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| Roll No. | | | | | | | | |
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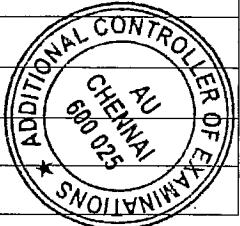
Department of ECE, College of Engineering, Guindy, Anna University, Chennai.
 END SEMESTER EXAMINATIONS NOV 2024
 V & VII Semester B.E – Biomedical Engineering R2019
 BM5016 – Virtual Reality in Medicine

Duration:180 Minutes

Max.Marks: 100

Answer ALL questions

| | |
|-----|---|
| CO1 | Comprehend and appreciate the significance and role of this course in the present contemporary world. |
| CO2 | Understand the basic concepts of Virtual reality. |
| CO3 | Expose the concept of Virtual Reality Programming with toolkits. |
| CO4 | Design of various modeling concepts. |
| CO5 | Develop the Virtual Reality applications in different areas. |



Part-A (10X2=20)

| Q.No. | Questions | Marks | CO | BL |
|-------|---|-------|----|----|
| 1. | How are VR, AVR, MR and XR corelated? | 2 | 2 | 3 |
| 2. | What are the three I's of VR and what are their role in the VR programming? | 2 | 2 | 2 |
| 3. | Define the term Model and Simulation. List various types of models. | 2 | 4 | 3 |
| 4. | What role does behaviour modelling has in VR design? | 2 | 4 | 3 |
| 5. | List the various types of sicknesses and distinguish between VR and cyber sickness. | 2 | 1 | 2 |
| 6. | What is sensor conflict and Neural mismatch? | 2 | 1 | 2 |
| 7. | What is OpenGL 3D LWJGL? What are its applications? | 2 | 3 | 2 |
| 8. | What is the principle behind rendering with index buffers? | 2 | 3 | 2 |
| 9. | What is a supervisory controlled robotic surgery? | 2 | 5 | 2 |
| 10. | How shared controlled robotic surgery is beneficial to medical fraternity? | 2 | 5 | 2 |

Part-B (5X13=65)

| Q.No. | Questions | Marks | CO | BL |
|-------|---|-------|----|----|
| 11. a | What is the need for trackers and navigators in a VR system and how do they blend and create a virtual world? | 13 | 2 | 3 |
| | OR | | | |
| b | How are output devices classified for a VR system? How do they enhance immersive experience? | 13 | 2 | 3 |
| 12. a | Why do we need Geometric modelling in VR system design? With neat diagrams bring out the applications of mathematical transformations used in geometric modelling.. | 13 | 4 | 4 |
| | OR | | | |
| b | What is Physical modelling in VR? Explain in detail the applications of haptics rendering pipeline in object modelling. | 13 | 4 | 4 |
| 13. a | Classify VR sicknesses and identify the various causes of VR sickness. Does hardware contribute to VR sickness, if so, how? | 13 | 2 | 4 |

| | | | | | | |
|-----|-----------|---|--|--|----|---|
| | OR | | | | | |
| | b | Does the contents used in any VR system design cause VR sickness? If so, describe those circumstances stating the reasons for the same. | | | 13 | 2 |
| 14. | a | With theoretical principles and algorithms clearly outlined write a program to display "Our first display" using OpenGL 3D LWJGL by defining and coding necessary packages, classes and methods. | | | 13 | 3 |
| | | OR | | | | |
| 15. | b | With theoretical principles and algorithms clearly outlined write a program to illustrate the role of VAOs and VBOs in VR design using OpenGL3D LWJGL by defining and coding necessary packages, classes and methods. | | | 13 | 3 |
| | | | | | | |
| 15. | a | Bring out the role of VR in human-robot Interaction. What are the key technologies involved and justify their need. | | | 13 | 5 |
| | | OR | | | | |
| | b | How did surgery evolve over the years? what are the roles, salient features, components and unique challenges of a surgical simulator? | | | 13 | 5 |

Part-C (1X15=15)

| Q.No. | Questions | | | Marks | CO | BL |
|-------|-----------|--|---|-------|----|----|
| 16. | | | What are the two measures of evaluation used in VR applications? Why do we need them? Bring out the various processes involved in detail. | 15 | 1 | 5 |

