UNIT-2 IMPORTANT QUESTIONS SOLUTIONS

1. Explain the Obstacles and Pitfalls in the Development Path.

Obstacles and Pitfalls in the Development Path

Gould (1988) has made these general observations about design:

Nobody ever gets it right the first time.

- Development is chock-full of surprises.
- Good design requires living in a sea of changes.
- Making contracts to ignore change will never eliminate the need for change.
- Even if you have made the best system humanly possible, people will still make mistakes when using it.
- Designers need good tools.

You must have behavioral design goals like performance design goals.

The first five conditions listed will occur naturally because people are people, both as users and as developers. These kinds of behavior must be understood and accepted in design. User mistakes, while they will always occur, can be reduced.

Pitfalls in the design process exist because of a flawed design process, including a failure to address critical design issues, an improper focus of attention, or development team organization failures. Common pitfalls are:

- No early analysis and understanding of the user's needs and expectations.
- A focus on using design features or components that are "neat" or "glitzy."
- Little or no creation of design element prototypes. ○ No usability testing.
- No common design team vision of user interface design goals.
- Poor communication between members of the development team.

2. What is Usability? Explain Common Usability Problems.

Usability

The term usability used to describe the effectiveness of human performance. The term usability is defined as "the capability to be used by humans easily and effectively, where,

easily = to a specified level of subjective assessment, effectively = to a specified level of human performance."

Common Usability Problems

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.

3 List and explain the Practical and Objective Measures of Usability.

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?

4. Identify the important human characteristics in design.

Important Human Characteristics in Design

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.

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.

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.

Visual Acuity

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.

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.

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.

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.

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.

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

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.

5 Explain about System Training and Documentation Needs

Training

 System training will be based on user needs, system conceptual design, system learning goals,

and system performance goals.

 Training may include such tools as formal or video training, manuals, online tutorials, reference

manuals, quick reference guides, and online help.

 Any potential problems can also be identified and addressed earlier in the design process,

reducing later problems and modification costs.

Documentation

 System documentation is a reference point, a form of communication, and a more concrete

design—words that can be seen and understood based on user needs, system conceptual design,

and system performance goals.

It will also be Creating documentation during the development progress will uncover issues and reveal

omissions that might not otherwise be detected until later in the design process.

SCANNING GUIDELINES

• Organization

• Minimize eye movement

• Provide groupings of information

• Organize content in a logical and obvious way.

• Writing

• Provide meaningful headings and subheadings.

• Provide meaningful titles

• Concisely write the text.

• Use bullets/ numbers

• Array information in tables

• Presentation

– Key information in words or phrases

– Important concepts

BROWSING GUIDELINES

• Facilitate scanning

• Provide multiple layers of structure

• Make navigation easy

• Respect users desire to leave

• Upon returning help users reorient themselves.

• Users can browse deeply or simply move on.

• Provide guidance to help reorientation

• Understand terms to minimize to need for users to switch context.

6(a) Identify the Human Considerations in Design.

Human Considerations in Design

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 job.	Use Frequent or infrequent use of other systems in doing
Education	High school, college, or advanced degree.
Reading Level	Less than 5th grade, 5th–12th, more than 12th grade.
Typing Skill average	Expert (135 WPM), skilled (90 WPM), good (55 WPM), (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 system.	Continual, frequent, occasional, or once-in-a-lifetime use of
Task or Need Importance performed.	High, moderate, or low importance of the task being
Task Structure	Repetitiveness or predictability of tasks being automated, high,moderate, or low.
Social Interactions required.	Verbal communication with another person required or not
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, 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 performance.	High, some, or no stress generally resulting from task
Cognitive Style	Verbal or spatial, analytic or intuitive, concrete or abstract.

6(b) Identify the human interaction speeds.

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.

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.

7 List and explain the Direct Methods for requirement analysis.

DIRECT METHODs

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.

Telephone Interview or Survey

A structured interview conducted via telephone.

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.

Number the cards on the back.

Arrange for a facility with large enough table for spreading out cards.

Select participants representing a range of users. Use one or two people at a time and 5 to 12 in total

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.

Make a record of the groupings using the numbers on the back of each card.

Reshuffle the cards for the next session.

When finished, analyze the results looking for commonalities among the different sorting sessions.

8.List and explain the Indirect Methods for requirement analysis.

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

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.

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:

Determine the survey objectives.

Determine where you will find the people to complete the survey.

Create a mix of multiple choice and open-ended questions requiring short answers addressing the survey objectives.

Keep it short, about 10 items or less is preferable.

Keep it simple, requiring no more than 5–10 minutes to complete

Iterative survey

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.

A third follow-up survey can also be designed to gather additional information about the most important requirements and tasks

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.

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.

9. Identify the Design Standards and Guidelines.

Design Standards or Style Guides

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:

- Allow faster performance.
- Reduce errors.
- Reduce training time.
- Foster better system utilization.
- Improve satisfaction.
- Improve system acceptance.

They are valuable to system developers because they:

- Increase visibility of the human-computer interface.
- Simplify design.

- Provide more programming and design aids, reducing programming time.
- Reduce redundant effort.
- Reduce training time.
- 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.

10. Examine about Determining Basic Business Functions.

Determining Basic Business Functions

The process the developer will use is summarized as follows:

- 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.
- 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.

The objects can be sorted into the following categories:

- Concrete objects—things that can be touched.
- People who are the object of sentences—normally organization employees, customers,
- for example.
- Forms or journals—things that keep track of information.
- People who are the subject of sentences—normally the users of a system. o Abstract objects—anything not included above.

Developing Conceptual Models

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

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.

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.