NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

IEL – Pico-Hydropower Plant

T052

Friday, 30/7/2021

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: **Pico-Hydropower Plant**

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: Pico-Hydropower Plant

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.

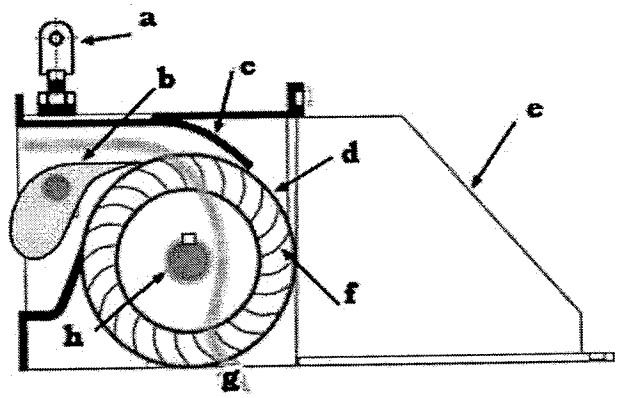
Section I: Attempt all the Twelve (12) questions **(60 marks)**

1. Describe the following elements:
   a. Dam
   b. Surge tank
   c. Valve house
   d. Penstock **(5 marks)**

2. In hydropower plant system, turbine is a major part that is needed. List down the categories of turbines. **(5 marks)**

3. List down any five (5) operating parameters monitored at hydropower plant. **(5 marks)**

4. The figure below shows the Cross-flow turbine, write down its parts:



(5 marks)

5. List down at least five (5) advantages of hydropower plant. **(5 marks)**

6. State at least any five (5) roles of operators during operation of hydropower plant. **(5 marks)**

7. Identify any five (5) points to be checked while maintaining alternator of hydropower plant. **(5 marks)**

8. (a) What is depreciation?

(b) Outline three (3) methods to be used for determining depreciation. **(5 marks)**

9. Identify the five (5) types of surge tank. **(5 marks)**

10. Write down any five (5) sources of energy. **(5 marks)**

11. Make comparison between embedded penstock and surface penstock used in hydro-electric power station. **(5 marks)**

12. Mounting solar panels correctly is part of maximizing power production. According to advantages and disadvantages differentiate Top roof mounting system and Ground mounting system. **(5 marks)**

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

13. Differentiate Impulse turbine from Reaction turbine. **(10 marks)**

14. A penstock is working under a water head of 210 meters. Its diameter is 2.4 meters. Find its thickness if the joint efficiency is 82 percent and allowable stress in the material is 1050kgf/cm^2. **(10 marks)**

15. As hydropower plant operator, find out five (5) typical electromechanical elements of Pico – hydropower plant. **(10 marks)**

16. A generating station has the following daily load cycle:

Time(hours)	0-6	6-10	10-12	12-16	16-20	20-24
Loads (MW)	30	50	70	50	60	40

Answer the following:

a) Draw the load curve

b) Maximum demand

c) Units (kwh) generated per day

d) Average load

e) Load factor. **(10 marks)**

17. **a)** Differentiate "renewable" from "non-renewable energy sources"

b) List down three (3) examples of renewable and non-renewable sources **(10 marks)**

18. **a)** Make a classification of hydropower plant based on the power generated. **(6 marks)**

b) Complete the following table: **(4 marks)**

Types of hydropower plant based on head	**Range of the head in m**
i.	.....
ii.	.....

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