



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

EED 113: ANALOGUE ELECTRONICS I

DATE: 2/6/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) With the aid of well labeled diagrams, explain the Bohr atomic structures of the following elements.
 - i. Conductors
 - iii. Semiconductors (4 marks)
- b) Explain the effect of temperature on a semiconductor under the following conditions
 - i. Below zero degrees
 - ii. At absolute zero
 - iii. Above absolute zero (6 marks)
- c) With the aid of well labeled diagrams, explain the formation of a P-N junction (6 marks)
- d) If an external voltage is added to the P-N junction in (c) above, explain what could be the effect. (4 marks)
- e) By the aid of a circuit diagram, explain the operation of a single stage amplifier (10marks)

QUESTION TWO (20 MARKS)

- a) Explain three properties of semiconductors (6 marks)
- b) Differentiate between Intrinsic semiconductors and Extrinsic semiconductors (4 marks)

- c) i) Calculate the operating point of a transistor whose collector load is $8k\Omega$ and the transistors' quiescent current is 2mA. Take V_{CC} as 20V. (6 marks)
- ii) If R_C was to be put to $10k\Omega$, what could be the operating point of the transistor in (i) above (4 marks)

QUESTION THREE (20 MARKS)

- a) 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)
- b) With respect to a common emitter connection, derive the relationship between β and α . (6marks)
- c) Find the values of collector and emitter currents in a transistor having $I_{CBO}=3\mu A$, and $DC=0.98$ when its base current is $60\mu A$. (8marks)

QUESTION FOUR (20 MARKS)

- a) By the aid of well labeled diagram, explain the V-I characteristics on the following considerations:-
- i. Forward biasing
 - ii. Reverse biasing
- (12 marks)
- b. In (a) above, highlight the parts of the V-I characteristics graph drawn (8 marks)

QUESTION FIVE (20 MARKS)

- a) With the aid of a well labeled diagram, explain a single stage emitter amplifier circuit (14 marks)
- b) Explain any six types of diodes and their application in the world of electronics (6 marks)