ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

SECOND SEMESTER EXAMINATION, 2017/2018 ACADEMIC SESSION

COURSE TITLE: DIGITAL IMAGE PROCESSING

COURSE CODE: ECE 532

EXAMINATION DATE: 7TH AUGUST, 2018

COURSE LECTURER: Dr. A. A. SOBOWALE

HOD's SIGNATURE

TIME ALLOWED: 2 HOURS

INSTRUCTIONS:

1. ANSWER FOUR QUESTIONS ONLY;
2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM.
3. YOU ARE **NOT** ALLOWED TO BORROW ANY WRITING MATERIALS DURING THE EXAMINATION.

Question #1

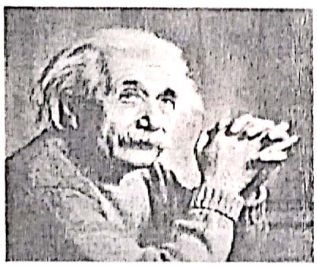
a. With the aid of a suitable diagram, explain what is Signal Processing? [**5 Marks**].
b. Write briefly on Image Processing [**2 Marks**]; Enumerate three steps of Image Processing [**3 Marks**].
c. Using relevant examples, Distinguish between Digital Image Processing and Analogue Image Processing [**5 Marks**].

Question #2

a. Write short notes on the following: [**2 Marks Each**]
   i. Digital Image ii. Digital Signal iii. Transformation
b. Given an image as shown in Figure 1 below, where for each pixel or intensity value of the input image, there is the same intensity value of output image;

Figure 1:

Input image



Output image

i. Draw the Transformation graph to represent the scenario in Figure 1[**3 Marks**].
ii. Write the mathematical representation of the scenario in Figure 1[**3 Marks**].
iii. Explain the implication of Figure 1[**3 Marks**]

Question #3

a. Enumerate the two major task of digital image processing [**2 Marks**].
b. Discuss any five applications of digital image processing [**5 Marks**].
c. You just won a contract to cover the pictures (images) of Pa Elizade 80th birthday anniversary, with the aid of a suitable diagram explain the process you will pass the snapped pictures (input images) through to give the school the expected digital output pictures (output image). [**8 Marks**].

Question #4

a. Enumerate five differences between *Analogue* and *Digital Signals*. [**5 Marks**].
b. Giving relevant examples or applications; Distinguish between the following; [**2 Marks Each**];
   i. Sampling and Quantization Techniques ii. Continuous System and Discrete System
   iii. Spatial Domain and Frequency Domain iv. Fourier Transform and Fourier Series
   v. Laplace Transform and Z- Transform

Question #5

a. Explain with the aid of a diagram, what is filtering; enumerate four types of filters [**6 Marks**].
b. The movement of objects captured by a researcher in an experiment produced defective pictures due to movement of the sensors used and the movement of the objects captured; kindly enumerate the steps you will employ to restore the defective image to its original state.
   Note, the limitations and/or challenges encountered should be listed [**9 Marks**].

Question #6

a. Write Briefly on the following: [**2 Marks Each**]
   i. Digital Filters ii. Image Understanding iii. Morphology iv. Spectral Transforms
   v. Image Processing with Artificial Neural Networks
b. Enumerate five Digital Image Processing Techniques [**5 Marks**].