NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

IEL –Electricity, Electronics and Electrical Measurements

T048

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: **INDUSTRIAL ELECTRICITY**

SUBJECT: **Electricity, Electronics 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: INDUSTRIAL ELECTRICITY

SUBJECT: Electricity, Electronics 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. Differentiate Direct current from Alternating current. **(5 marks)**

02. Calculate the working resistance for 240V, 60W of incandescent lamp. **(5 marks)**

03. Three (3) capacitors of capacitance of 2μF, 4μF and 6μF respectively are connected in series across a 220V supplied, Find:

a. the total capacitance

b. Charge on each capacitor

c. p.d. across each capacitor. **(5 marks)**

04. Complete the table below:

S/N	Quantity	Unit's name	Unit's symbol
a)	.....	Kilogram	.....
b)	.....	Candela	.....
c)	Time	.....	**s**
d)	Power	.....	**W**
e)	Energy	Joule	**J**
f)	.....	Ampere	.....
g)	.....	Volt	.....

(5 marks)

05. a) A resistor has color coded of Yellow, Violet, Red, and Gold; determine the value of that resistor.

b) A magnetizing force of 8000A/m is applied to a circular magnetic circuit of mean diameter 30cm by passing a current through a coil wound on the circuit. If the coil is uniformly wound around the circuit and has 750 turns, find the current in the coil.

(5 marks)

06. a) A source e.m.f. of 5V supplies a current of 3A for 10 minutes. Calculate the energy provided in this time.

b) A 12V battery is connected in a circuit having three series-connected resistors having resistances of 4Ω, 9Ω and 11Ω. Determine the current flowing through it and the p.d. across the 9Ω resistor. Find also the power dissipated in the 11Ω resistor.

(5 marks)

07. a) Determine the periodic time for a frequency of 60Hz.

b) An alternating current completes 5 cycles in 8ms; what is its frequency?

c) Determine the peak and mean values for a 240 V main supply.

(5 marks)

08. Calculate the active and reactive components of current in each phase of a star –connected 10,000Volts, 3-phase generator supplying 5,000Kw at a p.f. of 0.8. **(5 marks)**

09. (a) Calculate the resistance of an electric wire in Aluminum of 1Km length, having a diameter of 2.4mm if the resistivity of Aluminum is $2.6 \times 10^{-8} \Omega m$.

(b) A copper coil has a resistance of 50Ω at 0^0C. Find the resistance of the coil at 60^0C if the temperature coefficient of resistance is $0.0043/^0C$ at 0^0C. **(5 marks)**

10. Define the following items:

(i) Amplification
(ii) Transducer
(iii) Dielectrics
(iv) Absolute permittivity
(v) Chokes. **(5 marks)**

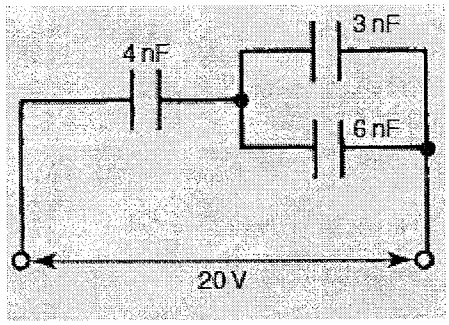
11. Three (3) resistances are in parallel. The current in first resistance is 0.1A; the power dissipated in the second is 3 watts. The voltage drop across the third is 100 volts and the total current is 0.2A. Determine the ohmic values of resistors. **(5 marks)**

12. a) Define Rectifier

b) Give the different types of rectifier. **(5 marks)**

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

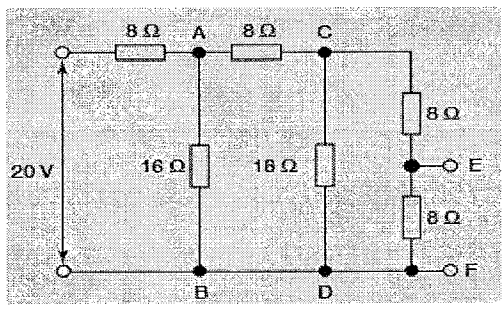
13. For the circuit below calculate:



a) The Voltage across each capacitor

b) The charge stored in the 3 nF. **(10 marks)**

14. Determine the potential difference between terminals E and F for the following circuit:



(10 marks)

15. An ideal 25KVA transformer has 500 turns on the primary winding and 40 turns on the secondary winding. The primary is connected to 3000V, 50Hz supply. Calculate:

a) Primary and secondary current on full load;

b) Secondary e.m.f

c) The maximum core flux. **(10 marks)**

16. A balanced 3-phase load consists of three coils, each of resistance 6Ω and inductive reactance of 8Ω. Determine the line current and power absorbed when the coils are in:

a) Star connected

b) Delta connected across 400V, 3-phase supply. **(10 marks)**

17. A capacitor C is connected in series with a 45Ω resistor across a supply of frequency 50Hz. A current of 4A flows and the circuit impedance is 60Ω. Calculate:

a) the value of capacitance

b) the supply voltage

c) the phase angle between the supply voltage and circuit current

d) the p.d. across the resistor

e) the p.d. across the capacitor. **(10 marks)**

18. (a) A 230V, 50Hz a.c. supply is applied to a coil of 0.06 H inductance and 2.5 Ω resistance connected in series with a 6.8μF capacitor. Calculate:

i. impedance;

ii. current;

iii. phase angle between current and voltage;

iv. Power factor; € power consumed.

(b) It is desired to raise the p.f. of a single-phase electrical installation whose power consumed is 50Kw under a supply voltage of 380V, 50Hz from 0.8 to 0.85. Calculate the capacitance of the capacitor required.

(10 marks)

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