.

- Advantages:

— Resembles their paper-based cousins.

— Visually distinctive.

— Effectively organize repetitive, related information.

- Disadvantages:

— Visually complex.

- Proper usage:

— To present discrete, logically structured, related, information.

— To present the setting choices that can be applied to an object.

— When a short tab label can meaningfully describe the tab's contents.

— When the order of information use varies.
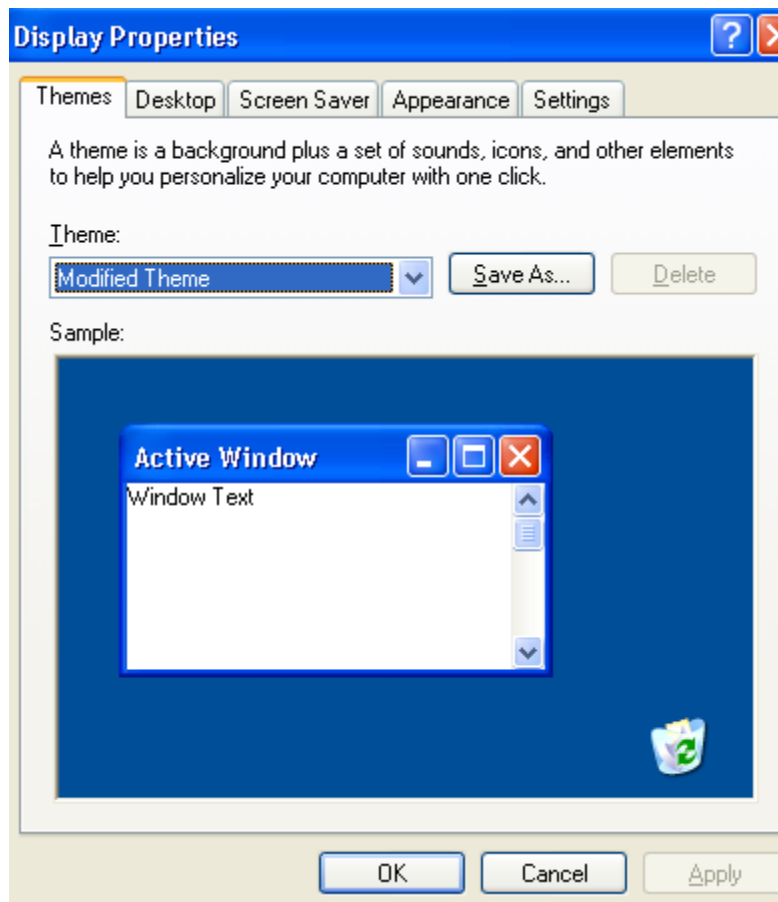
Sections and Pages

- Place related information within a page or section.
- Order them meaningfully.
- Arrange pages so they appear to go deeper, left to right and top to bottom.
- Provide pages of equal size.

Location, Size, and Labels

- Place the tabs at the top of the page or section.
- Provide fixed-width tabs for pages or sections of related information.

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- Provide textual labels.
    — Use system fonts.
    — Keep information brief and the same general length.
        • Nouns are usually better than verbs.
    — Use mixed case, capitalizing each significant word.
    — Assign a keyboard equivalent for keyboard access.
- Center the labels within the tabs.
- Restrict tabs to only one row.
- Arrange tabs so that they appear to go deeper, left to right and top to bottom.

Command Buttons

- If they affect only a page or section, locate the buttons on the page or section.
- If they affect the entire tabbed control, locate the buttons outside the tabbed pages

f.Date-Picker

- Description:
    — A drop-down list box that displays a 1-month calendar in the drop-down list box.
    — The displayed month can be changed through pressing command buttons with left- and right-pointing arrows.
        • The left arrow moves backward through the monthly calendars.
        • The right arrow moves forward through the monthly calendars.
    — A date for the list box can be selected from the drop-down calendar.
- Purpose:
    — To select a date for inscribing in a drop-down list box.
- Advantages:
    — Provides a representation of a physical calendar, a meaningful entity.
    — The calendar listing is ordered in a predictable way.
    — Visually distinctive.
- Disadvantages:
    — Requires an extra step to display the calendar.
    — When displayed, all month choices are not visible, requiring a form of scrolling to access the desired choice.
- Proper usage:
    — To select and display a single date in close monthly proximity to the default month presented on the drop-down list box.

g.Tree View

- Description:
    — A special list box control that displays a set of objects as an indented outline, based on the objects' logical hierarchical relationship.
    — Includes, optionally, buttons that expand and collapse the outline.
        • A button inscribed with a plus (+) expands the outline.
        • A button inscribed with a minus (-) collapses the outline.
    — Elements that can optionally be displayed are:
        • Icons.
        • Graphics, such as a check box.
        • Lines to illustrate hierarchical relationships.
- Purpose and proper usage:

— To display a set of objects as an indented outline to illustrate their logical hierarchical relationship.
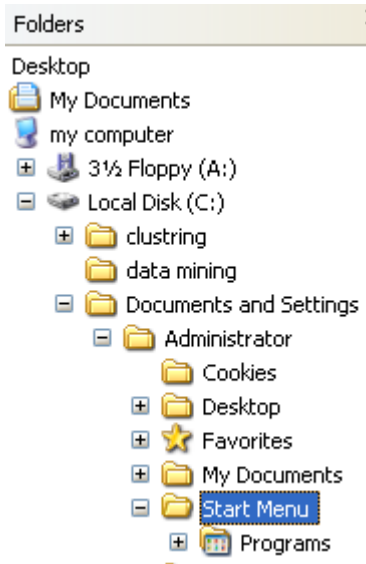
h.Scroll Bars

- Description:
  — An elongated rectangular container consisting of:
    - A scroll area.
    - A slider box or elevator inside.
    - Arrows or anchors at either end.
  — Available, if needed, in primary and secondary windows, some controls, and Web pages.
  — May be oriented vertically or horizontally at the window or page edge.
- Purpose:
  — To find and view information that takes more space than the allotted display space.
- Advantages:
  — Permits viewing data of unlimited size.
- Disadvantages:
  — Consumes screen space.
  — Can be cumbersome to operate.
- Proper use:
  — When more information is available than the window space for displaying it.
  — Do not use to set values.

Scroll Bar Design Guidelines

- General:
  — Provide a scroll bar when invisible information must be seen.
- Scroll area or container:
  — To indicate that scrolling is available, a scroll area or container should be provided.
    - Construct it of a filled-in bar displayed in a technique that visually contrasts with the window and screen body background.
- Scroll slider box or handle:
  — To indicate the location and amount of information being viewed, provide a slider box or handle.
    - Constructed of a movable and sizable open area of the scroll area, displayed in a technique that contrasts with the scroll area.
    - By its position, spatially indicate the relative location in the file of the information being viewed.

• By its size, indicate, proportionately, the percentage of the available
information in the file being viewed.

- Scroll directional arrows:
  — To indicate the direction in which scrolling may be performed, directional arrows should be provided.
  • Construct them as arrows in small boxes, with backgrounds that contrast with the scroll area.
- Selection:
  — When the slider box/handle has been selected, highlight it in some visually distinctive way.
- Location:
  — Position a vertical (top-to-bottom) scroll bar to the right of the window.
  — Position a horizontal (left-to-right) scroll bar at the bottom of the window.
- Size:
  — A vertical scroll bar should be the height of the scrollable portion of the window body.
  — A horizontal scroll bar should be at least one-half the width of the scrollable portion of the window body.
- Current state indication:
  — Whenever the window's size or the position of the information changes, the scroll bar components must also change, reflecting the current state.
  — Include scroll bars in all sizable windows.
  • If no information is currently available by scrolling in a particular direction, the relevant directional arrow should be subdued or grayed out.

Scroll Bar Usage Guidelines

- Scroll bar style:
  — Stick with standard, proven design styles.
- Directional preference:
  — Use vertical (top-to-bottom) scrolling.
  — Avoid horizontal (left-to-right) scrolling.

Media Controls

- For all playable files provide the following controls.
  — Play.
  — Pause/Resume.
  — Stop.
  — Rewind.
  — Fast Forward.
  — Volume.

9.Describe about Operable controls.
Operable controls are those that permit the entry, selection, changing, or editing of a particular value, or cause a command to be performed.

- Classes include buttons, text entry/read-only, selection, combination entry/selection, and other specialized controls.

a.Buttons

- Description:
  — A square or rectangular-shaped control with a label inside that indicates action to be accomplished.
  — The label may consist of text, graphics, or both.
- Purpose:
  — To start actions.
  — To change properties.
  — To display a pop-up menu.
- Advantages:
  — Always visible, reminding one of the choices available.
  — Convenient.
  — Can be logically organized in the work area.

— Can provide meaningful descriptions of the actions that will be performed.
— Larger size generally provides faster selection target.
— Can possess 3-D appearance:
  • Adds an aesthetically pleasing style to the screen.
  • Provides visual feedback through button movement when activated.
— May permit use of keyboard equivalents and accelerators.
— Faster than using a two-step menu bar/pull-down sequence.

- Disadvantages:
  — Consumes screen space.
  — Size limits the number that may be displayed.
  — Requires looking away from main working area to activate.
  — Requires moving the pointer to select.
- Proper usage:
  — Use for frequently used actions that are specific to a window.
    • To cause something to happen immediately.
    • To display another window.
    • To display a menu of options.
    • To set a mode or property value.
- A button comes in three styles.

Command buttons.

Toolbar buttons without labels.

Symbol button

Command Buttons

Command button guidelines include the following.

i.Usage
- For windows with a menu bar:
  — Use to provide fast access to frequently used or critical commands.
- For windows without a menu bar:
  — Use to provide access to all necessary commands.

ii.Structure
- Provide a rectangular shape with the label inscribed within it.
- Give the button a raised appearance.
- Maintain consistency in style throughout an application.

iii.Labels
- Use standard button labels when available.
- Provide meaningful descriptions of the actions that will be performed.
- Use single-word labels whenever possible.
  — Use two-three words for clarity, if necessary.
- Use mixed-case letters with the first letter of each significant label word capitalized.
- Display labels:
  — In the regular system font.
  — In the same size font.
- Do not number labels.
- Center the label within the button borders, leaving at least two pixels between the text and the button border.

- Provide consistency in button labeling across all screens.

iv.Size
- Provide as large a button as feasible.
- Maintain consistent button heights and widths.
- Exception: Buttons containing excessively long labels may be wider.

Color Palette >>

OK   Cancel   Help

v.Number
- Restrict the number of buttons on a window to six or fewer.

vi.Location and Layout
- Maintain consistency in button location between windows.
- Never simply "fit" buttons in available space.
- If buttons are for exiting the dialog:
    — Position them centered and aligned horizontally at the bottom.
- If buttons are used for invoking a dialog feature or expanding the dialog:
    — Position them centered and aligned vertically on the right side.
- If a button has a contingent relationship to another control:
    — Position it adjacent to the related control.
- If a button has a contingent relationship to a group of controls:
    — Position it at the bottom or to right of related controls.
- If, due to space constraints, exiting and expanding/invoking feature buttons must be placed together:
    — If at the bottom, place exiting buttons to the right, separating the   groupings   by one button's width.
    — If along the right side, place exiting buttons at the bottom, separating the   groupings by one button's height.
- For exiting and expanding/invoking feature buttons, do not:
    — Align with the other screen controls.
    — Present displayed within a line border.
- Provide equal and adequate spacing between adjacent buttons.
- Provide adequate spacing between buttons and the screen body controls.

Exiting buttons Invoking feature /
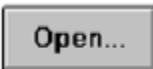expanding dialog buttons
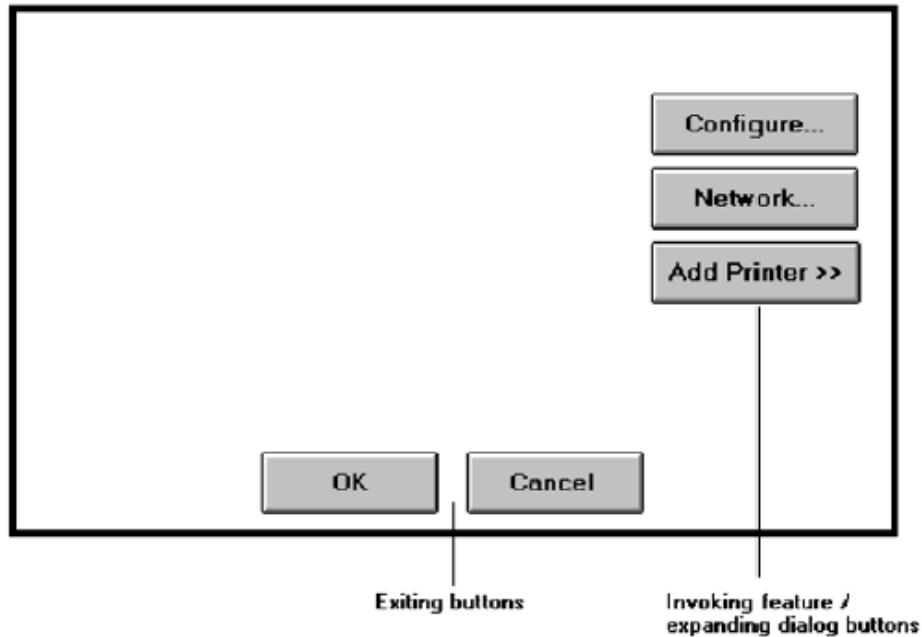
vii. Organization
- Organize standard buttons in the manner recommended by the platform being used.
- For other buttons, organize them in common and customary grouping schemes.
    — For buttons ordered left to right, place those for most frequent actions to the left.
    — For buttons ordered top to bottom, place those for most frequent   actions   at   the top.
- Keep related buttons grouped together.
- Separate potentially destructive buttons from frequently chosen selections.
- Buttons found on more than one window should be consistently positioned.
- The order should never change.
- For mutually exclusive actions, use two buttons; do not dynamically change the text.
- Windows recommends the following:
    o An affirmative action to the left (or above).
    o The default first.
    o OK and Cancel next to each other.
    o Help last, if supported.

viii. Intent Indicators
- When a button causes an action to be immediately performed, no intent indicator is necessary.

- When a button leads to a cascading dialog, include an ellipsis (...) after the label.

- When a button leads to a menu, include a triangle pointing in the direction the menu will appear after the label.

- When a button leads to an expanding dialog, include a double arrow (>>) with the label.

- When a button has a contingent relationship to another control that must be indicated, include a single arrow (->) pointing at the control.

← Clear
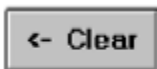
ix.Expansion Buttons
- Gray them out after expansion.
- Provide a contraction button, if necessary.
    - — Locate it beneath, or to right of, the expansion button.
    - — Gray it out when not applicable.

x.Defaults
- Intent:
    - — When a window is first displayed, provide a default action, if practical.
- Selection:
    - — A default should be the most likely action:
        - • A confirmation.
        - • An application of the activity being performed.
        - • A positive action such as OK, unless the result is catastrophic.
    - — If a destructive action is performed (such as a deletion), the default
should be Cancel.
- Presentation:
    - — Indicate the default action by displaying the button with a bold or
double border.
- Procedures:
    - — The default can be changed as the user interacts with the window.
    - — When the user navigates to a button, it can temporarily become the   default.
    - — Use the Enter key to activate a default button.
    - — If another control requires use of the Enter key, temporarily disable the   default
while the focus is on the other control.
    - — Permit double-clicking on a single selection control in a window to also   carry
out the default command.

xi.Unavailable Choices
- Temporarily unavailable choices should be dimmed or grayed out.

xii.Keyboard Equivalents and Accelerators
- Equivalents:
    - — Assign a keyboard equivalent mnemonic to each button to facilitate   keyboard
selection.
    - — The mnemonic should be the first character of the button's label.
        - • If duplication exists in first characters, for duplicate items, use another
character in the label.
        - • Preferably, choose the first succeeding consonant.
    - — Designate the mnemonic character by underlining it.
    - — Maintain the same mnemonic on all identical buttons on other screens.

Apply
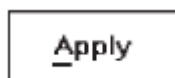
- Accelerators:
    - — Assign a keyboard accelerator to each button to facilitate keyboard
selection.

xiii.Scrolling
- If a window can be scrolled, do not scroll the command buttons.
    - — Exception: if the screen cannot scroll independently of the buttons.
- Use buttons to move between multipage forms, not scroll bars.
    - — Label buttons Next and Previous.

xiv.Button Activation
  Pointing:
    — Highlight the button in some visually distinctive manner when the pointer is resting on it and
    the button is available for selection.

Activation:
— Call attention to the button in another visually distinctive manner when it has been activated or pressed.
— If a button can be pressed continuously, permit the user to hold the mouse button down and repeat the action.

b.Toolbars

- *Toolbars* are compilations of commands, actions, or functions, usually graphical in structure but sometimes textual, grouped together for speedy access.
- Toolbars may also be called *button bars*, *control bars,* or *access bars*. Specialized toolbars may also be referred to as *ribbons*, *toolboxes*, or *palettes*. Toolbars may also appear in palette windows.

Usage

- To provide easy and fast access to most frequently used commands or options across multiple screens.
- To invoke a sub application within an application.
- To use in place of certain menu items.

Structure

- Images:
  — Provide buttons of equal size.
  — Create a meaningful and unique icon.
      • Design them using icon design guidelines.
  — Center the image within the button.
  — Give the button a raised appearance.
  — Ensure that toolbar images are discernible from Web page graphical images.
- Text:
  — Create a meaningful label, adhering to label guidelines for command buttons.
  — Create toolbar buttons of equal size, following the size guidelines recently described.
- Consistency:
  — Use the same icon throughout an application and between applications.

Size

- Button:
  — 24 (w) by 22 (h) pixels, including border.
  — 32 (w) by 30 (h) pixels, including border.
  — Larger buttons can be used on high-resolution displays.
- Label:
  — 16 (w) by 16 (h) pixels.
  — 14 (w) by 24 (h) pixels.
- Default:
  — Provide the smaller size as the default size with a user option to change it.
- Image:
  — Center the image in the button.

Organization

- Order the buttons based on common and customary grouping schemes.
  — For buttons ordered left to right, place those for the most frequently used actions to the left.
  — For buttons ordered top to bottom, place those for the most frequently used actions at the top.
- Keep related buttons grouped together.
- Separate potentially destructive buttons from frequently chosen selections.
- Permit user reconfiguration of button organization.

Location

- Position main features and functions bar horizontally across top of window just below menu bar.
- Position subtask and sub features bars along sides of window.
- Permit the location of the bar to be changed by the user.
- Permit display of the bar to be turned on or off by the user.
  — Also provide access through standard menus.

Active Items

- Make only currently available toolbar items available.
- Temporarily not available items may be displayed grayed out.

Customization
- Permit toolbars to be turned off by the user.
- Allow the customizing of toolbars.
    — Provide a default, however.

Keyboard Equivalents and Accelerators
- Equivalents:
    — Assign keyboard equivalents to facilitate keyboard selection.
    — Maintain the same mnemonic on all identical buttons on all screens.
- Accelerators:
    — Assign a keyboard accelerator to facilitate keyboard selection.

Button Activation
- Pointing:
    — Highlight the button in some visually distinctive manner when the pointer is resting on it and the button is available for selection.
- Activation:
    — Call attention to the button in another visually distinctive manner when it has been activated or pressed.

10.Discuss about the text boxes.

Text Entry/Read-Only Controls
- A Text Entry/Read-Only control contains text that is exclusively entered or modified through the keyboard.
- It may also contain entered text being presented for reading or display purposes only.

Text Boxes
- Description:
    — A control, usually rectangular in shape, in which:
        • Text may be entered or edited.
        • Text may be displayed for read-only purposes.
    — Usually possesses a caption describing the kind of information contained within it.
    — An outline field border:
        • Is included for enterable/editable text boxes.
        • Is not included for read-only text boxes.
    — Two types exist:
        • Single line.
        • Multiple line.
    — When first displayed, the box may be blank or contain an initial value.
- Purpose:
    — To permit the display, entering, or editing of textual information.
    — To display read-only information.
- Advantages:
    — Very flexible.
    — Familiar.
    — Consumes little screen space.
- Disadvantages:
    — Requires use of typewriter keyboard.
    — Requires user to remember what must be keyed.
- Proper usage:
    — Most useful for data that is:
        • Unlimited in scope.
        • Difficult to categorize.
        • Of a variety of different lengths.
    — When using a selection list is not possible.

Types of text box

- Two types of *text boxes* exist. One consists of a rectangular box into which information is typed. It may also be referred to as an *edit* control.
- The second is also rectangular in shape but contains text displayed purely for read-only purposes. The former type has historically been referred to as an *entry field*, the latter as an *inquiry* or *display field*.

Entry/Modification: | Information |

Display/Read Only: Information

Two forms of Text Box
Single-Line and Multiple-Line Text Boxes

- Single line:
  — Description:
    • A control consisting of no more than one line of text.
  — Purpose:
    • To make textual entries when the information can be contained within one line of the screen.
  — Typical uses:
    • Typing the name of a file to save.
    • Typing the path of a file to copy.
    • Typing variable data on a form.
    • Typing a command.
- Multiple line:
  — Description:
    • A control consisting of a multiline rectangular box for multiple lines of text.
  — Purpose:
    • To type, edit, and read passages of text.
  — Typical uses:
    • Creating or reading an electronic mail message.
    • Displaying and editing text files.

a.Captions

- Structure and size:
  — Provide a descriptive caption to identify the kind of information to be typed, or contained within, the text box.
  — Use a mixed-case font.
  — Display the caption in normal intensity or in a color of moderate brightness.
- Formatting:
  — Single fields:
    • Position the field caption to the left of the text box.
      — Place a colon (:) immediately following the caption.
      — Separate the colon from the text box by one space.

Composition: | |

    • Alternately, the caption may be placed above the text box.
      — Place a colon (:) immediately following the caption.
      — Position above the upper-left corner of the box, flush with the left edge.
      — Multiple occurrence fields:

Composition:
| |

    • For entry/modification text boxes:
      — Position the caption left-justified one line above the column of entry fields.

Offices:

— If the data field is long and fixed-length, or the displayed data is about the same length, center the caption above the displayed text box data.

Date:

| 07/17/94 |
| 07/21/94 |
| 01/26/95 |
| 08/21/95 |
| 11/18/96 |

— If the data displayed is alphanumeric, short, or quite variable in length, left-justify the caption above the displayed text box data.

Location:

| Alice Springs |
| Kakadu National Park |
| Traralgon |
| Wagga Wagga |
| Whyalla |

— If the data field is numeric and variable in length, right-justify the caption above the displayed text box data.

Balances:

| 12,642,123.05 |
| 53.98 |
| 355,125.44 |
| 199.13 |
| 612.01 |

b.Fields

- Structure:
  — Identify entry/modification text boxes with a line border or reverse polarity rectangular box.
  - To visually indicate that it is an enterable field, present the box in a recessed manner.
  - Present display/read-only text boxes on the window background.
  — Break up long text boxes through incorporation of slashes (/), dashes (-), spaces, or other common delimiters.

Date:

Telephone:

Date: /   /

Telephone: (   )   -

- Size:
  — Size to indicate the approximate length of the field.
  — Text boxes for fixed-length data must be large enough to contain the entire entry.
  — Text boxes for variable-length data must be large enough to contain the majority of the entries.

— Where entries may be larger than the entry field, scrolling must be provided to permit keying into, or viewing, the entire field.
— Employ word wrapping for continuous text in multiple-line text boxes.

- Highlighting:
  — Call attention to text box data through a highlighting technique.
  • Higher intensity.
  • If color is used, choose one that both complements the screen background and contrasts well with it.
- Unavailable fields:
  — Gray-out temporarily unavailable text boxes.
- Fonts:
  — To support multiple fonts, use a *Rich-Text Box*.

11. Explain various window management techniques.
Microsoft Windows also provides several window management schemes, a *single document interface, a multiple-document interface, workbooks*, and *projects*.

a.Single-Document Interface
- Description:
  — A single primary window with a set of secondary windows.
- Proper usage:
  — Where object and window have a simple, one-to-one relationship.
  — Where the object's primary presentation or use is as a single unit.
  — To support alternate views with a control that allows the view to be changed.
  — To support simultaneous views by splitting the window into panes.
- Advantages:
  — Most common usage.
  — Window manipulation is easier and less confusing.
  — Data-centered approach.
- Disadvantage:
  — Information is displayed or edited in separate windows.

b.Multiple-Document Interface
- Description:
  — A technique for managing a set of windows where documents are opened into windows.
  — Contains:
    • A single primary window, called the parent.
    • A set of related document or child windows, each also essentially a primary window.
  — Each child window is constrained to appear only within the parent window.
  — The child windows share the parent window's operational elements.
  — The parent window's elements can be dynamically changed to reflect the requirements of the active child window.
- Proper usage:
  — To present multiple occurrences of an object.
  — To compare data within two or more windows.
  — To present multiple parts of an application.
  — Best suited for viewing homogeneous object types.
  — To clearly segregate the objects and their windows used in a task.
- Advantages:
  — The child windows share the parent window's interface components (menus, toolbars, and status bars), making it a very space-efficient interface.
  — Useful for managing a set of objects.
  — Provides a grouping and focus for a set of activities within the larger environment of the desktop.
- Disadvantages:
  — Reinforces an application as the primary focus.

— Containment for secondary windows within child windows does not exist, obscuring window relationships and possibly creating confusion.

— Because the parent window does not actually contain objects, context cannot always be maintained on closing and opening.

— The relationship between files and their windows is abstract, making an MDI application more challenging for beginning users to learn.

— Confining child windows to the parent window can be inconvenient or inappropriate for some tasks.

— The nested nature of child windows may make it difficult for the user to distinguish a child window in a parent window from a primary window that is a peer with the parent window but is positioned on top.

c.Workbooks

- Description:

  — A window or task management technique that consists of a set of views organized like a tabbed notebook.

  — It is based upon the metaphor of a book or notebook.

  — Views of objects are presented as sections within the workbook's primary windows; child windows do not exist.

  — Each section represents a view of data.

  — Tabs can be included and used to navigate between sections.

  — Otherwise, its characteristics and behavior are similar to those of the multiple document interface with all child windows maximized.

- Proper usage:

  — To manage a set of views of an object.

  — To optimize quick navigation of multiple views.

  — For content where the order of the sections is significant.

- Advantages:

  — Provides a grouping and focus for a set of activities within the larger environment of the desktop.

  — Conserves screen real estate.

  — Provides the greater simplicity of the single-document window interface.

  — Provides greater simplicity by eliminating child window management.

  — Preserves some management capabilities of the multiple-document interface.

- Disadvantage:

  — Cannot present simultaneous views.

d.Projects

- Description:

  — A technique that consists of a container: a project window holding a set of objects.

  — The objects being held within the project window can be opened in primary windows that are peers with the project window.

  — Visual containment of the peer windows within the project window is not necessary.

  — Each opened peer window must possess its own menu bar and other interface elements.

  — Each opened peer window can have its own entry on the task bar.

  — When a project window is closed, all the peer windows of objects also close.

  — When the project window is opened, the peer windows of the contained objects are restored to their former positions.

  — Peer windows of a project may be restored without the project window itself being restored.

- Proper usage:

  — To manage a set of objects that do not necessarily need to be contained.

  — When child windows are not to be constrained.

- Advantages:

  — Provides a grouping and focus for a set of activities within the larger environment of the desktop.

  — Preserves some management capabilities of the multiple document interface.

  — Provides the greatest flexibility in the placement and arrangement of windows.

- Disadvantage:
  — Increased complexity due to difficulty in differentiating peer primary windows of the project from windows of other applications.

12. Explain briefly about various device based controls. (Nov/Dec 2011)
Device-based controls, often called input devices, are the mechanisms through which people communicate their desires to the system.
Characteristics of Device-Based Controls:
Several specific tasks are performed using graphical systems.

- To point at an object on the screen.
- To select the object or identify it as the focus of attention.
- To drag an object across the screen.
- To draw something free form on the screen.
- To track or follow a moving object.
- To orient or position an object.
- To enter or manipulate data or information.

Direct and Indirect Devices
- *Direct* devices are operated on the screen itself. Examples include the light pen, the finger, and voice.
- *Indirect* devices are operated in a location other than the screen, most often on the desktop.

a.Trackball
- Description:
  — A spherical object (ball) that rotates freely in all directions in its socket.
  — Direction and speed is tracked and translated into cursor movement.
- Advantages:
  — Direct relationship between hand and pointer movement in terms of direction and speed.
  — Does not obscure vision of screen.
  — Does not require additional desk space (if mounted on keyboard).
- Disadvantages:
  — Movement is indirect, in a plane different from the screen.
  — No direct relationship exists between hand and pointer movement in terms of distance.
  — Requires a degree of eye-hand coordination.
  — Requires hand to be removed from keyboard keys.
  — Requires different hand movements.
  — Requires hand to be removed from keyboard (if not mounted on keyboard).
  — Requires additional desk space (if not mounted on keyboard).
  — May be difficult to control.
  — May be fatiguing to use over extended time.

b.Joystick
- Description:
  — A stick or bat-shaped device anchored at the bottom.
  — Variable in size, smaller ones being operated by fingers, larger ones requiring the whole hand.
  — Variable in cursor direction movement method, force joysticks respond to pressure, movable ones respond to movement.
  — Variable in degree of movement allowed, from horizontal-vertical only to continuous.
- Advantages:
  — Direct relationship between hand and pointer movement in terms of direction.
  — Does not obscure vision of screen.
  — Does not require additional desk space (if mounted on keyboard).
- Disadvantages:
  — Movement indirect, in plane different from screen.
  — Indirect relationship between hand and pointer in terms of speed and distance.
  — Requires a degree of eye-hand coordination.
  — Requires hand to be removed from keyboard keys.

— Requires different hand movements to use.
— Requires hand to be removed from keyboard (if not mounted on keyboard).
— Requires additional desk space (if not mounted on keyboard).
— May be fatiguing to use over extended time.
— May be slow and inaccurate.

c.Graphic Tablet
- Description:
  — Pressure-, heat-, light-, or light-blockage-sensitive horizontal surfaces that lie on the desktop or keyboard.
  — May be operated with fingers, light pen, or objects like a stylus or pencil.
  — Pointer imitates movements on tablet.
- Advantages:
  — Direct relationship between touch movements and pointer movements in terms of direction, distance, and speed.
  — More comfortable horizontal operating plane.
  — Does not obscure vision of screen.
- Disadvantages:
  — Movement is indirect, in a plane different from screen.
  — Requires hand to be removed from keyboard.
  — Requires hand to be removed from keyboard keys.
  — Requires different hand movements to use.
  — Requires additional desk space.

  — Finger may be too large for accuracy with small objects

d.Touch Screen
- Description:
  — A special surface on the screen sensitive to finger or stylus touch.
- Advantages:
  — Direct relationship between hand and pointer location in terms of direction, distance, and speed.
  — Movement is direct, in the same plane as screen.
  — Requires no additional desk space.
  — Stands up well in high-use environments.
- Disadvantages:
  — Finger may obscure part of screen.
  — Finger may be too large for accuracy with small objects.
  — Requires moving the hand far from the keyboard to use.
  — Very fatiguing to use for extended period of time.
  — May soil or damage the screen.
- Design Guidelines:
  — Screen objects should be at least $3/4″ \times 3/4″$ in size.
  — Object separation should be at least $1/8″$.
  — Provide visual feedback in response to activation. Auditory feedback may also be appropriate.
  — When the consequences are destructive, require confirmation after selection to eliminate inadvertent selection.
  — Provide an instructional invitation to begin using.

e.Light Pen
- Description:
  — A special surface on a screen sensitive to the touch of a special stylus or pen.
- Advantages:
  — Direct relationship between hand and pointer movement in terms of direction, distance, and speed.
  — Movement is direct, in the same plane as screen.
  — Requires minimal additional desk space.
  — Stands up well in high-use environments.

— More accurate than finger touching.
- Disadvantages:
— Hand may obscure part of screen.
— Requires picking it up to use.
— Requires moving the hand far from the keyboard to use.
— Very fatiguing to use for extended period of time.

f.Voice
- Description:
— Automatic speech recognition by the computer.
- Advantages:
— Simple and direct.
— Useful for people who cannot use a keyboard.
— Useful when the user's hands are occupied.
- Disadvantages:
— High error rates due to difficulties in:
  • Recognizing boundaries between spoken words.
  • Blurred word boundaries due to normal speech patterns.
— Slower throughput than with typing.
— Difficult to use in noisy environments.
— Impractical to use in quiet environments.

g.Mouse
- Description:
— A rectangular or dome-shaped, movable, desktop control containing from one to three buttons used to manipulate objects and information on the screen.
— Movement of screen pointer mimics the mouse movement.
- Advantages:
— Direct relationship between hand and pointer movement in terms of direction, distance, and speed.
— Permits a comfortable hand resting position
— Selection mechanisms are included on mouse.
— Does not obscure vision of the screen.
- Disadvantages:
— Movement is indirect, in a plane different from screen.
— Requires hand to be removed from keyboard.
— Requires additional desk space.
— May require long movement distances.
— Requires a degree of eye-hand coordination.
- *Mouse Usage Guidelines*
  o Provide a "hot zone" around small or thin objects that mouse positioning.
  o Never use double-clicks or double-drags as the only means operations.
  o Do not use mouse plus keystroke combinations.
  o Do not require a person to point at a moving target.

h.Keyboard
- Description:
— Standard typewriter keyboard and cursor movement keys.
- Advantages:
— Familiar.
— Accurate.
— Does not take up additional desk space.
— Very useful for:
  • Entering text and alphanumeric data.
  • Inserting in text and alphanumeric data.
  • Keyed shortcuts—accelerators.
  • Keyboard mnemonics—equivalents.
— Advantageous for:

- Performing actions when less than three mouse buttons exist.
- Use with very large screens.
- Touch typists.
- Disadvantages:
  — Slow for non-touch-typists.
  — Slower than other devices in pointing.
  — Requires discrete actions to operate.
  — No direct relationship between finger or hand movement on the keys and cursor movement on screen in terms of speed and distance.
- Keyboard Guidelines
  o Provide keyboard accelerators.
  o Assign single keys for frequently performed, small-scale tasks.
  o Use standard platform accelerators.
  o Assign Shift-*key* combinations for actions that extend or are complementary to the actions of the key or key combination used without the Shift-*key*.
  o Assign Ctrl-*key* combinations for:
    • Infrequent actions.
    • Tasks that represent larger-scale versions of the task assigned to the unmodified key.
  o Provide keyboard equivalents.
  o Use standard platform equivalents.
  o Use the first letter of the item description.
  o If first letter conflicts exist, use:
    • Another distinctive consonant in the item description.
    • A vowel in the item description.
  o Provide window navigation through use of keyboard keys.

13.Explain the Window Operations.
Active Window
- A window should be made active with as few steps as possible.
- Visually differentiate the active window from other windows.

General Guidelines
- Design easy to use and learn windowing operations.
  — Direct manipulation seems to be a faster and more intuitive interaction style than indirect manipulation for many windowing operations.
- Minimize the number of window operations necessary to achieve a desired effect.
- Make navigating between windows particularly easy and efficient to do.
- Make the setting up of windows particularly easy to remember.
- In overlapping systems, provide powerful commands for arranging windows on the screen in user-tailorable configurations.

a.Opening a Window
- Provide an iconic representation or textual list of available windows.
  — If opening with an expansion of an icon, animate the icon expansion.
- When opening a window:
  — Position the opening window in the most forward plane of the screen.
  — Adapt the window to the size and shape of the monitor on which it will be presented.
  — Designate it as the active window.
  — Set it off against a neutral background.
  — Ensure that its title bar is visible.
- When a primary window is opened or restored, position it on top.
  — Restore all secondary windows to the states that existed when the primary window was closed.
- When a dependent secondary window is opened, position it on top of its associated primary window.
  — Position a secondary window with peer windows on top of its peers.
  — Present layered or cascaded windows with any related peer secondary windows.

- When a dependent secondary window is activated, its primary window and related peer windows should also be positioned at the top.
- If more than one object is selected and opened, display each object in a separate window.
- Designate the last window selected as the active window.
- Display a window in the same state as when it was last accessed.
  — If the task, however, requires a particular sequence of windows, use a fixed or consistent presentation sequence.
- With tiled windows, provide an easy way to resize and move newly opened windows.

b.Sizing Windows

- Provide large-enough windows to:
  — Present all relevant and expected information for the task.
  — Avoid hiding important information.
  — Avoid crowding or visual confusion.
  — Minimize the need for scrolling.
    • But use less than the full size of the entire screen.
- If a window is too large, determine:
  — Is all the information needed?
  — Is all the information related?
- Otherwise, make the window as small as possible.
  — Optimum window sizes:
    • For text, about 12 lines.
    • For alphanumeric information, about seven lines.
- Larger windows seem to have these advantages:
  o They permit displaying of more information.
  o They facilitate learning: Data relationships and groupings are more obvious.
  o Less window manipulation requirements exist.
  o Breadth is preferred to depth (based on menu research).
  o More efficient data validation and data correction can be performed.
- Disadvantages include:
  o Longer pointer movements are required.
  o Windows are more crowded.
  o More visual scanning is required.
  o Other windows more easily obscure parts of the window.
  o It is not as easy to hide inappropriate data.

c.Window Placement

- Considerations:
  — In placing a window on the display, consider:
    • The use of the window.
    • The overall display dimensions.
    • The reason for the window's appearance.
- General:
  — Position the window so it is entirely visible.
  — If the window is being restored, place the window where it last appeared**.**
  — If the window is new, and a location has not yet been established, place it:
    • At the point of the viewer's attention, usually the location of the pointer or cursor.
    • In a position convenient to navigate to.
    • So that it is not obscuring important or related underlying window information.
  — For multiple windows, give each additional window its own unique and
  discernible location.
    • A cascading presentation is recommended.
  — In a multiple-monitor configuration, display the secondary window on the same monitor as its primary window.
  — If none of the above location considerations apply, then:
    • Horizontally center a secondary window within its primary window just below the title bar, menu bar, and any docked toolbars.

— If the user then moves the window, display it at this new location the next time the user opens the window.

  • Adjust it as necessary to the current display configuration.

— Do not let the user move a window to a position where it cannot be easily repositioned.

- Dialog boxes:
  — If the dialog box relates to the entire system, center it on screen.
  — Keep key information on the underlying screen visible.
  — If one dialog box calls another, make the new one movable whenever possible.

d.Window Separation

- Crisply, clearly, and pleasingly demarcate a window from the background of the screen on which it appears.
  — Provide a surrounding solid line border for the window.
  — Provide a window background that sets the window off well against the overall screen background.
  — Consider incorporating a drop shadow beneath the window.

E.Moving a Window

- Permit the user to change the position of all windows.
- Change the pointer shape to indicate that the move selection is successful.
- Move the entire window as the pointer moves.
  — If it is impossible to move the entire window, move the window outline while leaving the window displayed in its original position.
- Permit the moving of a window without its being active.

f.Resizing a Window

- Permit the user to change the size of primary windows.
  — Unless the information displayed in the window is fixed or cannot be scaled to provide more information.
- Change the pointer shape to indicate that the resizing selection is successful.
- The simplest operation is to anchor the upper-left corner and resize from the lower right corner.
  — Also permit resizing from any point on the window.
- Show the changing window as the pointer moves.
  — If it is impossible to show the entire window being resized, show the window's outline while leaving the window displayed in its original position.
- When window size changes and content remains the same:
  — Change image size proportionally as window size changes.
- If resizing creates a window or image too small for easy use, do one of the following:
  — Clip (truncate) information arranged in some logical structure or layout when minimum size is attained, or
  — When no layout considerations exist, format (restructure) information as size is reduced, or
  — Remove less useful information (if it can be determined), or
  — When minimum size is attained, replace information with a message that indicates that the minimum size has been reached and that the window must be enlarged to continue working.
- Permit resizing a window without its being active.

Other Operations

Permit primary windows to be maximized, minimized, and restored.

g.Window Shuffling

Window shuffling must be easy to accomplish.

Keyboard Control/Mouse less Operation

- Window actions should be capable of being performed through the keyboard as well as with a mouse.
- Keyboard alternatives should be designated through use of mnemonic codes as much as possible.
- Keyboard designations should be capable of being modified by the user.

h.Closing a Window

- Close a window when:
  — The user requests that it be closed.
  — The user performs the action required in the window.

— The window has no further relevance.
- If a primary window is closed, also close all of its secondary windows.
- When a window is closed, save its current state, including size and position, for use when the window is opened again.

14.Discuss about the best controls for certain tasks and screen conditions, suggested uses for graphical controls and choosing a command form.

Best Controls for Certain Tasks and Screen Conditions

TASK	BEST CONTROL	IF SCREEN SPACE CONSTRAINTS EXIST
Mutually Exclusive	Radio Buttons	Drop-down/Pop-up List Box
Not Mutually Exclusive	Check Boxes	Multiple-Selection List Box
Select or Type a Value Text Entry Field	Radio Buttons with "Other"	Drop-down Combo Box
Setting a Value within a Range	Spin Button	Text Box

Suggested Uses for Graphical Controls

1. IF:	USE:
• *Mutually exclusive* alternatives. • Discrete data. • Best represented verbally. • Very limited in number (2 to 8). AND: • Typed entry is never necessary. • Content can never change. • Adequate screen space is available.	Radio Buttons
OR: • Typed entry is never necessary. • Content can never change. • Adequate screen space is not available.	Drop-down/Pop-up List Box
OR: • Typed entry may be necessary. • Content can change. • Adequate screen space is available.	Combo box
OR: • Typed entry may be necessary. • Content can change. • Adequate screen space is not available.	Drop-down/Pop-up Combo Box

2. IF:	USE:
• *Mutually exclusive* alternatives. • Discrete data. • Best represented verbally. • Potentially large in number (9 or more). AND: • Typed entry is never necessary. • Content can never change. • Adequate screen space is available.	Single-Selection List Box
OR: • Typed entry is never necessary. • Content can never change. • Adequate screen space is not available.	Drop-down/Pop-up List Box
OR: • Typed entry may be necessary. • Content can change. • Adequate screen space is available.	Combo Box
OR: • Typed entry may be necessary. • Content can change. • Adequate screen space is not available.	Drop-down/Pop-up Combo Box

3. IF:	USE:
• *Mutually exclusive* alternatives. • Discrete data. • Best represented graphically. • Content rarely changes. • Small or large number of items.	Palette

4. IF:	USE:
• *Mutually exclusive* alternatives. • Not frequently selected. • Content does not change. • Well-known, easily remembered data. • Predictable, consecutive data. • Typed entry sometimes desirable. *AND:* • Adequate screen space is not available.	 Spin Box
OR: • Adequate screen space is available.	Combo Box

5. IF:	USE:
• *Mutually exclusive* alternatives. • Continuous data with a limited range of settings. • Value increases/decreases in a well-known, predictable way. • Spatial representation enhances comprehension.	Slider

6. IF:	USE:
• *Nonexclusive* alternatives. • Discrete data. • Best represented verbally. • Typed entry is never necessary. • Content can never change. • Adequate screen space is available. *AND:* • Very limited in number (2 to 8).	 Check Boxes
OR: • Potentially large in number (9 or more).	Multiple-Selection List Box

Choosing a Command Form

IF THE COMMANDS:	USE:
Are standard commands provided by a tool set.	Commands provided by the tool set
Total seven or more, and can be arranged hierarchically into groups.	Menu bar and pull-downs
Total six or fewer, are selected frequently, and affect an entire window.	Buttons in a window
Total seven or more, are selected frequently, and affect an entire window.	Buttons in a toolbar
Are used with other controls, or are complicated commands and need to be simplified.	Buttons in a dialog box
Are sometimes used frequently and are sometimes used infrequently.	Buttons in a dialog box
Are frequently accessed and have only two conditions.	Toggled menu item

UNIT – IV PART – A

l. What type of words used in effective communication?

Short familiar words, Standard alphabetic characters, complete words, Positive terms, Simple action words, Consistent words

2. What are the guidelines followed for sentence and message?

Sentence and messages must be Brief and simple, directly and immediately usable, an affirmative statement and in an active voice.

3. Define message? What are the types of messages? (Nov/Dec 2012)

Messages are communication provided on the screen to the screen viewer. A message should possess the proper tone and style and be consistent within it.

 Types of message: System message, Status message, Informational message, Warning message, Critical message and Question message.

4. What is meant by instructional message?

Provide instructional information at the depth of detail needed by the user. Locate instruction at Strategic points on screen. Display instructions in a manner that visually differentiates from all other screen elements.

5. What is meant by response time?

Feed back to a user for an action must occur within certain time limits. System should match the speed and flow of human through processes.

6. What is the use of progress indicator?

A progress indicator is a long rectangular box that is initially empty but filled as the operation proceeds. Dynamically fill the bar with a color or shade of grey.

7. What is known as ear cons?

Sounds sometimes called ear cons are useful for altering the user. To minor and obvious mistakes
When something unexpected happens, a long process is finished.

8. Differentiate between slip and mistake?

Slip	Mistake
Can be reduced through proper application of human factors in design.	Can be reduced by eliminating ambiguity from design.

9. What are the ways to prevent errors?

Errors can be reduced in a number of ways, Disable inapplicable choices, Design screen using selection controls instead of entry controls and Accept common misspelling whenever possible.

l0. What is meant by contextual Help?

It provides information within the context of a task being performed or about a specific object being operated. Common kinds of contextual help command buttons, status bar messages and tool tips.

11. What is the purpose of hints?

To provide a few important contextual but specific items of information related to a displayed screen. It is more easily accessible and relevant to the current situation. The objective is quickly getting the user back on track when confusion occurs.

l2. Define internationalization. (AU-APR/MAY 2011)

Internationalization is the process of isolating culture specific elements from a product.
Example: the German text of a program developed in Germany is isolated from the program itself.

13. What is meant by localization?

Localization is the process of infusing a specific cultural context into previously internalized product. Ex: Translating German Screen Components and message into English for American users.

l4. What is meant by Accessibility?

Accessibility means a system must be designed to be usable by an almost unlimited range of people. It can be def1ned as providing easy access to a system for people with disabilities.

l5. What are the various types of disabilities?

Visual, Hearing, Physical movement, Speech or language impairments, Cognitive disorders and Seizure disorders.

16. What is meant by icon?

Icons are used to represent objects and action with users can interact with or they can manipulate. It may be stand alone on a desktop or in a window. It is to reinforce important information a warning icon in a dialog message box.

17. What are the various kinds of icon?
- Symbolic - An abstract image representing something.
- Exemplar - An image illustrating an example or characteristic of something.
- Arbitrary - An image completely arbitrary in appearance whose meaning must be learned.
- Analogy - An image physically or semantically associated with something.
- Resemblance – An image that looks like what it means.

18. What is meant by dithering?

If pixels of different colors are placed next to each other, this tremor combines the 2 colors into a 3rd color. This is referred to dithering.

19. Mention the three properties of a color. (Nov/Dec 2011)

Hue: It is the spectral wavelength composition of a color.
Chroma or Saturation: It is the purity of a color in a scale from gray to the most vivid version of the color.
Value or Intensity: It is the relative lightness or darkness of a color in a range from black to white.

20. What is known as protanopia, deuteranopia and tritanopia?

Red viewing deficiency is called protanopia. Green viewing deficiency is called deuteranopia. Blue viewing deficiency is called tritanopia.

21. Differentiate the proactive and retroactive interferences.

Proactive interferences: A person's existing memories interfere with learning.

Retroactive interferences: Learning interfaces with existing memories.

22. Define multimedia. (Nov/Dec 2012)

Inclusion of media on a screen, including images, photographs, video, diagrams, drawing and spoken audio.

23. Name the various criteria for developing a clear text for web applications. (APR 2011)

The unique characteristics of the web, requires a separate set of supplemental guidelines for several web topics, including word usage, error message presentation, text, heading and title writing.

24. Define status bar message.

Status bar message is an abbreviated, context-sensitive message related to the screen item with focus. Appears in window's status bar when the pair of mouse is pressed over an item.

25. State the guidelines for writing status bar message.

• be constructive, not simply descriptive

• be brief, but not cryptic

• being with a verb in the present tense

• if a command has multiple functions, summarize them.

• if a command is disabled, explain why.

26. State the design guidelines for tool tip. (AU-NOV/DEC 2010)

• Design guidelines for tool tip

• Make application-specific tool tips consistent with system-supplied tool tips.

• Use system color setting for tool tips above to distinguish them.

27. Define tool tip.

Tool tip is a small pop-up window that appears adjacent to control. This is presented when the pointer is moved over a control a short of time. It is used to display the name of a control when the control has no text label.

28. What do you mean by task- oriented help?

Task- oriented help, sometimes called procedural help is presented on a primary window assessed through the help topics browser dialog box on Microsoft windows. It includes a set of command buttons at the top, minimally, a button to display the help topics browser dialog box, a back button to return to the previous topic.

29. State any four design guidelines for task-oriented help. (AU-NOV/DEC 2010)

• Provide one procedure to complete a task, the simple and most common.

• Divide procedural instruction into small steps.

• Present each step in the order to be executed.

• Label each step.

30. State the presentation guidelines for task-oriented help.

The window should consume a minimum amount of screen space, but be lager enough to present the information without scrolling. Normally, do not exceed 4 steps / window. Use a different window color to distinguish task-oriented help window from other windows.

31. State the writing guidelines for task-oriented help.

• Write simply and clearly. Focus on how information, rather then what or why.

• Do not include introductory, conceptual, or reference material.

• include the topic title as part of the body

32. Describe reference help.

Reference help is another form of online documentation. Its purpose is to present help information that may reference-oriented, documenting the features of a product, or it may serve as a user's guide to a product.

33. State the guidelines for designing reference help.

• Provide a consistent presentation style, following previously presented guidelines.

• Include a combination of contextual help, and task- oriented help as necessary.

• Include text, graphics, animation, video, and audio effects as necessary.

• Make displayed toolbar buttons contextual to the topic being viewed.

34. State the writing guidelines for reference help.

• Write simply and clearly. Provide meaningful topic titles.

35. Define a wizard.

A wizard is a structured set of screens that gain user though a decision-making or data entry present wizards are displayed in a secondary window. The screen includes controls to collect input, and navigation command located at the page bottom.

36. Give the design guidelines for wizard.

• Provide screens of exact same size.

• Maintain consistent the locations for all elements.

• Include default or settings for all control when possible.

• Do not require the user to leave a wizard to complete a task.

37. State the presentation guidelines for wizards.

• Display the wizard window so it is immediately recognized as the primary point of input.

• Present a single window at one time.

• Do not advance pages automatically.

38. Give the writing guidelines for wizards.

• Clearly identify the purpose in title bar.

• Use a conversational rather than instructional style.

• Write simply, concisely, and clearly.

• Use world like "you" and "your".

39. Give the design guidelines for hints/tips.

• Provide guidelines on only 2 or 3 important point.

• Locate the button near where its guidance applies

• Write concisely and to the point.

<div align="center">1 MARK Questions and Answers</div>

140. Which of the following interface design principles reduces the user's memory load?
a. define intuitive shortcuts **b.** disclose information in a progressive fashion
c. establish meaningful defaults   **d.** answers a, b and c

141. The reason for reducing the user's memory load is make his or her interaction with the computer quicker to complete.
a. True **b.** False

142. Interface consistency implies that
a. each application should have its own distinctive look and feel
b. input mechanisms remain the same throughout the application
c. navigational methods are context sensitive   d. both **b** and **d**

143. If past interactive models have created certain user expectations it is not generally good to make changes to the model.
a. True **b.** False

144. Which model depicts the profile of the end users of a computer system?
a. design model   **b.** implementation model   **c.** user model   **d.** user's model

145. Which model depicts the image of a system that an end user creates in his or her head?
a. design model   **b.** user model   **c.** system model   **d.** system perception

146. Which model depicts the look and feel of the user interface along with all supporting information?
a. Implementation model   b**.** user model   **c.** user's model   **d.** system perception

147. Which of these framework activities is not normally associated with the user interface design processes?
a. cost estimation   **b.** interface construction   **c.** interface validation   **d.** user and task analysis

148. Which approach (es) to user task analysis can be useful in user interface design?
a. have users indicate their preferences on questionnaires
b. rely on the judgment of experienced programmers
c. study existing computer-based solutions   **d.** both c and d

149. Object-oriented analysis techniques can be used to identify and refine user task objects and actions without any need to refer to the user voice.
a. True **b.** False

<div align="center">Answers</div>

139 140 141 142 143 144 145 146 147 148

d   b   d   a   c   d   a   a   d   b

PART B

1. How will you design the content and text for web pages? Or Explain the concept of using text for web pages.(May/June 2013,Nov/ Dec2014)

Write Clear Text and Messages:

- The wording of the interface and its screens is the basic form of communication with the user.
- Clear and meaningfully crafted words, messages, and text lead to greatly enhanced system usability and minimize user confusion that leads to errors and possibly even system rejection.

Words, Sentences, Messages, and Text

- Like all aspects of interface design, knowing the user is the first step in choosing the proper words and creating acceptable messages and text.

Words

- Do not use:
  — Jargon, words, or terms:
    • Unique to the computer profession.
    • With different meanings outside of the computer profession.
    • Made up to describe special functions or conditions.
  — Abbreviations or acronyms.
    • Unless the abbreviation or acronym is as familiar as a full word or phrase.
  — Word contractions, suffixes, and prefixes.
- Use:
  — Short, familiar words.
  — Standard alphabetic characters.
  — Complete words.
  — Positive terms.
  — Simple action words; avoid noun strings.
  — The "more" dimension when comparing.
  — Consistent words.
- Do not:
  — Stack words.
  — Hyphenate words.
  — Include punctuation for abbreviations, mnemonics, and acronyms.

Sentences and Messages

- Sentences and messages must be:
  — Brief and simple.
  — Directly and immediately usable.
  — An affirmative statement.
  — In an active voice.
  —In the temporal sequence of events.
  — Structured so that the main topic is near the beginning.
  — Of parallel construction.
- Sentences and messages must be of the proper tone:
  — Nonauthoritarian: Imply that the system is awaiting the user's direction, not that the system is directing the user. For example, phrase a message as "*Ready for the next command,*" not "*Enter the next command.*"
  — Nonthreatening: errors are often the result of a failure to understand, mistakes, or trial-and-error behavior, the user may feel confused, inadequate, or anxious. Blaming the user for problems can heighten anxiety, making error correction more difficult and increasing the chance of more errors. Therefore, harsh words like "illegal," "bad," or "fatal" should be avoided.
  — Nonanthropomorphic: The best advice at this moment is do not give a human personality to a machine. Imply that the system is awaiting the user's direction, not vice versa. Say, for example, "*What do you need*?" not "*How can I help you*?"
  — Nonpatronizing: Patronizing messages can be embarrassing. "*Very good, you did it right*" may thrill a fourth-grader, but would be somewhat less than thrilling to an adult.

— Nonpunishing: messages should remain factual and informative, and should not be punishable. Punishment is never a desirable way to force a change in behavior, especially among adults.

— Cautious in the use of humor: Humor is a transitory and changeable thing. What is funny today may not be funny tomorrow, and what is funny to some may not be to others.

Messages

- Messages are communications provided on the screen to the screen viewer.
- Screen messages fall into two broad categories: system and instructional.
- *System* messages are generated by the system to keep the user informed of the system's state and activities.
- *Instructional* messages, sometimes referred to as *prompting* messages, are messages that tell the user how to work with, or complete, the screen displayed.

System messages:

- System messages are of several types, each reflecting a different purpose. Common message types are:
- Status messages. A status message is used for providing information concerning the progress of a lengthy operation.
- Informational messages. Informational messages, also called *notification* messages, provide information about the state of the system when it is not immediately obvious to the user.
- Warning messages. Warning messages call attention to a situation that may be undesirable. They are usually identified by an "!" icon to the left of the message.
- Critical messages. Critical messages, sometimes called *action* messages, call attention to conditions that require a user action before the system can proceed. A message describing an erroneous situation is usually presented as a critical message.
- Question messages. Question messages are another kind of message type sometimes seen. A question message asks a question and offers a choice of options for selection. It is designated by a "?" icon preceding the message text.

Writing Message Box Text

- Title bar:
  — Clearly identify the source of the message.
  - • The name of the object to which it refers.
  - • The name of the application to which it refers.
  — Do not include an indication of message type.
  — Use mixed case in the headline style.
- Message box:
  — Provide a clear and concise description of the condition causing the message box to be displayed.
  - • Use complete sentences with ending punctuation.
  - • State the problem, its probable cause (if known), and what the user can do about it.
  - • Avoid contractions.
  - • Avoid technical jargon and system-oriented information.
  - • Provide only as much background information as necessary for the message to be understood.
  - • Show only one message box about the cause of condition in a single message.
  - • Make the solution an option offered in the message.
  - • Avoid multistep solutions.
  - • Use consistent words and phrasing for similar situations.
  - • Use the word "please" conservatively.
  — Do not exceed two or three lines.
  — Include the relevant icon identifying the type of message to the left of the text.
  — Center the message text in window.

Message Box Controls

- Command buttons:
  — If a message requires no choices to be made but only acknowledgment:
  - • Include an *OK* button.
  — If a message requires a choice be made, provide a command button for each option:

- Include *OK* and *Cancel* buttons only when the user has the option of continuing or stopping the action.
- Include *Yes* and *No* buttons when the user must decide how to continue.
- If these choices are too ambiguous, label the command buttons with the names of specific actions.

— If a message allows initiation of an action to correct the situation described:
- Include a properly labeled button initiating the corrective action.

— If a message describes an interrupted process whose state cannot be restored:
- Provide a *Stop* button.

— If a message offers an opportunity to cancel a process as well as to perform or not perform an action:
- Provide a *Cancel* button.

— If more details about a message topic must be presented:
- Provide a *Help* button.

— Designate the most frequent or least destructive option as the default.
— Display a message box only when the window of an application is active.
— Display only one message box for a specific condition.

- Close box:
— Enable the title bar *Close* box only if the message includes a Cancel button.

Message Location
- Use the message line for messages that must not interfere with screen information.
- Pop-up windows may be used for all kinds of messages, if available.
- Pop-up windows should always be used for critical messages.

Other Message Considerations
- Abbreviated, more concise versions of messages should be available.
- Something that must be remembered should be at the beginning of the text.
- Do not include code numbers with messages.

Instructional Messages
- Provide instructional information at the depth of detail needed by the user.
- Locate it at strategic positions on the screen.
- Display it in a manner that visually differentiates it from other screen elements.
- In writing, follow all relevant writing guidelines for words, sentences, and messages.

Text
Text, by a very general definition, is any textual element that appears on a screen, including field captions, headings, words, sentences, messages, and instructions.

Presenting Text
- Fonts:
— Use plain and simple fonts.
— Choose a minimum point size of 12 to 14.
— Use proportional fonts.
- Width:
— Include no more than 40 to 60 characters on each line.
- A double column of 30 to 35 characters separated by five spaces is also acceptable.
— Do not right-justify.
— Do not hyphenate words.
- Content:
— Use headings to introduce a new topic.
— Separate paragraphs by at least one blank line.
— Start a fresh topic on a new page.
— Use lists to present facts.
— Emphasize important things by:
- Positioning.
- Boxes.
- Bold typefaces.
- Indented margins.

- Miscellaneous:
  — Use paging (not scrolling).
  — Provide a screen design philosophy consistent with other parts of the system.

Writing Text
- Sentences and paragraphs:
  — Use short sentences composed of familiar, personal words.
      • Cut the excess words.
      • Try to keep the number of words in a sentence to 20 or less.
  — Cut the number of sentences.
  — Use separate sentences for separate ideas.
  — Keep the paragraphs short.
  — Restrict a paragraph to only one idea.
- Style:
  — Use the active writing style.
  — Use the personal writing style, if appropriate.
  — Write as you talk.
  — Use subjective opinion.
  — Use specific examples.
      — Read it out loud.

Window Title
- All windows must have a title located in a centered position at the top.
  — Exception: Windows containing messages.
- Clearly and concisely describe the purpose of the window.
- Spell it out fully using an uppercase or mixed-case font.
- If title truncation is necessary, truncate it from right to left.
- If presented above a menu bar, display it with a background that contrasts with the bar.

Conventions
- Establish conventions for referring to:
  — Individual keyboard keys.
  — Keys to be pressed at the same time.
  — Field captions.
  — Names supplied by users or defined by the system.
  — Commands and actions.

Sequence Control Guidance
- Consider providing a guidance message telling how to continue at points in the dialog when:
  — A decision must be made.
  — A response needs to be made to continue.
- Consider indicating what control options exist at points in the dialog where several alternatives may be available.
- Permit these prompts to be turned on or off by the user.

2. Give the design guidelines to provide proper and effective feedback. Or With suitable illustration explain how response time and time delays are handled in user interface design (Nov/Dec 2014)

To be effective, feedback to the user for an action must occur within certain time limits. Excessive delays can be annoying, interrupt concentration, cause the user concern, and impair productivity as one's memory limitations begin to be tested.

Response Time
- System responsiveness should match the speed and flow of human thought processes.
  — If continuity of thinking is required and information must be remembered throughout several responses, response time should be less than one or two seconds.
  — If human task closures exist, high levels of concentration are not necessary, and moderate short-term memory requirements are imposed; response times of 2 to 4 seconds are acceptable.
  — If major task closures exist, minimal short-term memory requirements are imposed; responses within 4 to 15 seconds are acceptable.

— When the user is free to do other things and return when convenient, response time can be greater than 15 seconds.
- Constant delays are preferable to variable delays.

Dealing with Time Delays
- Button click acknowledgement:
  — Acknowledge all button clicks by visual or aural feedback within one-tenth of a second.
- Waits up to 10 seconds:
  — If an operation takes 10 seconds or less to complete, present a "busy" signal until the operation is complete.
    • Display, for example, an animated hourglass pointer.
- Waits of 10 seconds to 1 minute:
  — If an operation takes longer than 10 seconds to complete, display:
    • A rolling barber's pole or other large animated object.
    • Additionally, a progress indicator, percent complete message, or elapsed time message.
- Waits over 1 minute:
  — Present an estimate of the length of the wait.
  — Display a progress indicator, percent complete message, or elapsed time message.
  — When a long operation is completed, present an acknowledgment that it is completed.
    • A significantly changed screen appearance.
    • An auditory tone.
  — If an operation is very time-consuming:
    • Consider breaking the operation into subtasks and providing progress indicators for each subtask.
    • Allow users to start a new activity while waiting.
- Long, invisible operations:
  — When an operation not visible to the user is completed, present an acknowledgment that it is completed.
    • A message.
    • An auditory tone.
- Progress indicator:
  — A long rectangular bar that is initially empty but filled as the operation proceeds.
    • Dynamically fill the bar.
    • Fill it with a color or shade of gray.
    • Fill it from left to right or bottom to top.
- Percent complete message:
  — A message that indicates the percent of the operation that is complete.
  — Useful if a progress indicator takes too long to update.
- Elapsed time message:
  — A message that shows the amount of elapsed time that the operation is consuming.
  — Useful if:
    • The length of the operation is not known in advance.
    • A particular part of the operation will take an unusually long time to complete.
- Web page downloads:
  — For pages requiring download times greater than 5 seconds, give the user something to do while waiting.
    • Quickly present, at the top of the downloading page, some text or links.

Blinking for Attention
- Attract attention by flashing an indicator when an application is inactive but must display a message to the user.
  — If a window, flash the title bar.
  — If minimized, flash its icon.
- To provide an additional message indication, also provide an auditory signal (one or two beeps).
  — Very useful if:
    • The window or icon is hidden.
    • The user's attention is frequently directed away from the screen.

- Display the message:
  — When the application is activated.
  — When requested by the user.

Use of Sound

- Always use in conjunction with a visual indication.
- Use no more than six different tones.
  — Ensure that people can discriminate among them.
- Do not use:
  — Jingles or tunes.
  — Loud signals.
- Use tones consistently.
  — Provide unique but similar tones for similar situations.
- Provide signal frequencies between 500 and 1,000 Hz.
- Allow the user to adjust the volume or turn the sound off altogether.
- Test the sounds with users over extended trial periods.
- Use sounds sparingly because they:
  — Are annoying to many people, including other users and nonusers in the vicinity.
  — Can easily be overused, increasing the possibility that they will be ignored.
  — Are not reliable because:
    • Some people are hard of hearing.
    • If they are not heard, they leave no permanent record of having occurred.
    • The user can turn them off

Sounds, sometimes called *earcons,* are useful for alerting the user:

- To minor and obvious mistakes.
- When something unexpected happens.
- Where visual attention is directed away from the screen and immediate attention is required.
- When a long process is finished.

3. **Discuss any five guidance and assistance mechanisms.(Nov/Dec 2012) or How is guidance and assistance helpful in managing errors(Nov/Dec 2013) or Discuss the guidance and assistance to the users in UI design(May/June 2013,2014)**

Preventing Errors

- Errors can be classified as slips or mistakes. A *slip* is automatic behavior gone awry. Slips are usually, but not always, corrected fairly easily. Slips can be reduced through proper application of human factors in design
- A *mistake* results from forming a wrong model or goal and then acting on it. A mistake may not be easily detected because the action may be proper for the perceived goal—it is the goal that is wrong.

Problem Management

  a. Prevention:
  — Disable inapplicable choices.
  — Use selection instead of entry controls.
  — Use aided entry.
  — Accept common misspellings, whenever possible.
  — Before an action is performed:
    • Permit it to be reviewed.
    • Permit it to be changed or undone.
  — Provide a common action mechanism.
  — Force confirmation of destructive actions.
    • Let expert users disable this.
  — Provide an automatic and continuous Save function.
  ➢ Detection:
  — For conversational dialogs, validate entries as close to point of entry as possible.
    • At character level.
    • At control level.

- When the transaction is completed or the window closed.
— For high speed, head-down data entry.
- When the transaction is completed or the window closed.
— Leave window open.
— Maintain the item in error on the screen.
— Visually highlight the item in error.
— Display an error message in a window.
- Do not obscure item in error.
— Handle errors as gracefully as possible.
- The greater the error, the more dramatic should be the warning.
— Use auditory signals conservatively.
➢ Correction:
— Preserve as much of the user's work as possible.
— At window-level validation, use a modeless dialog box to display an error list.
- Highlight first error in the list.
- Place cursor at first control with error.
- Permit fixing one error and continuing to next error.
— Always give a person something to do when an error occurs.
- Something to enter/save/reverse.
- A Help button.
- Someone to call.
— Provide a constructive correction message saying:
- What problem was detected?
- Which items are in error?
- What corrective action is necessary?
— Initiate a clarification dialog if necessary.

Providing Guidance and Assistance:
➢ Guidance in the form of the system's hard-copy, online documentation, computer-based training, instructional or prompting messages, and system messages serves as a cognitive development tool to aid this process. So does assistance provided by another form of online documentation, the Help function.
➢ Useful guidance and assistance answers the following questions:
   a. What is this?
   b. What does it do?
   c. How do I make it do it?
   d. What is its role in the overall scheme of things?

Problems with Documentation
Poor products, however, suggest that being a native speaker of the language is not a sufficient qualification to ensure communicative success. Rather, four other factors contribute to bad design.
- **Organizational factors.** First are organizational factors including management decisions concerning who does the writing: product developers or specialist technical authors. Another organizational factor
- is the frequency and nature of the contact between writers and developers.
- **Time scale.** Second is the time scale allocated for the writing process. Successful writing also involves detailed early planning, drafting, testing, and considerable revising.
- **Theoretical rationale.** Third, there is not yet a clear theoretical rationale about what content should be included in documentation and how this information should be presented.
- **Resources.** Finally, Wright concludes, there are the resources. Adequate resources are needed to include people with different skills in the documentation development process.

Another problem with documentation is created by the need for translation in our shrinking world.

How Users Interact with Documentation
There are three broad stages through which a reader interacts with documentation:
- Finding information is enhanced through use of contents pages and index lists.
- Pictures and symbols can also be used to draw the reader's attention to particular kinds of information.

- Understanding can also be maximized through testing and revision of materials as necessary.

Instructions or Prompting

- Instructional or prompting information is placed *within the body* of a screen. Prompting is provided to assist a person in providing what is necessary to complete a screen.
- Inexperienced users find prompting a valuable aid in learning a system.
- Since instructions or prompting can easily create screen noise, be cautious in placing it on a screen. Use it only if all screen usage will be casual or infrequent.

Help Facility

- The most common form of online documentation is the Help system. The overall objective of a Help facility is to assist people in remembering what to do.
- One potential danger of the Help facility, as one study found, is that a person's recall of command operations is related to frequency of Help facility access; fewer Help requests were associated with better command recall.
- The specific design characteristics that enhance an online Help are still being identified. Three broad areas of Help that must be addressed in creating Help are: its content, its presentation, and its access mechanisms.
- The content (and structure) of an effective online Help can be specified using the GOMS (goals, operators, methods, selection rules) model

Help Facility Guidelines

- Kind:
  — Collect data to determine what types of Help are needed.
- Training:
  — Inform users of availability and purpose of Help.
- Availability:
  — Provide availability throughout the dialog.
  — If no Help is available for a specific situation, inform the user of this and provide directions to where relevant Help may exist.
- Structure:
  — Make them as specific as possible.
  — Provide a hierarchical framework.
    • Brief operational definitions and input rules.
    • Summary explanations in text.
    • Typical task-oriented examples.
- Interaction:
  — Provide easy accessibility.
  — Leave the Help displayed until:
    • The user exits.
    • The action eliminating the need for Help is performed.
  — Provide instructions for exiting.
  — Return to original position in dialog when Help is completed.
- Location:
  — Minimize the obscuring of screen content.
  — If in a window, position priorities are: right, left, above, and below.
- Content:
  — Minimize the Help's length.
  — Develop modular dialogs that can be used to describe similar and dissimilar procedural elements of the interface.
  — Provide step-by-step interface procedures to assist the user with specific problems.
  — Provide procedural demonstrations of interface procedures to aid quick learning of simple operations.
  — Provide information to help users select between multiple interface methods.
  — Provide users with an understanding of representative tasks to increase their knowledge of when to apply specific skills.
- Style:
  — Provide easy browsing and a distinctive format.

- Contents screens and indexes.
- Screen headings and subheadings.
- Location indicators.
- Descriptive words in the margin.
- Visual differentiation of screen components.
- Emphasized critical information.

— Use concise, familiar, action-oriented wording.
— Refer to other materials, when necessary.
— Never use Help to compensate for poor interface design.

- Consistency:
  — Provide a design philosophy consistent with other parts of the system.
- Title:
  — Place the word "Help" in all Help screen titles.

4. Elaborate on icons, their types and characteristics. (Nov/Dec 2012)
Icons are most often used to represent objects and actions with which users can interact with or that they can manipulate.

Kinds of Icons
Icons fall into these categories by Marcus:

- **Icon.** Something that looks like what it means.
- **Index.** A sign that was caused by the thing to which it refers.
- **Symbol.** A sign that may be completely arbitrary in appearance.

An expanded definition by Roger's icon kinds are

- **Resemblance**—An image that looks like what it means. a book, for example , to represent a dictionary
- **Symbolic**—An abstract image representing something. A cracked glass, for example, can represent something fragile
- **Exemplar**—An image illustrating an example or characteristic of something. a knife and fork has come to indicate a restaurant
- **Arbitrary**—An image completely arbitrary in appearance whose meaning must be learned.
- **Analogy**—An image physically or semantically associated with something. a wheelbarrow full of bricks for the move command

Characteristics of Icons
An icon possesses the technical qualities of syntactics, semantics, and pragmatics

- *Syntactics* refers to an icon's physical structure.
- *Semantics* is the icon's meaning.
- *Pragmatics* is how the icons are physically produced and depicted.

Icon Usability

- Provide icons that are:
  — Familiar.
  — Clear and Legible.
  — Simple.
  — Consistent.
  — Direct.
  — Efficient.
  — Discriminable.
- Also consider the:
  — Context in which the icon is used.
  — Expectancies of users.
  — Complexity of task.

Choosing Icons
A Successful Icon

- Looks different from all other icons.
- Is obvious what it does or represents.
- Is recognizable when no larger than 16 pixels square.

- Looks as good in black and white as in color.

Size
- Supply in all standard sizes.
  — 16 X 16 pixels.
    • 16- and 256-color versions.
  — 32 X 32 pixels
    • 16- and 256-color versions.
    • Effective: 24 X24 or 26 X 26 in 32 X 32 icon.
  — 48 X 48 pixels
    • 16- and 256-color versions.
- Use colors from the system palette.
- Use an odd number of pixels along each side.
  — Provides center pixel around which to focus design.
- Minimum sizes for easy selection:
  — With stylus or pen: 15 pixels square.
  — With mouse: 20 pixels square.
  — With finger: 40 pixels square.
- Provide as large a hot zone as possible.

5.Elaborate the guidelines used for choosing colors for statistical Graphical screen. (May/Jun 2012) or Discuss the issues to be considered in choosing colors for statistical graphic screens. (Nov 2013)
a.Choose the Proper Colors
- A color can only be described in terms of a person's report of his or her perceptions.
- The visual spectrum of wavelengths to which the eye is sensitive ranges from about 400 to 700 milli microns.
- Objects in the visual environment often emit or reflect light waves in a limited area of this visual spectrum, absorbing light waves in other areas of the spectrum.
- The dominant wavelength being "seen" is the one that we come to associate with a specific color name. The visible color spectrum and the names commonly associated with the various light wavelengths

  Red   700
  Orange   600
  Yellow   570
  Yellow-green   535
  Green   500
  Blue-green   493
  Blue   470
  Violet   400
- A color posses three properties
  o *Hue* is the spectral wavelength composition of a color. It is to this we attach a meaning such as green or red.
  o *Chroma* or *saturation* is the purity of a color in a scale from gray to the most vivid version of the color. The more saturated a hue is, the more visible it is at a distance.
  o saturated, the less visible it is. *Value* or *intensity* is the relative lightness or darkness of a color in a range from black to white.
- The long-wavelength colors (red) are commonly referred to as warm and short wavelength colors (blue) as cool.
- Color, then, is a combination of hue, chroma, and value.(HSV) or primary wavelength colors RGB.

b.Dithering
- The eye is never steady, instead trembling slightly as we see.
- If pixels of different colors are placed next to each other, this tremor combines the two colors into a third color. This is referred to as *dithering*, and sometimes *texture mapping*.

- Taking advantage of this phenomena, an optical illusion, a third color can be created on a screen. Dithering is often used to create a gray scale when only black and white pixels are available to work with.

c.Color Uses

- Use color to assist in formatting a screen:
  — Relating or tying elements into groupings.
  — Breaking apart separate groupings of information.
  — Associating information that is widely separated on the screen.
  — Highlighting or calling attention to important information by setting it off from the other information.
- Use color as a visual code to identify:
  — Screen components.
  — The logical structure of ideas, processes, or sequences.
  — Sources of information.
  — Status of information.
- Use color to:
  — Realistically portray natural objects.
  — Increase screen appeal.

d.Possible Problems with Color

- When used improperly, color may even impair performance by distracting the viewer and interfering with the handling of information.
- Possible problems may be caused by the perceptual system itself or the physiological characteristics of the human eye.
- **High Attention-Getting Capacity**
  o This quality causes the screen viewer to associate, or tie together, screen elements of the same color, whether or not such an association should be made.
  o The result is often bewilderment, confusion, and slower reading.
- **Interference with Use of Other Screens**
  o Indiscriminate or poor use of color on some screens will diminish the effectiveness of color on other screens.
- **Varying Sensitivity of the Eye to Different Colors**
  o All colors are not equal in the eye of the viewer. The eye is more sensitive to those in the middle of the visual spectrum (yellow and green), which appear brighter than those at the extremes (blue and red). Thus, text composed of colors at the extremes is thought to be more difficult to read.
  o The wavelengths of light that produce blue are normally focused in front of the eye's retina, the red wavelengths behind it. Simultaneous or sequential viewing of red and blue causes the eye to continually refocus to bring the image directly onto the retina, thereby increasing the potential for eye fatigue.
  o The perceived appearance of a color is also affected by a variety of other factors, including the size of the area of color, the ambient illumination level, and other colors in the viewing area.
  o Also, larger changes in wavelength are needed in some areas of the visual spectrum for a color change to be noticed by the eye. Small changes in extreme reds and purples are more difficult to detect than small changes in yellow and blue-green.
- **Color-Viewing Deficiencies**
  o A red viewing deficiency is called *protanopia*, a green deficiency is called *deuteranopia*, and a blue deficiency is called *tritanopia*.
  o These common color deficiencies, their results, and the percentage of people who experience these problems are given below.

	COLOR SEEN WITH:		
ACTUAL COLOR	**RED-VIEWING DEFICIENCY (2.04%)**	**GREEN-VIEWING DEFICIENCY (6.39%)**	**BLUE-VIEWING DEFICIENCY (0.003%)**
Red	Brown	—	—
Yellow	Greenish-Yellow	Orange	Deeper Yellow
Purple	Dark Blue	Red	Deep Red
Green	—	Light Brown	—
Brown	—	Reddish-Brown	—
Blue	—	—	Green

6. List the general guidelines for choosing colors for textual graphic screens. (May/June 2013)
- For displaying data, text, and symbols on a textual graphical screen colors selected should have adequate visibility, meaning, contrast, and harmony.
- Use effective foreground/background combinations.
- Use effective foreground combinations.
- Choose the background color first.
- Display no more than four colors at one time.
- Use colors in toolbars sparingly.
- Test the chosen colors.

Effective Foreground/Background Combinations
- Lalomia and Happ (1987) established effective foreground/background color combinations
- From a color set of 16 different foregrounds and 8 different backgrounds, 120 color combinations were evaluated for (1) response time to identify characters, and (2) subjective preferences of users.
- The results from each measure were ranked and combined to derive an overall measure of color combination effectiveness.
- The best and poorest color combinations are summarized in Table given below
- The results yield some interesting conclusions:
  - The majority of good combinations possess a bright or high-intensity color as the foreground color.
  - The majority of poor combinations are those with low contrast.
  - The best overall color is black.
  - The poorest overall color is brown.
  - Maximum flexibility and variety in choosing a foreground color exists with black or blue backgrounds.
  - Brown and green are the poorest background choices.

FOREGROUND	BACKGROUND							
	BLACK	BLUE	GREEN	CYAN	RED	MAGENTA	BROWN	WHITE
BLACK	x			Good		Good		Good
BLUE		x			Poor			Good
H.I. BLUE			Poor	Poor			Poor	Poor
CYAN	Good		Poor	x			Poor	
H.I. CYAN	Good	Good		Good	Good	Good		
GREEN	Good	Good	x	Poor	Good		Poor	Poor
H.I. GREEN		Good						
YELLOW	Good	Good		Good		Good		
RED			Poor		x	Poor	Poor	
H.I. RED			Poor					
MAGENTA			Poor		Poor	x	Poor	
H.I. MAGENTA	Good		Good			Poor		
BROWN			Poor			Poor	x	
GRAY		Poor			Poor		Poor	
WHITE		Good		Poor				x
H.I. WHITE	Good		Good	Good				

(H.I. = High Intensity)

From Lalomia and Happ (1987).

- Bailey and Bailey (1989), in their screen creation utility Protoscreens, have a table summarizing research-derived good foreground/background combinations.

BACKGROUNDS	ACCEPTABLE FOREGROUNDS	
Black	Dark Cyan Dark Yellow Dark White	Light Green Light Cyan Light Magenta Light Yellow Light White
Blue	Dark Green Dark Yellow Dark White	Light Green Light Cyan Light Yellow Light White
Green	Black Dark Blue	Light Yellow Light White
Cyan	Black Dark Blue	Light Yellow Light White
Red		Light Green Light Cyan Light Yellow Light White
Magenta	Black	Light Cyan Light Yellow Light White
Yellow	Black Dark Blue Dark Red	
White	Black Dark Blue	

Uses of Color to Avoid

- Relying exclusively on color.
- Too many colors at one time.
- Highly saturated, spectrally extreme colors together:
  — Red and blue, yellow and purple.
- Low-brightness colors for extended viewing or older viewers.
- Colors of equal brightness.
- Colors lacking contrast:

— For example, yellow and white; black and brown; reds, blues, and browns against a light background.
- Fully saturated colors for text or other frequently read screen components.
- Pure blue for text, thin lines, and small shapes.
- Colors in small areas.
- Color for fine details.
- Non-opponent colors.
- Red and green in the periphery of large-scale displays.
- Adjacent colors that only differ in the amount of blue they possess.
- Single-color distinctions for color-deficient users.
- Using colors in unexpected ways.
- Using color to improve legibility of densely packed text.

7.What is need for internationalization? Discuss the related issues. Or Describe the issues of internationalization in user interface.(May/ June 2013)
Provide Effective Internationalization and Accessibility
To make a product acceptable worldwide, it must be internationalized. A system must also be designed to be usable by an almost unlimited range of people, being accessible to anyone who desires to use it. The design concepts used to achieve these goals are called internationalization and accessibility.
International Considerations
- To create a product for use internationally may involve two steps, *internationalization* and *localization.*
- Internationalization is the process of isolating culturally specific elements from a product. Localization is the process of infusing a specific cultural context into a previously internationalized product.

a.Localization
- When to do it:
  — When the market includes few or no English speakers.
  — When translation is required by law or by custom.
  — When the widest possible market is desired.
- When not to do it:
  — When the audience already reads English.
  — When the cost of retrofitting or rewriting the software is prohibitive.

b.Words and Text
- Use very simple English.
  — Develop a restricted vocabulary.
  — Restrict the sentence structure using: noun-verb-object.
- Avoid:
  — Acronyms and abbreviations.
  — Stringing three nouns together.
  — Local or computer jargon.
  — A telegraphic writing style.
  — An over-friendly writing style.
  — Culturally specific examples.
  — References to national, racial, religious, and sexist stereotypes.
- Adhere to local user language idioms and cultural contexts.
- Keep the original term for words that cannot be translated.
- Allow additional screen space for the translation.
  — Horizontally, using Table 10.1.
  — Vertically.
- When translating to other languages, first do:
  — European: German.
  — Middle East: Arabic.
  — Far East: Japanese.
- Position icon captions outside of the graphic.

- Modify mnemonics for keyboard access.
- Adhere to local formats for date, time, money, measurements, addresses, and telephone numbers.

c.Images and Symbols
- Adhere to local cultural and social norms.
- Use internationally accepted symbols.
- Develop generic images.
- Be particularly careful with:
    — Religious symbols (crosses and stars).
    — The human body.
    — Women.
    — Hand gestures.
    — Flags.
    — The cross and check for check boxes.
- Review proposed graphical images early in the design cycle.

d.Color, Sequence, and Functionality
- Adhere to local color connotations and conventions.
- Provide the proper information sequence.
- Provide the proper functionality.
- Remove all references to features not supported.

Table 10.2 Some Cultural Color Associations

	RED	YELLOW	GREEN	BLUE	WHITE
China	Happiness	Birth Wealth Power	Ming Dynasty Heavens Clouds	Heavens Clouds	Death Purity
Egypt	Death	Happiness Prosperity	Fertility Strength	Virtue Faith Truth	Joy
France	Aristocracy	Temporary	Criminality	Freedom Peace	Neutrality
India	Life Creativity	Success	Prosperity Fertility		Death Purity
Japan	Anger Danger	Grace Nobility	Future Youth Energy	Villainy	Death
United States	Danger Stop	Cowardice Caution	Safety Go	Masculinity	Purity

e.Requirements Determination and Testing
- Establish international requirements at the beginning of product development.
- Establish a relationship within the target culture.
- Test the product as if it were new.

8.Explain the issues for choosing colors in interface design.
Choosing Colors
- When choosing colors for display, one must consider these factors:
    o the human visual system,
    o the possible problems that the colors' use may cause,
    o the viewing environment in which the display is used,
    o the task of the user, how the colors will be used, and
    o the hardware on which the colors will be displayed

Choosing Colors for Categories of Information
- Choosing colors for categories of information requires a clear understanding of how the information will be used.

- Some examples:

If different parts of the screen are attended to separately, color-code the   different parts to focus selective attention on each in turn.

If decisions are made based on the status of certain types of information on the   screen,   color-code the types of status that the information may possess.

If screen searching is performed to locate information of a particular kind or quality, color-code these kinds or qualities for contrast.

If the sequence of information use is constrained or ordered, use color to identify the sequence.

If the information displayed on a screen is packed or crowded, use color to provide visual groupings.

- Use color as a redundant screen code.

Colors in Context

- Colors are subject to contextual effects. The size of a colored image, the color of images adjacent to it, and the ambient illumination all exert an influence on what is actually perceived.
- At the normal viewing distance for a screen, maximal color sensitivity is not reached until the size of a colored area exceeds about a 3-inch square.
- Adjacent images can influence the perceived color. A color on a dark background will look lighter and brighter than the same color on a light background.
- Colors also change as light levels change. Higher levels of ambient light tend to desaturate colors. Saturated colors will also appear larger than desaturated colors.

Usage

- Design for monochrome first.
  - in shades of black, white and gray.
  - Doing this will permit the screen to be effectively used:
    - By people with a color-viewing deficiency.
    - On monochrome displays.
    - In conditions where ambient lighting distorts the perceived color.
    - If the color ever fails.
- Use colors conservatively.

Do not use color where other identification techniques, such as location, are   available.

Discrimination and Harmony

- For best absolute discrimination, select no more than four or five colors widely spaced on the color spectrum.

Good colors: red, yellow, green, blue, and brown.

- For best comparative discrimination, select no more than six or seven colors widely spaced on the color spectrum.

Other acceptable colors: orange, yellow-green, cyan, violet, and magenta.

- Choose harmonious colors.

One color plus two colors on either side of its complement.

Three colors at equidistant points around the color circle.

- For extended viewing or older viewers, use brighter colors.

Emphasis

- To draw attention or to emphasize elements, use bright or highlighted colors. To deemphasize elements, use less bright colors.

The perceived brightness of colors from most to least is white, yellow, green,   blue, red.

- To emphasize separation, use contrasting colors.

Red and green, blue and yellow.

- To convey similarity, use similar colors.

Orange and yellow, blue and violet.

Common Meanings

- To indicate that actions are necessary, use warm colors.

Red, orange, yellow.

- To provide status or background information, use cool colors.

Green, blue, violet, purple.

- Conform to human expectations.

In the job.

In the world at large.

- Some common color associations are the following:
  - Red—Stop, fire, hot, danger.
  - Yellow—Caution, slow, test.
  - Green—Go, OK, clear, vegetation, safety.
  - Blue—Cold, water, calm, sky, neutrality.
  - Gray—Neutrality.
  - White—Neutrality.
  - Warm colors—Action, response required, spatial closeness.
  - Cool colors—Status, background information, spatial remoteness.
- Some typical implications of color with dramatic portrayal are:
  - High illumination—Hot, active, comic situations.
  - Low illumination—Emotional, tense, tragic, melodramatic, romantic situations.
  - High saturation—Emotional, tense, hot, melodramatic, comic situations.
  - Warm colors—Active, leisure, recreation, comic situations.
  - Cool colors—Efficiency, work, tragic and romantic situations.

Location

- In the center of the visual field, use red and green.
- For peripheral viewing, use blue, yellow, black, and white.
- Use adjacent colors that differ by hue and value or lightness.

Ordering

- Order colors by their spectral position.
  — Red, orange, yellow, green, blue, indigo, violet.

Foregrounds and Backgrounds

- Foregrounds:
  — Use colors that highly contrast with the background color.
  — For text or data, use:
    • Black.
    • Desaturated or spectrum center colors such as white, yellow, or green.
    • Warmer more active colors.
  — Use colors that possess the same saturation and lightness.
  — To emphasize an element, highlight it in a light value of the foreground color, pure   white,   or

yellow.

  — To deemphasize an element, lowlight it in a dark value of the foreground color.
- Backgrounds:
  — Use a background color to organize a group of elements into a unified whole.
  — Use colors that do not compete with the foreground.
  — Use:
    • Light-colored backgrounds of low intensity: Off-white or light gray.
    • Desaturated colors.
    • Cool, dark colors such as blue or black.
    • Colors on the spectral extremes.

Three-Dimensional Look

- Use at least five colors or color values to create a 3-D look on a screen.
  — Background: The control itself and the window on which it appears.
  Foreground: Captions and lines for buttons, icons, and other objects.
    • Usually black or white.
  Selected mode: The color used when the item is selected.
  Top shadow: The bezel on the top and left of the control.
  Bottom shadow: The bezel on the bottom and right of the control.
- Motif has created an algorithm to automatically calculate the top and bottom shadows, and the select color based upon the background (Kobara, 1991). Briefly, it recommends the following:
  - **Background.** Midrange colors, 155–175 on the RGB scale.

- o **Foreground.** Black or white, depending on the lightness or darkness of the background.
- o **Selected mode.** About 15 percent darker than the background color, halfway between
- o the background and bottom shadow. (Calculate this by multiplying the background color's RGB value by 0.85.)
- o **Top shadow.** About 40 to 50 percent brighter than the background color. (Calculate this by multiplying the background color's RGB by 1.50.)
- o **Bottom shadow.** About 45 to 60 percent darker than the background color. (Calculate this by multiplying the background's RGB values by 0.50.)

Color Palette, Defaults, and Customization
- Permit users to customize their colors.
- Provide a default set of colors for all screen components.
- Provide a palette of six or seven foreground colors.
  — Provide 2 to 5 values or lightness shades for each foreground color.
- Provide a palette of six or seven background colors.
- Never refer to a screen element by its color.

Gray Scale
- For fine discriminations use a black-gray-white scale.
  — Recommended values are white, light gray, medium gray, dark gray, black.

9. List the various types of disabilities and how will you design for those disabilities.
Disabilities can be grouped into several broad categories: visual, hearing, physical movement, speech or language impairments, cognitive disorders, and seizure disorders.
- *Visual* disabilities can range from slightly reduced visual acuity to total blindness.
- *Hearing* disabilities range from an inability to detect certain sounds to total deafness.
- *Physical movement* disabilities include difficulties in, or an inability to, perform certain physical tasks such as moving a mouse, pressing two keyboard keys simultaneously, or accurately striking a single keyboard key.
- People with *speech or language* disabilities may find it difficult to read and write (as with dyslexia).
- *Cognitive* disabilities include memory impairments and perceptual problems.
- People with *seizure* disorders are sensitive to visual flash rates, certain rates triggering seizures.

Accessibility Design
- Consider accessibility issues during system planning, design, and testing.
- Provide compatibility with installed accessibility utilities.
- Provide a customizable interface.
- Follow standard Windows conventions.
- Use standard Windows controls.

a.Visual Disabilities
- Utilities:
  — Ensure compatibility with screen-review utilities.
  — Ensure compatibility with screen-enlargement utilities.
- Screen components:
  — Include meaningful screen and window titles.
  — Provide associated captions or labels for all controls, objects, icons, and graphics.
      • Including graphical menu choices.
  — Provide a textual summary for each statistical graphic.
  — Allow for screen element scalability.
  — Support system settings for high contrast for all user interface controls and client area content.
      • When a "high contrast" setting is established, hide any images drawn behind the text to maintain screen information legibility.
  — Avoid displaying or hiding information based on the movement of the pointer.
      • Exception: Unless it's part of the standard interface (Example: ToolTips).
- Keyboard:
  — Provide a complete keyboard interface.
  — Provide a logical order of screen navigation.

- Color:
  — Use color as an enhancing design characteristic.
  — Provide a variety of color selections capable of producing a range of contrast levels.
  • Create the color combinations based on the system colors for window components.
  • Do not define specific colors.

b. Hearing Disabilities

- Provide captions or transcripts of important audio content.
- Provide an option to display a visual cue for all audio alerts.
- Provide an option to adjust the volume.
- Use audio as an enhancing design characteristic.
- Provide a spell-check or grammar-check utility.

c. Physical Movement Disabilities

- Provide voice-input systems.
- Provide a complete and simple keyboard interface.
- Provide a simple mouse interface.
- Provide on-screen keyboards.
- Provide keyboard filters.

d. Speech or Language Disabilities

- Provide a spell-check or grammar-check utility.
- Limit the use of time-based interfaces.
  — Never briefly display critical feedback or messages and then automatically remove them.
  — Provide an option to permit the user to adjust the length of the time-out

e. Cognitive Disabilities

- Permit modification and simplification of the interface.
- Limit the use of time-based interfaces.
  — Do not briefly display critical feedback or messages and then automatically remove them.
  — Provide an option to permit the user to adjust the length of the time-out.

f. Seizure Disorders

- Use elements that do not blink or flicker at rates between frequency ranges of 2 Hz and 55 Hz.
- Minimize the area of the screen that is flashing.
- Avoid flashing that has a high level of contrast between states.
- Provide an option to enable users to slow down or disable screen flashing.

Documentation

- Provide documentation on all accessible features.
- Provide documentation in alternate formats.
- Provide online documentation for people who have difficulty reading or handling printed material.

10. **Explain the role of multimedia in user interface design.(May/Jun 2014)**

   Importance of combining multimedia

- **The proper multimedia combinations can improve learning and performance.** Hearing spoken text combined with a visual graphic is an especially useful combination, especially for complex tasks. All studies found this pairing useful.
- **Visual graphics do enhance learning and performance.** In the Bowers and Lee study, the various graphical combinations yielded the higher learning rates.
- **Single-dimensional textual media are not as successful when used alone.** In the Bowers and Lee study, viewing text or hearing spoken text alone yielded the lowest learning rates.
- **Hearing spoken text and viewing text at the same time may not be great, but it may not be terrible, either.** This combination yielded "middle-of the- road" results in the Bowers and Lee study. The dual code theory would suggest, however, that its use be minimized. Exercise caution in this area.
- **Visual text should always be integrated with related visual graphics.** Tindall-Ford et al. found much better user performance when visual text was closely integrated with, or adjacent to, related

visual graphics. It will be much easier for user to coordinate and integrate the visual materials. Presenting spatially separated text and related graphics places greater demands on working memory.

UNIT – V
PART – A

1. What are the principles of good screen design?
Present the proper amount of information on each screen. Providing an ordering that is logical, sequential and rhythmic to guide a person's eye through the display. Keep the proportion of the window devoted to information no more than 30 to 40 percent of the window's entire area.

2. What is the purpose of usability testing? (AU-NOV/DEC 2010)
• It establishes a communication bridge between developer and users.
• It is used to evaluate a product and validate design decisions.

3. What is meant by cognitive walk through? (Nov/Dec 2012)
In a cognitive walk through, developers walk through an interface in the context of representative user tasks. Individual task actions are examined and the evaluators try to establish a logical reason way the user would perform each examined action.

4.State the advantages and disadvantages of cognitive walkthrough.
i. Do not require a functioning prototype.
ii. Low cost.
iii. It can be used to evaluate alternate solutions.
iv. It can be performed by developers.
Disadvantages: Tedious to perform. It may miss inconsistencies and general recurring problem.

5. What is meant by think-aloud evaluation?
The users perform specific tasks while thinking out load. The objective is to get the user to talk continuously.

6. Define focus group.
In a focus group a small group of knowledgeable users and a moderator are brought together to discuss an interface design prototype or proposed design tasks.

7. Define transition diagram.
It has a set of nodes that represents system states and a set of links between the nodes that represents possible transitions. Each link is labeled with the user action that selects that link and possible computer responses.

8. What is the importance of usability testing?
- Developers and users possess different models.
- Developers intuitions are not always correct. There is no average user.
• It's impossible to predict usability from appearance.

9. What is meant by prototype?
A prototype is a simulation of an actual system that can be quickly created. It is a vehicle for exploration, communication and evaluation. A prototype may be a rough approximation such as a simple hand-drawn sketch, or it may interactive, allowing the user to key.

10. What are the various searches used in the multimedia document?
Photo search, Map search, Design or Diagram search, Sound search, Video search, Animation search.

11. What are the features of user-interface building tools?
User interface independence, Rapid prototyping, Methodology and notation.

12. List some software tools used for user interface design.
➢ User interface model can be created with slide show presentation such as Adobe persuasion, Microsoft-Power point.
➢ Apple hyper card, Macro Mind director or A Symmetric Tool Book used for creating multimedia applications.
➢ Visual programming tool paragraph provide direct manipulation.

13. What are the benefits of menu trees?
They are powerful as a specification tool since they sow users, managers, implementers and other interested parties the complete and detailed coverage of the system. It shows high level relationships and low level details.

14. What are the ways to categorizing the web?

Primary way of categorizing the web sites is by the originator's identity. Second way of categorizing the web sites is by goals of the organization. Third way of categorizing the web sites is by the number of pages or amount of information is accessible. Fourth way of categorizing the web sites is by measure of success.

15. What are the various types of TTT?
One dimensional linear data, Two dimensional map data, Three dimensional data, Temporal data, Multi-dimensional data, Tree data, Network data.

16. What are the four phases of framework to classify user interface for textual search?
• formulation (expressing the search) action (launching the search)
• review of result (reading messages and outcomes)
• refinement (formulating the next step)

17. Define WWW.
World Wide Web site design is a matter of balancing the structure and relationship of menu or one page and individual content pages or other linked graphics and documents.

18. Mention the types of prototypes.
Hand sketches and scenarios, Interactive paper prototype and Programmed façade.

19.Differentiate between Vertical alignment and horizontal alignment.

Vertical alignment	Horizontal alignment
Vertical orientation, a top-to-bottom flow. Recommended structure. 2 or 3 columns of controls may be created. Line borders can emphasize column separation and downward flow.	Item descriptions are positioned as close to a button or box that they relate to. The objective is to create as few vertical alignment points as possible. Window space constraints dictate a horizontal orientation of controls i.e. consistent, predictable, and distinct.
Leads to window space constraints.	May lead to indistinctiveness or inconsistently spaced item descriptions

20. List the four types of testing.
Exploratory evaluations, Assessment evaluations, Comparison evaluations and Validation evaluation.

21. Define visual clutter. How can we avoid visual clutter? (AU-APR/MAY 2011)
Maintain low screen density levels
Maintain distinctive ness of elements

22. What is pilot test?
A pilot test evaluates the planned testing session. It is a practice session that tries out the evaluation materials and equipment, planned time schedule and the overall running of the session. The following steps are followed: Choose a participant, Design and assemble the test environment, Run the pilot test.

23. What is meant by dependent control?
A control, which may be active only under certain conditions.eg)"do you have any children?" If response is affirmative a field requesting their names can be displayed. If response is "no", then control moves to next field. Either it -Display these controls as grayed out manner, when it is relevant then returns it to normal intensity. Do not display until the related information is set.

24. Give the guidelines regarding the size of window.
Provide large enough window to present all relevant and expected information for the task.
Prevent crowding or visual confusion. Minimize need for scrolling.

25. Define Visualization. (Nov/Dec 2012)
It is a cognitive process that allows people to understand information that is difficult to perceive, because it is either too voluminous or too abstract.

26.List the steps involved in testing.
• Identifying the purpose and scope of testing. Understanding the importance of testing.
• Developing a prototype. Developing the right kind of set plan
• Designing a test of yield relevant data. Soliciting a test to yield relevant data.
• Providing the proper test facility. Conducting tests and collecting data.
• Modifying the prototypes as necessary. Testing the system again.
• Evaluating the working system.

27. Describe hand sketches and scenarios.

The first, and simplest, prototype is a low-fidelity rough hand-drawn sketch, or mock-up of the screens. The focus is on the design of individual screens, not the interface mechanics.

28. State some advantages of hand sketch and scenarios.
• It can be used very early in the development process. No programming skill needed.
• It is suited for use by entire design team. No large investment of time and cost.

29. State some disadvantages of hand sketch and scenarios. (AU-NOV/DEC 2010)
• Only a rough approximation. A demonstration, not an exercise.
• Driven by a facilitator, not the user. Limited usefulness for a usability text.

30. What do you mean interface paper prototype?
A low fidelity prototype involving use of common office supplies such as post. It notes, transparencies, markers and scissors.

31. State the advantages of interactive paper prototypes.
• More illustrative of program dynamics than sketches.
• It can be used to demonstrate the interaction.
• Otherwise, generally the same as for hand-draw sketches and scenarios.

32. State the disadvantages of interactive paper prototypes.
• Only a rough approximation.
• A demonstration, not an exercise.
• Driven by a facilitator, not the user.
• Limited usefulness for a usability testing.

33.What is a programmed façade?
It provides a realistic surface view of a real program and to illustrate some of the program's functioning.

34. State the advantages and disadvantages of programmed facades.
Advantages of programmed facades:
Provide a good detailed specification for writing code. A vehicle for data collection.
Disadvantages of programmed facades:
i.It may solidify the design too soon.   ii.More expensive to develop.
iii.More time-consuming to create.   iv.Not effective for requirements gathering.

35.What do you mean by heuristic evaluation?
In a heuristic evaluation, interface specialists study a system in depth and look for properties, they know, from experience, will lead to problem.

36. Stat the advantages of heuristic evaluation.
i.Easy to do.   ii.Relatively low cost.
iii.Does not waste user's time.   iv.It can identify many problems.

37. State the disadvantages of heuristic evaluation.
• Evaluators must possess interface design expertise.
• Difficult to identify system wide structural problems.
• Difficult to uncover missing exits and interface elements.

<div align="center">1 MARK Questions and Answers</div>

182. The computer's display capabilities are the primary determinant of the order in which user interface design activities are completed.
a. True **b.** False

183. It is sometimes possible that the interface designer is constrained by environmental factors that mitigate against ease of use for many users.
a. True **b.** False

184. One means of defining user interface objects and actions is to conduct a grammatical parse of the user scenario.
a. True **b.** False

185. Interface design patterns typically include a complete component-level design (design classes, attributes, operations, and interfaces).
a. True **b.** False

186. Several common design issues surface for almost every user interface including
a. adaptive user profiles   **b.** error handling resolution of graphics
c. displays system   **d.** both b and d

187. Add-on help facilities are almost always better received by users than integrated help facilities.
a. True **b.** False

188. User interface development systems typically provide several mechanisms for building interface prototypes including
a. code generation   **b.** drawing tools   **c.** input validation   **d.** both c and d

189. Usability questionnaires are most meaningful to the interface designers when completed by
a. customers   **b.** experienced programmers   **c.** product users   **d.** project managers

190. Several usability measures can be collected while observing users interacting with a computer system including
a. down time for the application **b.** number of user errors
c. software reliability   **d.** both b and d

191. An appraisal, of a system's performance after it has been installed, is called system
a. planning   **b.** review   **c.** maintenance   **d.** batch Processing

<div align="center">Answers</div>

179	180	181	182	183	184	185	186	187	188
b	a	a	d	b	d	d	c	d	b

<div align="center">PART- B</div>

1. **Explain the need and importance of prototypes (Nov/Dec 2012) or Explain the prototype used in user interface(May/ June 2013)**

Prototypes

- A prototype is primarily a vehicle for exploration, communication, and evaluation. Its purpose is to obtain user input in design, and to provide feedback to designers.
- A prototype is a simulation of an actual system that can be quickly created.
- A prototype may be a rough approximation, such as a simple hand-drawn sketch, or it may be interactive, allowing the user to key or select data using controls, navigate through menus, retrieve displays of data, and perform basic system functions.
- A prototype may have great breadth, including as many features as possible to present concepts and overall organization, or it might have more depth, including more detail on a given feature or task to focus on individual design aspects.

The types of prototypes:

Hand sketches and scenarios, Interactive paper prototype and Programmed façade.

a.Hand Sketches and Scenarios

- Description:
  — Screen sketches created by hand.
  — Focus is on the design, not the interface mechanics.
  — A low-fidelity prototype.
- Advantages:
  — Can be used very early in the development process.
  — Suited for use by entire design team.
  — No large investment of time and cost.
  — No programming skill needed.
  — Easily portable.
  — Fast to modify and iterate.
  — A rough approximation often yields more substantive critical comments.
  — Easier to comprehend than functional specifications.
  — Can be used to define requirements.
- Disadvantages:
  — Only a rough approximation.
  — Limited in providing an understanding of navigation and flow.
  — A demonstration, not an exercise.
  — Driven by a facilitator, not the user.
  — Limited usefulness for a usability test.
  — A poor detailed specification for writing the code.
  — Usually restricted to most common tasks.
- **Sketch Creation Process**

- o Sketch (storyboard) the screens while determining:
  - — The source of the screen's information.
  - — The content and structure of individual screens.
  - — The overall order of screens and windows.
- o Use an erasable medium.
- o Sketch the screens needed to complete each workflow task.
- o Try out selected metaphors and change them as necessary.
- o First, storyboard common/critical/frequent scenarios.
  - — Follow them from beginning to end.
  - — Then, go back and build in exceptions.
- o Don't get too detailed; exact control positioning is not important, just overall order and flow.
- o Storyboard as a team, including at least one user.
- o Only develop online prototypes when everyone agrees that a complete set of screens has been satisfactorily sketched.

b.Interactive Paper Prototypes
- Description:
  - — Interface components (menus, windows, and screens) constructed of common paper technologies (Post-It notes, transparencies, and so on).
  - — The components are manually manipulated to reflect the dynamics of the software.
  - — A low-fidelity prototype.
- Advantages:
  - — More illustrative of program dynamics than sketches.
  - — Can be used to demonstrate the interaction.
  - — Otherwise, generally the same as for hand-drawn sketches and scenarios.
- Disadvantages:
  - — Only a rough approximation.
  - — A demonstration, not an exercise.
  - — Driven by a facilitator, not the user.
  - — Limited usefulness for usability testing.

c.Programmed Facades
- o Description:
  - — Examples of finished dialogs and screens for some important aspects of the system.
  - — Created by prototyping tools.
  - — Medium-fidelity to high-fidelity prototypes.
- o Advantages:
  - — Provide a good detailed specification for writing code.
  - — A vehicle for data collection.
- o Disadvantages:
  - — May solidify the design too soon.
  - — May create the false expectation that the "real thing" is only a short time away.
  - — More expensive to develop.
  - — More time-consuming to create.
  - — Not effective for requirements gathering.
  - — Not all of the functions demonstrated may be used because of cost, schedule limitations, or lack of user interest.
  - — Not practical for investigating more than two or three approaches.

Prototype-Oriented Languages
- Description:
  - — An example of finished dialogs and screens for some important aspects of the system.
  - — Created through programming languages that support the actual programming process.
  - — A high-fidelity prototype.
- Advantages:
  - — May include the final code.
  - — Otherwise, generally the same as those of programmed facades.
- Disadvantages:

— Generally the same as for programmed facades.

2. Explain detail about kinds of tests and retest. Or How will you test web pages? Explain briefly. (Nov/Dec 2014)

A test is a tool that is used to measure something. The "something" may be:

- Conformance with a requirement.
- Conformance with guidelines for good design.
- Identification of design problems.
- Ease of system learning.
- Retention of learning over time.
- Speed of task completion.
- Speed of need fulfillment.
- Error rates.
- Subjective user satisfaction.

a.Guidelines Review

- Description:
  — A review of the interface in terms of an organization's standards and design guidelines.
- Advantages:
  — Can be performed by developers.
  — Low cost.
  — Can identify general and recurring problems
  — Particularly useful for identifying screen design and layout problems.
- Disadvantages:
  — May miss severe conceptual, navigation, and operational problems.

b.Heuristic Evaluation

- Description:
  — A detailed evaluation of a system by interface design specialists to identify   problems.
- Advantages:
  — Easy to do.
  — Relatively low cost.
  — Does not waste user's time.
  — Can identify many problems.
- Disadvantages:
  — Evaluators must possess interface design expertise.
  — Evaluators may not possess an adequate understanding of the tasks and user communities.
  — Difficult to identify system wide structural problems.
  — Difficult to uncover missing exits and interface elements.
  — Difficult to identify the most important problems among all problems uncovered.
  — Does not provide any systematic way to generate solutions to the problems uncovered.
- Guidelines:
  — Use 3 to 5 expert evaluators.
  — Choose knowledgeable people:
    • Familiar with the project situation.
    • Possessing a long-term relationship with the organization.
- **Heuristic Evaluation Process**
- o Preparing the session:
  — Select evaluators.
  — Prepare or assemble:
    • A project overview.
    • A checklist of heuristics.
  — Provide briefing to evaluators to:
    • Review the purpose of the evaluation session.
    • Preview the evaluation process.
    • Present the project overview and heuristics.
    • Answer any evaluator questions.

- • Provide any special evaluator training that may be necessary.
  - o Conducting the session:
    — Have each evaluator review the system alone.
    — The evaluator should:
    - • Establish own process or method of reviewing the system.
    — provide usage scenarios, if necessary.
    - • Compare his or her findings with the list of usability principles.
    - • Identify any other relevant problems or issues.
    - • Make at least two passes through the system.
    — Detected problems should be related to the specific heuristics they violate.
    — Comments are recorded either:
    - • By the evaluator.
    - • By an observer.
    — The observer may answer questions and provide hints.
    — Restrict the length of the session to no more than 2 hours.
  - o After the session:
    — Hold a debriefing session including observers and design team members where:
    - • Each evaluator presents problems detected and the heuristic it violated.
    - • A composite problem listing is assembled.
    - • Design suggestions for improving the problematic aspects of the system are discussed.
    — After the debriefing session:
    - • Generate a composite list of violations as a ratings form.
    - • Request evaluators to assign severity ratings to each violation.
    - • Analyze results and establish a program to correct violations and deficiencies.
- • **Heuristic Evaluation Effectiveness**
  - o One of the earliest papers addressing the effectiveness of heuristic evaluations was by Nielsen (1992). He reported that the probability of finding a *major* usability problem averaged 42 percent for single evaluators in six case studies. The corresponding probability for uncovering a *minor* problem was only 32 percent.
  - o Heuristic evaluations are useful in identifying many usability problems and should be part of the testing arsenal. Performing this kind of evaluation before beginning actual testing with users will eliminate a number of design problems, and is but one step along the path toward a very usable system.
- • Research based set of heuristics

1. Automate unwanted workload.
   - Free cognitive resources for high-level tasks.
   - Eliminate mental calculations, estimations, comparisons, and unnecessary thinking.

2. Reduce uncertainty.
   - Display data in a manner that is clear and obvious.

3. Fuse data.
   - Reduce cognitive load by bringing together lower-level data into a higher-level summation.

4. Present new information with meaningful aids to interpretation.
   - Use a familiar framework, making it easier to absorb.
   - Use everyday terms, metaphors, and so on.

5. Use names that are conceptually related to functions.
   - Context-dependent.
   - Attempt to improve recall and recognition.

6. Group data in consistently meaningful ways to decrease search time.

7. Limit data-driven tasks.
   - Reduce the time needed to assimilate raw data.
   - Make appropriate use of color and graphics.

8. Include in the displays only that information needed by a user at a given time.
   - Allow users to remain focused on critical data.
   - Exclude extraneous information that is not relevant to current tasks.

9. Provide multiple coding of data where appropriate.

10. Practice judicious redundancy.
    - To resolve the conflict between heuristics 6 and 8.

From Gerhardt-Powals (1996).

c. Cognitive Walkthroughs

- Description:
  — Reviews of the interface in the context of tasks users perform.
- Advantages:
  — Allow a clear evaluation of the task flow early in the design process.
  — Do not require a functioning prototype.
  — Low cost.
  — Can be used to evaluate alternate solutions.
  — Can be performed by developers.
  — More structured than a heuristic evaluation.
  — Useful for assessing "exploratory learning."
- Disadvantages:
  — Tedious to perform.
  — May miss inconsistencies and general and recurring problems.
- Guidelines:
  — Needed to conduct the walkthrough are:
    - A general description of proposed system users and what relevant knowledge they possess.
    - A specific description of one or more core or representative tasks to be performed.
    - A list of the correct actions required to complete each of the tasks.
  — Review:
    - Several core or representative tasks across a range of functions.
    - Proposed tasks of particular concern.
  — Developers must be assigned roles of:
    - Scribe to record results of the action.
    - Facilitator to keep the evaluation moving.
  — Start with simple tasks.
  — Don't get bogged down demanding solutions.
  — Limit session to 60 to 90 minutes.

d. Think-Aloud Evaluations

- Description:
  — Users perform specific tasks while thinking out load.
  — Comments are recorded and analyzed.
- Advantages:
  — Utilizes actual representative tasks.
  — Provides insights into the user's reasoning.
- Disadvantages:
  — May be difficult to get users to think out loud.
- Guidelines:
  — Develop:
    • Several core or representative tasks.
    • Tasks of particular concern.
  — Limit session to 60 to 90 minutes.

e.Usability Test

- Description:
  — An interface evaluation under real-world or controlled conditions.
  — Measures of performance are derived for specific tasks.
  — Problems are identified.
- Advantages:
  — Utilizes an actual work environment.
  — Identifies serious or recurring problems.
- Disadvantages:
  — High cost for establishing facility.
  — Requires a test conductor with user interface expertise.
  — Emphasizes first-time system usage.
  — Poorly suited for detecting inconsistency problems.

f.Classic Experiments

- Description:
  — An objective comparison of two or more prototypes identical in all aspects except for one design issue.
- Advantages:
  — Objective measures of performance are obtained.
  — Subjective measures of user satisfaction may be obtained.
- Disadvantages:
  — Requires a rigorously controlled experiment to conduct the evaluation.
  — The experiment conductor must have expertise in setting up, running, and analyzing the data collected.
  — Requires creation of multiple prototypes.
- Guidelines:
  — State a clear and testable hypothesis.
  — Specify a small number of independent variables to be manipulated.
  — Carefully choose the measurements.
  — Judiciously select study participants and carefully or randomly assign them to groups.
  — Control for biasing factors.
  — Collect the data in a controlled environment.
  — Apply statistical methods to data analysis.
  — Resolve the problem that led to conducting the experiment.

g.Focus Groups

- Description:
  — A discussion with users about interface design prototypes or tasks.
- Advantages:
  — Useful for:
    • Obtaining initial user thoughts.
    • Trying out ideas.
  — Easy to set up and run.

— Low cost.
- Disadvantages:
  — Requires experienced moderator.
  — Not useful for establishing:
    • How people really work.
    • What kinds of usability problems people have.
- Guidelines:
  — Restrict group size to 8 to 12.
  — Limit to 90 to 120 minutes in length.
  — Record session for later detailed analysis.

Analyze, Modify, and Retest
- Compile the data from all test participants.
- List the problems the participants had.
- Sort the problems by priority and frequency.
- Develop solutions for the problems.
- Modify the prototype as necessary.
- Test the system again, and again.

3. Explain in detail about hypermedia and WWW with example. Or Explain briefly the concept of hypermedia(May/ June 2013)

Hypermedia
- **Hypermedia** is used as a logical extension of the term hypertext in which graphics, audio, video, plain text and hyperlinks intertwine to create a generally non-linear medium of information.
- This contrasts with the broader term *multimedia*, which may be used to describe non-interactive linear presentations as well as hypermedia.
- Hypermedia should not be confused with hypergraphics or super-writing which is not a related subject. It is also related to the field of Electronic literature. A term first used in a 1965 article by Ted Nelson.
- The World Wide Web is a classic example of hypermedia, whereas a non-interactive cinema presentation is an example of standard multimedia due to the absence of hyperlinks.

Hypermedia development tools
- Hypermedia may be developed a number of ways. Any programming tool can be used to write programs that link data from internal variables and nodes for external data files.
- Multimedia development software such as Adobe Flash, Adobe Director, Macromedia Authorware, and MatchWare Mediator may be used to create stand-alone hypermedia applications, with emphasis on entertainment content.
- Some database software such as Visual FoxPro and FileMaker Developer may be used to develop stand-alone hypermedia applications, with emphasis on educational and business content management.
- Hypermedia applications may be developed on embedded devices for the mobile and the Digital signage industries using the Scalable Vector Graphics (SVG) specification from W3C (World Wide Web Consortium).
- Software applications such as Ikivo Animator and Inkscape simplify the development of Hypermedia content based on SVG. Embedded devices such as iPhone natively support SVG specifications and may be used to create mobile and distributed Hypermedia applications.
- Hyperlinks may also be added to data files using most business software via the limited scripting and hyperlinking features built in.
- Documentation software such as the Microsoft Office Suite allows for hypertext links to other content within the same file, other external files, and URL links to files on external file servers.
- For more emphasis on graphics and page layout, hyperlinks may be added using most modern desktop publishing tools. This includes presentation programs, such as Microsoft Powerpoint, add-ons to print layout programs such as Quark Immedia, and tools to include hyperlinks in PDF documents such as Adobe InDesign for creating and Adobe Acrobat for editing.

- Hyper Publish is a tool specifically designed and optimized for hypermedia and hypertext management. Any HTML Editor may be used to build HTML files, accessible by any web browser.
- CD/DVD authoring tools such as DVD Studio Pro may be used to hyperlink the content of DVDs for DVD players or web links when the disc is played on a personal computer connected to the internet.

WWW

The **World Wide Web** (commonly shortened to **the Web**) is a system of interlinked hypertext documents accessed via the Internet. With a Web browser, a user views Web pages that may contain text, images, videos, and other multimedia and navigates between them using hyperlinks.

The World Wide Web was created in 1989 by British scientist Sir Tim Berners-Lee, working at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland, and released in 1992.

Since then, Berners-Lee has played an active role in guiding the development of Web standards (such as the markup languages in which Web pages are composed), and in recent years has advocated his vision of a Semantic Web.

[*edit*] *How it works*

Viewing a Web page on the World Wide Web normally begins either by typing the URL of the page into a Web browser, or by following a hyperlink to that page or resource. The Web browser then initiates a series of communication messages, behind the scenes, in order to fetch and display it.

First, the server-name portion of the URL is resolved into an IP address using the global, distributed Internet database known as the domain name system, or DNS. This IP address is necessary to contact and send data packets to the Web server.

The browser then requests the resource by sending an HTTP request to the Web server at that particular address.

In the case of a typical Web page, the HTML text of the page is requested first and parsed immediately by the Web browser, which will then make additional requests for images and any other files that form a part of the page.

Statistics measuring a website's popularity are usually based on the number of 'page views' or associated server 'hits', or file requests, which take place.

Having received the required files from the Web server, the browser then renders the page onto the screen as specified by its HTML, CSS, and other Web languages. Any images and other resources are incorporated to produce the on-screen Web page that the user sees.

Standards

Many formal standards and other technical specifications define the operation of different aspects of the World Wide Web, the Internet, and computer information exchange.

Many of the documents are the work of the World Wide Web Consortium (W3C), headed by Berners-Lee, but some are produced by the Internet Engineering Task Force (IETF) and other organizations.

Usually, when Web standards are discussed, the following publications are seen as foundational:

- Recommendations for markup languages, especially HTML and XHTML, from the W3C. These define the structure and interpretation of hypertext documents.
- Recommendations for stylesheets, especially CSS, from the W3C.
- Standards for ECMAScript (usually in the form of JavaScript), from Ecma International.
- Recommendations for the Document Object Model, from W3C.

Additional publications provide definitions of other essential technologies for the World Wide Web, including, but not limited to, the following:

- *Uniform Resource Identifier* (URI), which is a universal system for referencing resources on the Internet, such as hypertext documents and images. URIs, often called URLs, are defined by the IETF's RFC 3986 / STD 66: *Uniform Resource Identifier (URI): Generic Syntax*, as well as its predecessors and numerous URI scheme-defining RFCs;
- *HyperText Transfer Protocol (HTTP)*, especially as defined by RFC 2616: *HTTP/1.1* and RFC 2617: *HTTP Authentication*, which specify how the browser and server authenticate each other.

Java

A significant advance in Web technology was Sun Microsystems' Java platform. It enables Web pages to embed small programs (called applets) directly into the view. These applets run on the end-user's computer, providing a richer user interface than simple Web pages.

Java client-side applets never gained the popularity that Sun had hoped for a variety of reasons, including lack of integration with other content (applets were confined to small boxes within the rendered page) and the fact that many computers at the time were supplied to end users without a suitably installed Java Virtual Machine, and so required a download by the user before applets would appear.

Adobe Flash now performs many of the functions that were originally envisioned for Java applets, including the playing of video content, animation, and some rich GUI features. Java itself has become more widely used as a platform and language for server-side and other programming.

JavaScript

JavaScript, on the other hand, is a scripting language that was initially developed for use within Web pages. The standardized version is ECMAScript.

While its name is similar to Java, JavaScript was developed by Netscape and has very little to do with Java, although the syntax of both languages is derived from the C programming language.

In conjunction with a Web page's Document Object Model (DOM), JavaScript has become a much more powerful technology than its creators originally envisioned.[*citation needed*] The manipulation of a page's DOM after the page is delivered to the client has been called Dynamic HTML (DHTML), to emphasize a shift away from *static* HTML displays.

In simple cases, all the optional information and actions available on a JavaScript-enhanced Web page will have been downloaded when the page was first delivered.

Ajax ("Asynchronous JavaScript and XML") is a group of interrelated web development techniques used for creating interactive web applications that provide a method whereby parts *within* a Web page may be updated, using new information obtained over the network at a later time in response to user actions.

This allows the page to be more responsive, interactive and interesting, without the user having to wait for whole-page reloads. Ajax is seen as an important aspect of what is being called Web 2.0. Examples of Ajax techniques currently in use can be seen in Gmail, Google Maps, and other dynamic Web applications.

Publishing Web pages

Web page production is available to individuals outside the mass media. In order to publish a Web page, one does not have to go through a publisher or other media institution, and potential readers could be found in all corners of the globe.

Many different kinds of information are available on the Web, and for those who wish to know other societies, cultures, and peoples, it has become easier.

The increased opportunity to publish materials is observable in the countless personal and social networking pages, as well as sites by families, small shops, etc., facilitated by the emergence of free Web hosting services

WWW prefix in Web addresses

The letters "www" are commonly found at the beginning of Web addresses because of the long-standing practice of naming Internet hosts (servers) according to the services they provide.

This use of such prefixes is not required by any technical standard; indeed, the first Web server was at "nxoc01.cern.ch",[32] and even today many Web sites exist without a "www" prefix. The "www" prefix has no meaning in the way the main Web site is shown. The "www" prefix is simply one choice for a Web site's host name.

Some Web browsers will automatically try adding "www." to the beginning, and possibly ".com" to the end, of typed URLs if no host is found without them. ll major web browser will also prefix "http://www." and append ".com" to the address bar contents if the Control and Enter keys are pressed simultaneously.

4. **Explain in detail about visualization?**
    - **Visualization** is any technique for creating images, diagrams, or animations to communicate a message.
    - Visualization through visual imagery has been an effective way to communicate both abstract and concrete ideas since the dawn of man.
    - Examples from history include cave paintings, Egyptian hieroglyphs, Greek geometry, and Leonardo da Vinci's revolutionary methods of technical drawing for engineering and scientific purposes.
    - Visualization today has ever-expanding applications in science, education, engineering (e.g. product visualization), interactive multimedia, medicine , etc.
    - Typical of a visualization application is the field of computer graphics.

- The invention of computer graphics may be the most important development in visualization since the invention of <u>central perspective</u> in the <u>Renaissance</u> period. The development of <u>animation</u> also helped advance visualization.

Fields of visualization

- A scientific visualization of an extremely large simulation of a Raleigh-Taylor instability caused by two mixing fluids.
- As a subject in <u>computer science</u>, **data visualization** or <u>scientific visualization</u> is the use of interactive, sensory representations, typically visual, of abstract data to reinforce <u>cognition</u>, <u>hypothesis</u> building and <u>reasoning</u>.

a.Educational visualization

- Educational visualization is using a <u>simulation</u> normally created on a <u>computer</u> to create an image of something so it can be taught about. In the Roman times, this is very useful when teaching about a topic which is difficult to otherwise see, for example, <u>atomic structure</u>, because atoms are far too small to be studied easily without expensive and difficult to use scientific equipment.
- It can also be used to view past events, such as looking at <u>dinosaurs</u>, or looking at things that are difficult or fragile to look at in reality like the <u>human skeleton</u>, without causing physical or mental harm to a subjective volunteer or cadaver.

b.Information visualization

- Information visualization concentrates on the use of computer-supported tools to explore large amount of abstract data.
- The term "information visualization" was originally coined by the User Interface Research Group at Xerox PARC and included Dr. Jock Mackinlay. Practical application of information visualization in computer programs involves selecting, <u>transforming</u> and representing abstract data in a form that facilitates human interaction for exploration and understanding.
- Important aspects of information visualization are dynamics of visual representation and the interactivity. Strong techniques enable the user to modify the visualization in real-time, thus affording unparalleled perception of patterns and structural relations in the abstract data in question.

c.Knowledge visualization

- The use of visual representations to transfer knowledge between at least two persons aims to improve the transfer of <u>knowledge</u> by using <u>computer</u> and non-computer based visualization methods complementarily.
- Examples of such visual formats are <u>sketches</u>, <u>diagrams</u>, <u>images</u>, <u>objects</u>, interactive visualizations, information visualization applications and imaginary visualizations as in <u>stories</u>. While information visualization concentrates on the use of computer-supported tools to derive new insights, knowledge visualization focuses on transferring insights and creating new <u>knowledge</u> in <u>groups</u>.
- Beyond the mere transfer of <u>facts</u>, knowledge visualization aims to further transfer <u>insights</u>, <u>experiences</u>, <u>attitudes</u>, <u>values</u>, <u>expectations</u>, <u>perspectives</u>, <u>opinions</u>, and <u>predictions</u> by using various complementary <u>visualizations</u>.

d.Product Visualization

- Product Visualization involves visualization software technology for the viewing and manipulation of 3D models, technical drawing and other related documentation of manufactured components and large assemblies of products.
- It is a key part of <u>Product Lifecycle Management</u>. Product visualization software typically provides high levels of photorealism so that a product can be viewed before it is actually manufactured. This supports functions ranging from design and styling to sales and marketing.
- *Technical visualization* is an important aspect of product development. Originally <u>technical drawings</u> were made by hand, but with the rise of advanced <u>computer graphics</u> the <u>drawing board</u> has been replaced by <u>computer-aided design</u> (CAD).
- CAD-drawings and models have several advantages over hand-made drawings such as the possibility of <u>3-D</u> modeling, <u>rapid prototyping</u> and <u>simulation</u>.

Visual communication

- Visual communication is the communication of ideas through the visual display of information. Primarily associated with two dimensional images, it includes: alphanumerics, art, signs, and electronic resources.
- Recent research in the field has focused on web design and graphically oriented usability.

Visual analytics

- Visual analytics focuses on human interaction with visualization systems as part of a larger process of data analysis. Visual analytics has been defined as "the science of analytical reasoning supported by the interactive visual interface" [2].
- Its focus is on human information discourse (interaction) within massive, dynamically changing information spaces. Visual analytics research concentrates on support for perceptual and cognitive operations that enable users to detect the expected and discover the unexpected in complex information space.
- Technologies resulting from visual analytics find their application in almost all fields, but are being driven by critical needs (and funding) in biology and national security.

Visualization techniques

The following are examples of some common visualization techniques:

- Constructing isosurfaces
- direct volume rendering
- Streamlines, streaklines, and pathlines
- table, matrix
- charts (pie chart, bar chart, histogram, function graph, scatter plot, etc.)
- graphs (tree diagram, network diagram, flowchart, existential graph, etc.)
- Maps
- parallel coordinates - a visualization technique aimed at multidimensional data
- treemap - a visualization technique aimed at hierarchical data
- Venn diagram
- Euler diagram
- Chernoff face
- Hyperbolic trees

5.a)Describe about Interface Design Tools.

Tools used for designing the interface, development environments for writing code, and toolkits of graphical user interfaces.

Epark

- EnhancementPark™ (EPark) is an advanced set of OSF/Motif™ widgets extensively tested in hundreds of large scale commercial software applications.
- EPark provides developers with tested, easy-to-use components that eliminate the time, cost, and risk of custom widget development.
- Key Features:
  o Windows95-like controls
  o Easy to use geometry managers and containers
  o Data presentation, application
  o Binary and source code available
  o No royalties or runtime fees

Converter

- At Integrated Computer Solutions we are committed to your success.
- That's why we offer several products that will let you migrate from software that does not meet your needs to the state-of-the-art, industry standard that will help you retain the value of your code.
- Our code conversion is more than simply translating to UIL, you need to know how to avoid creating more problems than you solve.

BX PRO

- Builder Xcessory PRO™ (BX PRO) provides C, C++ or Java developers with everything they need to develop and manage GUI projects of any size from start to finish.

- Benefits
  - Speed GUI development
  - Eliminate unmaintainable code
  - Quickly implement changes

ICE Interface

- ICEfaces is a standards-compliant extension to JavaServer Faces (JSF) for building and deploying rich web applications. ICEfaces™ creates rich user interaction and provides superior presentation characteristics like:
- Smooth, incremental page updates with in-place editing and no full page refresh
- User context preservation during page update, including scrollbar positioning and user focus
- Asynchronous page updates driven from the application in real time
- Fine-grained user interaction during form entry that augments the standard submit/response loop
- ICEfaces is an industrial strength solution that leverages the JSF application framework and the entire J2EE ecosystem of tools and execution environments. Rich application features are developed in pure Java, and in a pure thin-client model.
- There are no Applets, browser plugins, or JavaScript-ladened pages thanks to ICEfaces' breakthrough Direct-to-DOMTM rendering technology. And because ICEfaces applications are JSF applications, your J2EE and JSF development skills apply directly with no learning curve.

5b. Write short notes on Software Testing Tools.

Quick Test Professional (QTP)

Quick Test Professional (QTP) is an automated functional Graphical User Interface (GUI) testing tool that allows the automation of user actions on a web or client based computer application. It is primarily used for functional regression test automation. QTP uses a scripting language built on top of VBScript to specify the test procedure, and to manipulate the objects and controls of the application under test.

WinRunner

WinRunner, Mercury Interactive's enterprise functional testing tool. It is used to quickly create and run sophisticated automated tests on your application. Winrunner helps you automate the testing process, from test development to execution. You create adaptable and reusable test scripts that challenge the functionality of your application. Prior to a software release, you can run these tests in a single overnight run- enabling you to detect and ensure superior software quality.

LoadRunner

LoadRunner is divided up into 3 smaller applications:

The Virtual User Generator allows us to determine what actions we would like our Vusers, or virtual users, to perform within the application. We create scripts that generate a series of actions, such as logging on, navigating through the application, and exiting the program.

The Controller takes the scripts that we have made and runs them through a schedule that we set up. We tell the Controller how many Vusers to activate, when to activate them, and how to group the Vusers and keep track of them.

The Results and Analysis program gives us all the results of the load test in various forms. It allows us to see summaries of data, as well as the details of the load test for pinpointing problems or bottlenecks.

TestDirector

TestDirector, the industry's first global test management solution, helps organizations deploy high-quality applications more quickly and effectively. Its four modules Requirements, Test Plan, Test Lab, and Defects are seamlessly integrated, allowing for a smooth information flow between various testing stages. The completely Web-enabled TestDirector supports high levels of communication and collaboration among distributed testing teams, driving a more effective, efficient global application-testing process

Silk Test

Silk Test is a tool specifically designed for doing **REGRESSION AND FUNCTIONALITY** testing. It is developed by Segue Software Inc. Silk Test is the industry's leading functional testing product for e-business applications, whether Window based, Web, Java, or traditional client/server-based. Silk Test also offers test planning, management, direct database access and validation, the flexible and robust 4Test scripting language, a built in recovery system for unattended testing, and the ability to test across multiple platforms, browsers and technologies.

You have two ways to create automated tests using silktest:

1. Use the **Record Testcase command** to record actions and verification steps as you navigate through the application.

2. Write the testcase manually using the **Visual 4Test scripting language**.

1. **Record Testcase**

The Record / Testcase command is used to record actions and verification steps as you navigate through the application. Tests are recorded in an object-oriented language **called Visual 4Test**. The recorded testreads like a logical trace of all of the steps that were completed by the user. The Silk Test point and click verification system allows you to record the verification step by selecting from a list of properties that are appropriate for the type of object being tested. For example, you can verify the text is stored in a text field.

2. **Write the Testcase manually**

We can write tests that are capable of accomplishing many variations on a test. The key here is re-use. A test case can be designed to take parameters including input data and expected results. This "data-driven" testcase is really an instance of a class of test cases that performs certain steps to drive and verify the application-under-test. Each instance varies by the data that it carries. Since far fewer tests are written with this approach, changes in the GUI will result in reduced effort in updating tests. A data-driven test design also allows for the externalization of testcase data and makes it possible to divide the responsibilities for developing testing requirements and for developing test automation. For example, it may be that a group of domain experts create the Testplan Detail while another group of test engineers develop tests to satisfy those requirements.

In a script file, an automated testcase ideally addresses one test requirement. Specifically, a 4Test function that begins with the test case keyword and contains a sequence of 4Test statements. It drives an application to the state to be tested, verifies that the application works as expected, and returns the application to its base state.

A script file is a file that contains one or more related testcases. A script file has a .t extension, such as find .t

Rational Robot

Rational Robot is a complete set of components for automating the testing of Microsoft Windows client/server and Internet applications running under Windows NT 4.0, Windows 2000, Windows 98, and Windows 95.

The main component of Robot lets you start recording tests in as few as two mouse clicks. After recording, Robot plays back the tests in a fraction of the time it would take to repeat the actions manually. Other components of Robot are:

- Rational Administrator Use to create and manage Rational projects, which store your testing information.
- Rational TestManager Log Use to review and analyze test results.
- Object Properties, Text, Grid, and Image Comparators Use to view and analyze the results of verification point playback.
- Rational SiteCheck Use to manage Internet and intranet Web sites.

6.Describe about Specification Methods of software tools.

- Design requires a good notation to record and discuss alternate possibilities:
  - The default language for specifications in any field is natural language, e.g., English
  - Communication medium, e.g., sketchpad, or blackboard
- Natural-language specifications tend to be:
  - lengthy
  - vague
  - ambiguous
- Therefore often are difficult to prove:
  - correct
  - consistent
  - complete
- Backus-Naur Form (a.k.a. Backus Normal Form or BNF)
  - high-level components are described as nonterminals
  - specific strings are described as terminals
  - Grammars Example

<Telephone book entry>::= <Name><Telephone number>
<Name> ::= <Last name>, <First name>
<Last name> ::= <string>
<First name> ::= <string>
<string> ::= <character>|<character><string>
<character> ::= A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z
<Telephone number>::= (<area code>) <exchange>-<local number>
<area code>::= <digit><digit><digit>
<exchange>::= <digit><digit><digit>
<local number>::= <digit><digit><digit><digit><digit>::= 0|1|2|3|4|5|6|7|8|9

- Examples of acceptable entries
    - WASHINGTON, GEORGE (301) 555-1234
    - BEEF, STU (726) 768-7878
    - A, Z (999) 111-1111
- Multiparty grammars

<Session> ::= <U: Opening> <C: Responding>
<U: Opening> ::= LOGIN <U: Name>
<U: Name> ::= <U: string>
<C: Responding> ::= HELLO [<U: Name.]

U: User   C: Computer
- Multiparty grammars are effective for text oriented command sequences.

Transition Diagram
- a set of *nodes* that represents system states and a set of *links* between the nodes that represents possible transitions.
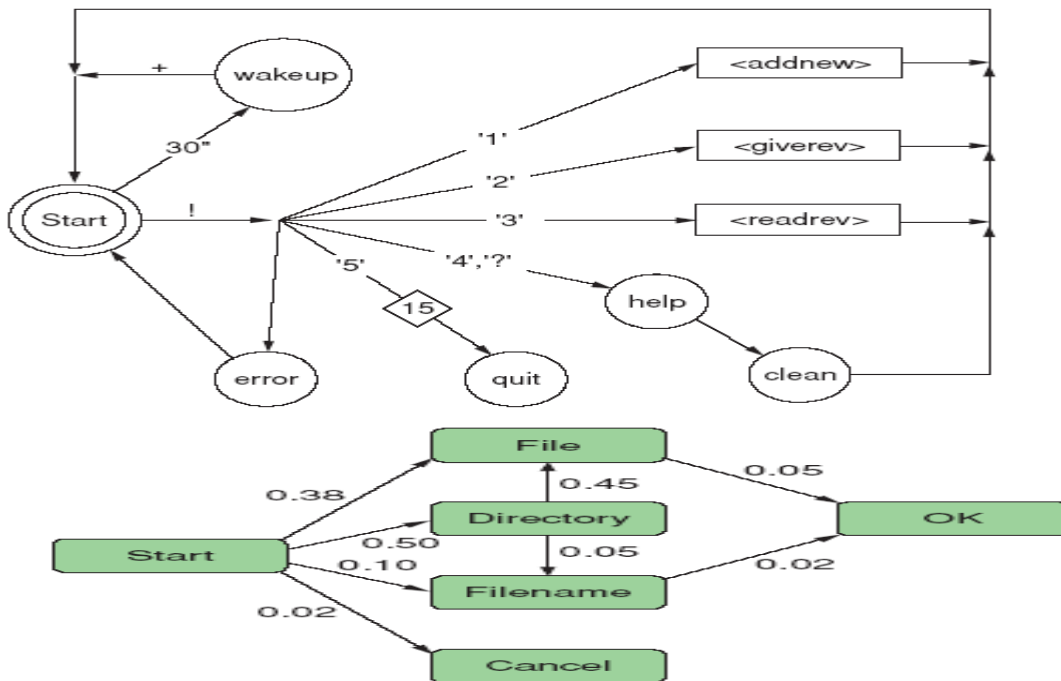
State Charts:
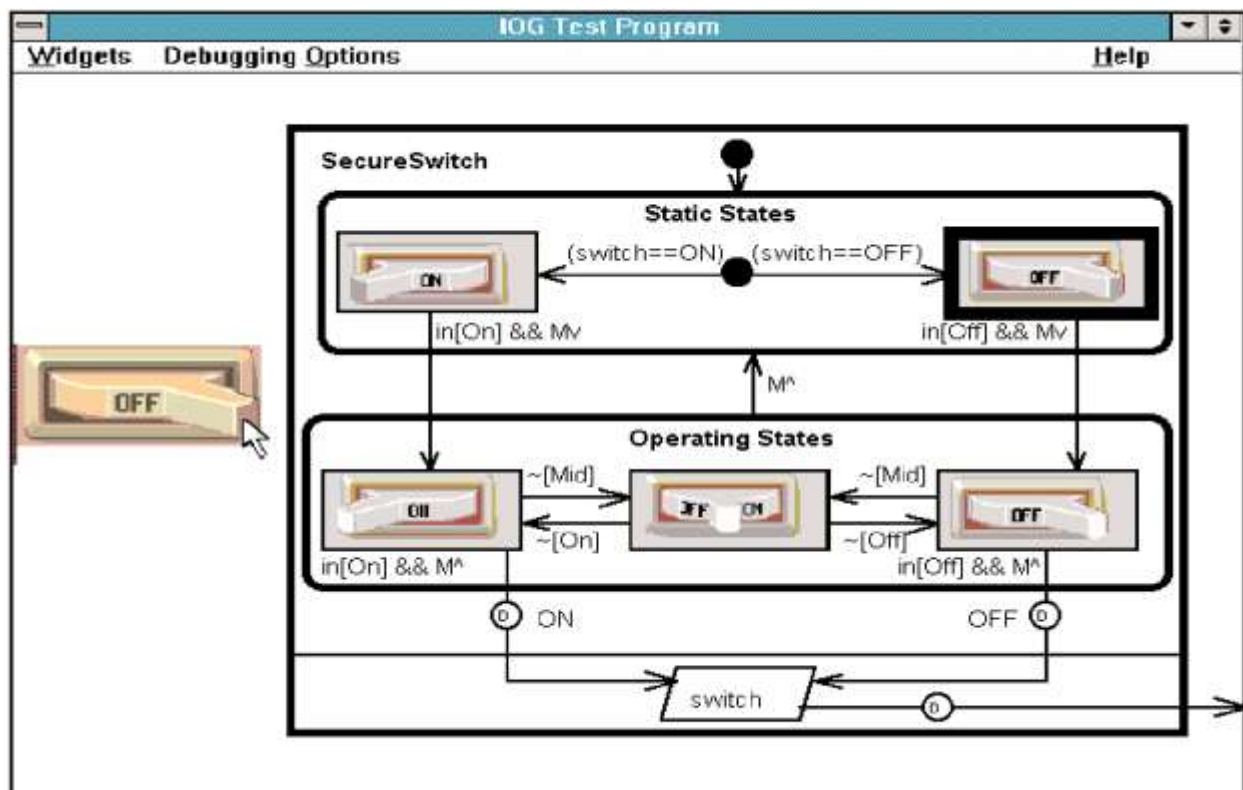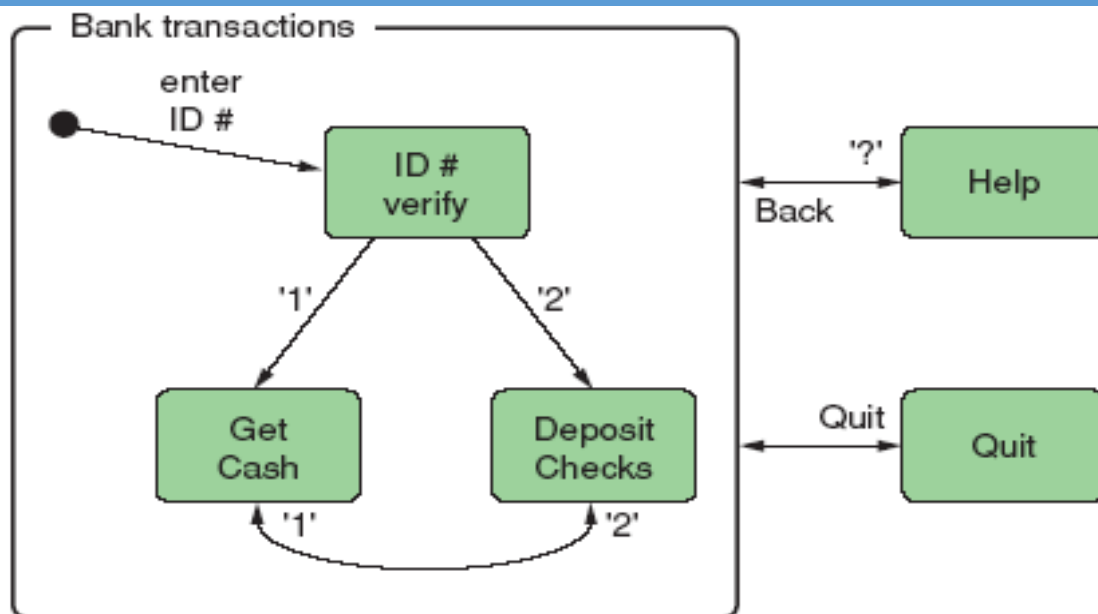
7.Discuss about Interface-Building Tools.

Features of Interface-Building Tools:
- User Interface Independence
    - Separate interface design from internals
    - Enable multiple user interface strategies
    - Enable multiple platform support
    - Establish user interface architect role
    - Enforce standards
- Methodology & Notation
    - Develop design procedures
    - Find ways to talk about design
    - Create project management

- Rapid Prototyping
  - Try out ideas very early
  - Test, revise, test, revise,...
  - Engage end users, managers, and others
- Software Support
  - Increase productivity
  - Offer some constraint & consistency checks
  - Facilitate team approaches
  - Ease maintenance

User interface mockup tools
- Examples
  - Paper and pencil
  - Word processors
  - Slide-show software
  - Macromedia Director, Flash mx, or Dreamweaver
- Visual Editing
  - Microsoft Visual Studio
  - Borland JBuilder
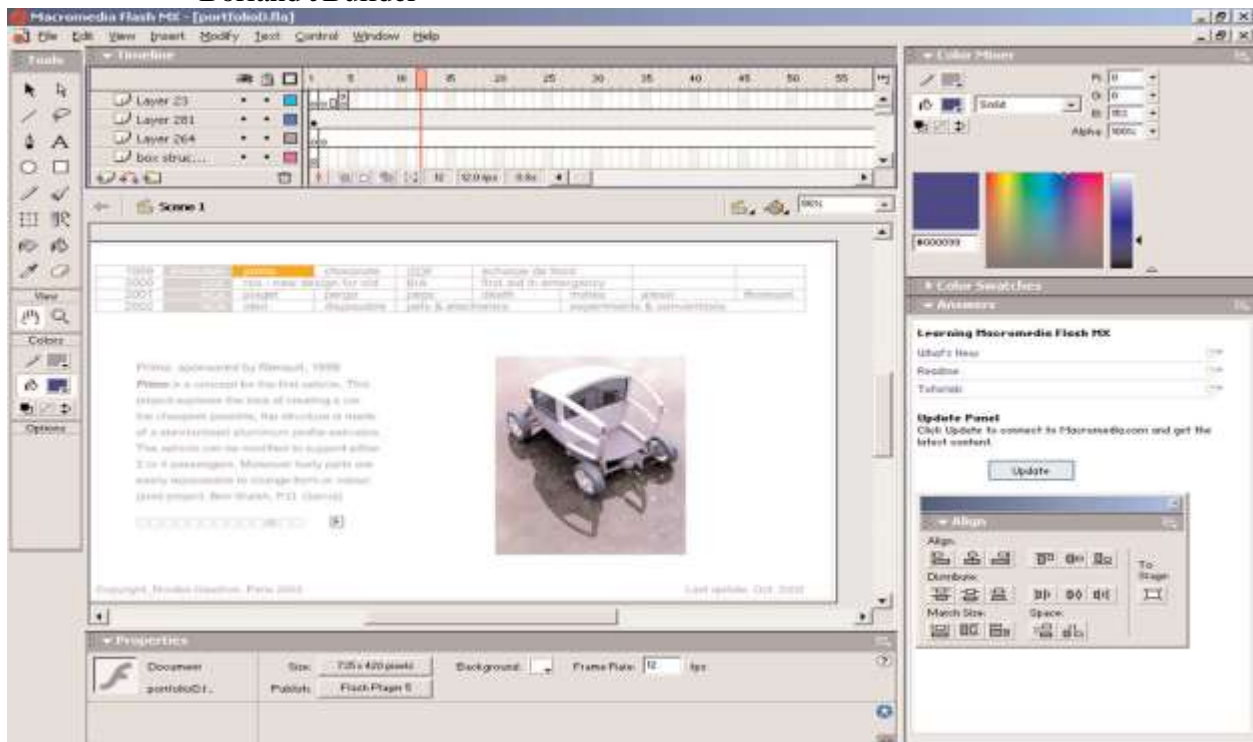
- **Finding the right tool is a tradeoff between six main criteria:**
  1. Part of the application built using the tool.
  2. Learning time
  3. Building time
  4. Methodology imposed or advised
  5. Communication with other subsystems
  6. Extensibility and modularity

	Software Layers	Visual Tools	Examples
4	Application	Model-Based Building Tools	Microsoft Access, Sybase PowerDesigner
3	Application Framework/ Specialized Language	Conceptual Building Tools	Macromedia Director, Tcl/Tk, Microsoft MFC
2	GUI Toolkit	Interface Builder	Borland JBuilder Microsoft Visual Studio
1	Windowing System	Resources Editor	Windows Graphical User Interface Apple Quartz X11 Windowing System

Layer	Part of the application built	Learning time	Building time	Methodology imposed or advised	Communication with other subsystems	Extensibility and modularity
4	All for a specific domain	Long	Short	Specification first, then visual, then programming (if required)	Very good for the specific domain of the tool	Very good
3	Presentation, interaction	Short (days)	Short	Visual first	Depends on the tool	Languages: Bad Frameworks: Good
2	Presentation	Long (weeks)	Long	Visual first with tools, none otherwise	Good	Medium/ good
1	All	Very long (months)	Very long	None	Very good	Very bad

- **The windowing system layer**
  - Sometimes working at a low-level is required.
  - E.g., new platform
  - The while(true) main loop

```
main() {
    InitializeSystem();
    SetInitialState();
    DisplayInitialGraphics();
    while(true) {
        Event event = readNextEvent();
        switch(event.type) {
        case EVENT_REDISPLAY: redisplay(); break;
        case EVENT_PEN_DOWN: doPenDown(event.x, event.y); break;
        case EVENT_CHAR: doInputChar(event.detail); break;
        ...
        default: doSystemDefault(event); break;
        }
    }
}
```

- **The GUI toolkit layer**
  - Widgets, such as windows, scroll bars, pull-down or pop-up menu, etc.
  - Difficult to use without an interface.

```
class PhoneBook {
  public static void main(String[] args) {
    Frame frame = new Frame("PhoneBook");      // create the main window
    final TextField entry = new TextField();   // create a text field
    frame.add(entry, BorderLayout.NORTH);      // add the text field on the upper
                                               // side of the window
    Panel panel = new Panel();                 // create a composite panel to store
                                               // the two "Add" and "Remove" buttons
    panel.setLayout(new FlowLayout());         // specify how the widgets will be
                                               // laid out in the panel
    Button add = new Button("Add");            // create the "Add" button
    panel.add(add);                            // add it to the panel
    Button remove = new Button("Remove");      // create the "Remove" button
    panel.add(remove);                         // add it to the panel
    frame.add(panel, BorderLayout.SOUTH);      // add the panel on the lower side
    final List list = new List();              // create a new item list widget
    frame.add(list, BorderLayout.CENTER);      // add it to the  window's center
    list.add("Washington George
      (301) 555-1234");                        // add one item to the list
    frame.pack();                              // compute the final widgets' sizes
                                               // and positions
    frame.setVisible(true);                    // show the window
    add.addActionListener(new
      ActionListener() {                       // add action to the "Add" button
public void actionPerformed(ActionEvent e)
{ list.add(entry.getText()); }                 // add the text field's text
      });                                      // to the list
    remove.addActionListener
    (new ActionListener() {                    // add action to the "Remove" button
    public void actionPerformed
    (ActionEvent e)
{ try { list.remove(entry.getText()); } catch(Exception ex) {}}
      });
  }
}
```
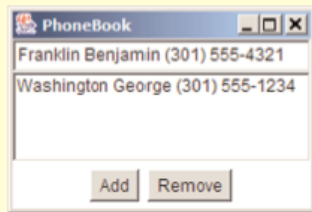

- **The application framework and specialized language layer**
  - Application frameworks are based on object-oriented programming
    - Can quickly build sophisticated interfaces
    - Require intensive learning
  - Specialized language layers lighten the programming burden
    - Tcl (and its toolkit Tk)
    - Perl/Tk
    - Python/Tk
    - Visual Basic
    - Java Script

8.Elaborate on usability testing guidelines. (May/Jun 2012) or Write a note on usability test. (May/June 2013)
Usability Test
- Description:
  — An interface evaluation under real-world or controlled conditions.
  — Measures of performance are derived for specific tasks.
  — Problems are identified.
- Advantages:
  — Utilizes an actual work environment.
  — Identifies serious or recurring problems.
- Disadvantages:
  — High cost for establishing facility.

— Requires a test conductor with user interface expertise.

— Emphasizes first-time system usage.

— Poorly suited for detecting inconsistency problems.

The Purpose of Usability Testing

First, it establishes a communication bridge between developers and users. Through testing, the developer learns about the user's goals, perceptions, questions, and problems.

- Second, testing is used to evaluate a product. It validates design decisions. It also can identify potential problems in design at a point in the development process where they can be more easily addressed.

The Importance of Usability Testing

A thorough usability testing process is important for many reasons,

- Developers and users possess different models.
- Developer's intuitions are not always correct.
- There is no average user.
- It's impossible to predict usability from appearance.
- Design standards and guidelines are not sufficient.
- Informal feedback is inadequate.
- Problems found late are more difficult and expensive to fix.
- Advantages over a competitive product can be achieved.

Developing and Conducting the Test

- A usability test requires developing a test plan, selecting test participants, conducting the test, and analyzing the test results.

a.The Test Plan

- Define the scope of the test.
  - A test's scope will be influenced by a variety of factors.
  - Determinants include the following issues:
  - The *design stage:* early, middle, or late—the stage of design influences the kinds of prototypes that may exist for the test,
  - the *time available* for the test—this may range from just a few days to a year or more,
  - *finances allocated* for testing—money allocated may range from one percent of a project's cost to more than 10 percent,
  - the project's *novelty* (well defined or exploratory)—this will influence the kinds of tests feasible to conduct,
  - expected *user numbers* (few or many) and *interface criticality* (life-critical medical system or informational exhibit)—much more testing depth and length will be needed for systems with greater human impact, and finally, the development team's *experience* and testing knowledge will also affect the kinds of tests that can be conducted.
- Define the purpose of the test.
  — Performance goals.
  — What the test is intended to accomplish.
- Define the test methodology.
  — Type of test to be performed.
  — Test limitations.
  — Developer participants.
- Identify and schedule the test facility or location.
  - The location should be away from distractions and disturbances. If the test is being held in a usability laboratory, the test facility should resemble the location where the system will be used.
  - It may be an actual office designated for the purpose of testing, or it may be a laboratory specially designed and fitted for conducting tests.
- Develop scenarios to satisfy the test's purpose.

b.Test Participants

- Assemble the proper people to participate in the test.

c.Test Conduct and Data Collection

- To collect usable data, the test should begin only after the proper preparation. Then, the data must be properly and accurately recorded.
- Finally, the test must be concluded and followed up properly.

Usability Test Guidelines

- Before starting the test:
  — Explain that the objective is to test the software, not the participants.
  — Explain how the test materials and records will be used.
  — If a consent agreement is to be signed, explain all information on it.
  — If verbal protocols will be collected, let participants practice thinking aloud.
  — Ensure that all participants' questions are answered and that participants are comfortable with all procedures.
- During the test:
  — Minimize the number of people who will interact with the participants.
  — If observers will be in the room, limit them to two or three.
  — Provide a checklist for recording:
    • Times to perform tasks.
    • Errors made in performing tasks.
    • Unexpected user actions.
    • System features used/not used.
    • Difficult/easy-to-use features.
    • System bugs or failures.
  — Record techniques and search patterns that participants employ when attempting to work through a difficulty.
  — If participants are thinking aloud, record assumptions and inferences being made.
  — Record the session with a tape recorder or video camera.
  — Do not interrupt participants unless absolutely necessary.
  — If participants need help, provide some response.
    • Provide encouragement or hints.
    • Give general hints before specific hints.
    • Record the number of hints given.
  — Watch carefully for signs of stress in participants:
    • Sitting for long times doing nothing.
    • Blaming themselves for problems.
    • Flipping through documentation without really reading it.
  — Provide short breaks when needed.
  — Maintain a positive attitude, no matter what happens.
- After the test:
  — Hold a final interview with participants; tell participants what has been learned in the test.
  — Provide a follow-up questionnaire that asks participants to evaluate the product or tasks performed.
  — If videotaping, use tapes only in proper ways.
    • Respect participants' privacy.
    • Get written permission to use tapes.

9.Describe the four phases of frameworks used to clarify user interfaces for textual search(May/June 2013)

1. **Formulation:** expressing the search
2. **Initiation of action:** launching the search
3. **Review of results:** reading messages and outcomes
4. **Refinement:** formulating the next step
5. **Use:** compiling or disseminating insight.

1. **Formulation**
   - Provide access to the appropriate sources in libraries and collections.
   - Use *fields* for limiting the source: structured fields such as year, media, or language; and text fields such as titles or abstracts of documents.
   - Recognize *phrases* to allow entry of names, such as George Washington or Environmental Protection Agency, and concepts, such as abortion rights reform or gallium arsenide.
   - Permit *variants* to allow relaxation of search constraints, such as case sensitivity, stemming, partial matches, phonetic variations, abbreviations, or synonyms from a thesaurus.
   - Control the size of the result set.
2. **Initiation of action**
   - Include *explicit actions* initiated by buttons with consistent labels (such as "Search"), locations, sizes, and colors.
   - Include *implicit actions* initiated by changes to a parameter of the formulation phase that immediately produce new sets of search results.
3. **Review of results**
   - Present explanatory messages.
   - View an overview of the results and previews of items.
   - Manipulate visualizations.
   - Adjust the size of the result set and which fields are displayed.
   - Change the sequencing (alphabetical, chronological, relevance ranked, and so on).
   - Explore clustering (by attribute value, topics, and so on).
   - Examine selected items.
4. **Refinement**
   - Use meaningful messages to guide users in progressive refinement; for example, if the two words in a phrase are not found near each other, offer easy selection of individual words or variants.
   - Make changing of search parameters convenient.
   - Explore relevance feedback.
5. **Use**
   - Allow queries, parameter settings, and results to be saved and annotated, sent by e-mail, or used as input to other programs (such as visualization or statistical tools).

10.a)State the problems in search facilities and explain the search facility guidelines in detail(Nov/Dec 2013)
- Information search should be a joyous experience, but it takes a skilled searcher with robust tools to perform an effective search
- Information retrieval and database management have evolved into:
   - information gathering, seeking, filtering, collaborative filtering, sense making, and visual analytics.
   - data mining from data warehouses and data marts
   - knowledge networks or semantic webs
- All the above is complicated by the increased volume of material to search

Searching in Textual Documents and Database Querying:

Expert users can use SQL:

SELECT DOCUMENT# FROM JOURNAL-DB WHERE (DATE >= 2004 AND DATE <= 2008) AND (LANGUAGE = ENGLISH OR FRENCH) AND (PUBLISHER = ASIST OR HFES OR ACM)

- SQL has powerful features, but it requires training
   - While SQL is a standard, form fill-in queries have simplified query formulation.
- Other methods include:
   - Natural language queries
   - Form fill-in

- Query By Example (QBE)
- Evidence shows that users perform better and have higher satisfaction when they can view and control the search.

A search for "user interface" powered by Endeca (http://www.lib.ncsu.edu) returns 144 results grouped into 10 pages. The menu at the upper right allows users to sort results by relevance or by date, while on the left a summary of the results organized by Subject, Genre, or Format provides an overview of the results and facilitates further refinement of the search.

10b) Write short notes on Evaluation and Critiquing Tools.

a.Tullis' Display Analysis Program, Version 4.0:
- Takes alphanumeric screen designs and produces display-complexity metrics plus some advice:
  - Upper-case letters: 77%. The percentage of upper-case letters is high.
    - Consider using more lower-case letters, since text printed in normal upper- and lower-case letters is read about 13% faster than text in all upper case. Reserve all upper-case for items that need to attract attention.
  - Maximum local density =89.9% at row 9, column 8.
    Average local density = 67.0%
    - The area with the highest local density is identified...you can reduce local density by distributing the characters as evenly as feasible over the entire screen.
  - Total layout complexity = 8.02 bits
    Layout complexity is high.
    - This means that the display items (labels and data) are not well aligned with each other...Horizontal complexity can be reduced by starting items in fewer different columns on the screen (that is, by aligning them vertically).

b.Doctor HTML - Web Page Analyzer:
- http://imagiware.com/RxHTML
  - Did not find the required open and close HEAD tag. You should open and close the HEAD tag in order to get consistent performance on all browsers.
  - Found extra close STRONG tags in the document. Please remove them.

11a)Describe about Multimedia Document Searches.
- Image search

- Map search
- Design or diagram search
- Sound search
- Video search
- Animation search

a.Image Search:
- Finding photos with images such as the Statue of Liberty is a challenge
  - Query-by-Image-Content (QBIC) is difficult
  - Search by profile (shape of lady), distinctive features (torch), colors (green copper)
- Use simple drawing tools to build templates or profiles to search with
- More success is attainable by searching restricted collections
  - Search a vase collection
  - Find a vase with a long neck by drawing a profile of it
- Critical searches such as fingerprint matching requires a minimum of 20 distinct features
- For small collections of personal photos effective browsing and lightweight annotation are important

b.Map Search
- On-line maps are plentiful
- Search by latitude/longitude is the structured-database solution
- Today's maps are allow utilizing structured aspects and multiple layers
  - City, state, and site searches
  - Flight information searches
  - Weather information searches
  - Mapquest, Google Maps, etc.
- Mobile devices can allow "here" as a point of reference

c.Design/Diagram Searches
- Some computer-assisted design packages support search of designs
- Allows searches of diagrams, blueprints, newspapers, etc., e.g. search for a red circle in a blue square or a piston in an engine
- Document-structure recognition for searching newspapers

d.Sound Search
- MIR supports audio input
- Search for phone conversations may be possible in future on speaker independent basis

e.Video Search
- Provide an overview
- Segmentation into scenes and frames
- Support multiple search methods
- Infomedia project

f.Animation Search
- Prevalence increased with the popularity of Flash
- Possible to search for specific animations like a spinning globe
- Search for moving text on a black background.

11 b)Write short notes on Advanced Filtering and Search Interfaces.
- Filtering with complex Boolean queries
- Automatic filtering
- Dynamic queries
- Faceted metadata search
- Query by example
- Implicit search
- Collaborative filtering
- Multilingual searches
- Visual field specification

For advanced uses there are alternatives to form fill-in query interfaces:
- Filtering with complex Boolean queries

- – Problem with informal English, e.g. use of 'and' and 'or'
  - – Venn diagrams, decision tables, and metaphor of water flowing have not worked for complex queries
- • Dynamic Queries - Adjusting sliders, buttons, etc and getting immediate feedback
  - – "Direct manipulation" queries
  - – Use sliders and other related controls to adjust the query
  - – Get immediate (less than 100 msec) feedback with data
  - – Dynamic HomeFinder and Blue Nile
  - – Hard to update fast with large databases
- • Query previews present an overview to give users information and the distribution of data and thereby eliminate undesired items
- • Faceted metadata search
  - – Integrates category browsing with keyword searching
  - – Flameco
- • Collaborative Filtering
  - – Groups of users combine evaluations to help in finding items in a large database
  - – User "votes" and his info is used for rating the item of interest, e.g. a user rating six restaurants highly is given a list of restaurants also rated highly by those who agree the six are good
- • Multilingual searches
  - – Current systems provide rudimentary translation searches
  - – Prototypes of systems with specific dictionaries and more sophisticated translation
- • Visual searches
  - – Specialized visual representations of the possible values, e.g. dates on a calendar or seats on a plane
  - – On a map the location may be more important than the name
  - – Implicit initiation and immediate feedback

Blue Nile (bluenile.com) uses dynamic queries to narrow down the results of searches. Here, the double-sided sliders were adjusted to show only lower-priced diamonds with very good cut and high carat ratings.

Flamenco (http://flamenco.berkeley.edu/) is an example of a faceted metadata search. Facets include Media, Location, Date, Themes, and so on. Here, two attribute values are selected (Date = 20th century and Location = Europe) with results grouped by location. The image previews are updated immediately as constraints are added or removed (another example of implicit query initiation). Clicking on a group heading such as "Belgium/Flanders" refines the query into that category, while clicking on "All" dates relaxes the date constraint.

Using The Hive Group's treemap (http://www.hivegroup.com/), users can review all waterproof binoculars in the catalog of Amazon.com products and browse the items in the list, grouped by manufacturer. Each box corresponds to a pair of binoculars, and the size of the box is proportional to its price. Green boxes are best-sellers. Users can filter the results using the dynamic query sliders on the right. Here all the binoculars with less than three user reviews have been filtered out, leaving only 61 binoculars to consider.

Write in detail about information searching techniques (May/Jun 2012) or Explain the procedure involved in information search in web pages(Nov/ Dec 2014)
10a, 11a & b answers.