THE TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY
(DICT 12M FT/EV)

EEE 2140: ELECTRONICS

END OF SEMESTER EXAMINATION

SERIES: APRIL 2013
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Attempt question **ONE** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **TWO** printed pages

Question One (Compulsory)

a) Derive from the first principles the equation of the output voltage of a differentiator and integrator using OP – AMP. **(8 marks)**

b) With the aid of symbolic diagrams, briefly explain the operations of the following Thyristors SCR, DIAC and TRIAC **(12 marks)**

Question Two

a) With the aid of circuit diagrams, derive the gains of inverting and non-inverting amplifiers using operational amplifiers. **(10 marks)**

b) Calculate the output voltage of a summing amplifier for the following sets of input voltages and resistors. (Rf = 0.1MΩ in all cases)

(i) $V_1 = +IV, V_2 = +2V, V_3 = 3V$
$R_1 = 50K\Omega, R_2 = 01M\Omega, R_3 = 0.1M\Omega$

(ii) $V_1 = -2V, V_2 = +3V, V_3 = +3V$
$R_1 = 20K\Omega, R_2 = 50K\Omega, R_3 = 0.1M\Omega$ **(10 marks)**

Question Three

a) A comparator circuit is fabricated using an OP – AMP. Vcc = 9V, $R_1 = 200K\Omega$, $R_2 = 100K\Omega$ + $V_{SAT} = +12V$ and $-V_{SAT} = -12V$.

(i) If $V_{IN} = 3V$ determine the output voltage of the comparator.

(ii) If $V_{IN} = 4V$ determine the output voltage of the comparator

(iii) If the resistor are interchanged and $V_{IN} = 4V$, determine the nature of the output voltage. **(10 marks)**

b) With the aid of a circuit diagram, explain the operation of a class A, Temperature stabilized transistor amplifier **(10 marks)**

Question Four

a) Using a graph show all the operational parameter of an SCR and explain each of them. **(10 marks)**

b) State at least **FIVE** applications of Zener diodes. **(5 marks)**

c) With the aid of circuit diagram briefly explain the operation of a Zener diode regulator. **(5 marks)**

Question Five

a) An inverting amplifier using OP-AMP has an input in = -0.2 sinwt. If the amplifier offer a gain of – 100.

(i) Determine the expression for the output of the amplifier

(ii) Draw the sketch of the output signal

(iii) Determine the values of R_{in} and R_f which will give the amplifier the gain. **(10 marks)**

b) Explain at least **FIVE** ideal properties of an Operational Amplifier. **(10 marks)**