

# SEE Exam Complete Guide for HCI Unit 1 (Human Computer Interaction)

## Overview & Syllabus Coverage

This guide covers all major topics of Unit 1 (as per "unit1.pdf") for MCA HCI SEE exams, incorporates previous year questions & bank, and includes diagrams and examples for scoring maximum marks.

## SEE Examination Pattern (HCI)

- **Section A:** Short answers (2 marks each) – Definitions, differences, direct examples
- **Section B:** Essay/Long answers (5-10 marks) – Diagrams, explanations, practical cases
- **Section C:** Application/Case Study/QA (8-10 marks) – Real-world analysis and design/problem solving
- **Question types:** Definitions, Short note, Diagram, Explanation, Comparison, Real-life Example/Case Study, Design/Analysis

## Most Important & Frequently Asked Topics (Unit 1)

### (Marked with ★ for frequent SEE occurrence)

- Human IO channels (Visual, Auditory, Haptic, Movement) ★
- Types of Human Memory (Sensory, Short-term, Long-term) ★
- Reasoning and Problem Solving (Deductive, Inductive, Abductive) ★
- Productive vs. Reproductive Thinking
- Human error: Slips and Mistakes ★
- ATM interface/memory design/application
- Visual Perception: Size, Depth, Brightness, Colour, Optical Illusions ★
- Gestalt Theory and Problem Solving
- Interaction Models: Norman's Model, Abowd-Beale model ★
- Ergonomics: Principles and Application ★
- User Interaction Styles (CLI, Menu, Form fill, Direct manipulation, Natural language, Gesture, GUI, VR) ★
- Usability/Accessibility/Cognitive Psychology/Emotional factors
- Paradigms of Interaction (Batch, Timesharing, Networking, GUI, WWW, Ubiquitous)

## Additional Topics (Covered for full marks!)

- Reasoning errors & interface design
- Human Information Processing – Capacity limits & design
- Case studies/examples from banking, mobile apps, healthcare, ATMs

## Key Topic Summaries, Examples & Diagrams

### 1. Human IO Channels

- **Visual (vision):** Input via eyes, critical for UI design. Diagram: Eye & Retina structure, focus/fovea.
- **Auditory (hearing):** Input via ears, for alerts, speech interfaces. Diagram: Ear anatomy, frequency range.
- **Haptic (touch):** Skin receptors, tactile feedback for buttons/screens. Example: Vibration on smartphone.
- **Movement (motor):** Reaction time/accuracy, Fitts Law (speed-distance trade-off). Diagram: Fitts Law curve.

### 2. Types of Human Memory

- **Sensory memory:** Short duration, raw physical signals.
- **Short-term memory:** Working, limited capacity ( $\sim 7 \pm 2$  chunks), closure effect.
- **Long-term memory:** Episodic (events), Semantic (facts/concepts), unlimited capacity, organized by frames/scripts/production rules.

**Real-world Example:** ATM design returns card before cash to ensure closure; prevents forgotten cards (see unit1.pdf).

### 3. Reasoning & Problem Solving

- **Deductive:** General to specific (All humans are mortal; Socrates is human  $\Rightarrow$  Socrates is mortal)
- **Inductive:** Specific to general (All elephants seen have trunks  $\Rightarrow$  all elephants have trunks)
- **Abductive:** Best explanation (Car won't start, battery might be dead)
- **Problem Solving Models:** Gestalt theory (proximity, similarity, closure); Productive (creative) vs. Reproductive (routine) thinking.

**Diagram:** Triangle showing Deductive, Inductive, Abductive pathways.

## 4. Human Error: Slips & Mistakes

- **Slip:** Correct intention, wrong execution
- **Mistake:** Incorrect understanding; wrong intention  
**Example:** Email sent to wrong address (slip); storing passwords insecurely (mistake)

## 5. Visual Perception & Illusions

- **Factors:** Size, Depth, Brightness, Colour
- **Optical Illusions:** Ponzo, Muller-Lyer, design needs compensation (optical center, page margin)  
(Diagram from unit1.pdf)

## 6. Norman's Interaction Model

### 7 Stages:

1. Goal
2. Intention
3. Specify actions
4. Execute
5. Perceive system state
6. Interpret
7. Evaluate against goal

**Diagram:** Execution-Evaluation Loop (see unit1.pdf)

## 7. Ergonomics & Design

- **Arrangement, environment, controls, user performance, health, display grouping, colour for signals**
- **Design tip:** Controls grouped by frequency/use; seating for all sizes; colour for warnings

## 8. Interaction Styles

Style	Example
Command line (CLI)	Linux terminal
Menu-driven	Navigation in mobile app
Form-fill	Registration forms online
Direct manipulation	Drag-and-drop file managers
Natural language	Siri, ChatGPT
Gesture-based	Swipe in photo gallery
Touch-based	Smartphone apps
GUI	Windows OS
VR/AR	VR games

**SEE TIP:** Always write examples (from QnBank) for all styles.

## 9. Paradigms of Interaction

Batch, Timesharing, Networking, Graphical Display, Microprocessor, WWW, Ubiquitous computing

- **Diagram:** Timeline showing paradigm shifts in computing technology

## 10. Usability & Accessibility

- **Usability goals:** Easy, efficient, satisfying
- **Accessibility:** Design for persons with disabilities

## SEE Tips & Tricks for Full Score

- Learn diagrams for visual IO, memory, Norman's model, Fitts law
- Always provide real-life examples: ATMs, Mobile apps, E-commerce, Healthcare
- For short answers: Keep definitions precise, use technical vocabulary, add examples
- For essays: Add diagrams, structure well, use points & paragraphs
- Revise errors, memory types, reasoning classifications
- Apply theory to real-world design issues—connect to ATM case, mobile, patient dashboards

## Previous Year/QnBank SEE Questions – Unit 1 (with Answers)

### 2-Marks (Short Answer/Definition)

1. Define human IO channels.
  - Human IO channels include visual, auditory, haptic, and movement channels, allowing people to receive and send information to the outside world.
2. What is short-term memory?
  - A type of memory acting as a scratch pad for temporary recall, lasting about 20-30 seconds, with limited capacity ( $7 \pm 2$  chunks).
3. Mention two examples of haptic feedback in devices.
  - Smartphone vibration motors; game controller force feedback.
4. Define slip in terms of human error.
  - A slip is a mistake in execution despite correct intention, such as sending an email to the wrong contact by accident.
5. What is the significance of reasoning in HCI?
  - Reasoning helps users solve problems and make decisions when interacting with interfaces, influencing usability and system design.
6. State one limitation of human memory.

- Human short-term memory has a limited capacity, typically able to hold only  $7 \pm 2$  items at a time.

7. What is sensory memory?

- Sensory memory is a buffer for stimuli received through sensory channels (eyes, ears, touch) and passes information to short-term memory.

8. How does size affect the visual detection of on-screen objects?

- Larger objects are more easily detected visually; smaller objects may require increased focus or attention.

### 5-Marks (Essay/Diagram/Comparison)

1. Explain how auditory and visual IO channels are used in modern vehicles.

- Visual displays (speedometer, indicators), auditory alerts (warnings, turn signals), combined for safe and efficient interface design.

2. Illustrate how ATM interface design accounts for limitations in human memory.

- ATMs return card before cash to exploit closure effect; design minimizes short-term memory errors by structuring user tasks appropriately.

3. Explain Fitts Law and its relevance to HCI.

- Fitts Law quantifies movement time in relation to distance and size of a target: speed up by making buttons larger and closer (see diagram in unit1.pdf).

4. Discuss the role of memory in user authentication systems (PIN vs biometrics).

- PIN relies on memorization (with risks), biometrics minimize cognitive load and enhance security.

### 10-Marks (Long Answer/Application/Analysis)

1. Analyze the role of memory in user authentication systems e.g., PIN vs biometrics.

- Discuss types of memory needed (long-term), impact on usability and security, mitigation strategies (password rule, cueing).

2. Design a prototype interaction for an elderly-friendly healthcare app using human IO considerations.

- Apply large visual icons, clear auditory feedback, tactile input, minimize memory load, diagram showing user flows.

3. Examine the use of augmented reality AR in training, focusing on memory and reasoning.

- AR overlays support episodic and semantic memory, enhance reasoning by contextualized information, gives adaptive feedback.

## Example Diagrams and Figures

Images from unit1.pdf such as:

- Eye anatomy (for visual IO)
- Norman's Model (Execution-Evaluation Loop)
- Fitts Law (target size-distance illustration)
- Interaction styles (WIMP/GUI images)
- Semantic Network/Frames

## Complete Unit 1 Topics - Summary Table

Topic	Key Points/Examples	Tips (★=Important)
Human IO Channels	Visual, Auditory, Haptic, Movement	Learn diagrams, write examples ★
Memory Types	Sensory, STM, LTM, closure effect	ATM/card case, draw schematic ★
Reasoning/Problem Solving	Deductive, Inductive, Abductive, Gestalt	Show triangle diagram, add real case ★
Errors (slip/mistake)	Slips (execution), Mistakes (intention)	Write device/email examples ★
Visual Perception	Size, brightness, color, illusions	Bring diagrams/optical effect images ★
Interaction Models	Norman's 7 Stage, Abowd-Beale	Replicate diagram, connect stages ★
Ergonomics	Arrangement, environment, health	Show grouping/seating/color use
Interaction Styles	CLI, Menu, Direct Manip, GUI, Gestures, VR	Table with examples, accessibility ★
Paradigms	Batch, Timesharing, GUI, WWW, Ubiquitous	Draw timeline/shift diagrams
Usability/Accessibility	Goals, disabled user support	Always mention design principles ★

## Final Exam Success Checklist

- Study all diagrams and redraw them for practice
- Always start answers with definitions; use technical terms
- Add one real-world example to every theory answer
- Structure essay answers securely (intro, body, example, diagram, conclusion)
- Review and memorize previous year Q/A from above
- Use tables and bullet points where clarity is needed
- Write about ATM and banking interface cases where possible (scoring high with practical design references)

## Endnotes & References

- All examples, diagrams, definitions, and tables sourced from unit1.pdf and QnBank\_HCl.pdf (SEE pattern and previous year QP included)
- Extra cases adapted directly from SEE QP papers and marked by frequency for maximum scoring.

**Good luck for your SEE exam – this guide is optimized for scoring full marks in Unit 1!**

**(All key images, figures, and diagrams referenced are present in unit1.pdf and can be redrawn for answers as per exam requirement)**

[1] [2] [3] [4] [5]

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1. unit1.pdf
2. QnBank\_HCl.pdf
3. QP2\_IA1.pdf
4. QP1\_IA1.pdf
5. unit1.pdf