TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

UNIVERSITY EXAMINATION FOR:

DIPLOMA TELECOMMUNICATIONS

ETI 2305 : MICROWAVE DEVICES AND COMPONENTS

END OF SEMESTER EXAMINATION

SERIES: DEC 2016

TIME:2 HRS

DATE:

<u>**Instructions to Candidates**</u>
You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of FIVE questions. Attempt ANY THREE questions
Do not write on the question paper.

Question ONE

(a)   With the aid of a diagram explain how a circulator is used in a tunnel diode amplifier.
(8 marks)

(b)   With the aid of a diagram describe how a travelling wave tube is used as microwave amplifier.
(12 marks)

Question TWO

(a)   With the aid of a diagram explain how solid state diode are used in microwave rectification.
(10 marks)

(b)   Explain how the following devices and circuits are realized in microwave:

(i)   Capacitance
(ii)   Dummy load
(iii)   Low power load
(iv)   High power load

(v)   Attenuator

(10 marks)

Question THREE

(a)   With the aid of a diagram explain the operation of Klystrons Oscillator in microwave systems.

(10 marks)

(b)   Describe with the aid of a diagram the operation of a directional coupler.   **(10 marks)**

Question FOUR

(a)   Describe the operation of a magnetron.   **(10 marks)**

(b)   Draw electric and magnetic field patterns for the following waveguide modes: TE_{10}, TE_{110}, TM_{11} and state the expressions for magnetic and electric field strength for TE_{10} mode.

(10 marks)

Question FIVE

(a)   State Maxwell's equation for loss less region and determine the wave equation for E_Z and H_Z.

(7 marks)

(b)   Solve the wave equations in 5a(i)   **(13 marks)**