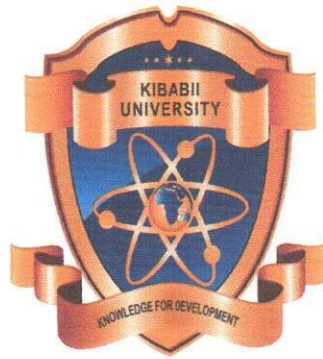


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(Knowledge for Development)

KIBABII UNIVERSITY
(KIBU)

UNIVERSITY EXAMINATIONS
2024/2025 ACADEMIC YEAR

END OF SEMESTER EXAMINATION
YEAR ONE SEMESTER ONE EXAMINATION

FOR THE DEGREE
(INFORMATION TECHNOLOGY)

COURSE CODE : BIT 1150

COURSE TITLE : INTRODUCTION TO ELECTRONICS

DATE: 10/01/2025

TIME: 2.00 P.M – 4.00 P.M

2HRS

INSTRUCTIONS TO CANDIDATES

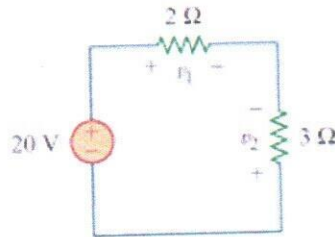
ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (30 MARKS) [COMPULSORY]

- a. Explain how transistors are essential for memory storage in the Random Access Memory of a computer system. (2 Marks)
- b. Describe the term voltage (2 Marks)
- c. Explain the main function of a Light-Emitting Diode (LED). (2 Marks)
- d. State the Kirchhoff's current law (2 Marks)
- e. A computer's power supply unit converts high-voltage alternating current (AC) from a wall socket into low-voltage direct current (DC) required by the internal components. This is made possible by different electrical elements. Describe the function of the following electrical elements as used in a computer power supply unit:
 - i. Resistors (2 Marks)
 - ii. Capacitors (2 Marks)
 - iii. Inductors (2 Marks)
- f. Describe the term microcontroller. (2 Marks)
- g. State the TWO main functions of transistors in electrical circuits. (2 Marks)
- h. State TWO factors that determine an LED's color, and how you can change the LED's emission color. (2 Marks)
- i. A light bulb draws 0.5A current at an input voltage of 240 V. Determine the resistance of the filament (3 Marks)
- j. A load generally refers to a piece of equipment connected to the output of an electric circuit in form of a resistor, capacitor or inductor. Draw schematic diagrams of these circuit elements that represent loads in a fundamental form. (3 Marks)
- k. Contrast between analog and digital electronics. (4 Marks)

QUESTION TWO [20 MARKS]

- a. Explain how diodes function with respect to protecting the motherboard (2 Mark)
- b. Discuss the components of a modulated signal. (4 Marks)
- c. Consider the circuit below where the source voltage is 20 V, $R_1 = 2\Omega$ $R_2 = 3\Omega$, determine voltages V_1 and V_2 . [6 Marks]



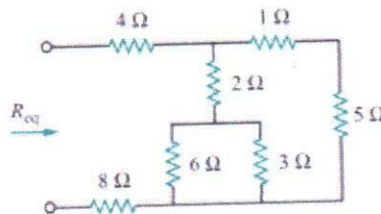
- d. Explain the factors that affect resistance of a material.

(8 Marks)

QUESTION THREE [20 MARKS]

- a. Determine the equivalent resistance of the circuit shown below.

(6 Mark)



- b. Describe the different components that are integrated to form a microcontroller that is well suited for embedded systems.

(14 Marks)

QUESTION THREE [20 MARKS]

- a. i. Explain the concept of extrinsic semiconductors. (2 Marks)
- ii. Elaborate how the addition of different types of impurities influences their behavior. (4 Marks)
- b. Describe the concept of binary numbers, and why is it essential in digital electronics. (2 Marks)
- c. Describe the term semiconductor, and hence explain how they differ from conductors and insulators in terms of their electrical properties. (4 Marks)
- d. Contrast between minority and majority carriers in n-type and p-type semiconductors and how they influence conductivity. (4 Marks)
- e. Represent AND and OR gates using their logic diagrams. (4 Marks)

QUESTION FOUR [20 MARKS]

- a. Describe the concept of Digital –to-Analog Conversion resolution and how it affects the accuracy of the analog output. (2 Marks)
- b. With the aid of an example, explain the concept of open-loop configurations in op-amp circuits. (3 Marks)
- c. Elaborate the function of an Analog-to-Digital converter, and its use in electronic systems. (3 Marks)
- d. Explain the Nyquist-Shannon sampling theorem and its relevance to Analog-to-Digital converters. (3 Marks)
- e. Discuss the programming and development of microcontrollers by highlighting the role of programming languages, development tools and the development ecosystem in creating microcontroller applications. (9 Marks)

QUESTION FIVE [20 MARKS]

- a. State the different types of Analog-to-Digital converter architectures and provide a real-world application for each type. (8 Marks)
- b. With the aid of relevant diagrams, discuss the key types of modulation techniques and their applications. (12 Marks)