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Internal Assessment Test 1 – Nov. 2021

Sub:	Principles of User Interface Design							Sub Code:	18MCA552	
Date:	13/11/2021	Duration:	90 min's	Max Marks:	50	Sem:	V	Branch:	MCA	

Note : Answer FIVE FULL Questions, choosing ONE full question from each Module		MARKS	OBE	
			CO	RBT
	PART I			
1	Explain about different types of high-level theories to support user interface design.	[10]	CO1	L1
	OR			
2	Discuss four pillar of design with a neat diagram.	[10]	CO2	L2
	PART II			
3	Discuss different usability motivation. Explain participatory observation for design.	[10]	CO2	L2
	OR			
4	Explain the method used in the evaluation during active usage.	[10]	CO1	L1
	PART III			
5	Discuss the variety of expert review methods with suitable example.	[10]	CO2	L2
	OR			
6	What are the eight golden rules of interface Design? Explain with example	[10]	CO2	L1
	PART IV			
7	Write a note on ethnographic observation development methodology.	[10]	CO2	L1
	OR			
8	Explain the stages of user interface design methodology in details with suitable example.	[10]	CO2	L1
	PART V			
9	Explain acceptance test scope and components with example. Explain different steps in Surveys techniques of	[10]	CO2	L1
	OR			
10	Describe the usability requirement analysis & measures of user interface design	[10]	CO1	L2

Scheme of Valuation

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	Note : Answer FIVE FULL Questions, choosing ONE full question from each Module							**Marks Distribution**	**Marks Obtained**
1	Explain about different types of high-level theories to support user interface design. Myers-Briggs Type Indicator (MBTI) Smith and Mosier Foley and Van Dam four-level approach							5 2 3	10
2	Discuss four pillar of design with a neat diagram. User Requirements Process Guidelines User Interface Software Tools Expert Review & Usability Test Diagram							2 2 2 2 2	10
3	Discuss different usability motivation. Explain participatory observation for design. • Life Critical Systems • Industrial and Commercial Uses • Office, Home and Entertainment applications • Exploratory, creative, and cooperative systems • Social-technical systems • Design for User • Design by User • Design with User • Example							1 1 1 1 1 1 1 1 2	10
4	Explain the method used in the evaluation during active usage. • Interviews and focus group discussions • Continuous user-performance data logging • Online or telephone consultants • Online suggestion box or trouble reporting • User newsletters and conferences • Online bulletin board or newsgroup							2 2 2 2 2	10

5	Discuss the variety of expert review methods with suitable example.
	    ▪ Heuristic evaluation
	    ▪ Guidelines review
	    ▪ Consistency inspection
	    ▪ Cognitive walkthrough
	    ▪ Formal usability inspection
		2
		2
		2
		2
		2
			10

6	What are the eight golden rules of interface Design? Explain with example
	    1. Strive for consistency
	    2. Cater to universal usability
	    3. Offer informative feedback
	    4. Design dialogs to yield closure
	    5. Prevent errors
	    6. Permit easy reversal of actions
	    7. Support internal locus of control
	    8. Reduce short term memory *(Answer Any Five Points)*
		2
		2
		2
		2
		2
		2
		2
		2
			5x2= 10

7	Write a note on ethnographic observation development methodology.
	    • Definition of ethnographic
	    • Example of ethnographic
	    • Focused ethnographic
	    • Scope of ethnographic
	    • Prototype and ethnographic
		2
		2
		2
		2
		2
			10

8	Explain the stages of user interface design methodology in details with suitable example.
	    Stage 1: Develop Product Concept
	    Stage 2: Research and Needs Analysis
	    Stage 3: Design Concepts and Key Screen Prototype
	    Stage 4: Iterative Design and Refinement
	    Stage 5: Implement Software
	    Stage 6: Provide Roll-Out Support-
		2
		2
		2
		2
		2
		-
			10

9	Explain acceptance test scope and components with example.
	Explain different steps in Surveys techniques
	    • Time to learn specific functions
	    • Speed of task performance
	    • Rate of errors by users
	    • Human retention of commands over time
	    • Subjective user satisfaction
	    • Users background
	    • Experience with computers
	    • Job responsibilities
	    • Personality style
	    • Reasons for not using an interface
	    • Familiarity with features
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
			10

10	Describe the usability requirement analysis & measures of user interface design		
	• Ascertain the user's needs	2	
	• Ensure reliability	2	
	• Promote standardization, integration, consistency, and portability	2	
	• Foster design standardization within and among systems	2	
	• Minimize skill and personnel requirements and training time	2	10

1. **Explain about different types of high-level theories to support user interface design**

   Foley's four level approach for designing
   ☐ Conceptual level: User's mental model of the interactive system.Two mental models for image creation are paint programs that manipulatepixels and drawing programs that operate on objects. Users of paint programsthink in terms of sequences of actions on pixels and groups of pixels,while users of drawing programs apply operators to alter and group objects.Decisions about mental models affect each of the lower levels.
   ☐ Semantic level: Describes the meanings conveyed by the user's command input and by the computer's output display For example, deleting an object in adrawing program could be accomplished by undoing a recent action or byinvoking a delete-object action. Either action should eliminate a single objectand leave the rest untouched.
   ☐ Syntactic level: Defines how the units (words) that convey semantics are assembled into a complete sentence that instructs the computer to perform a certain task.
   ☐ Lexical level: Deals with device dependencies and with the precise mechanisms by which a user specifies the syntax

   Myers–Briggs Type Indicator (MBTI)

   The MBTI is based on the conceptual theory proposed by Swiss psychiatrist Carl Jung, who had speculated that people experience the world using four principal psychological functions—sensation, intuition, feeling, and thinking—and that one of these four functions is dominant for a person most of the time. The four categories are introversion/extraversion, sensing/intuition, thinking/feeling, judging/perceiving. Each person is said to have one preferred quality from each category, producing 16 unique types.

   In personality typology, the **Myers–Briggs Type Indicator (MBTI)** is an introspective self-report questionnaire indicating differing psychological preferences in how people perceive the world and make decisions. The test attempts to assign four categories: introversion or extraversion, sensing or intuition, thinking or feeling, judging or perceiving. One letter from each category is taken to produce a four-letter test result, such as "INFJ" or "ENFP".

   Most of the research supporting the MBTI's validity has been produced by the Center for Applications of Psychological Type, an organization run by the Myers-Briggs Foundation, and published in the center's own journal, the *Journal of Psychological Type*, raising questions of independence, bias, and conflict of interest.

   Smith and Mosier (1986) offer five high-level goals
   – Consistency of data display/transaction
   – Efficient information assimilation by the user
   – Minimal input actions by user
   – Minimal memory load on the user
   – Compatibility of data display with data entry
   – Flexibility for user control of data display

2. Discuss four pillar of design with a neat diagram.
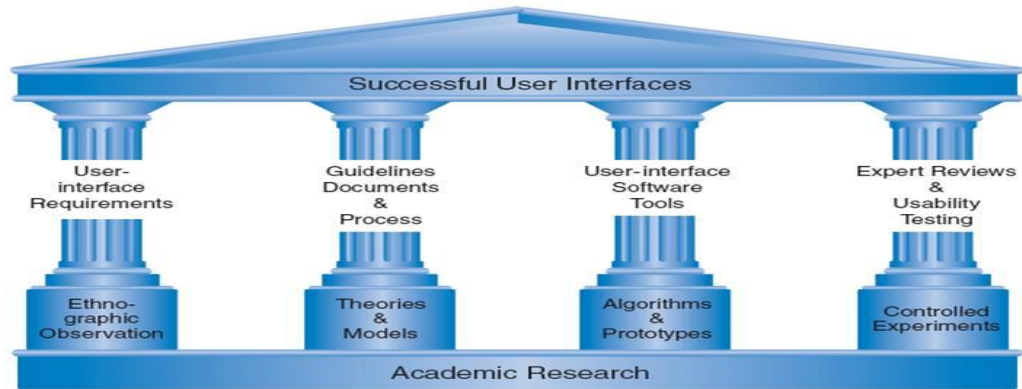
User Interface Requirements
– Soliciting and clearly specifying user requirements is a major key to success in any development activity
– Laying out the user-interface requirements is part of the overall requirements development and management process
– User interface requirements describe system behavior
• Ethnographic Observation
– Identifying and observing the user community in action
– Discussed later
Guidelines documents and processes
      Each project has different needs, but guidelines should be considered for:
• Words, icons, and graphics
– Terminology (objects and actions), abbreviations, and capitalization
– Character set, fonts, font sizes, and styles (bold, italic, underline)
– Icons, graphics, line thickness, and
– Use of color, backgrounds, highlighting, and blinking
• Screen-layout issues
– Menu selection, form fill-in, and dialog-box formats
– Wording of prompts, feedback, and error messages
– Justification, white space, and margins
– Data entry and display formats for items and lists
– Use and contents of headers and footers
• Input and output devices
– Keyboard, display, cursor control, and pointing devices
– Audible sounds, voice feedback, touch input, and other special devices
– Response time for a variety of tasks
• Action sequences
– Direct-manipulation clicking, dragging, dropping, and gestures
– Command syntax, semantics, and sequences
– Programmed function keys
– Error handling and recovery procedures
• Training
– Online help and tutorials
– Training and reference materials
– Command syntax, semantics, and sequences
User Interface Software Tools
  A p l i c a t i o n
  Higher-level Tools

Toolkit
Windowing System
Operating System
Expert Review and Usability testing
Interactive-System designers are now recognizing that they must carry out many *small* and some *large pilot tests* of system components before release to customers

3. Discuss different usability motivation. Explain participatory observation for design.

1.Life-critical systems
o Air traffic control, nuclear reactors, power utilities, police & fire dispatch systems
o High costs, reliability and effectiveness are expected
o Length training periods are acceptable provide error-free performance
o Subject satisfaction is less an issue due to well motivated users Retention via frequent use and practice
2. Industrial and commercial uses
o Banking, insurance, order entry, inventory management, reservation, billing, and point-of-sales systems
o Lower cost may sacrifice reliability
Training is expensive, learning must be easy
o Speed and error rates are relative to cost, however speed is the supreme concern
Subject satisfaction is fairly important to limit operator burnout
3. Office, home, and entertainment applications
o Word processing, electronic mail, computer conferencing, and video game systems
o Choosing functionality is difficult because the population has a wide range of both novice and expert users
o Competition cause the need for low cost
4. Exploratory, creative, and cooperative systems
o Database, artist toolkits, statistical packages, and scientific modeling systems
o Benchmarks are hard to describe due to the wide array of tasks
o With these applications, the computer should "vanish" so that the user can be absorbed in their task domain
5. Sociotechnical systems
o Designers have to take into consideration the diverse levels of expertise that users with different roles have.
o For the professional administrators and the seasoned investigators will enable rapid performance of complex procedures with visualization tools to spot unusual patterns or detect fraud in usage logs

Explain participatory observation for design.
Participatory action research (PAR) is an approach to action research emphasizing participation and action by members of communities affected by that research. It seeks to understand the world by trying to change it, collaboratively and following reflection. PAR emphasizes collective inquiry and experimentation grounded in experience and social history. Within a PAR process, "communities of inquiry and action evolve and address questions and issues that are significant for those who participate as co-researchers".PAR contrasts with mainstream research methods, which emphasize controlled experimentation, statistical analysis, and reproducibility of findings.
PAR practitioners make a concerted effort to integrate three basic aspects of their work: participation (life in society and democracy), action (engagement with experience and history),

and research (soundness in thought and the growth of knowledge). "Action unites, organically, with research" and collective processes of self-investigation. The way each component is actually understood and the relative emphasis it receives varies nonetheless from one PAR theory and practice to another. This means that PAR is not a monolithic body of ideas and methods but rather a pluralistic orientation to knowledge making and social change.

4. **Explain the method used in the evaluation during active usage**
    A carefully designed and thoroughly tested system is a wonderful asset, but successful active use requires constant attention from .
    1. dedicated managers,
         a. user-services personnel,
         b. and maintenance staff.
         c. Perfection is not attainable, but percentage improvements are possible and are worth pursuing.

    Interviews and focus group discussions
    b. ___*Interviews with individual*___ users can be productive because the interviewer can pursue specific issues of concern.
    c. After a series of individual discussions, ___*group discussions*___ are valuable to ascertain the universality of comments.

    Continuous user-performance data logging
    ❑ The software architecture should make it easy for system managers to collect data about the patterns of system usage, speed of user performance, rate of errors, or frequency of request for online assistance.
    ❑ A major benefit of usage-frequency data is the guidance they provide to system maintainers in optimizing performance and reducing costs for all participants.

    Online or telephone consultants
    ❑ Online or telephone consultants are an extremely effective and personal way to provide assistance to users who are experiencing difficulties.
    ❑ Many users feel reassured if they know there is a human being to whom they can turn when problems arise.
    ❑ On some network systems, the consultants can monitor the user's computer and see the same displays that the user sees while maintaining telephone voice contact.
    ❑ This service can be extremely reassuring; the users know that someone can walk them through the correct sequence of screens to complete their tasks.

    Online suggestion box or trouble reporting
    ❑ Electronic mail can be employed to allow users to send messages to the maintainers or designers.
    ❑ Such an online suggestion box encourages some users to make productive comments, since writing a letter may be seen as requiring too much effort.

    User newsletters and conferences
    ❑ Newsletters that provide information about novel interface facilities, suggestions for improved productivity, requests for assistance, case studies of successful applications, or stories about individual users can promote user satisfaction and greater knowledge.
    ❑ Printed newsletters are more traditional and have the advantage that they can be carried away from the workstation.
    ❑ Online newsletters are less expensive and more rapidly disseminated

❑ Conferences allow workers to exchange experiences with colleagues, promote novel approaches, stimulate greater dedication, encourage higher productivity, and develop a deeper relationship of trust.

Online bulletin board or newsgroup
❑ Many interface designers offer users an electronic bulletin board or newsgroups to permit posting of open messages and questions.
❑ Bulletin-board software systems usually offer a list of item headlines, allowing users the opportunity to select items for display.
❑ New items can be added by anyone, but usually someone monitors the bulletin board to ensure that offensive, useless, or repetitious items are removed.

5. Discuss the variety of expert review methods with suitable example

While *informal demos* to colleagues or *customers can provide some useful feedback,* more formal expert reviews have proven to be effective.

Expert reviews entail one-half day to one week effort, although a lengthy training period may sometimes be required to explain the task domain or operational procedures.

There are a variety of expert review methods to choose from:

- Heuristic evaluation
- Guidelines review
- Consistency inspection
- Cognitive walkthrough
- Formal usability inspection

- Expert reviews can be *scheduled* at several points in the development process when experts are available and when the design team is ready for feedback. Different experts tend to find different problems in an interface, so *3-5 expert reviewers* can be highly productive, as can complementary usability testing.

- The dangers with expert reviews are that the experts *may not have an adequate understanding o*f the task domain or user communities.

- To strengthen the possibility of successful expert reviews it helps to choose *knowledgeable experts* who are familiar with the project situation and who have a longer-term relationship with the organization. Moreover, even experienced expert reviewers have great difficulty knowing *how typical users*, especially first-time users will really behave.

6. What are the eight golden rules of interface Design? Explain with example

The following rules are mentioned to be the golden rules for GUI design

1. Strive for consistency - Consistent sequences of actions should be required in similar situations. Identical terminology should be used in prompts, menus, and help screens. Consistent commands should be employed throughout.

2. Enable frequent users to use short-cuts - The user's desire to reduce the number of interactions increases with the frequency of use. Abbreviations, function keys, hidden commands, and macro facilities are very helpful to an expert user.

3. Offer informative feedback - For every operator action, there should be some system feedback. For frequent and minor actions, the response must be modest, while for infrequent and major actions, the response must be more substantial.

4. Design dialog to yield closure - Sequences of actions should be organized into groups with a beginning, middle, and end. The informative feedback at the completion of a group of actions gives the operators the satisfaction of accomplishment, a sense of relief, the signal to drop contingency plans and options from their minds, and this indicates that the way ahead is clear to prepare for the next group of actions.

5. Offer simple error handling - As much as possible, design the system so the user will not make a serious error. If an error is made, the system should be able to detect it and offer simple, comprehensible mechanisms for handling the error.

6. Permit easy reversal of actions - This feature relieves anxiety, since the user knows That errors can be undone. Easy reversal of actions encourages exploration of unfamiliar options. The units of reversibility may be a single action, a data entry, or a complete group of actions.

7 Support internal locus of control - Experienced operators strongly desire the sense that they are in charge of the system and that the system responds to their actions. Design the system to make users the initiators of actions rather than the responders.

8 Reduce short-term memory load - The limitation of human information processing in short-term memory requires the displays to be kept simple, multiple page displays be consolidated, window-motion frequency be reduced, and sufficient training time be allotted for codes, mnemonics, and sequences of actions.

7. Write a note on ethnographic observation development methodology

A social scientists spends a considerable time observing and analysing how people actually work.
People *do not have to explain* or articulate their work.

Social and organisational factors of importance may be observed.
Ethnographic studies have shown that *work is usually richer* and more complex than suggested by simple system models.

Focused ethnography

- Developed in a project studying the **air traffic control** process
- Combines ethnography with prototyping
- Prototype development results in **unanswered questions** which focus the ethnographic analysis.
- The problem with ethnography is that it studies existing practices which may have some **historical basis which is no longer relevant**.
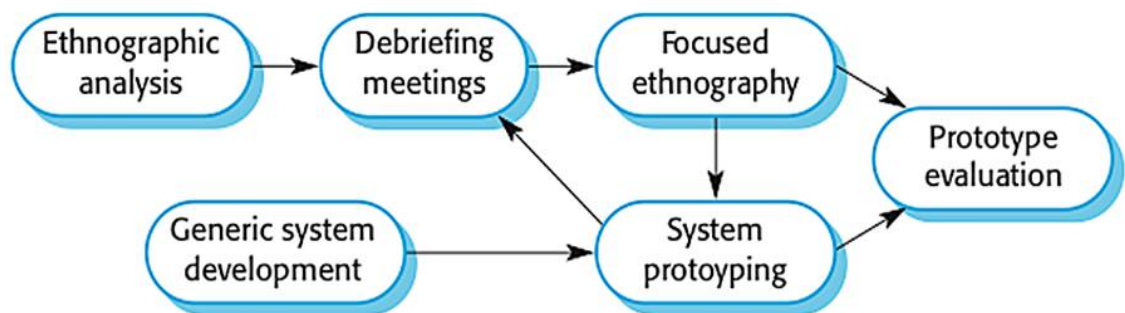
- Requirements that are derived from the way that **people actually work** rather than the way which process definitions suggest that they ought to work.
- Requirements that are derived from **cooperation and awareness of other people's activities.**

8. **Explain the stages of user interface design methodology in details with suitable example.**
   Stage 1: Develop Product Concept
   - Create a high concepts
   - Establish Business objectives
   - Set usability design team
   - Identify user population
   - Identify technical and environment issues
   - Produce staffing plan , schedule and budget

   Stage 2: Research and Needs Analysis
   - Break job activities into task unit
   - Partition user population into homogeneous segments
   - Identify major objects and structures which will be used in the software interface

   Stage 3: Design Concepts and Key Screen Prototype
   - Identify set of key screen, logion, home, major process.
   - Conduct Initial review and usability test
   - Initiate guidelines and style guide

   Stage 4: Iterative Design and Refinement

- Conduct heuristic and expert reviews
- Conduct full-scale usability tests.
- Deliver prototype and specifications

Stage 5: Implement Software
- Develop standard practices
- Manage late stage change
- Develop online help, documentation and tutorials

Stage 6: Provide Roll-Out Support
- Provide training and assistance
- Perform logging, evaluation, and maintenance

9. Explain acceptance test scope and components with example. Explain different steps in Surveys techniques

ACCEPTANCE TEST

Rather than the vague and misleading criterion of "user friendly," <u>measurable criteria</u> for the user interface can be established for the following:

Time to learn specific functions
Speed of task performance
Rate of errors by users
Human retention of commands over time
Subjective user satisfaction

In a large system, there may be *eight or 10* such tests to carry out on different components of the interface and with different user communities.

Once acceptance testing has been successful, there may be a period of field testing before national or international distribution..

Surveys techniques

Written user surveys are a familiar,
inexpensive and generally acceptable companion for
usability tests and expert reviews.

The keys to successful surveys are **clear goals** in advance and then development of focused items that help attain the goals.

Survey goals can be tied to the components of the **Objects and Action Interface model of interface design.** Users could be asked for their subjective impressions about specific aspects of the interface such as the representation of:
task domain objects and actions
syntax of inputs and design of displays.

Online surveys avoid the cost of printing and the extra effort needed for distribution and collection of paper forms.

- ❑ **Users background** (age, gender, origins, education, income)
- ❑ **Experience with computers** (specific applications or software packages, length of time, depth of knowledge)
- ❑ **Job responsibilities** (decision-making influence, managerial roles, motivation)
- ❑ **Personality style** (introvert vs. extrovert, risk taking vs. risk aversive, early vs. late adopter, systematic vs. opportunistic)
- ❑ **Reasons for not using an interface** (inadequate services, too complex, too slow)
- ❑ **Familiarity with features** (printing, macros, shortcuts, tutorials)
- ❑ **Feeling state after using an interface** (confused vs. clear, frustrated vs. in-control, bored vs. excited).

10. Describe the usability requirement analysis & measures of user interface design

Task analysis to ensure proper functionality
☐ Define what tasks and subtasks must be carried out
☐ Pay special attention to those tasks which are only performed occasionally, common tasks are easy to define.
☐ Functionality must complete, or else users will reject or underutilize the product.
2. Reliability, Availability, Security, and Data Integrity
☐ Commands must function as specified
☐ Data displayed must reflect the actual database
☐ Appease the user's sense of mistrust
☐ System must be error free
☐ Ensure the user's privacy by protecting against unwarranted access, destruction of data, and malicious tampering
3. Standardization, Integration, Consistency, and Portability
☐ Standardization: use pre-existing industry standards
☐ Integration: product should be able to run across different software tools and packages
☐ Consistency:
☐ compatibility across different product versions
☐ compatibility with related, non-computer based systems
☐ use common action sequences, terms, units, colors, etc. within the program
☐ Portability: allow for the user to convert data across multiple software and hardware environments
4. Schedules and Budgets
Late products can make a company ineffective or uncompetitive

Measures of user interface design

Ans
Definition :User Interface is a part of a computer system with which a user interacts in order to undertake tasks and achieve goals.
2. User interface is the front-end application view to which user interacts in order to use the software. User can manipulate and control the software as well as hardware by means

of user interface. Today, user interface is found at almost every place where digital technology exists, right from computers, mobile phones, cars, music players, airplanes, ships etc.

User interface is part of software and is designed such a way that it is expected to provide the user insight of the software. UI provides fundamental platform for human-computer interaction.

UI can be graphical, text-based, audio-video based, depending upon the underlying hardware and software combination. UI can be hardware or software or a combination of both.