THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMMUNICATIONS ENGINEERING

SECCOND SEMESTER EXAMINATION (2021)

EE-492 MICROWAVE COMMUNICATIONS & OPTICAL SYSTEMS

FINAL YEAR ELECTRICAL ENGINEERING (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. **Answer all questions.**

3. All answers must be written in the **ANSWER BOOK** supplied.

4. **COMPLETE THE DETAILS REQUIRED ON THE FRONT COVER OF YOUR ANSWER BOOK – DO THIS NOW.**

5. Only drawing instruments and calculators are permitted on your desk. Textbooks and notebooks are **NOT** permitted.

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 seat before the start of Examination

QUESTION ONE: [10 MARKS]

A. Explain the Microwave communication system with appropriate Diagram?

[5 marks]

B. If two parallel transmission line, separated by 4 mm and diameter of the wire is 0.1 mm is given for loss less transmission line. Calculate the following

   i.   L
   ii. C
   iii. Character Impedance   [5 Marks]

QUESTION TWO: [10 MARKS]

The dimension of rectangular waveguide are 2.5 x 1 cm^2 and the frequency is 8.6 GHZ. Calculate the following:

   i.   Possible mode
   ii. Cut-off frequency
   iii. Guide Wavelength   [10 marks]

QUESTION THREE: [10 MARKS]

A. An air filed rectangular waveguide has inner dimension of 3 x 2 cm. Calculate the wave impendence of the TE20 mode of propagation in the waveguide at a frequency of 30 GHZ.   [5 Marks]

B. A TE11 mode is propagating through circular waveguide. The radius of the guide is 5 cm and the guide contains air dielectric. Calculate the following:

   i.   Cut-off Frequency and Cut-off Wavelength
   ii. Phase velocity for operating frequency 3 GHZ
   iii. Guided Wavelength
   iv. Wave Impedance   [5 Marks]

QUESTION FOUR: [10 MARKS]

A. Explain the block diagram of optical fiber communication system ?

B. Explain the internal structure of microwaves isolators?

(5+5 marks)

QUESTION FIVE: [10 MARKS]

A. Explain the various Types of LED Structures ?   [5 Marks]

B. State the difference between Step Index and Graded Index fiber? [5 Marks]