



**End Term (Even) Semester Examination June 2025**

Roll no. 22941038

Name of the Course and semester: BTech(CSE) 6<sup>th</sup> Semester

Name of the Paper: Introduction to Virtual Reality

Paper Code: TCS 675

Time: 3 hour

Maximum Marks: 100

**Note:**

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

**Q1. (CO1)**

(2X10=20 Marks)

- a. Why is Depth perception necessary? Discuss the different cues that can help in depth perception.
- b. If there are several objects in the virtual environment, it is necessary to determine which objects are obscured by others. The obscured objects then do not need to be drawn on the screen. Suggest two techniques for solving this challenge.
- c. Discuss degrees of freedom in detail. Differentiate between Relative and Absolute degrees of freedom.

**Q2. (CO2)**

(2X10=20 Marks)

- a. Why RGB is converted to YCbCr in JPEG algorithm? Explain the JPEG compression algorithm in detail.
- b. Explain Interaural Time Difference (ITD) and Interaural Level Difference (ILD). What do you understand by HRTF and for what purposes it can be used?
- c. Two virtual reality applications are to be developed: (i) A medical simulation system and (ii) A blind person helper system that provides audio feedback. Give design considerations of these two systems from the viewpoint of isomorphic and non-isomorphic types. Also discuss the pros and cons of the approaches in your design choices for the two systems.

**Q3. (CO3)**

(2X10=20 Marks)

- a. What are the two components of Navigation in a Virtual Reality system? Give a critical review of Wayfinding techniques in virtual environments.
- b. Write code in A-frame to create a complete scene in a Virtual World (You can use your own imaginations for your scene.)
- c. What is the significance of a haptic system in Virtual Environments? Construct a birds eye view of a haptic system using a block diagram?

**Q4. (CO4)**

(2X10=20 Marks)

- a. Point out the reasons why an abstract method like Menus are sometimes used in Virtual Reality instead of direct interaction? Summarize the different ways of placing flat menus in VR.
- b. Formulate the issues that comes up with text input in VR systems.
- c. Assess the issues in VR systems that require (i) haptic feedback and (ii) voice commands.

**Q5. (CO5)**

(2X10=20 Marks)

- a. What do you understand by Temporal Compliance? Latency causes a break of temporal compliance- what can be done by a VR programmer to counteract this?
- b. You have been asked to develop a VR system to simulate the University building to a newcomer. Most of the users will be first time users of a Virtual Reality system. Provide the design decisions based on human factors for the development of VR systems.
- c. You are developing a VR system to learn driving a geared motorcycle. Your system will use a HMD. Provide the Evaluation and Testing mechanism of your system starting from the initial development phase to the final development phase.