TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BSCS/SEP2023/J-FT

BSIT/SEP2023/J-FT

BTIT/SEP2023/J-FT

BTIT/SEP2024/S-PT

CCI 4202: ELECTRONICS

END OF SEMESTER EXAMINATION

SERIES:DECEMBER 2024

TIME:2HOURS

DATE: Pick DateDec2024

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

(a) In electronics resistor are very important as they control the amount of current passing through a circuit and can also act as a potential divider. Describe any THREE methods of connecting resistor (3 Marks)

(b) Capacitors are passive electronic components that are found in most electronic circuits: discuss FIVE major applications of capacitors (5 Marks)

(c) Discuss the FOUR different classifications of Operational amplifier gain (4 Marks)

(d) Describe with the aid of a sketch any THREE possibilities of PN junction diode biasing (3 Marks)

(e) One of the electronic components made from semiconductor materials is a diode, discuss the construction and application of the following diodes

(i) PIN diode (4 Marks)

(ii) Avalanche diode (4 Marks)

(f) "Semiconductors are more popular compared to Vacuum Tubes", Discuss the validity of the above statement. (3 Marks)

(g) Transistors are used as amplifiers in electronic circuits

(iii) Outline any other application of transistors (1 Mark)

(iv) With the aid of a sketch, describe any THREE configuration of FET (3 Marks)

Question TWO

(a) BJT transistors have many applications in our day to day life as they are found in many electronic components that we use: REQUIRED

(i) Describe the DC load line of a single stage common Emitter transistor amplifier with the aid of a sketch (5 Marks)

(c)Bipolar Transistors are "CURRENT" Amplifying or current regulating devices that control the amount of current flowing through them in proportion to the amount of biasing current applied to their base terminal. REQUIRED discuss with the aid of a sketch

(i) Common Base configuration with the aid of a sketch (5 Marks)

(ii) Common Emitter Configuration (5 Marks)

(iii) Common Collector configuration (5 Marks)

Question THREE

The Field Effect Transistor has no junctions but instead has a narrow "Channel" of N-type or P-type silicon with electrical connections at either end commonly called the DRAIN and the SOURCE respectively

(i) Discuss the construction of MOSFET with the aid of a sketch (4 Marks)

(ii) Discuss the output characteristic voltage-current curves of a typical junction MOSFET with the aid of a sketch. (8 Marks)

(iii) Distinguish between depletion and enhanced MOSFET with the aid of a sketch (4 Marks)

Question FOUR

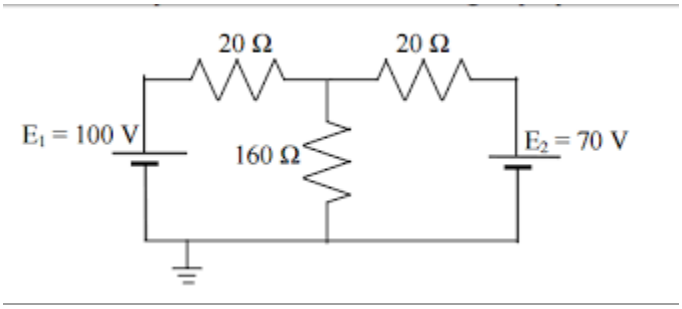
Given the diagram below R1=R3=20 Ω and R2=160 Ω

(i) Find the current passing through each resistor (6 Marks)

(ii) Justify your answer in Q 4 (i) using Kirchhoff's Laws (4 Marks)

(iii) Find the current through R2 using Norton's Theorem (5 Marks)

(iv) Calculate the current through R2 using Thevenin's Theorem (5Marks)



Question FIVE

One of the building blocks of electronics is the operational amplifier

(a) Define operational amplifier (2 Marks)

(b) (i) Draw a well labeled equivalent circuit of an ideal operational amplifier (4 Marks)

(ii) Explain any FOUR parameters with their idealized characteristics (4 Marks)

(c) Describe with the aid of a diagram TWO applications of a summing amplifier namely:

(i) Digital to Analogue Convertor (5 Marks)

(ii) Audio Mixer (5 Marks)