

(2 1/2 Hours)

[Total Marks: 75]

- N.B.**
- 1) All questions are **compulsory**.
 - 2) **Figures** to the **right** indicate marks.
 - 3) **Illustrations**, in-depth answers and diagrams will be appreciated.
 - 4) **Mixing** of sub-questions is **not allowed**.

Q.1 Attempt All the Questions**(15M)****(a) Multiple Choice Questions:**

1. Which of the following function represents $y=mx+c$?
 - a) Linear
 - b) Cubic
 - c) Trigonometric
 - d) Quadratic
2. The Theorem of Pythagoras in 3D is
 - a) $d = \sqrt{\Delta x^2 + \Delta y^2 + \Delta z^2}$
 - b) $d = \sqrt{\Delta x^1 + \Delta y^2 + \Delta z^1}$
 - c) $d = \sqrt{\Delta x^2 + \Delta y^1 + \Delta z^2}$
 - d) $d = \sqrt{\Delta x^2 + \Delta y^2 + \Delta z^1}$
3. Which of the following lightning type interpolates the normal and perform lightning calculations?
 - a) diffuse lightning
 - b) pixel lightning
 - c) point lightning
 - d) spot lightning
4. Which of the following method of MonoBehaviour class is called 60 frames per second?
 - a) Start()
 - b) Init()
 - c) Update()
 - d) Run()
5. Which of the following represents animation clips structured flowchart?
 - a) Animation Container
 - b) Animation Controller
 - c) Animation Class
 - d) Animation Frame

(b) Fill in the blanks (Use following pool to answer questions)

[Unit, depth, Position, XMFLOAT3, Box, Circle, Roll]

1. A vector p is _____ vector if point P(x, y, z) is vector's head and origin is its tail.
2. The _____ buffer is a texture that does not contain image data but contains depth information about a particular pixel.
3. In 3D graphics angle of rotation of an object about x-axis is _____.
4. _____ describes a 3D vector consisting of three single precision floating point values.
5. In UFO game _____ collider is best suited for pickup objects.

(c) Answer in ONE or TWO sentences:

1. What is Sine Rule?
2. What is back buffer?
3. Explain the prototype of WinMain() function.
4. What is unit quaternion?
5. List any four applications of augmented reality.

- Q. 2 Attempt the following (Any THREE) (15M)**
- Define quaternion. Explain addition and subtraction of quaternion with suitable example.
 - Explain in brief the situation which leads to gimbal lock.
 - What is GPU? Explain in brief the communication between CPU and GPU.
 - Explain in brief 3D scaling and 3D translation with suitable example.
 - Write a short note on perspective projection.
 - Explain how to derive a unit normal vector for a triangle.
- Q. 3 Attempt the following (Any THREE) (15M)**
- Explain in brief the role of following functions in window creation:
 - GetMessage()
 - PeekMessage()
 - TranslateMessage()
 - DispatchMessage()
 - PostQuitMessage()
 - Explain the concept on index buffer and vertex buffer.
 - Explain the input assembler(IA) stage of Direct3D11 rendering pipeline.
 - State and prove the cosine rule.
 - What is the idea behind compound angle?
Show that:
 - $\sin(A \pm B) = \sin(A) \cos(B) \pm \cos(A) \sin(B)$
 - $\sin(2B) = 2\sin(B)\cos(B)$
 - Write a short note on swap chain of DirectX rendering pipeline.
- Q. 4 Attempt the following (Any THREE) (15 M)**
- What is mixed reality? Explain in brief any four applications of it.
 - Write a short note on smart glasses.
 - Explain capsule and sphere colliders used in Unity under 3D project.
 - Write a short note on animation controller in Unity.
 - Write down the steps for following:
 - Adding Audio
 - Adding Video
 - Adding GUIText element
 - Write a short note on Rigidbody component of Physics under 3D project.
- Q. 5 Attempt the following (Any THREE) (15 M)**
- Given a light source at (20,20,40) and the illuminated source as (0,10,0) and unit vector n (0,1,0) check the visibility of the object.
 - State the difference between diffuse lighting and specular lightning.
 - What is multi-sampling? Describe how multi-sampling is done in Direct3D.
 - Explain in brief COM with respect to Direct3D.
 - State the difference between virtual reality and augmented reality.