UNIVERSITY OF GHANA

B.SC COMPUTER SCIENCE, FIRST SEMESTER EXAMINATIONS 2022/2023
DEPARTMENT OF COMPUTER SCIENCE
DCIT407: IMAGE PROCESSING
(3 CREDITS)

INSTRUCTION:

Attempt only Four (4) Questions
All Questions Carry Equal Marks.

TIME ALLOWED:

TWO AND HALF (2 ½) HOURS

A1. Explain with sample code how you can convert a RGB image to XYZ and vice versa [25 marks]

A2. Describe the concept of filtering in image analysis using the 2D function below:

$$f(x,y)=\frac{1}{2\pi\sigma^2}\exp\left(-\frac{x^2+y^2}{2\sigma^2}\right)$$ [25 marks]

A3. (a) Write a simple algorithm to demonstrate the *addition* and *removal* of salt-and-pepper noise to an image using the Median Filter. [8 marks]

(b) By a sample *python* or *MATLAB* code show how you can add salt and pepper noise to an image and how you can remove the noise using both Mean and Median filters. [12 marks]

(c) Discuss the difference between the two methods to remove the salt and pepper noise. [5 marks]

A4. (a) What is the difference between *Dilation* and *Erosion* in image processing? [8 marks]

(b) Write the algorithm of Gabor filtering and explain how it can be used to extract facial features. [17 marks]

A5. (a) Explain the formation of digital image using a simple mathematical model. [10 marks]

(b) Demonstrate how you can detect the skin of a human being using a simple algorithm and flowchart. [15 marks]