



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL ENGINEERING

EEE1101: ANALOGUE ELECTRONICS I.

END OF SEMESTER EXAMINATION

SERIES: APRIL, 2025

TIME: 2 HOURS

DATE: Pick Date Select Month Pick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt ANY THREE.

Do not write on the question paper.

Question ONE

- a) Explain the following terms as applied in atomic theory
 - ii. Thermionic emission
 - iii. Covalent bonds
 - iv. Valency shell (6marks)
- b. Draw the atomic structure of Boron and Phosphorous (4marks)
- c. With the aid of diagrams Differentiate between Intrinsic and Extrinsic semi-conductor materials (6marks)
- d. compare the resistivity of the conductor, semiconductor and insulator (4marks)

Question TWO

- a) Define the following terms as applied to atomic structure:
 - i. Peak inverse voltage
 - ii. Ionization (4marks)
- b) Explain the operation of the two biasing modes in the P-N junction (6marks)
- c) State any two applications of the Zener and LED diodes (4marks)
- d) An a.c. voltage of peak value 10 V is connected in series with a silicon diode and load resistance of $250\ \Omega$. If the forward resistance of diode is $5\ \Omega$, find :
 - (i) peak current through diode (ii) peak output voltage (4marks)
- e) State the changes that would occur if the diode in (d) was Ideal. (2marks)

Question THREE

- a) With the aid of diagrams describe the construction and operation of a half wave rectifier
(6marks)
- b) Explain the effect of connecting a capacitor across the load in the circuit of (a) above .
Illustrate using waveforms (4marks)
- c) State any two advantages of Bridge rectifier over half wave (4marks)
- d) With the aid of diagrams explain any two applications of zener diodes (6marks)

Question FOUR

- a) A transistor has the following $I_e = 3.5\text{mA}$ and $\alpha = 0.986$ determine the values of I_C , I_B and β . derive any equation used from the basic fundamentals (7marks)
- b) State the reasons why common emitter mode of connection is preferred than other modes.
(5marks)
- c) With the aid of diagrams describe the construction of an NPN transistor (5marks)
- d) Show that $H_{FE} = H_{FB}/(1 - H_{FB})$ (3marks)

Question FIVE

- a) Explain the factors that affect the Q-point of an amplifier circuit (6marks)

b) Explain how biasing and stabilization is achieved in the collector bias circuit

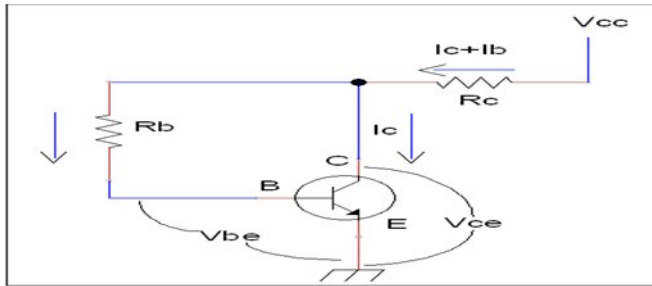
(6marks)

e) The circuit shown in fig. 3 has $V_{CC}=10V$, $V_{BE}=0.7V$, $I_C=5mA$ and $\beta=250$. determine:-

- i. V_{CE} ,
- ii. I_B ,
- iii. R_C ,
- iv. R_B

(8marks)

ii.



c) The circuit in fig 4 has the following $V_{DD} = V_{in} =$, $I_{DSS} = 10mA$, $V_P = -8V$ determine the value of

- i. I_D
- ii. V_{DS}
- iii. V_{GS}
- iv. V_S

(9marks)