

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2019

Course: OpenGL (CSEG364) (PE - II)

Semester: VI

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	Explain any four commands with their very brief description that can be written inside the scope of <code>glBegin()</code> and <code>glEnd()</code> .	[4]	CO2
Q 2	Elaborate the different data types that OpenGL supplies as command arguments.	[4]	CO1, CO2
Q 3	Differentiate between per-vertex and per-fragment operations.	[4]	CO1, CO2
Q 4	Discuss the working of <code>glClearColor()</code> , <code>glClearDepth()</code> , and <code>glClear()</code> commands in the context of buffer clearing. Justify why <code>glFlush()</code> command is invoked in OpenGL programs?	[4]	CO2
Q 5	List and give example for the commands available in GLUT to handle input events.	[4]	CO2

SECTION B

Q 6	Demonstrate the minimal OpenGL code to rotate a rectangle primitive around its center to generate a smooth animation effect.	[10]	CO2
Q 7	Explain Pixmaps. List and discuss five different OpenGL pixel formats. Also explain packed pixel formats?	[10]	CO3
Q 8	Describe the graphics pipeline in OpenGL. Where do the functions <code>gluOrtho2D()</code> and <code>gluLookAt()</code> come into the picture in the above flow?	[10]	CO2
Q 9	Illustrate the sequence of vertex transformation required to produce the desired scene for viewing. Show the process with an example OpenGL code.	[10]	CO2, CO3
	<i>OR</i>		
	Demonstrate how the coordinate system is setup in OpenGL for orthographic and perspective projection.	[10]	CO2, CO3

SECTION C

Q 10	(a) Explain multi-texturing. Neatly describe the multi-texturing pipeline in OpenGL. (b) Discuss various ways to load textures in the memory.	[20]	CO3
Q 11	Construct and show an OpenGL program to demonstrate the usage of three fundamental OpenGL libraries, namely, GL, GLU, and GLUT. Clearly mention, which	[20]	CO3, CO4

	particular library the command syntax in your code belongs to. Show the code in OpenGL syntax to draw a stippled line.		
	<i>OR</i>		
	(a) Explain mip mapping. Discuss how mip-levels are generated in OpenGL using suitable example. (b) Summarize the vertex and fragment shaders? Briefly explain the following: (i) Identity Shader (ii) Flat Shader (iii) Shaded Shader (iv) The default light shader	[20]	CO3, CO4

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SECTION A

Q 1	List at the least four constants to refer graphical primitives in OpenGL. Write the piece of code to display a FANNED triangle in OpenGL.	[4]	CO2
Q 2	Define a normal vector in the context of OpenGL. Also discuss the syntax to use it.	[4]	CO1, CO2
Q 3	What are the different buffers and associated constants? How these buffers can be cleared at times? What are contexts and Profiles in OpenGL?	[4]	CO1, CO2
Q 4	What is the utility of the commands <code>glPolygonMode()</code> and <code>glCullFace()</code> ? Is it possible to draw stippled lines in OpenGL? If yes, then specify the syntax.	[4]	CO2
Q 5	Write in brief on the following commands: (a) <code>gluLookAt()</code> (b) <code>gluPerspective()</code> (c) <code>gluLoadIdentity()</code> (d) <code>gluOrtho2D</code>	[4]	CO2

SECTION B

Q 6	Differentiate between Ambient, Diffuse, Specular, and Emissive Light. Describe how OpenGL imitates material colours using RGB values.	[10]	CO2
Q 7	Explain the Vertex Arrays in OpenGL. Discuss the steps to use Vertex Arrays with suitable example.	[10]	CO3
Q 8	Describe how the texture coordinates are specified for each vertex. Write the syntax to specify texture coordinates.	[10]	CO2
Q 9	Explain the steps in rendering a lit sphere. Discuss briefly the sphere map and cube map textures.	[10]	CO2, CO3
	<i>OR</i>		
	Critically analyze your views on shading. Explain different programmable shaders.	[10]	CO2, CO3

SECTION C

Q 10	(a) How shadow maps are created in OpenGL. Explain with the help of an example code. (b) Discuss various ways to load textures in the memory.	[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 <code>gluOrtho2D()</code> and <code>gluLookAt()</code> come into the picture in the above flow?	[20]	CO3, CO4

	<i>OR</i>		
	(a) Discuss OpenGL Shading Language with shading structure. How the shaders are used in OpenGL? (b) Explain Blending, Dithering, and logical operations in the context of frame buffer.	[20]	CO3, CO4