

061005T4ICT

ICT TECHNICIAN LEVEL 5

IT/OS/ICT/CC/01/5

APPLY BASIC ELECTRONICS

Nov. /Dec. 2022



THE KENYA NATIONAL EXAMINATIONS COUNCIL

WRITTEN ASSESSMENT

Time: 3 hours

INSTRUCTIONS TO CANDIDATES

Maximum marks for each question are indicated in brackets.

*This paper consists of **THREE** sections: **A**, **B** and **C**.*

Answer questions as per the instructions in each section.

You are provided with a separate answer booklet.

Answer all the questions in English.

This paper consists of EIGHT (8) printed pages
Candidates should check the question paper to ascertain that all pages
are printed as indicated and that no questions are missing

SECTION A (20 MARKS)

(Answer all questions in this section)

1. The following are basic logic gates except? (1 Mark)
 - A. NAND gate
 - B. OR gate
 - C. AND gate
 - D. NOR gate
2. A device which converts BCD to seven segments is called? (1 Mark)
 - A. Encoder
 - B. Decoder
 - C. Multiplexer
 - D. Converter
3. The basic storage element in a digital system is? (1 Mark)
 - A. Flip-flop
 - B. Counter
 - C. Multiplexer
 - D. Encoder
4. Which of the following device has one input and many outputs? (1 Mark)
 - A. Multiplexer
 - B. Demultiplexer
 - C. Counter
 - D. Flip flop
5. Write 11100110 in 1's complement. (1 Mark)
 - A. 00011001
 - B. 10000001
 - C. 00011010
 - D. 00000000

6. The number of depletion layers in a transistor is (1 Mark)
- A. Four
 - B. Three
 - C. One
 - D. Two
7. What carries current is in a PnP transistor? (1 Mark)
- A. Acceptor ions
 - B. Donor ions
 - C. Free electrons
 - D. Holes
8. Which oscillator is used in a transmitter? (1 Mark)
- A. Hartley
 - B. RC phase-shift
 - C. Wien-bridge
 - D. Crystal
9. If a radio receiver amplifies all the signal frequencies accurately, it is said to have high (1 Mark)
- A. Sensitivity
 - B. Selectivity
 - C. Distortion
 - D. Fidelity
10. The major advantage of FM over AM is (1 Mark)
- A. Reception is less noisy
 - B. Higher carrier frequency
 - C. Smaller bandwidth
 - D. Small frequency deviation
11. The purpose of a parallel circuit resonance is to magnify (1 Mark)
- A. Current
 - B. Voltage
 - C. Power
 - D. Frequency

12. A semiconductor is formed by bonds. (1 Mark)
- A. Covalent
 - B. Electrovalent
 - C. Co-ordinate
 - D. None of the above
13. Both EPROM and EEPROM are (1 Mark)
- A. Sequential access memory
 - B. Random access memory
 - C. Volatile memory
 - D. Destructive memory
14. Which of the following waves has the highest value of peak factor? (1 Mark)
- A. Square wave
 - B. Sine wave
 - C. Half wave rectified sine wave
 - D. Triangular wave
15. Skin effect occurs when a conductor carries current at _____ frequencies. (1 Mark)
- A. Very low
 - B. Low
 - C. Medium
 - D. High
16. Which of the following refers to a parallel circuit? (1 Mark)
- A. The current through each element is same
 - B. The voltage across element is in appropriate to it's resistance value
 - C. The equivalent resistance is greater than any one of the resistors
 - D. The current through any one element is less than the source current
17. The power factor of a D.C. circuit is always? (1 Mark)
- A. Less than unity
 - B. Unity
 - C. Greater than unity
 - D. Zero

18. The active components in an IC are? (1 Mark)
- A. Resistors & Capacitors
 - B. Capacitors & diodes
 - C. Transistors and diodes
 - D. None of the above
19. Which of the following is the most popular type of IC (1 Mark)
- A. Thin-film
 - B. Hybrid
 - C. Thick-film
 - D. Monolithic
20. Which of the following is most difficult to fabricate in an IC? (1 Mark)
- A. Diode
 - B. Transistor
 - C. FET
 - D. Capacitor

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SECTION B (40 MARKS)

(Answer all questions in this section)

21. a) Differentiate between the following (2 Marks)

- i) A.C and D.C currents
- ii) Electrolyte and Electrode

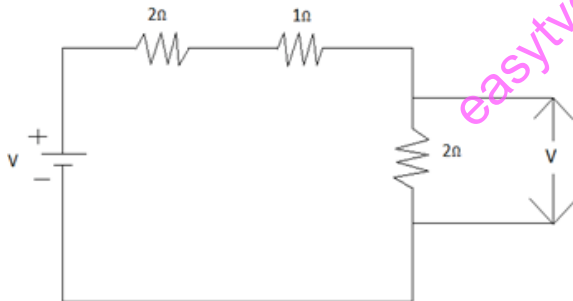
b) Explain the following as used in electronics. (8 Marks)

- i) potential difference
- ii) Current
- iii) Voltage
- iv) Power

22. a) What is an electric current? (1 Mark)

b) Explain the **two** types of Electric Circuits (4 Marks)

c) Calculate Voltage across 2Ω Resistor where supply $v= 10\text{volts}$. (4 Marks)



d) If there are 3 Resistors R_1 , R_2 and R_3 in series and V is total voltage and I is total current then Voltage across R_2 is? (1 Mark)

23. Explain any **five** electronic components and their functions. (10 Marks)

24. a) Define semiconductor. (2 Marks)

b) Explain **two** types of extrinsic semiconductors? (4 Marks)

c) With aid of a sketch, outline the PN junction diode showing the flow of current and depletion region formation. (4 Marks)

SECTION C (40 MARKS)

(Answer any two questions in this section)

25. a) Define ohm's law. (2 Marks)
- b) State the purpose of fuse and circuit breakers? (2 Marks)
- c) Outline any **four** advantages of semiconductors that make them highly useful in almost all electronic devices. (4 Marks)
- d) Explain the following as used in Bipolar transistor configuration (6 Marks)
- i) Common Base Configuration
 - ii) Common Emitter Configuration
 - iii) Common Collector Configuration
- e) With aid of a sketch, outline the configurations of PN junction diode showing both the input signal and output. (6 Marks)
26. a) Define Capacitance (2 Marks)
- b) Draw a closed circuit of three inductors (L1, L2 and L3) in series, showing the current (I) flow and voltage (V1, V2 and V3) across each inductor. (6 Marks)
- c) Discuss any **six** challenges of emerging trends in electronic manufacturing (12 Marks)
27. a) Convert the following Binary numbers to their decimal equivalent (8 Marks)
- i) $(1110010)_2$
 - ii) $(11011)_2$
- b) Convert the following Binary Numbers to octal equivalent (4 Marks)
- i) 10101_2
 - ii) $0110\ 011.1011_2$

- c. Convert binary number 1101010 into hexadecimal number. (6 Marks)
- d. Convert hexadecimal number 1F.01B into decimal number. (2 Marks)
28. a) Explain the following as used in atomic structure. (6 Marks)
- i) Atom
 - ii) Proton
 - iii) Neutron
- b) What is the difference between the following (6 Marks)
- i) Cache memory and virtual memory?
 - ii) Volatile memory and Non-volatile memory
 - iii) DRAM and SRAM
- c) Discuss **four** types of Read Only Memory (8 Marks)

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