KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCT 103: ELECTRONIC DEVICES AND CIRCUITS (NEW)

DATE: Monday, 22nd November, 2010 TIME: 8.00 a.m. – 10.00 a.m.

INSTRUCTIONS:

Answer question **ONE** and any other **TWO** questions.

QUESTION ONE

a) Explain what a P-N junction is and how it is formed, clearly illustrating the biasing (3 marks)

b) Discuss a brief theory of the following:

i) P-N junction diode (3 marks)

ii) Bipolar junction transistor (3 marks)

iii) Field effect transistor (3 marks)

iv) Operational amplifier (3 marks)

v) Comparison on Analog to digital and Digital to analog converters (4 marks)

vi) Using a well labeled circuit diagram, discuss the functionalities of a Wien bridge oscillator. (6 marks)

c) List and explain the characteristics of the two mainly used semiconductor doping material (4 marks)

d) Differentiate between oscilloscopes and multi-meters (1 mark)

QUESTION TWO

a) Using a well-labeled diagram, discuss the biasing of a PNP and NPN transistor (6 marks)

b) Draw an output characteristic of a transistor, and use a load line to illustrate how a transistor is used as an amplifier (6 marks)

c) Differentiate between the following types of Field Effect Transistors:

i) MOSFET (2 marks)

ii) MESFET (2 marks)

iii) IGBET (2 marks)

iv) JFET (2 marks)

QUESTION THREE

a) Use a circuit diagram, and an expression to show how an operational amplifier achieves the following function:

i) Adding (4 marks)

ii) Subtracting (4 marks)

iii) Comparator (4 marks)

b) With an aid of a circuit diagram and a flow chart, explain how a Successive Approximation Analog to Digital Converter (ADC) functions. (8 marks)

QUESTION FOUR

a) When using a oscilloscope, it was realized that the displayed signal amplitude is of low magnitude, and the signal was not stable. What two variables would be used to solve this problem (6 marks)

b) You are training a technician to use a multi-meter. Which three precautions would you advice the technician to observe while using the multi-meter? (3 marks)

c) List and explain any **FIVE** characteristics of an ideal operational amplifier (5 marks)

d) Using well labeled diagrams, differentiate between a high pass filter and a low pass filter (6 marks)

QUESTION FIVE

a) With an aid of a bias arrangement for N-channel JFET, explain the biasing and the operation of a JFET (6 marks)

b) Draw the JFET output characteristics, clearly showing the ohmic, saturation, cut-off and break-down regions. (6 marks)

c) With an aid of a circuit diagram, and a mathematical expression, explain how an operational amplifier is used as:

i) Differential amplifier (4 marks)

ii) Integrator (4 marks)