

(3 Hours)

[Total Marks: 80]

- N. B. 1. Question **No. 1** is Compulsory.  
2. Attempt any **three** questions, from the remaining five questions.  
3. Assume suitable data if **necessary** and justify the assumption.  
4. Figure to the **right** indicates full marks.

**Q1.** Attempt **any four** questions

- a) Explain how virtual reality differs from telepresence. **5**
  - b) Explain the need for a homogeneous transformation matrix. **5**
  - c) List and explain and four benefits of VR. **5**
  - d) Describe applications of Augmented Reality. **5**
  - e) Write short note on avoiding physical contacts while developing AR applications. **5**
- Q2.**
- a) Explain Marker detection Procedure. **10**
  - b) Explain Feedback in user interfaces. **10**
- Q3.**
- a) Discuss in brief about architectural walkthrough and visualization. **10**
  - b) Explain the virtual reality experience with examples. **10**
- Q4.**
- a) Explain Viewport transformation. **10**
  - b) Define Vection. List and explain types of vection. **10**
- Q5.**
- a) Draw and explain the flowchart of a simple AR system. **10**
  - b) Explain Multimodal user interface. **10**
- Q6.**
- a) Explain 3D rotation concerning yaw, roll, and pitch. **10**
  - b) Write a note on collision detection. How collision is tested in VR?. **10**
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