CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF ARTS

GEOG 434: DIGITAL IMAGE PROCESSING

STREAMS: B.A Y4S1   **TIME: 2 HOURS**

DAY/DATE: THURSDAY 23/09/2021   **2.30 P.M – 4.30 P.M.**

INSTRUCTIONS:
- **Answer question ONE and any other TWO questions.**
- **When necessary use examples and illustrations to support your answers.**

1.   (a)   Account for FIVE sources of geometric distortions associated with satellite
                    images.   (10 marks)

      (b)   The following are cell values for a digital raster image.

1	1	1	2	2	2	2	2	2	2
1	1	1	2	2	2	2	2	2	2
1	1	1	2	2	2	2	2	2	2
1	1	1	1	2	2	2	2	2	2
1	1	1	1	1	2	2	2	2	2
1	1	1	1	1	2	2	2	2	2
1	1	1	1	1	2	2	2	2	2
1	1	1	1	1	3	3	3	3	3
1	1	1	1	1	3	3	3	3	3
1	1	1	1	1	3	3	3	3	3

      (i)   Write down the file structure for the above raster data.   (8 marks)

      (c)   Explain the THREE techniques used for spatial interpolation of Digital Numbers
                    of images during resampling.   (6 marks)

(d)　(i)　Carry out linear contrast enhancement on the below 3X3 image Kernel cell value 35. (4 marks)

15	60	120
5	35	47
200	185	33

　　(ii)　Comment on the resultant brightness value of the said cell. (2 marks)

2.　Using illustrations, discuss the basic techniques used in the reduction and compaction of raster image data. (20 marks)

3.　Examine the SEVEN steps followed during the performance of image processing using computers. (20 marks)

4.　(a)　Differentiate between "Hard" and "Soft" classifiers. (4 marks)

　　(b)　Using the Error matrix below for a given classification scheme:

100	22	5	30
41	35	52	63
88	101	60	135
210	70	25	15

Compute the:　(i)　Overall accuracy (2 marks)
　　　　　　(ii)　Producer's accuracy (3 marks)
　　　　　　(iii)　Users' accuracy (3 marks)

　　(c)　Explain the FOUR resolutions that can be determined when choosing digital images. (8 marks)

5.　(a)　Describe FOUR methods that can be used to carry out change Detention Analysis on classified images. (8 marks)

　　(b)　Distinguish between "Quantization" and "Sampling" during digital image acquisition. (4 marks)

　　(c)　Examine FOUR contemporary applications of Digital Image Processing. (8 marks)