



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR FIRST SEMESTER CERTIFICATE IN ELECTRICAL AND ELECTRONICS ENGINEERING

EPC 107: ANALOQUE ELECTRONICS

DATE: 24/7/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

Attempt Question One and Any Other Two Questions

1.
 - a)
 - (i) Define doping (2 marks)
 - (ii) Explain the formation of P type material (4 marks)
 - (iii) Describe how N type material is made (4 marks)
 - b) Differentiate between intrinsic and extrinsic semiconductor material (4 marks)
 - c) With the aid of a diagram(s), explain the difference between reverse and forward biasing in PN junction diode. (7 marks)
 - d)
 - (i) Describe how Avalanche breakdown occurs. (3 marks)
 - (ii) Calculate the barrier potential of silicon junction at 100°C and (3 marks)
 - (iii) 0°C if its value at 25°C is 0.7V. (3 marks)
2.
 - a) Explain the following terms
 - i) Depletion layer (2 marks)
 - ii) Minority carrier current (2 marks)

- iii) Reverse current in a diode (2 marks)
 - iv) Breakdown voltage (2 marks)
 - b)
 - (i) Explain the formation of the depletion layer (4 marks)
 - (ii) Draw and explain the diode characteristics curve (I-V curve) (4 marks)
 - (iii) Describe zener breakdown (4 marks)
- 3.
 - a)
 - (i) Calculate the circuit current and power dissipated in ideal diode fig 1(a)
 - (ii) Calculate the circuit current and power in a 6Ω resistor of the circuit in fig
 - b) Calculate the current in the circuit below fig 2 (a) (5 marks)
 - c) Calculate the current if any in the circuit below, which uses two oppositely, connected ideal diodes in parallel. (8 marks)

4. a) A sinusoidal voltage of peak value 50V is applied to a diode as shown in the fig a below. Sketch the output waveform. (5 marks)
- b) Sketch the waveform of the output voltage V_o of the circuit shown below (a) considering diodes as ideal diode. (5 marks)
- c) Draw a Fullwave rectifier and explain its operation indicating all the waveforms in every stage. (10 marks)
5. a) State the four basic guideposts about all transistor circuits. (4 marks)
- b) The following current readings are obtained in a transistor connected in CB configuration
 $I_E = 2 \text{ mA}$ and $I_B = 20 \mu\text{A}$. Compute the values of α and I_C (8 marks)
- c) The reverse saturation current of an NPN Transistor in common base circuit is $12.5 \mu\text{A}$. For an emitter current of 2 mA , collector current is 1.97 mA . Calculate the current gain and base current. (8 marks)