NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

HPE – Electricity and Electrical Measurements

T088

Wednesday, 21/7/2021

08:30 – 11:30 AM

Names: .....

Index number: .....

TVET NATIONAL EXAMINATION, RTQF LEVEL 5, 2020-2021

QUESTIONS and ANSWERS BOOKLET

OPTION/TRADE: **HYDROPOWER ENERGY**

SUBJECT: **ELECTRICITY AND ELECTRICAL MEASUREMENTS**

ACADEMIC YEAR: **2020-2021**

Read carefully the instructions on page (i) & (ii).

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 EXAMINATION, RTQF LEVEL 5, 2020-2021

INSTRUCTIONS TO CANDIDATES: PART I (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 (Black Box).

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

3. A candidate should check if all pages of the answer booklet are complete. No candidate should remove or tear any pages or part of it from the answer booklet.

4. A candidate should answer in the language in which the examination is set. (See page ***(ii)***)

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 12 lined pages (From page 1 of 12 to page 12 of 12).

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.

TVET NATIONAL EXAMINATION, RTQF LEVEL 5, 2020-2021

OPTION/TRADE: HYDROPOWER ENERGY

SUBJECT: Electricity and Electrical Measurements

DURATION: 3 hours

INSTRUCTIONS TO CANDIDATES: PART II (Question Paper)

The paper is composed of two (2) main Sections as follows:

Section I: Attempt all the Twelve (12) questions **(60 marks)**

Section II: Attempt any Four (4) questions out of Six (6)

(40 marks)

Allowed materials:

-Ruler and square

-Calculator

Note:

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

Section I: Attempt all the Twelve (12) questions **(60 marks)**

01. Define correctly the following terms:

a) Electric current

b) Voltage

c) Resistance

d) Conductance

e) Power. **(5 marks)**

02. State correctly and model the following laws:

a) Ohm's law

b) Kirchhoff's current and voltage law. **(5 marks)**

03. List any five (5) characteristics of instrument and measurement. **(5 marks)**

04. Enumerate any five (5) safety of equipment used for measurement instrumentation. **(5 marks)**

05. Differentiate AC from DC current. **(5 marks)**

06. State any five (5) techniques for keeping of measuring instruments. **(5 marks)**

07. An 8-pole, wave-connected armature has 600 conductors and is driven at 625 rev/min. If the flux per pole is 20 mWb, Determine the generated e.m.f. **(5 marks)**

08. A 100W electric light bulb is connected to a 250V supply. Determine:

a) Current flowing in the bulb

b) The resistance of the bulb. **(5 marks)**

09. A current of 5A flows in the winding of an electric motor, the resistance of the winding being 100 ohms. Determine:

a) Potential difference across the winding

b) Power dissipated by the coil. **(5 marks)**

10. Two resistors of 3 Ω and 6 Ω are connected in parallel across a battery having a voltage of 24V. Determine:

a) The total circuit resistance

b) The current flowing in 3 Ω resistors. **(5 marks)**

11. A capacitor has a reactance of 40Ω when operated on a 50Hz supply. Determine the value of its capacitance. **(5 marks)**

12. A 100 kVA, 4000 V/200 V, 50 Hz single-phase transformer has 100 secondary turns. Determine:

a) The primary and secondary current

b) The number of primary turns

c) The maximum value of the flux. **(5 marks)**

Section II: Attempt any Four (4) questions out of Six (6) **(40 marks)**

13. List and explain any five (5) electrical measurement instruments.

(10 marks)

14. A short-shunt compound generator supplies 80 A at 200V. If the field resistance, Rf =40Ω, the series resistance, RSe =0.02Ω and the armature resistance, Ra=0.04 Ω, determine the e.m.f. generated.

(10 marks)

15. With scheme, connect four (4) batteries of 12V in parallel and series.

(10 marks)

16. A 30μF capacitor is connected in parallel with an 80Ω resistor across a 240V, 50Hz supply. Demonstrate:

a) The current in each branch

b) The supply current

c) The circuit phase angle

d) The circuit impedance

e) The power dissipated.

(10 marks)

17. A 20Ω resistor is connected in parallel with an inductance of 2.387 mH across a 60V, 1 KHz supply. Calculate:

a) The current in each branch

b) The supply current

c) The circuit phase angle

d) The circuit impedance

e) The power consumed.

(10 marks)

18. In three phase system, electrical loads can be connected either in star or delta. Compare star to delta connection. **(10 marks)**

NESA2021