NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

ELS –Fundamentals of Electronics

T077

Tuesday, 25/07/2023

08:30 – 11:30 AM

Names:.....

Index number:.....

TVET NATIONAL EXAMINATIONS, LEVEL 5, 2022-2023

QUESTIONS and ANSWERS BOOKLET

OPTION/ TRADE : ELECTRONICS SERVICES

SUBJECT/EXAM: FUNDAMENTALS OF ELECTRONICS

DURATION: 3 Hours

Read carefully the instructions on page 1 & 2.

FOR EXAMINER'S USE ONLY

QUESTIONS	1	2	3	4	5	6	7	8	9	10	Total
Marks											
QUESTIONS	11	12	13	14	15	16	17	18	19	20	Total
Marks											
QUESTIONS	21	22	23	24	25	26	27	28	29	30	Total
Marks											

TVET NATIONAL EXAMINATIONS, LEVEL 5, 2022-2023

INSTRUCTIONS TO CANDIDATES (ANSWER BOOKLET)

1. A candidate should fill in the actual names and the Index number on the cover of this questions and answer booklet on the provided place.

2. It is illegal for a candidate to write any of names, Index number or school name inside the answer booklet.

3. No candidate should remove or tear any pages or part of it in the answer booklet.

4. A candidate should answer in the language in which the examination is set.

5. A candidate should sign on the sitting plan when submitting the answer booklet. He/she has also to check if the answer booklet is well sealed.

6. No extra paper is allowed in the examinations room. If a candidate is caught with it his/her results will be nullified.

7. No candidate is allowed to write answers not related to the subject being sat for, otherwise it will be considered as a cheating case.

8. Write your answers on the 16 lined pages (From page 7 to page 22).

9. Use the last non-lined pages as draft.

10. Results for any candidate who is caught in examination malpractices are nullified. The cheating can be recognized during examinations administration, marking exercise or even thereafter.

N.B: 1) After results publication, there is no remarking and no candidate is given his/her answer booklet for review. This answer booklet is a property of NESA.
2) Claims are only received online within 30 days after results publication. A link will be provided after results publication.

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INSTRUCTIONS TO CANDIDATES (QUESTION PAPER)

This Exam paper is composed of Three Sections (A, B, and C). Follow the instructions given below, and answer the indicated questions for a total of 100 marks

Section **A**: Fourteen (**14**) questions, all **Compulsory**	**55 marks**
Section **B**: Among the five (**5**) questions, attempt any three (3)	**30 marks**
Section **C**: Among the two (**2**) questions, attempt any one (1)	**15 marks**

Allowed materials:

- Blue or black pen
- Mathematical set
- Non-programmable calculator

Note:

Every candidate is required to carefully comply with the provided assessment instructions.

SECTION A: Attempt all questions **(55 marks)**

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01. Give the two (2) main applications of transistors. **(2marks)**

02. List any four (4) types of nonlinear resistors. **(4marks)**

03. List any five (5) main Integrated Circuit Logic families. **(5marks)**

04. Match the column A and column B by filling the appropriate letters in the first column: **(5marks)**

Letters	Parameters (A)	Units (B)
1.....	1. Resistance	a) Hertz
2.....	2. inductance	b) farad
3.....	3. Current	c) Henry
4.....	4. Frequency	d) Ampere
5.....	5. Capacitance	e) ohm

05. **a)** Define "Universal logic gate". **(3marks)**

b) Give the two (2) types of Universal gates.

06. Draw a Darlington transistor. **(2marks)**

07. What is the value of these passive components: **(3marks)**

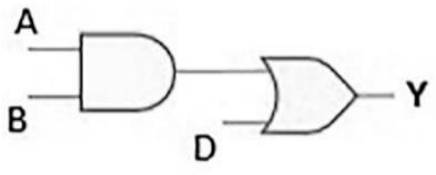
a) A resistor having four color red, red, red and gold.

b) Ceramic capacitor marked by 104 J

08. Describe the main sections (parts) of an oscilloscope. **(4marks)**

09. Categorize the four (4) different types of waveforms generated by a function generator. **(4marks)**

10. Build a truth table of the circuit below. **(4marks)**



11. What is the largest decimal value that can be represented by: **(5marks)**

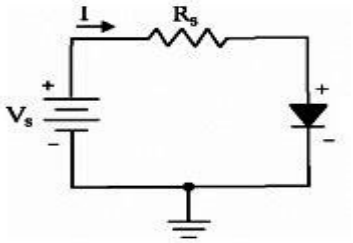
a) 8-bit binary?

b) 16-bit binary number?

12. Using the Boolean laws and rules, simplify the logic expression below: **(5marks)**

$$Z=(\overline{A}+B)(A+B)$$

13. For the circuit below, if Vs = 2 V, and Rs = 100Ω, calculate the current flowing through the diode. Assume a silicon diode. **(4marks)**



14. Typically, digital thermometers use BCD to drive their digital displays. How many BCD bits are required to drive a 3-digit thermometer display? What bits are sent to display a temperature of 357 degrees? **(5marks)**

Section B: Attempt any three (3) questions **(30 marks)**

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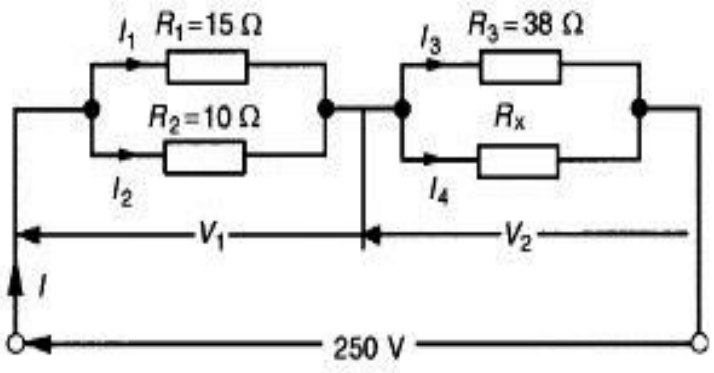
15. For the circuit shown in figure below, calculate: **(10marks)**

a) The value of R_X such that the total power dissipated in a circuit is 2.5kW.

b) The current flowing in each of the four resistors.



16. The following is a message encoded in ASCII code: **(10marks)**

1001000 1000101 1001100 1001100 1001111.

What is that message in normal characters?

17. A sinusoidal waveform is displayed by an oscilloscope with a vertical sensitivity of 2 volts per division and a time base of 0.5 milliseconds per division. If this signal has peak to peak voltage of 5 divisions vertically and period of 5 divisions horizontally, determine the following: **(10marks)**

a) Peak to peak voltage;

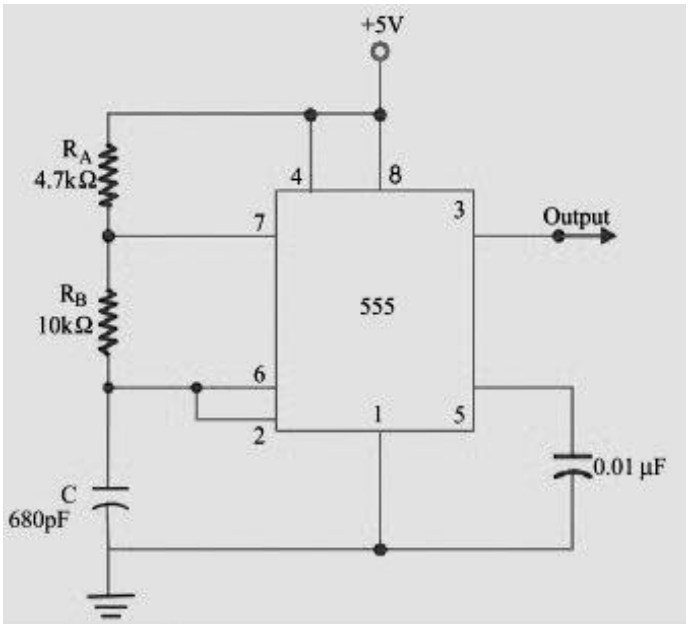
b) Peak voltage;

c) RMS voltage;

d) Period;

e) Frequency.

18. The circuit below is a 555-timer configured as an astable multivibrator. Determine the values T_{ON}, T_{OFF}, frequency and duty cycle of the output waveform**.** **(10marks)**



19. Draw a block diagram of a regulated power supply and sketch the output signal at each stage of that power supply. **(10marks)**

Section C: Attempt only one (1) question **(15 marks)**

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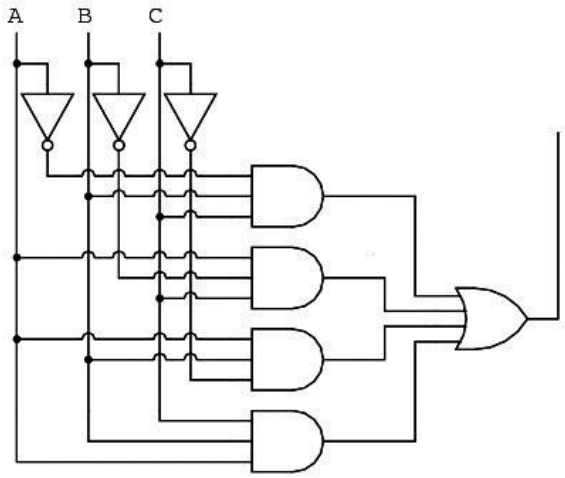
20. Implement the following Boolean expression using minimum number of 3-input NAND gates. **(15marks)**

f (A, B, C, D) = Σ (1, 2, 3, 4, 7, 9, 10, 12)

21. From the following figure:



a) Make the simplification using Karnaugh Map (K-Map). **(8marks)**

b) Draw the simplified circuit. **(7marks)**

END OF ASSESSMENT

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