THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMMUNICATIONS ENGINEERING

FIRST SEMESTER EXAMINATION (2022)

EE417: DIGITAL SIGNAL PROCESSING (BEEC/4)

TIME ALLOWED: 3 HOURS

INFORMATION FOR STUDENTS

1. You have **TEN (10) MINUTES** to read the paper.
   You must not begin writing during this time.

2. All answers must be written in the **ANSWER BOOK** supplied. **COMPLETE THE DETAILS REQUIRED ON THE FRONT COVER OF YOUR ANSWER BOOK - DO THIS NOW**.

3. Only drawing instruments and calculators are permitted on your desk.

4. Answer all questions.

5. Total available mark is 40.

6. If you are found cheating in the Examination, the penalties specified by the University shall apply.

7. **TURN OFF** all mobile phone and place them on the floor under your sit before the start of examination.

QUESTION ONE [3+5+2 = 10 MARKS]

A) What do you mean by term "Signal Processing"?
B) Explain the Block Diagram of DSP?
C) What are the advantages and disadvantages of DSP?

QUESTION TWO [10 MARKS]

Calculate the circular convolution using Graphical Method for the

$X_1(n) = \{1, 2, 2, 1\}$ & $X_2(n) = \{3, 1, 2, 0\}$

QUESTION THREE [5+5 = 10 MARKS]

A) Using Direct Form 2, realize the following IIR Filter

$$H(Z)=\frac{7z^2-5.3z+2.45}{z^2-1.34z+0.125}$$

B) Using Parallel Form, realize the following IIR Filter

$$H(Z)=\frac{-0.52z}{z-0.5}+\frac{1.35z}{z+0.3}$$

QUESTION FOUR [5+5 = 10 MARKS]

A) Using Cascade Form, realize the following FIR Filter

$$H(Z)=\frac{\left(z^2+4z+2\right)\left(z^2+2z-1\right)}{z^4}$$

B) Using Direct Form, realize the following FIR Filter

$$H(z)=\left(1-\frac{1}{4}Z^{-1}+\frac{3}{8}Z^{-2}\right)\left(1-\frac{1}{8}Z^{-1}-\frac{1}{2}Z^{-2}\right)$$