



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (TELECOMMUNICATION AND INFORMATION
TECHNOLOGY)

SPH 314: MICROWAVE AND DEVICES

DATE:

TIME:

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) List 3 advantages and 2 disadvantages of microwave (5 marks)
- b) Explain 3 application of microwaves (6 marks)
- c) Discuss the three types of losses in conventional transmission lines (6 marks)
- d) Sketch a Magic Tee and explain its operation (8 marks)
- e) An air – filled rectangular waveguide has inner dimensions of $3\text{cm} \times 4\text{ cm}$. Determine the minimum operating frequency. (5 marks)

QUESTION TWO (20 MARKS)

- a) Draw the physical structure and doping profile of IMPATT diode oscillator and amplifier in detail. (8 marks)
- b) Give the comparison between gunn, IMPATT, TRAPATT and Baritt diode. (12 marks)

QUESTION THREE (20 MARKS)

With suitable illustrations that correspond to the different region in the IV characteristics of a tunnel diode, explain the tunnelling effect from using a pn-junction

QUESTION FOUR (20 MARKS)

- a) Define Microwaves
- b) Draw a circuit diagram of a Two Cavity Klystron Amplifier and discuss its operation (14 marks)
- c) Differentiate between Linear beam tubes (O-type) & Crossed-field tubes (M-type) (4 marks)

QUESTION FIVE (20 MARKS)

- a) Explain the principle of microwave power measurements (6 marks)
- b) Using appropriate block diagram explain how Measurement of Impedance is carried out using (14 marks)
 - (i) the Slotted Line
 - (ii) the Reflectometer