

(3 hours)

Total Marks: 80

- N.B.** 1. Question No. 1 is compulsory  
 2. Attempt any three questions from remaining five questions  
 3. Assume suitable data if necessary and justify the assumptions  
 4. Figures to the right indicate full marks

- Q1 Answer any four questions.
- A Define augmented reality. Define and explain the importance of tracking, calibration and registration in augmented reality. **5**
- B List and explain the various challenges with Augmented Reality. **5**
- C What is a data flow graph? Explain giving examples. **5**
- D Explain infrared tracking. **5**
- E What are the applications of augmented reality technology in the medical field? **5**
- Q2 A Solve the following problems: **10**
- a) Calculate the reflected position of a triangle whose coordinates are given by  $A = (3, 4)$ ,  $B = (6, 4)$  and  $C = (4, 8)$  with respect to X- Axis.
- b) Given a 3D object with coordinate points  $A(0, 3, 3)$ ,  $B(3, 3, 6)$ ,  $C(3, 0, 1)$ ,  $D(0, 0, 0)$ . Apply the scaling parameter 2 towards X axis, 3 towards Y axis and 3 towards Z axis and obtain the new coordinates of the object.
- B What is sensor fusion? Explain competitive and cooperative sensor fusion. **10**
- Q3 A Explain software engineering requirements of AR applications. **10**
- B Explain the concept of registration in augmented reality. Explain the image registration and location-based registration in detail. **10**
- Q4 A Explain the VR aspect of computer vision? How is computer vision useful in VR? **10**
- B State the AR Design principles. **10**
- Q5 A Explain different types of AR with their use case. **10**
- B What are the security and privacy issues in AR? **10**
- Q6 A Explain the following concepts with respect to auditory perception: **10**
1. Precedence effect
  2. Localization
- B In what way does the platform abstraction and decoupled simulation add value to the AR application? **10**

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