Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Advanced Computer Graphics (CSEG459) **Semester: VII**

Programme: B.Tech. (CSE spl. GG)

Time: 03 hrs. **Max. Marks: 100**

Instructions: Attempt all questions. There are internal choices in Q. No. 9 and 11.

	SECTION A		
Q 1	What is Alpha-Channel in the context of RGB color space?	**[4]**	**CO1, CO2**
Q 2	What is subdivision of mesh surfaces? Why is it required?	**[4]**	**CO2**
Q 3	Differentiate between vertex and fragment shaders.	**[4]**	**CO2**
Q 4	List at the least four OpenGL texture mapping functions with their one/two lines description.	**[4]**	**CO2**
Q 5	Differentiate between global and local illumination with the help of example.	**[4]**	**CO1**
	SECTION B		
Q 6	What are NURBS surfaces? Discuss their advantages over non-rational B-spline patches.	**[10]**	**CO2**
Q 7	Write an OpenGL function to draw a mesh.	**[10]**	**CO3**
Q 8	List various properties of the meshes. What is polyhedra?	**[10]**	**CO2**
Q 9	Discuss scene-graphs graphics data structure.	**[10]**	**CO3, CO4**
	OR		
	Discuss OpenGL surface texture and volume texture functions.	**[10]**	**CO3, CO4**
	SECTION C		
Q 10	Is ray tracing an extended idea for ray casting? Explain the basic ray tracing algorithm. Discuss how space-subdivison methods reduce intersection computations.	**[20]**	**CO3**
Q 11	Explain Marching-Cubes algorithm with suitable example.	**[20]**	**CO3, CO4**
	OR		
	In the context of projections, describe: (1) One-principal vanishing point perspective (2) Two-principal vanishing point perspective (3) Three-principal vanishing point perspective	**[20]**	**CO3, CO4**

	What are the principal vanishing points for the standard perspective transformation?		

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	SECTION A		
Q 1	List some commonly used NURBS surfaces.	**[4]**	**CO2**
Q 2	What is subdivision of mesh surfaces? Why is it required?	**[4]**	**CO1**
Q 3	List different methods to add details to surfaces.	**[4]**	**CO2**
Q 4	Write at the least four OpenGL texture mapping functions with their one/two lines description.	**[4]**	**CO2**
Q 5	Define perspective foreshortening and vanishing points.	**[4]**	**CO1, CO2**
	SECTION B		
Q 6	Explain texture mapping with brief discussion on linear and surface texture patterns.	**[10]**	**CO3**
Q 7	Do the modern graphics hardware operate the same way that the fixed function pipeline suggests? If not then how to modify the fixed function pipeline?	**[10]**	**CO3, CO4**
Q 8	Discuss the working and utility of Lattice-Boltzman method in generating realistic graphics.	**[10]**	**CO2**
Q 9	Discuss that reflection mapping can be used to improve realism in graphics.	**[10]**	**CO2, CO3**
	OR		
	Explain different programmable shaders.	**[10]**	**CO2, CO3**
	SECTION C		
Q 10	Write short notes on following graphics data structures: (a) Triangle meshes (b) Winged-edge data structure	**[20]**	**CO3**
Q 11	Draw and explain a 3D graphics pipeline. Describe the graphics pipeline in OpenGL and discuss its conformance to the above-mentioned 3D graphics pipeline. Where do the functions *gluOrtho2D*() and *gluLookAt*() come into the picture in the above flow?	**[20]**	**CO3, CO4**
	OR		
	Discuss OpenGL Shading Language with shading structure. How the shaders are used in OpenGL?	**[20]**	**CO3, CO4**