

# HCI Unit 4 - Exam Preparation Guide

Design and Development

Based on Previous Question Paper Patterns

Expected Question Patterns & Important Topics

## 2-Mark Questions (Short Answers)

- **User Persona Definition:** Fictional representation of target users based on research
- **Low-Fidelity Prototyping:** Simple, rough prototypes for quick idea exploration
- **Scenario-Based Design:** Using stories of system use to guide design decisions
- **Participatory Design:** Collaborative approach involving end-users in design process
- **Domain-Specific Design:** Tailored interfaces for specific fields (healthcare, aerospace, kids)
- **High-Fidelity Prototyping:** Detailed, interactive prototypes resembling final product

## 5-Mark Questions (Medium Answers)

- **Compare Low vs High-Fidelity Prototyping**
- **Explain User Persona Lifecycle (5 phases)**
- **Benefits of Participatory Design in Product Development**
- **Prototyping Strategies (Horizontal, Vertical, Task-oriented, Scenario-based)**
- **Key Principles for HCI Design for Kids**

## 8-10 Mark Questions (Long Answers)

- **Complete User Persona Development for Domain-Specific Application**
- **Design Prototyping Workflow from Low to High-Fidelity**
- **Scenario-Based Design Implementation for Specific System**
- **Participatory Design Strategy for Healthcare/Aerospace Applications**
- **Compare Domain-Specific Design Approaches (Healthcare vs Kids Educational Tools)**

## Unit 4 Topics with Expected Questions & Answers

### 1. User Personas

**Expected Question:** "Define user persona and explain the 5 phases of persona lifecycle."

**Answer:**

**Definition:** User personas are fictional characters created based on research to represent different user types who might use a service, product, or system. They put a human face on the user data.

**The 5 Phases of Persona Lifecycle:**

1. **Family Planning:** Decide if personas are right for your organization
2. **Conception & Gestation:** Research and gather data about users
3. **Birth & Maturation:** Create and develop detailed persona descriptions
4. **Adulthood:** Use personas actively in design and development
5. **Lifetime Achievement & Retirement:** Maintain, update, or retire personas

**Memory Tip:** "FCBAR" (Family planning, Conception, Birth, Adulthood, Retirement)

### 2. Prototyping Tools and Techniques

**Expected Question:** "Compare low-fidelity and high-fidelity prototyping tools with examples."

**Answer:**

Aspect	Low-Fidelity	High-Fidelity
Purpose	Quick idea exploration, early brainstorming	Testing usability, visual design, final interactions
Detail Level	Minimal detail - layouts, structure only	Very detailed - UI design, colors, fonts, animations
Resemblance	Low resemblance to final product	High resemblance - looks like final product
Interactivity	Usually static (paper sketches, wireframes)	Highly interactive (clickable prototypes)
Tools	Balsamiq, Miro, Paper sketches, Whiteboard	Figma, Adobe XD, Sketch, InVision, Axure
Cost/Time	Inexpensive, quick to create	More expensive, time-intensive

**Examples:**

- **Low-Fi:** Paper sketches of mobile app screens
- **High-Fi:** Interactive Figma prototype with animations and real data

### 3. Prototyping Strategies

**Expected Question:** "Explain the four prototyping strategies with examples."

**Answer:**

#### 1. Horizontal Prototypes

- **Definition:** Broad view of system features with little functional depth
- **Purpose:** Show overall navigation, layout, major options
- **Example:** Mobile banking app showing all screens (home, transfer, bills, profile) but buttons don't execute real transactions

#### 2. Vertical Prototypes

- **Definition:** Deep, functional slice of one specific feature
- **Purpose:** Test technical feasibility and UX of key function
- **Example:** Only fund transfer feature works completely with validation and confirmation

#### 3. Task-Oriented Prototypes

- **Definition:** Combines horizontal and vertical for specific task analysis
- **Purpose:** Independent testing of individual tasks
- **Example:** E-commerce "Add to Cart → Checkout → Payment" process only

#### 4. Scenario-Based Prototypes

- **Definition:** Focus on realistic usage scenarios in real-world context
- **Purpose:** Experience system in realistic use situations
- **Example:** Video prototype showing how doctor uses patient monitoring system during emergency

### 4. Scenario-Based Design

**Expected Question:** "Explain scenario-based design process with its framework."

**Answer:**

**Definition:** User-centered design approach using stories of how people use systems in real-life situations to drive requirements, design, and evaluation.

#### SBD Framework Process:

1. **Analyze:** Problem scenarios describing current practice and stakeholder activities
2. **Design:** Activity scenarios showing redesigned work with new technology
  - Information scenarios (what information is needed)
  - Interaction scenarios (how users interact)
3. **Prototype & Evaluate:** Create usability specifications and conduct iterative testing

### **Key Benefits:**

- Changes focus from system operations to user activities
- Makes possibilities concrete rather than abstract
- Facilitates communication among stakeholders
- Supports contextual understanding

**Example:** Airline entertainment system scenario - "Sarah wants to watch movie, track flight, order food" guides menu design and navigation system.

## **5. Participatory Design**

**Expected Question:** *"Describe participatory design approach and its key aspects."*

### **Answer:**

**Definition:** Collaborative design approach involving end-users directly in the design process to create products that better meet user needs.

### **Key Aspects:**

1. **Inclusion:** Diverse participants (users, designers, developers, domain experts)
2. **Collaboration:** Workshops, interviews, brainstorming, co-design exercises
3. **Empowerment:** Users actively influence design decisions
4. **Iteration:** Continuous feedback and refinement cycles
5. **Contextual Understanding:** Cultural, social, environmental factors
6. **User Advocacy:** Equal space for collaboration, addressing power imbalances

### **Benefits:**

- Improved user satisfaction and engagement
- Reduced development costs and rework
- Increased innovation and social inclusion
- Better understanding of real user needs

**Example:** Hospital patient monitoring system - involve doctors, nurses, technicians in design workshops to understand workflow challenges and requirements.

## **6. Domain-Specific Design**

### **Healthcare Domain**

**Expected Question:** *"Explain HCI challenges and applications in healthcare domain."*

### **Answer:**

### **Applications:**

- **Smart Clinical Decision Support:** Real-time alerts for medication errors, abnormal lab values
- **Telemedicine Platforms:** Video consultation interfaces optimized for usability
- **Wearable Monitoring:** Real-time patient monitoring with actionable alerts
- **Operating Room Dashboards:** Hands-free displays for surgeons with dynamic information

#### **Challenges:**

- **Interoperability:** Systems must communicate and share data effectively
- **Privacy & Security:** Protecting sensitive patient information
- **Accessibility:** Inclusive design for diverse populations
- **Cognitive Load:** Avoiding information overload for medical professionals

## **Aerospace Domain**

**Expected Question:** *"Describe HCI applications and challenges in aerospace."*

#### **Answer:**

#### **Applications:**

- **Glass Cockpits:** Real-time avionics displays with intuitive touch/multimodal interaction
- **Mission Control:** Live spacecraft monitoring with user-centered visualization
- **Air Traffic Control:** Real-time conflict detection optimized for cognitive load
- **Fault Warning Interfaces:** Real-time status and troubleshooting for pilots

#### **Challenges:**

- **Cognitive Load:** Not overwhelming users with excessive information
- **Usability in Extreme Conditions:** Performance under stress, high G-forces, zero gravity
- **System Interoperability:** Seamless communication between systems
- **Error Prevention:** Mitigating human errors in safety-critical operations

## **Kids Domain**

**Expected Question:** *"What are the key principles for HCI design for children?"*

#### **Answer:**

#### **Key Principles:**

1. **Simplicity & Clarity:** Minimal clutter, clear navigation, large colorful buttons
2. **Engagement Through Play:** Animations, game-like features, interactive elements
3. **Age-Appropriate Design:**
  - Preschoolers (3-5): Simple visuals, voice instructions, single-task interactions
  - School-aged (6-12): Gamified interfaces, complex problem-solving tasks
4. **Physical & Cognitive Development:** Limited dexterity, shorter attention spans

**5. Parental Control:** Time management, content filters, usage monitoring

**6. Safety & Security:** COPPA compliance, no personal data collection

### **Applications:**

- Educational games with immediate feedback
- AR apps for collaborative play
- Communication aids for children with disabilities
- Creative tools with drag-and-drop interfaces

## **Sample Long Questions & Answer Structure**

**Question:** "Design a complete user persona for a telemedicine application targeting elderly patients."

### **Answer Structure:**

#### **1. Research Foundation**

- Conducted interviews with 15+ elderly patients (65-80 years)
- Analyzed healthcare usage patterns and technology comfort levels
- Identified common pain points in traditional healthcare access

#### **2. Persona Profile - Margaret Chen**

- **Age:** 72, Retired teacher
- **Tech Experience:** Basic smartphone use, limited computer skills
- **Health Conditions:** Diabetes, mild arthritis, regular medication management
- **Goals:** Monitor health remotely, reduce hospital visits, stay independent
- **Frustrations:** Small text, complex navigation, fear of making mistakes
- **Context:** Lives alone, adult children live far away

#### **3. Design Implications**

- Large fonts and high contrast colors
- Voice-guided navigation options
- Simple, single-task screens
- Emergency contact integration
- Medication reminder features

#### **4. Validation & Iteration**

- Test with 5+ elderly users
- Refine based on accessibility feedback
- Include family member access for support

**Question:** "Propose a prototyping workflow from low to high-fidelity for a wearable heart monitoring device."

**Answer Structure:**

### 1. Low-Fidelity Phase (Weeks 1-2)

- Paper sketches of device interface and mobile app screens
- Cardboard mockups for physical form factor testing
- Whiteboard user journey mapping
- Basic wireframes using Balsamiq
- Test with 10+ potential users for concept validation

### 2. Medium-Fidelity Phase (Weeks 3-4)

- Interactive wireframes using Axure or Figma
- Basic clickable prototype with core navigation
- Simple data visualization mockups
- Bluetooth connectivity simulation
- Usability testing with 8+ users

### 3. High-Fidelity Phase (Weeks 5-6)

- Detailed visual design in Figma with actual brand colors
- Fully interactive prototype with realistic data
- Animation and micro-interactions
- Integration with actual sensor data
- Clinical testing with healthcare professionals

### 4. Hardware Prototyping

- 3D printed device casing
- Arduino-based sensor integration
- Battery life and durability testing
- FDA compliance validation

## Quick Revision Checklist

**Definitions to Memorize:**

- User Persona = Fictional character representing target users based on research
- Low-Fi Prototype = Simple, rough, inexpensive for quick exploration
- High-Fi Prototype = Detailed, interactive, resembles final product

- Scenario-Based Design = Using stories of system use to guide design
- Participatory Design = Collaborative approach with end-users
- Domain-Specific Design = Tailored interfaces for specific fields

### **Process Mnemonics:**

- Persona Lifecycle: **FCBAR** (Family, Conception, Birth, Adulthood, Retirement)
- Prototyping Strategies: **HVTS** (Horizontal, Vertical, Task-oriented, Scenario-based)
- Participatory Design: **ICEICU** (Inclusion, Collaboration, Empowerment, Iteration, Context, User advocacy)
- Domain Challenges: **IPAC** (Interoperability, Privacy, Accessibility, Cognitive load)

**Comparison Tables:** Practice drawing quick tables for:

- Low-Fi vs High-Fi prototyping
- Domain-specific challenges (Healthcare vs Aerospace vs Kids)
- Prototyping strategies comparison

### **Final Exam Tips**

1. **For 2-mark questions:** Give precise definitions with key characteristics
2. **For 5-mark questions:** Structure with examples and brief process steps
3. **For 8-10 mark questions:** Use structured approach with real-world domain examples
4. **Always include:** Process phases, advantages/disadvantages, practical applications
5. **Draw diagrams:** For persona lifecycle, prototyping workflow, SBD framework
6. **Use domain examples:** Healthcare (patient monitoring), Aerospace (cockpit design), Kids (educational games)

**Time Management:** 2-marks (2 min), 5-marks (8 min), 8-10 marks (15-20 min)