NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

BACHELOR OF ENGINEERING (HONS) DEGREE

Final examination May 2013 TEE 5222

Radio Frequency and Microwave Devices and Circuits

Duration of Examination 3 Hours

Instructions to Candidates:

1. Answer any **five** questions only.
2. All questions carry equal marks.
3. Show all your steps clearly in any calculation.
4. Start the answers for each question on a fresh page.

Question 1

(a) Describe the principle of operation and show at least two circuit arrangement of Microwave phase shifters. (14 marks)

(b) Sketch a cross-section of a magnetron. (6 marks)

Question 2

(a) Describe the none-linear equivalent model circuit for a large signal FET behaviour. State the function of all components shown in the model design of a medium power amplifier. (14 marks)

(b) Draw the circuit of a distribute amplifier ,state one are where it is used. (6 marks)

Question 3

(a) Describe and explain the biasing network in microwave amplifiers, show at least two types of circuit arrangement that are used . (15 marks)

(b) State five performance application of a klystron. (5 marks)

Question 4

(a) Describe and show the circuit arrangement of a High Isolation lossless feedback amplifier. (12 marks)

(b) Describe a Balanced Configuration FET amplifier . (8 marks)

Question 5

With the help of block diagrams and relevant expression explain and define the application of Scattering parameters at microwave frequencies. (20 marks)

Question 6

Discuss the transistors used at microwave frequencies ,list the problems found and state how these factors are tackled. (20 marks)

Question 7

(a) Define and explain the main electrical characteristics which are important in microwave mixers (10 marks)

(b) Show the circuit arrangement of a double balance mixer . (7 marks)

(c) State three characteristic of a ferrite phase shifters. (3 marks)

Question 8

(a) Describe the operation of a GUNN DIODE, show the bulk arrangement (14marks)

(b) Show a Lange 3 dB coupler in microstrip technology. (6 marks)

END