



**ELIZADE UNIVERSITY**

**ILARA-MOKIN**

**FACULTY: BASIC AND APPLIED SCIENCES**  
**DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE**  
**1<sup>st</sup> SEMESTER EXAMINATION**  
**2018 / 2019 ACADEMIC SESSION**

**COURSE CODE: CSC 427**

**COURSE TITLE: Computer Graphics & Visualization**

**COURSE LEADER: Mr. O. T. Babalola**

**DURATION: 2 Hours**

**HOD's SIGNATURE**

**INSTRUCTION:**

Candidates should answer all questions in Section A and 1 in Section B.

Students are warned that possession of any unauthorized materials in an examination is a serious assessment offence

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**SECTION A :** Answer all questions in Section A

1. What is computer graphics?
2.  $p = \begin{bmatrix} 7 \\ 7 \\ 4 \end{bmatrix}$   $q = \begin{bmatrix} -7 \\ 7 \\ -4 \end{bmatrix}$  Describe the two vectors graphically.
3.  $p = \begin{bmatrix} 8 \\ 6 \\ 4 \end{bmatrix}$   $q = \begin{bmatrix} 12 \\ 9 \\ 6 \end{bmatrix}$  i. Is  $p$  &  $q$  in the same direction? ii. What is  $p \cdot q$ ?
4. If  $B = \begin{bmatrix} x & y & z \end{bmatrix}$  what is  $B^T$  ?
5. What can you say about two vector  $s$  and  $t$  if  
(a)  $s \times t = 0$  (b)  $s \cdot t = 0$
6. Choose values for  $m$  and  $n$  and compose a  $m \times n$  matrix, call it  $K$ . State the order of  $K$ , the matrix you composed. Find  $2.5K$
7. What is the magnitude of  $p = \begin{bmatrix} 5 & 5 & 5 \end{bmatrix}$ ?
8. Briefly explain how computer graphics is used in education.
9. Why is mathematics prevalent in computer graphics? List 5 areas of mathematics and an area of physics that is mainly found in CG.
10. What are primitives in computer graphics, list 5 primitives.
11. List the various libraries and tools you would need if you were to use OpenGL. What is each of those used for?
12. List the various OpenGL statements for producing a triangle primitive.
13. What is the place of hardware in computer graphics? What is the interest in GPUs?
14. What is the major feature of raster graphics?
15. Computer displays are raster devices? Y/N? Explain. What are raster graphics? Vector graphics?
16. List some transformations and describe them mathematically.
17.  $RP + t \neq R(P + t)$ . Explain using visual aids.
18. What is the graphics pipeline?
19. What is a callback function? Give some OpenGL examples.
20. Mention some 5 things visualization can do.
21. Who owns OpenGL?
22. List three coordinate systems. Is there 1D? Support your answer with diagrams.
23. What is the homogenous coordinate?
24. List some common vector operations in computer graphics.
25. What is the image resolution?
26. Mention 5 transformations
27. Mention 5 transformations and state the type of matrix operation used to manipulate them

28. Is it possible to use a singular type of operation for every type of transformation? Explain your answer.
29. Define a diagonal matrix, state its order.
30. What is the difference between OpenGL and CorelDraw?

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**SECTION B:** Answer one question in Section B.

1. We need to produce a triangle in OpenGL. Explain how you would approach the problem. Give each step of the process from the analysis till the display of the triangle on your computer screen. Note - you must write an OpenGL program among other things. (20 marks).
2. a. What is rendering? Give practical instances. Explain the graphics pipeline specifying at least 6 major phases in the pipeline (6 marks). 2b. Explain 3 concepts in OpenGL lighting techniques (2 marks) 2c. Mention 3 concepts in OpenGL shading techniques (2 marks). 2d. Using diagrams, show 4 key transformations and their matrix (10 marks).
3. a. What is the difference between images and visualization? Briefly explain the visualization process (5 marks for good discrimination). 3b. Consider this: `glVertex3f(75, 75, 0)`; is this code snippet correct? Explain. (3 marks). 3c. List and explain 3 special matrices (4 marks). 3d. Choose values for  $m$  and  $n$  and compose a  $m \times n$  matrix, call it  $J$ . Find  $J + J^T$  (4 marks). 3e. Present a vector  $z$ . Find  $|z|$ , and thence change the direction and magnitude of  $z$  (4 marks).