



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF SCIENCE AND
TECHNOLOGY (MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

IN

COMPUTER SCIENCE

COURSE CODE: BCS 124/BIT 126

COURSE TITLE: ELECTRONICS

DATE: 13/04/2023

TIME: 08:00-10:00AM

INSTRUCTIONS TO CANDIDATES

- * Answer Questions ONE and ANY OTHER TWO.

QUESTION ONE (30 MARKS) COMPULSORY

- a. In a common base connection, current amplification factor is 0.9. If the emitter current is 1mA, determine the value of base current. **4 Marks**
- b. Prove that for OPAMP connected in a non-inverting mode, the voltage gain (V_o/V_{in}), is given by $(1+R_f/R_{in})$. Show your working **5 Marks**
- c. Use appropriate diagrams to explain the working of a Full Wave Bridge rectifier using a center tap transformer, including a smoothing circuit. **7 Marks**
- d. Draw the forward and reverse characteristics of a p-n junction diode and explain them qualitatively. **5 Marks**
- e. Briefly explain the operations of a Varactor diode **5 Marks**
- f. Compare and contrast small signal amplifiers and power amplifiers **4 Marks**

QUESTION TWO (20 MARKS)

- a. By use of schematic diagrams, explain the construction of an NPN Bipolar Junction Transistor. **10 Marks**
 - i. Compare and contrast the different regions of the BJT
 - ii. Why is the device referred to as bipolar junction transistor?
- b. State the ideal characteristics of an OPAMP **4 Marks**
- c. What is a 'multistage amplifier'? Give the requirements to be fulfilled for an ideal coupling network. **6 Marks**

QUESTION THREE (20 MARKS)

- a. Differentiate 'intrinsic' and 'extrinsic' semiconductors. Comment on their conductivity. **5 Marks**
- b. A BJT has a base current of 250 μ A and emitter current of 15mA. Determine the collector current gain and β **4 Marks**
- c. Explain the classification of power amplifiers according to operational modes. **5 Marks**
- d. Using diagrams, illustrate an OPAMP as an integrator; show its typical input and output waveforms. **6 Marks**

QUESTION FOUR (20 MARKS)

- a. By use of diagrams, illustrate and explain the **THREE** different types of coupling applied in multistage amplifiers. **6 Marks**
- b. Briefly explain what transistor biasing is. **2 Marks**
- c. State the basic conditions which are necessary to be fulfilled for achieving faithful amplification of input signal in transistor amplifiers. **4 Marks**
- d. Explain how an Opamp can be used as a, use clear illustration diagrams. **8 Marks**
 - (i) Differentiator
 - (ii) Integrator

QUESTION FIVE (20 MARKS)

- a. This transistor configuration is preferred for impedance matching. **9 Marks**
 - i) Identify which configuration,
 - ii) Explain the term impedance matching

iii) Identify and explain how the characteristic(s) makes it suitable for this task.

- b. Draw a three input summing amplifier circuit diagram using an operational amplifier as a summer for three input voltages v_1 , v_2 and v_3 . Calculate the output voltage in terms of resistance and voltage. Show your working. **8 Marks**
- c. Explain the difference between a clipping and a clamping circuit. **3 Marks**