



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY
EXAMINATIONS
2018/2019 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER**

**SCHOOL OF SCIENCES
BACHELOR OF SCIENCE IN
COMPUTER SCIENCE**

**COURSE CODE: PHY 3209
COURSE TITLE: ELECTRONICS 1**

**DATE: 17TH APRIL 2019
1030HRS**

TIME: 0830 -

INSTRUCTIONS TO CANDIDATES

1. Answer Question **ONE** and any other **TWO** questions
2. Question one carries 30 marks while each of the others carries 20 marks.
3. Credit will be awarded for clear explanations and illustrations.

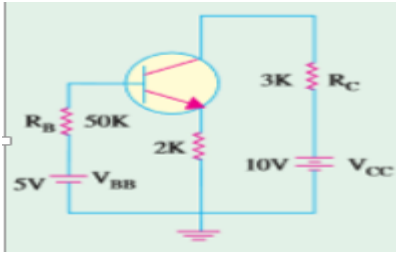
This paper consists of 4 printed pages. Please turn over.

QUESTION ONE

- a) In terms energy bands distinguish, between insulators, conductors and semiconductors.
(3marks)
- b) Find the intrinsic carrier concentration in silicon at 300⁰ K for
 $N=3 \times 10^{25} m^{-3}, E_g=1.1 eV$
(4marks)
- c) Explain how P-type extrinsic semi-conductor is formed (3marks)
- d) State two uses of bipolar junction transistor in electronics (2marks)
- e) Derive an expression for forward current gain and leakage current of common-emitter configuration in terms of current gain and leakage current of common –base configuration. If $\alpha=0.98, I_{CBO}=5 mA$, calculate β and I_{CEO}
(5marks)
- f) Define ‘FET’ and state two types of FETs (4marks)
- g) Give two situations in which direct coupling of amplifiers is permissible (2marks)
- h) A transistor operating in CB configuration has
 $I_C=2.98 mA, I_E=3.00 mA \wedge I_{CO}=0.01 mA$. what current will flow in the collector circuit of this transistor when connected to CE configuration with a base current of 30 μ A.
(4marks)
- i) State three uses of light emitting diodes (3marks)

QUESTION TWO

- a) With the aid of diagram explain forward biasing of P-N junction (5marks)
- b) Name three parts of transistor and state their functions (3marks)
- c) In a simple amplifier circuit ,shown in the figure below, with base resistance,
 $R_B=50 K, R_E=2 K, R_C=3 K, V_{CC}=10 V, h_{FE}=100$, determine whether or not the silicon transistor is in the saturation and find I_B, I_C . Explain the saturation region in common –emitter characteristics
(6marks)



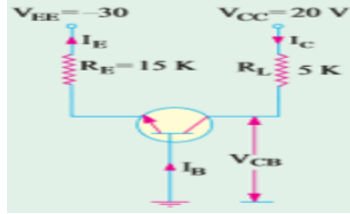
- d) State four advantages of FETs (4marks)
 e) What are breakdown devices (2marks)

QUESTION THREE

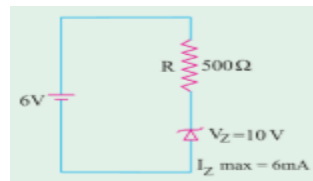
- a) State four main applications of semiconductor diodes in modern electronic circuitry (4marks)
 b) The reverse saturation current of an NPN transistor in common-base circuit is $12.5 \mu A$ for an emitter current of 2mA, collector current is 1.97mA. Determine the current gain and base current. (5marks)
 c) State four uses of zener diodes (4marks)
 d) Sketch the volt-ampere characteristics of the d.c behavior of the P-N diode both in forward and reverse bias. (5marks)
 e) Explain why at the junction of zener diode has low resistance in the break down region. (2marks)

QUESTION FOUR

- a) The current transfer characteristics for a common base circuit is rarely use for audio-frequency circuits. Give two reasons. (2marks)
 b) Explain the terms (i) active region and (ii) quiescent point as use in d.c load line of a transistor. (2marks)
 ii. For the circuit shown in the figure below. Draw the dc load line and locate its quiescent or the dc working point. (6marks)



- c) Determine whether the ideal zener diode in the figure below is properly biased. Explain why? (4marks)



- d) Name four circuit applications of UJT (4marks)

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