

Questions on GVC Lectures 3 TO 11 (Finite Time Assessment)

Lectures: 3, 4, 5, 6, 7, 8, 9, 10, and 11

Date September 12, 3:00PM to 4:00PM (1 Hour)

On the Top margin of each paper Students should write their

i) Question No, ii) Roll No, iii) Name and iv) Signature.

These pages should be scanned and uploaded. Please install Adobe Scan to take the pictures of your answer pages for uploading it (Preferably in PDF). Do not Scan at high resolution so that the file size is large and it becomes difficult to upload it from your end.

Do not share your login and password of your IITA e-mail. Any Malpractice of uploading through a single IP no, Uploading someone else's answer Sheet IS A CRIME. THE STUDENT will automatically fail the course.

These are difficult times. Your sincerity towards learning and ethical practice is expected from all of you.

[Marks: 30X1=30 + Bonus(5 Max)].

There will be marking the answer should be at least 75% correct to obtain 1 otherwise the marking will be 0. Those who will submit with 90% correct answer in:

- I. The first 30 min will get bonus 5 marks]**
- II. Within 30 min to 45 min will get bonus 3 marks**
- III. Within 45 min to 60 min will get bonus 2 marks**
- IV. Within 60 min to 90 min will get bonus 0 marks**
- V. Within 90 min to 2 hours will get penalty of -0.5 marks**
- VI. Those who submit late by 3 hour, -1 marks.**
- VII. Those who submit late by n hours, -n marks (Negative marks will be reset to 0).**

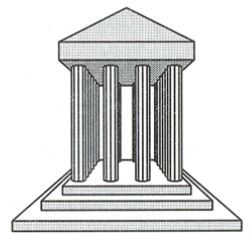
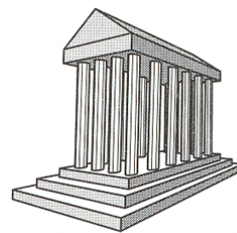
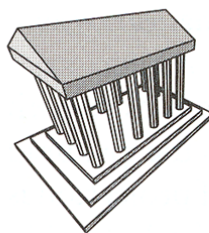
If a student has gone through my lectures and read the book he will surely get the bonus marks while the student who has not done any effort will find it difficult to reply within the time frame.]

1. Write the conversion equation to convert from spherical and cylindrical coordinates to cartesian coordinates.
2. We would like to represent a wizard's conical hat surface. Determine a conical coordinate system for a cone which has a slope "m". The top point of the cone is at a height H_0 from the base. Convert the conical coordinates into cartesian coordinates.
3. Draw the block diagram of the Graphical pipeline.
4. What is the standard way to describe the camera depth axis?
5. The colour texture and illumination is also quantized normally into_____.
6. In the DDA algorithm how does the parametric form of line equation help in selection of x and y increments?
7. Why is the Bresenham algorithm faster than DDA?
8. How is 2-step algorithm by Xiaolin Wu and improvement on Bresenham.
9. Why is the main propeller of the Apache helicopter static in the video?
10. For a Gaussian profile of an aliased line show that the line with a slope m, will also have a Gaussian profile in the y direction cut. Determine the new $\sigma'(m, \sigma)$ as a function of the slope and the σ of the Gaussian profile of the line.

11. Explain briefly how the Intensity variation due to weights which are proportional to the area of a pixel occupied by the line is made.
12. How is transformation categorized into different classes?
13. What is the definition of Linear Transformation?
14. Is Translation a linear transformation?
15. What is Affine transformation?
16. How is rotation performed around an arbitrary vector \mathbf{k}
17. Prove that 2 translation transformations are commutative.
18. Is rotation around 2 different axes commutative? When is rotation commutative?
19. The origins of the Two orthonormal coordinates (X, Y, Z) and (U, V, W) are separated by t_x , t_y , and t_z .
Derive the transformation matrix from (X, Y, Z) to (U, V, W) .
20. Give an example of a Change of Orthonormal Basis. Explain.
21. How do we perform the following tasks? **a)** *Position objects in a scene.* **b)** *Change the shape of objects.* **c)** *Create multiple copies of objects.* **d)** *Projection for virtual cameras.* **e)** *Animations.* We perform the tasks through _____
22. Draw the chair table and the tray with fruits shown in the video lecture. Draw the Hierarchy tree marking the blocks. Locate the animation transformation on this hierarchy tree.
23. When will the chair fall and when will it fly if rotation transformation is applied to the objects of the chair?
24. Draw the diagram with an ideal lens (of focal length f), imaging an object at a distance z ($f \ll z$).
Using trigonometric relations, derive the perspective projection.
25. How is this transformation represented through affine/homogeneous transformation?
26. What do we obtain by normalizing ω ?
27. What is the "Look At" vector, the "Up" vector? What is the relation of these vectors with the camera coordinate?
28. Derive the Camera Coordinates $(\hat{x}, \hat{y}, \hat{z})$ w.r.t. \overline{LookAt} and \overline{Up} vectors.

29. How many vanishing points? {From Left to Right}

- i) Fig(A) :
- ii) Fig(B) :
- iii) Fig(C) :



30. In this image of IITA taken from CC-2 looking towards CC-1 the road shows 2-point Vanishing points (The **Ocher lines** and the **yellow lines**). Why do we see 2 vanishing points on the same straight road?

