Q1. (6 marks) — Three GDD personas + one key design decision each

1. **"Sara" — Primary-school child (school trip)**
    - **Goal:** Learn fun facts quickly and enjoy a guided, social VR experience.
    - **Frustrations:** Complex menus, long text, motion sickness.
    - **Design decision:** *Simplified, gamified guided mode* — single-button navigation, large icons, short audio narration, and multiplayer/cooperative prompts so children explore together safely.
2. **"Dr. Khan" — Adult specialist / researcher**
    - **Goal:** Access deep, referenced content and high-fidelity 3D models for study.
    - **Frustrations:** Over-simplified content, lack of citations, restricted control over viewpoints.
    - **Design decision:** *Advanced "scholar" mode* — access to layered content (summary → detailed → primary sources), fine-grain controls (camera, measurement tools), and citation/export features.
3. **"Ayesha" — Visitor with visual impairment**
    - **Goal:** Understand exhibits through non-visual channels and navigate independently.
    - **Frustrations:** Reliance on visuals, inaccessible gesture controls, confusing spatial audio.
    - **Design decision:** *Multi-modal non-visual interface* — clear spatial audio cues, descriptive audio tracks for VR scenes, haptic feedback on controllers, and voice + gesture alternatives for navigation and interaction.

Q2. (6 marks) — Three high-level system goals + why important

1. **Accessibility & Inclusion**
    - *Why:* The visitor base includes people with visual, hearing, and motor impairments; legal/ethical obligation and broader audience reach.
2. **Engagement & Immersion**
    - *Why:* VR aims to create memorable experiences that increase learning, dwell time, and visitor satisfaction.
3. **Personalization & Relevance**
    - *Why:* Diverse visitors (children, specialists, casual adults) need different content depths and recommendations to maximize learning and return visits.

Q3. (6 marks) — GQM for Goal: Personalization & Relevance

GOAL: Increase the relevance and usage of personalized suggestions so visitors engage more deeply with exhibits.

Questions

1. Are visitors receiving suggestions that match their interests and needs?
2. Do personalized suggestions increase time spent on recommended content?
3. Do personalized suggestions lead to higher satisfaction and return visits?

Metrics

1. **Suggestion uptake rate:** % of suggested items clicked/accepted by users.
2. **Engagement delta:** Average additional time (minutes) spent on content after accepting a suggestion vs. baseline.
3. **Satisfaction score:** Post-visit rating (1–5) specifically about how relevant suggestions felt.
4. **Repeat-visit conversion:** % of users who return within X months after receiving personalized suggestions. (optional extra metric)

Q4. (6 marks) — Forms and how they impact UX

Forms present in the Museum VR system:

- **Head-mounted VR headset + handheld controllers** — primary immersive form.
- **Mobile app (smartphone)** — lightweight, accessible alternative and companion.
- **Kiosk / tabletop touchscreen** — public preview or fallback for those who cannot use VR.
- **Haptic devices / wearable feedback** — optional for tactile cues.
- **Spatial audio system / earbuds** — for 3D audio narration and cues.

Impact on UX

- **Immersion vs. accessibility tradeoff:** Headsets provide presence but can exclude users with motion sickness or certain disabilities; complementary mobile and kiosk forms preserve access.
- **Learnability & UI complexity:** VR controllers require careful mapping and onboarding; simple metaphors and robust tutorials reduce cognitive load.
- **Physical comfort & session length:** Headset weight and motion design affect comfort; UX must offer short, comfortable sessions and easy pause/exit controls.
- **Social & collaborative experience:** Mobile/app + kiosk enable shared experiences (groups/children) while individual headsets must support social signaling (e.g., "I'm inside VR" indicators).
- **Perception & feedback:** Haptics and spatial audio improve navigation for non-visual users but must be tunable to user sensitivity.
- **Maintenance & hygiene:** Physical forms require hygiene workflows (cleaning headsets) — UX must include quick user checks and visible cleaning status to build trust.

Q5. (10 marks) — a) First step of Goal-Directed Design; b) Three methods for it; c) Data types

a) First step: Research — gather data about users, tasks, context of use, and stakeholders.

b) Methods, explanation (museum VR context), and data types

1. **Contextual Inquiry / Field Observation**
    - **Explanation:** Observe visitors (children, adults, people with disabilities) in the museum as they use existing exhibits and audio guides; shadow school groups and note social dynamics. For VR pilots, observe first-time headset users.
    - **Data collected:** Qualitative notes, photos/videos (with consent), task flows, quotes, pain points, observational logs.
2. **Semi-structured Interviews (with visitors + staff + accessibility experts)**
    - **Explanation:** Interview teachers (school trip leads), specialist visitors, museum curators, and accessibility officers to learn goals, constraints, and content priorities. Include users with disabilities to capture needs.
    - **Data collected:** Transcripts, audio recordings, prioritized needs, quotes, user goals, feature requests.
3. **Surveys + Analytics of existing mobile/wireless usage**
    - **Explanation:** Short exit surveys asking demographics, interests, device comfort, and accessibility needs; instrument current app/wireless to capture flow (pages visited, session length). Use pre/post VR trial surveys to measure satisfaction.
    - **Data collected:** Quantitative metrics (session time, click rates), Likert-scale satisfaction scores, demographic data, usage logs.

(Extra useful method: **Accessibility walkthroughs / Assistive-tech testing** with screen-reader and switch users; data: compatibility notes, error logs.)

Q6. (6 marks) — Features for different experience levels

1. **Novice (first-time / low experience)**
    - **Feature:** *Guided Onboarding Tour* — a short, mandatory tutorial that shows basic controls, safety tips, and a "guided tour" path.
    - **Why:** Reduces anxiety and prevents misuse; ensures comfortable first session.
2. **Intermediate (comfortable with VR / app)**
    - **Feature:** *Exploration Mode with Hints & Bookmarks* — free roam plus contextual hint overlay and ability to bookmark exhibits for later review in the app.
    - **Why:** Encourages discovery while offering support when users get stuck.
3. **Expert (researchers, repeat visitors)**
    - **Feature:** *Advanced/Scholar Mode* — layer toggles, measurement tools in 3D, full metadata/citations, adjustable simulation speed, and data export (citations, screenshots, logs).
    - **Why:** Provides the depth and control experts need without cluttering novice UI