(2 ½ 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 Questions** (15)
(A) Choose the correct alternative. (10)
(i) Which of the following function represents y=mx+c?
(a) Linear
(b) Cubic
(c) Trigonometric
(d) Quadratic

(ii) _____ is the angle of rotation about the z -axis.
(a) roll
(b) pitch
(c) yaw
(d) None

(iii) To get the depth information _____ is used.
(a) Back Buffer
(b) Depth Buffer
(c) Font Buffer
(d) Swap Buffer

(iv) Blender,3Delight,Corona etc are examples of ?
(a) API
(b) Rendering Engines
(c) Scripting language
(d) Graphics card

(v) The UI Control that is not visible on the screen is?
(a) Text
(b) Image
(c) Mask
(d) Rawimage

(vi) Lambert's law states that light intensity on a surface is proportional to the
_____ of the angle between the surface normal vector and light
source direction.
(a) sine
(b) cosine
(c) tangent
(d) cosec

(vii) _____ is the transformation equation for Scaling.
(a) $x' = x.sx, \quad y' = y.sy$
(b) $x' = x + sx, \quad y' = y + sy$
(c) $x' = -x, \quad y' = y$
(d) $x' = x + y\tan\beta, \quad y' = y$

(viii)   To render the target, texture target view is created using _____.
      (a) ID3D11DeviceContext
      (b) ID3D11RenderTargetView
      (c) IDXGISwapChain
      (d) ID3D11ShaderResourceView

(ix)   In the _____ primitive topology every two Vertices in the draw, forms an individual line.
      (a) point
      (b) Line list
      (c) Point list
      (d) Line

(x)   The type of light that emits light equally in all directions is called _____?
      (a) Point
      (b) Spot
      (c) Diffuse
      (d) Directional

(B)   **Fill in the blanks.**   (5)
   (Debug.Alert,Magnitude,Network Manager,Frustum, Scene view,Debug.Log, 0, direction,1)
(i)   The _____ of a vector r is represented by $\|r\|$.
(ii)   For 2D transformation the value of third coordinate i.e. w=____
(iii)   Volume of the space the camera sees is _____.
(iv)   _____ is used to create a Multiplayer project
(v)   We use _____ to send message to Unity console

Q.2   **Attempt the following:(ANY THREE)**   (15)
(A)   Explain 2D Rotation about an Arbitrary Point.
(B)   How does Dot product helps in Back Face Detection?
(C)   Explain the architecture of the GPU.
(D)   Explain 3D translation , 3D Scaling with suitable examples.
(E)   Explain the concept of perspective projection
(F)   Explain how to derive a unit normal vector for a triangle.

Q.3   **Attempt the following:(ANY THREE)**   (15)
(A)   Explain the concept of swap Chain and page flipping.
(B)   Explain the following lighting
   a. Diffuse lighting
   b. Ambient lighting
   c. Specular lighting
(C)   Draw and explain the stages of the rendering pipeline of DirectX.
(D)   State the properties of Bezier curves.
(E)   Explain the different topologies used in Input Assembler stages.
(F)   Write a short note on the Vertex Shader stage and define the matrix for View space.

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Q. 4   **Attempt the following:(ANY THREE)**   (15)
(A)   Describe any two rendering engines
(B)   Explain the use of Physics in Unity projects
(C)   Define MR and mention its applications
(D)   Explain with code snippet the use of FixedUpdate() in Unity Script
(E)   Write a short note on Head mount display
(F)   Explain the steps in creating multiplayer project in Unity

Q. 5   **Attempt the following:(ANY FIVE)**   (15)
(A)   Explain in detail Direction Cosine
(B)   Explain in detail Cross or Vector Product with suitable example.
(C)   What is Blending and mention the Blending equation, Blend Operations , Blend Factors and Blend State. (with reference to DirectX)
(D)   Mention any two differences between AR,VR and MR
(E)   What is an Animation clip and how it is created?
(F)   Write a note on the COM object.
(G)   Illustrate the concept of a homogeneous coordinate system
(H)   What are raycasters? Explain in brief.

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