TEVETA

Technical Education, Vocational and Entrepreneurship Training Authority

DIPLOMA IN COMPUTER SYSTEMS ENGINEERING

LEVEL 6 YEAR I EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: NOVEMBER / DECEMBER 2025

SUBJECT: DIGITAL ELECTRONICS II

TIME: THREE (3) HOURS **TOTAL MARKS: 100**

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE:

1. Write your examination number and national registration card number on the answer booklet provided. Ensure to append your signature in the space provided on the answer booklet.
2. Write your answer SCRIPT SERIAL NUMBER on the examination register provided and the entry slip.
3. There are eight (8) questions in this paper.
4. Question one is compulsory. Answer any other FOUR (4) questions.
6. Cell phones and programmable calculators are not allowed in the examination room.

DO NOT TURN TO THE NEXT PAGE UNTIL YOU ARE TOLD TO DO SO

THERE ARE EIGHT (8) QUESTIONS IN THIS PAPER. QUESTION ONE IS COMPULSORY. ANSWER ANY OTHER FOUR (4) QUESTIONS

QUESTION ONE - (COMPULSORY)

A. State two (2) application of Hexadecimal system. (2 marks)

B. Describe in detail the meaning of the following benefits of using number system in computer engineering

i. Efficient Data Representation (2 marks)

ii. Compactness & Readability (2 marks)

iii. Ease in Debugging and Development (2 marks)

iv. Simplified Circuit Design (2 marks)

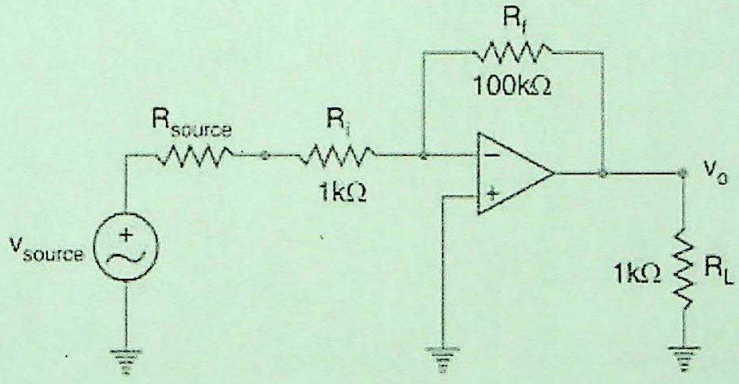
v. Mathematical Precision (2 marks)

C. Explain the working principle of the Emitter-Coupled Logic (2 marks)

D. The figure below shows an inverting OP-amp. Find the closed-loop gain if

i. $R_{source} = 0\Omega$ (3 marks)

ii. $R_{source} = 1\ k\Omega$ (3 marks)



Total [20 marks]

QUESTION TWO

A. Explain the importance of logic circuit in computer engineering (4 marks)

B. With reference to digital electronics, Define the following terms

i. Electronic adder (2 marks)

ii. Half adder (2 marks)

iii. Flip-flop (2 marks)

C. Differentiate between noise immunity and noise margin (2 marks)

D. Explain the concept of **high noise margin** and **low noise margin** in digital circuits. (4 marks)

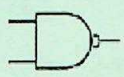
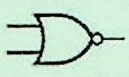
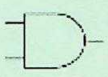
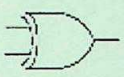
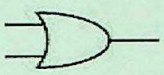
E. Describe the basic operation of a Transistor-Transistor Logic (TTL) inverter (4 marks)

Total [20 marks]

QUESTION THREE

A. Define a logic gate (2 marks)

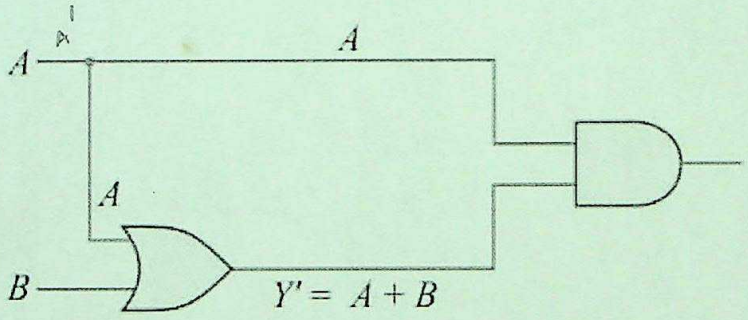
B. Identify the following logic gates (5 marks)

i.  ii.  iii.  iv.  v. 

C. Explain the operation of an AND Gate (3 marks)

D. Distinguish between combination logic circuit and a sequential logic circuit (4 marks)

E. Write the expression and the truth table for the diagram shown below (6 marks)



Total [20 marks]

QUESTION FOUR

A. State De-Morgan's theorem (2 marks)

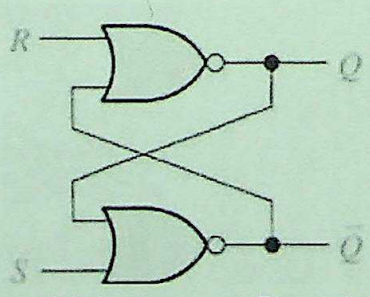
B. Simplify the following Boolean expressions :

i. $Y = (A + B + C) \cdot (A + B)$ (4 marks)

ii. $Y = AB + ABC + AB\bar{C}$ (4 marks)

C. State the '**Duality Principle**" with regards to Boolean algebra (2 marks)

D. Explain the operation of the latch diagram shown in the figure below. (4 marks)



E. Distinguish between a Decoder and Encoder (4 marks)

Total [20 marks]

QUESTION FIVE

A. With reference to digital electronics, define the following terms

i. Multiplexer (2 marks)

ii. De multiplexer (2 marks)

B. Explain the difference between a 2-to-1 multiplexer and a 4-to-1 multiplexer (4 marks)

C. State four (4) applications of multiplexers (8 marks)

D. Describe the working of a modem (4 marks)

Total [20 marks]

QUESTION SIX

A. Define surface mount device (SMD) (2 marks)

B. Differentiate between Chip-On-Board (COB) and Ball Grid Array (BGA). (4 marks)

C. Describe four (4) limitations of small scale integration (SSI) and MSI technologies (4 marks)

D. State four (4) advantages of integrated circuit (ICs) (4 marks)

E. In LM317 voltage regulator shown in the figure below, $R_2$is adjusted to 2.4kΩ. if the value of $R_1$is 240Ω, determine the regulated d.c output voltage for the circuit. (6 marks)

Total [20 marks]

QUESTION SEVEN

A. Define differential amplifier (2 marks)

B. Distinguish a common mode signal from differential signal (4 marks)

C. Explain the working of an inverting amplifier using a circuit diagram below. (8 marks)

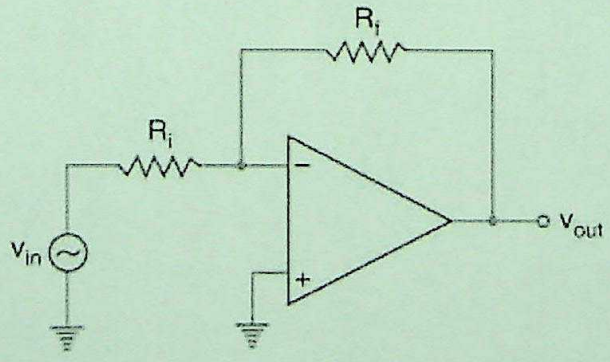
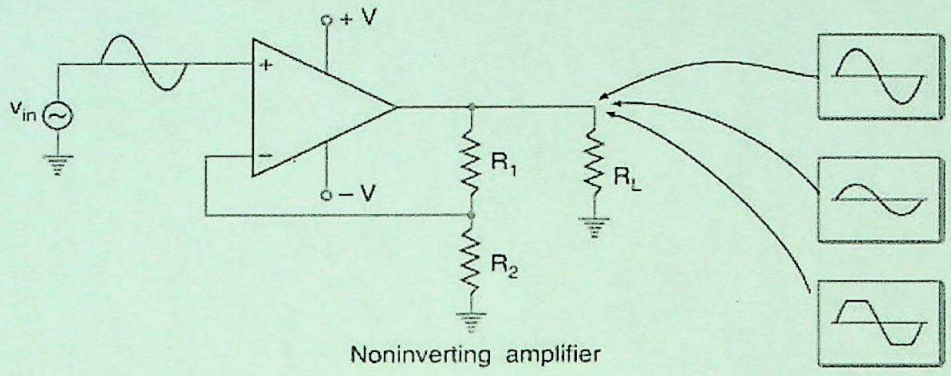


Fig 7. (c)

D. The circuit diagram below shows a noninverting amplifier, with reference to the circuit diagram below, explain two common faults that this amplifier will develop.

(6 marks)



Noninverting amplifier

Total [20 marks]

QUESTION EIGHT

A. State the main features of Asynchronous Transfer Mode (ATM) (4 marks)

B. Explain the following layers of TCP/IP model

i. Application layer (2 marks)
ii. Transport layer (2 marks)
iii. Internet layer (2 marks)
iv. Link layer (2 marks)

C. Describe the following types of networks

i. Wide area network (WAN) (2 marks)
ii. Local area network (LAN) (2 marks)

D. Identify the deployment of the networks described in "C" above. (4 marks)

Total [20 marks]