(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 ANY FOUR from the following:** **(20M)**

(a) Explain how dot product is used in calculation of back face detection.
(b) Discuss the concept of 2D scaling with examples.
(c) Describe the role and significance of color in the context of 3D modelling and rendering.
(d) Given a homogeneous point (1, 2, 3). Apply rotation 90 degree towards X, Y and Z axis and find out the new coordinate points.
(e) Explain types of parallel projections.
(f) Write a short note on Shader Models.

Q. 2 **Attempt ANY FOUR from the following:** **(20M)**

(a) Explain 2D and 3D game development with NumPy.
(b) Describe the concept of IDE.
(c) Explain about feature levels in Direct3D.
(d) Discuss the game engine architecture.
(e) Describe the process of animating a game object in Pygame, providing detailed steps and explanations for implementing animation with Pygame's game object.
(f) Write a short note on multisampling theory.

Q. 3 **Attempt ANY FOUR from the following:** **(20M)**

(a) Which are the game design strategies, explain.
(b) How to use sprites in Unity, explain.
(c) Describe the steps necessary to script collision events.
(d) Write a note on Unity Colliders.
(e) Explain various animation types and components used in Unity.
(f) Briefly discuss Unity's virtual world.

Q. 4 **Attempt ANY FIVE from the following:** **(15M)**

(a) How to calculate the surface area of parallelogram using vectors r and s?
(b) Which are the main components of game engine?
(c) Describe the primary functions used by Unity's game loop.
(d) Describe any three types of light used in models.
(e) Write any three key features of 2D Pygame.
(f) Explain loops are supported by Unity.

****