TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL ENGINEERING

EEE1101: ANALOGUE ELECTRONICS .

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 with diagrams the term thermionic emission (3marks)

b) Define the following with respect to semiconductors.

i. Ionization potential

ii. Covalent bonding

iii. Doping (3marks)

c) Plot the I-V characteristics of the diode shown in table and fig.1 (7marks)

Table 1.

Forward voltage(v)	0	0.2	0.4	0.6	0.8
Forward Current	0	0	0.02	1	100

(mA)					

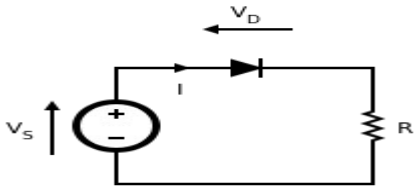

Fig. 1

ii. From the characteristics determine the value of the load voltage across R if the diode starts conducting fully at forward voltage of 0.6V and R is 2KΩ (4marks)

iii. Explain why there is no current till almost 0.6V (3mark)

Question TWO

a) Explain why silicon material is preferred in semiconductors. (2marks)

b) Using appropriate diagrams describe the formation of N and P semiconductor materials (8marks)

c) Describe the effect of connecting an external source to a P-N junction.(illustrate with diagrams. (6marks)

d) State any two applications of the LED and varactor diodes (4marks)

Question THREE

a. Draw a well labelled block diagram of a regulated DC power supply (4marks)

b. Draw a circuit diagram of a single phase full wave bridge rectifier and explain its operation. (6marks)

c. Sketch the input and output voltage waveform of the rectifier circuit in c above (4marks)

d. List one advantages and two application of power diodes (3marks)

e. Explain the importance of incorporating a Zener diode in a rectified power supply (3marks)

Question FOUR

a) i. With the aid of sketches explain the operation of any three classes of amplifiers (9marks)

ii. Using first principles, show that ß = $\frac{\alpha}{1-\alpha}$ (4 marks)

b) i. With the aid of the appropriate diagrams describe the construction and operation of a J FET

(ii) Compare and contrast between FET and BJT (7marks)

Question FIVE

a) With the aid of sketches explain the four regions of the Bipolar Junction Transistor. (6marks)

b) Describe how the biasing and stabilization is achieved in the collector bias network. (6marks)

c) For the circuit in Figure 1. Vcc =15V β= 100 and Vbe = 0.7V determine the value of

i. The base supply voltage (Vbb)

ii. The bias resistor (RB)

iii. The emitter current (IE)

iv. State the function of RE mentioning any modification that can be introduced to improve on the stability of the circuit. (8marks)

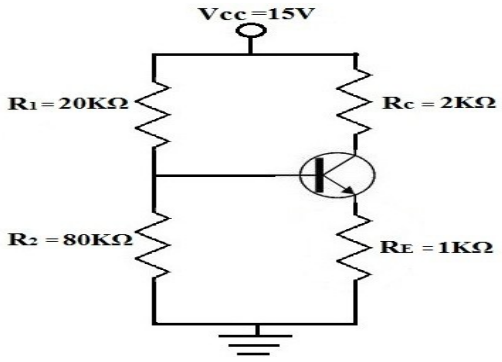

Fig. 1