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*(The University of Choice)*

# MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

## UNIVERSITY EXAMINATIONS

## MAIN CAMPUS

## 2021/2022 ACADEMIC YEAR

## FOURTH YEAR FIRST SEMESTER EXAMINATIONS

## FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE & INFORMATION TECHNOLOGY

**COURSE CODE:** **BCS 124/ BIT 122**

**COURSE TITLE:** **ELECTRONICS**

**DATE:** **Wednesday, 27th April, 2022** **TIME:** **12:00-2:00 PM**

INSTRUCTIONS TO CANDIDATES

/Answer questions ONE and any other TWO questions.

TIME: 2 Hours

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## QUESTION ONE: 30 MARKS [COMPULSORY]

a. An NPN Transistor has a DC base bias voltage, Vb of 10v and an input base resistor, Rb of 100kΩ. What will be the value of the base current into the transistor? **3 Marks**

b. An NPN Transistor has a DC current gain, (Beta) value of 200. Calculate the base current $I_b$ required to switch a resistive load of 4mA. **4 Marks**

c. A circuit known as a summing amplifier is illustrated in the figure below. Use the ideal-op-amp assumption to solve for the output voltage in terms of the input voltages and resistor values. **7 Marks**

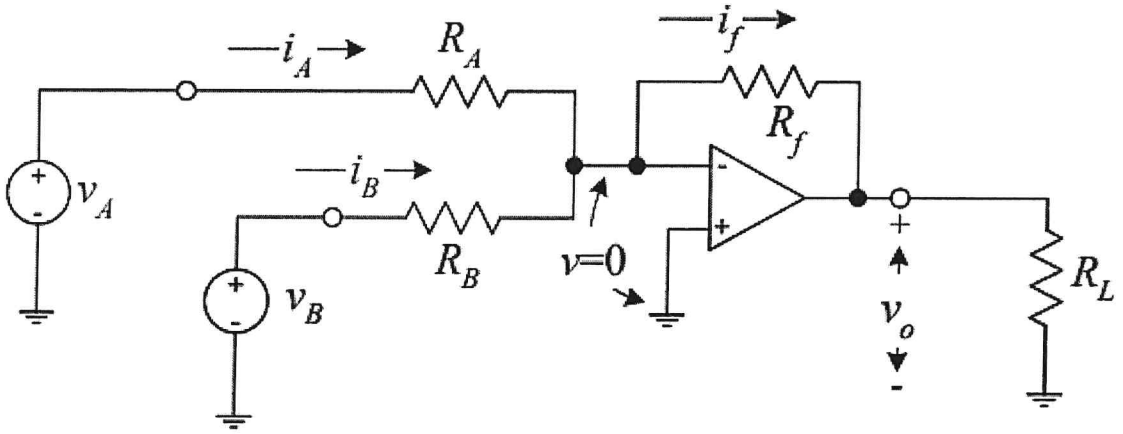



**Fig.1 Summing Amplifier**

d. Compare any **THREE** classes of amplifiers in terms of their bias point, conduction angle, efficiency and typical application. **9 Marks**

**e.** What is a 'multistage amplifier'? Give the requirements to be fulfilled for an ideal coupling network. **7 Marks**

## QUESTION TWO: 20 MARKS

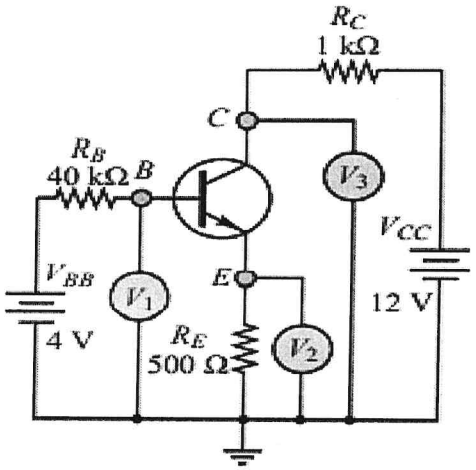
a. Using an appropriate circuit diagram and various waveforms, input and output, demonstrate and explain the working of a full wave rectification using 4 diodes. Include all the necessary components which would aid in getting a smooth DC output. **9 Marks**

b. Illustrate the operation of a Zener diode as a voltage regulator. **5 Marks**

c. Describe the basic operation of bipolar junction transistors. **6 Marks**

## QUESTION THREE: 20 MARKS

a. Given the circuit diagram shown below, assume that the measurements reveal the following conditions: $V_B$ = V1 = 2 V; $V_E$ = V2 = 1.3 V $V_C$ = V3 = 8 V, calculate $I_B$, $I_C$, $V_{CE}$ and β values which would aid the transistor operation. **7 Marks**




b. Using an appropriate diagram, illustrate how you would determine the operating point of a BJT device. State all the necessary conditions which would make you achieve the best operating point. Assume a common emitter configuration. **6 Marks**

c. Briefly explain the need for biasing in semiconductor devices. **3 Marks**

**d.** Compare and contrast FETs and conventional bipolar junction transistor. **4 Marks**

## QUESTION FOUR: 20 MARKS

a. An amplifier produces an output voltage of 2 V for an input of 50 mV. If the input and output currents in this condition are, respectively, 4 mA and 200 mA, determine: **6 Marks**

i. the voltage gain;
ii. the current gain;
iii. the power gain.

b. An operational amplifier operating with negative feedback produces an output voltage of 2 V when supplied with an input of 400 μV. Determine the value of closed-loop voltage gain. **4 Marks**

c. State the ideal characteristics of an OPAMP **4 Marks**

d. Using diagrams, illustrate an OPAMP as an integrator; show its typical input and output waveforms. **6 Marks**

## QUESTION FIVE: 20 MARKS

**a.** Identify 4 different biasing configurations of a basic transistor amplifier and briefly explain the advantages and disadvantages of each. **12 Marks**

b. Explain how an Opamp can be used as a/an **8 Marks**
(i) Differentiator (ii) Integrator

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# Masinde Muliro University of Science and Technology

## UNIVERSITY EXAMINATIONS
## 2021/2022 ACADEMIC YEAR

## SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE
OF

## BSc. in Information Systems & Knowledge Management

**COURSE CODE:** BIK 220

**COURSE TITLE:** Intelligent Systems

**DATE: Tuesday 26th April, 2022** **TIME: 8:00-10:00AM**

**INSTRUCTIONS**

Answer **QUESTION ONE** and **ANY OTHERTWO**

## Question One (30 Marks)

**a.** Define the terms Automated Reasoning. Is it useful in intelligent systems? **6 marks**

**b.** Explain the people involved in the design of the pioneer expert system. **6 marks**

**c.** The easiest way to present an overall view of intelligent system structure is with a representative diagram. Explain this statement using a diagram. **4 marks**

**d.** When developing an expert system a shell becomes handy because it will not force you to develop the expert system from scratch, it allows you as the KNOWLEDGE ENGINEER to focus more on the knowledge. Explain the term shell and give examples. **14 marks**

## Question Two (20 Marks)

a. Definitions of agents are greatly dependent on the agents' level of rationality. Explain. **4 marks**

b. Explain some of the intelligent systems that have been commercialized. **8 marks**

c. Explain the major components of an expert system shell. **8 marks**

## Question Three (20 Marks)

a) The output of a problem-solving algorithm is either failure or a solution. Explain. **8 marks**

b) Using how you can evaluate an algorithm's performance explain the application of at least three (3) heuristic search techniques. **12 marks**

## Question Four (20 Marks)

a) Autonomy of intelligent agents implies that an agent takes initiative and exercises control over its own action. Explain how an agent should show its autonomy. **6 marks**

b) Explain the significance of some of the main processes that occur within the intelligent systems? **14 marks**

## Question five (20 marks)

Construct a PEAS for at least four agents in a transportation environment, giving challenges that may exist in their design. **20 marks**