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Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Examination, Summer 2026

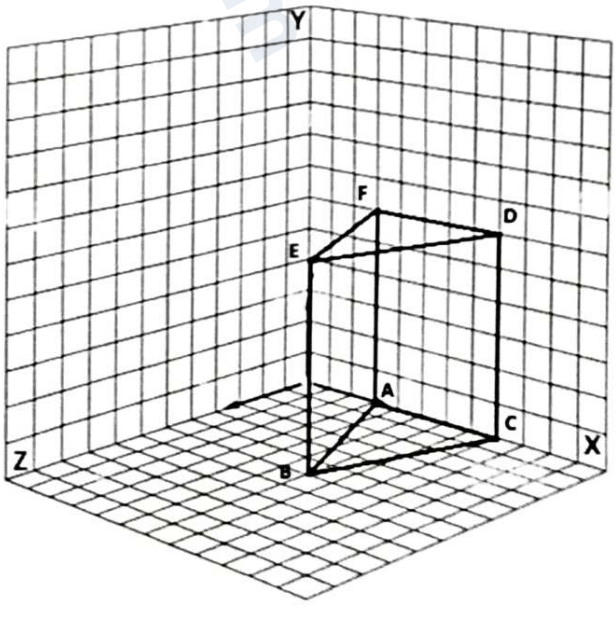
Course Code: CSE 411, Course Title: Computer Graphics

Level: 3 Term: 1 Batch: 65

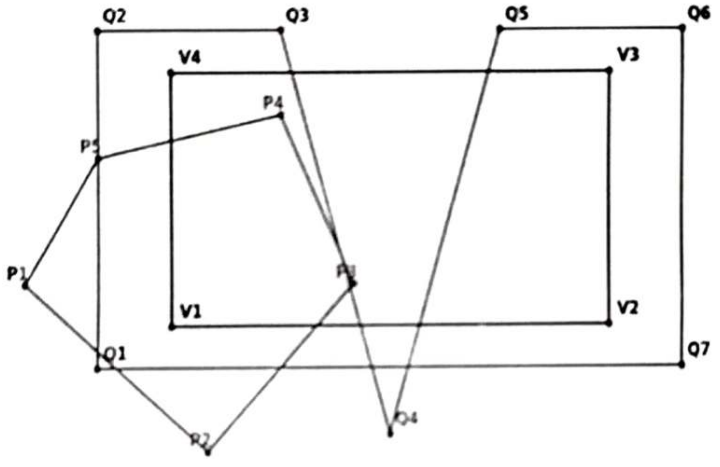
Time: 02:00 Hrs **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.		An architectural company is preparing technical drawings and a 3D promotional animation for a newly designed office skyscraper. Engineers need accurate drawings for construction, while the marketing team requires realistic images of the completed building. The animation shows the building being constructed floor by floor, from the foundation to the finished structure. To create smooth motion, the animator sketches the key stages, determines the animation duration, and generates the intermediate frames. In the final scene, the building is viewed from different angles, where only the visible surfaces are displayed despite overlapping objects.	**[10]**	**CO1**
	a)	Which projection method should be used for the engineering drawing? Justify your answer.	**[2.5]**	
	b)	While standing directly in front of the building, a visitor notices that the road appears to converge into a single point. Identify the type of projection with proper reasoning.	**[2.5]**	
	c)	Identify the steps involved in designing the animation sequence in the given scenario. Briefly explain the purpose of each step.	**[2.5]**	
	d)	Which Visible Surface Identification technique is most suitable for ensuring that only the surfaces nearest to the viewer are displayed when different parts of the building overlap? Briefly justify your answer.	**[2.5]**	
2.		Consider the following Figure-A and apply the appropriate 3D transformation algorithms to solve the following: **i)** Identify the coordinates of each point. **ii)** Rotate the cube 45° about the Z-axis. **iii)** Shear the object along the Z-axis, where the shear value is 3. **For questions (ii) and (iii), consider the points lying on the XZ-plane.**  Fig: A	**[7]**	**CO2**

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3.	*a)*	A GIS application stores maps using world coordinates but displays them on a monitor using device coordinates. The application uses Window having, Xwmin=50, Xwmax=150, Ywmin=20, Ywmax=120 and Viewport having, Xvmin=0, Xvmax=500, Yvmin=100, Yvmax=400 dimensions. A location is stored at (80, 70) in the window. Analyze the window-to-viewport mapping process and determine the corresponding viewport coordinates of the given location.	[3]	CO3
	b)	In Figure-B below, V1V2V3V4 is the rectangular clipping window. Two subject polygons are given with respect to this window: • Polygon-1: P1P2P3P4P5 (a convex pentagon) • Polygon-2: Q1Q2Q3Q4Q5Q6Q7 (a concave, "crown-shaped" heptagon) Clip Polygon-1 (P1P2P3P4P5) against the window and clip Polygon-2 (Q1Q2Q3Q4Q5Q6Q7) against the same window. For each polygon, choose the appropriate polygon-clipping algorithm. Construct the clipped polygon(s), and show all intermediate steps.  Fig: B	[5+5]	
4.	*a)*	Consider the following 9×9 grayscale image block, where each value represents an 8-bit pixel intensity. $\begin{bmatrix} 193 & 241 & 169 & 193 & 147 & 193 & 48 & 193 & 73 \\ 25 & 96 & 241 & 147 & 193 & 169 & 218 & 241 & 241 \\ 218 & 73 & 241 & 169 & 193 & 241 & 218 & 121 & 121 \\ 241 & 218 & 96 & 121 & 147 & 193 & 121 & 218 & 73 \\ 241 & 147 & 218 & 218 & 169 & 73 & 73 & 193 & 218 \\ 96 & 96 & 241 & 147 & 121 & 25 & 48 & 241 & 121 \\ 121 & 218 & 147 & 147 & 169 & 241 & 218 & 96 & 241 \\ 241 & 193 & 48 & 169 & 96 & 241 & 193 & 169 & 218 \\ 218 & 241 & 193 & 169 & 218 & 218 & 169 & 241 & 241 \end{bmatrix}$ **i)** Determine the frequency of each distinct pixel intensity to construct the Huffman tree and assign a binary Huffman code to each pixel intensity. **ii)** Calculate the encoded length and average code length (in bits), and analyze the compression efficiency.	[5+2]	CO3
	b)	If JPEG compression is applied to the given grayscale image, identify the major steps involved in the compression process and briefly explain how each step contributes to reducing the image data.	[3]	