MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA IN MECHANICAL ENGINEERING
DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

EED 113: ANALOGUE ELECTRONICS 1

DATE: 4/8/2016 **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS:

Answer Question One and Any Two Questions from Section B

1. a) With the aid of well labeled diagrams, explain the Bohr atomic structures of the following elements.

   i. Conductors iii. Semi conductors (4 marks)

   b) Explain the effect of temperature on a semi conductor under the following conditions

   i) Below zero degrees

   ii) At absolute zero

   iii) Above absolute zero (6 marks)

c) i) With the aid of well labeled diagrams, explain the formation of a P-N junction (6 marks)

ii) If an external voltage is added to the P-N junction in (i) above, explain what could be the effect. (4 marks)

d) With the aid of a circuit diagram, explain the operation of a single stage amplifier (10 marks)

SECTION B: ANSWER ANY OTHER TWO QUESTIONS

2. a) Explain three properties of semi conductors. (6 marks)

b) Differentiate between Intrinsic semiconductors and Extrinsic semiconductors (4marks)

c) i) Calculate the operating point of a transistor whose collector load is 8kΩ and the transistors' quiescent current is 2mA. Take VCC as 20V. (6 marks)

ii) If RC was to be put to 10KΩ, what could be the operating point of the transistor in (i) above (4 marks)

3. a) i) In a common base connection the emitter current is 10mA. If the emitter circuit is open, the collector current is 100mA. Find the total collector current given that $\alpha = 0.98$ (6 marks)

ii) With respect to a common emitter connection, derive the relationship between β and α. (6 marks)

b) Find the values of collector and emitter currents in a transistor having ICBO=3μA, and dc = 0.98 when its base current is 60μA. (8 marks)

4. a) With the aid of well labeled diagram, explain the V-I characteristics on the following considerations:-

i) Forward biasing

ii) Reverse biasing (12 marks)

b) Explain the effect of using filters along with rectifier's output waveforms. (8 marks)

5. a) What are the advantages of the FET over a conventional bipolar junction transistor?

(4 marks)

b) Define Pinch off voltage, transconductance, amplification factor and drain resistance of a FET. (8 marks)

c) Explain with the help of circuit diagram how an FET is used as a voltage amplifier and as voltage dependent resistor (VDR). (8 marks)