Question Bank – UNIT III

Q1. What is a VR device?
A: A **VR (Virtual Reality) device** is hardware that enables users to experience an immersive virtual environment by blocking out the real world and replacing it with a computer-generated simulation.

Q2. Name some popular VR devices.
- HTC Vive
- Google Cardboard
- Samsung Gear VR
- Oculus Quest
- Samsung Odyssey
- Oculus Rift

Q3. What are the key components of a VR system?
1. **Head-Mounted Display (HMD)** – Provides visual output.
2. **Tracking System** – Monitors user movement.
3. **Controllers & Input Devices** – Enables interaction.
4. **Processing Unit** – Handles graphics and motion.

Q4. How does HTC Vive work?
A: HTC Vive uses **SteamVR tracking technology** with external base stations to track the user's head and hand movements. It provides **room-scale VR** with high accuracy and low latency.

Q5. What is Google Cardboard, and how does it function?
A: Google Cardboard is a **low-cost VR headset** made of cardboard that works with a smartphone. It uses **lenses to create a stereoscopic 3D effect** by splitting the screen into two images.

Q6. What makes Samsung Gear VR different from other VR devices?
A: Samsung Gear VR is a **mobile-based VR headset** that uses a **Samsung smartphone** as the display and processing unit, offering a portable VR experience.

Q7. How does the Oculus Quest differ from other VR headsets?
A: Oculus Quest is a **standalone VR headset** that does not require a PC or external sensors. It has **inside-out tracking** using built-in cameras.

Q8. What is unique about the Samsung Odyssey VR headset?
A: Samsung Odyssey is a **Windows Mixed Reality headset** with **built-in AKG headphones** and **inside-out tracking**, offering a high-resolution VR experience.

Q9. How does the Oculus Rift function?
A: The Oculus Rift is a **PC-powered VR headset** that uses **external sensors and controllers** for **positional tracking** and **hand interactions**.

Q10. What are the main components of an AR system?
1. **Scene Generator** – Creates virtual elements.
2. **Tracking System** – Aligns virtual objects with the real world.
3. **Display System** – Renders the AR content.
4. **Input System** – Enables user interaction (touch, gestures, voice).

Q11. What is a Scene Generator in AR?

A: A Scene Generator is the **software component** responsible for rendering **3D virtual objects** in an AR environment.

Q12. What is the function of a Tracking System in AR?

A: A Tracking System determines the **position and orientation** of the user or device to correctly overlay virtual objects onto the real world.

Q13. What are the types of Tracking Systems used in AR?

1. **Optical Tracking** – Uses cameras to detect markers or objects.
2. **IMU-Based Tracking** – Uses accelerometers and gyroscopes.
3. **GPS-Based Tracking** – Used in location-based AR applications.

Q14. What is the role of a Monitoring System in AR?

A: A Monitoring System ensures that AR objects **remain stable and correctly positioned** in the real world as the user moves.

Q15. What are the different types of displays used in AR and VR?

1. **Optical See-Through HMDs**
2. **Video See-Through HMDs**
3. **Monitor-Based Systems**
4. **Projection Displays**
5. **Virtual Retinal Systems**

Q16. How do Optical See-Through HMDs work?

A: Optical See-Through HMDs use **transparent lenses** that allow users to see both the real world and overlaid virtual content simultaneously (e.g., Microsoft HoloLens).

Q17. What are Video See-Through HMDs?

A: Video See-Through HMDs capture **real-world images** using cameras, process them, and combine them with digital content before displaying them on the screen.

Q18. What is a Virtual Retinal System?

A: A **Virtual Retinal Display (VRD)** projects images **directly onto the user's retina**, creating a sharp and immersive visual experience.

Q19. How do Projection Displays work in AR?

A: Projection Displays use **light projectors** to display digital content onto physical surfaces, eliminating the need for a screen or HMD.

Q20. What are Monitor-Based AR systems?

A: These systems display AR content on **traditional monitors, tablets, or smartphones**, rather than using headsets (e.g., Pokémon GO on a smartphone).

Q21. What are the advantages of AR technology?

- Enhances real-world experiences.
- Useful in education, healthcare, and navigation.
- Interactive and engaging user experience.
- Supports remote assistance and collaboration.

Q22. What are the disadvantages of AR technology?

- Requires **high-performance hardware**.
- Privacy and security concerns.
- Can cause **motion sickness** in some users.

- Limited battery life for AR devices.

Q23. What are the advantages of VR technology?
- **Complete immersion** in a virtual environment.
- Used in **gaming, training, and simulations**.
- Helps in **therapy and rehabilitation**.
- Enables **remote collaboration** in virtual spaces.

Q24. What are the disadvantages of VR technology?
- **Expensive hardware** requirements.
- **User isolation** from the real world.
- Risk of **motion sickness** and eye strain.
- **Limited real-world interaction** compared to AR.

Q25. How does AR improve user experience compared to VR?
A: Unlike VR, which replaces reality, AR **enhances reality** by adding digital elements to the real world, allowing **seamless integration with daily life**

Q27. What is the difference between Inside-Out and Outside-In Tracking?
- **Inside-Out Tracking** – Uses **cameras on the headset** to track movement (Oculus Quest).
- **Outside-In Tracking** – Uses **external sensors** to track movement (HTC Vive).

Q26. How do AR headsets differ from VR headsets?

Feature	AR Headsets	VR Headsets
Real-World Interaction	Yes	No
Immersion Level	Partial	Full
Display Type	Optical See-Through or Video See-Through	Enclosed HMD
Example	Microsoft HoloLens	Oculus Rift