NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

HPE – Fundamentals of Hydro-power Plant operations

T093

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: **HYDROPOWER ENERGY**

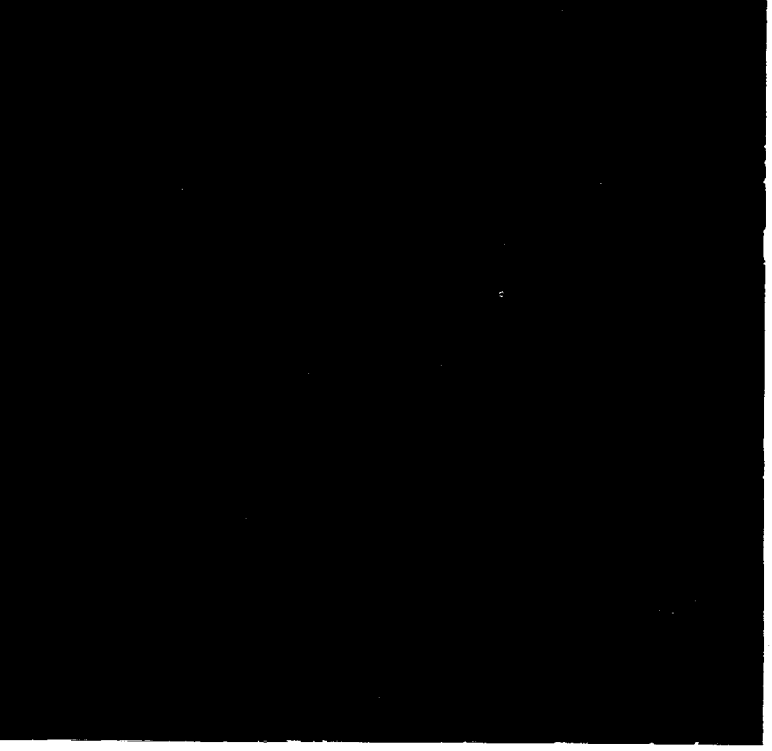
SUBJECT: **Fundamentals of Hydropower Plant operations**

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: Fundamentals of Hydropower Plant operations

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. Explain the following hydropower elements:

a) Dam

b) Surge tank

c) Hydraulic turbine

d) Valve house

e) Penstock. **(5 marks)**

02. Before constructing hydropower station on the site it is necessary to know the point that can be followed while they selected that site. Write down these points. **(5 marks)**

03. **a)** Hydropower plant should always have surge tank. What will happen when there is no surge tank in hydroelectric system?

b) List down at least five (5) operating parameters monitored at hydropower plant. **(5 marks)**

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

05. Why are hydropower plant stations always located at a high risk zone? **(5 marks)**

06. The essential element or constituent of hydropower plant system are the one that can be considered when they are constructing hydropower plant, what are they? **(5 marks)**

07. It is necessary to use spill ways in hydropower plant. Explain the function of spill ways. **(5 marks)**

08. In hydropower plants classification is according to the nature, describe them based on load plant and peak load plant.

(5 marks)

09. **a)** As industrial electrician, it is necessary to know the different sources of electrical energy and hydropower plant is one of source of electrical energy. Explain clearly the meaning Hydro-electric Power Station.

b) We know that electricity can be produced from water. Explain briefly how water can produce electricity. **(5 marks)**

10. State why the availability of head of water and Storage of water are necessary to be considered when selecting hydropower plant.

(5 marks)

11. Discuss where the battery is required in hydropower plant.

(5 marks)

12. Enumerate the classification of hydroelectric plants according to their capacity. **(5 marks)**

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

13. The principle of generator operation is quite for industrial electrician. Talk about the working principle of generator (alternator). **(10 marks)**

14. List and explain the different categories of turbines. **(10 marks)**

15. Three similar coils, each having a resistance of 20 ohms and inductance of 0.05H are connected in Star and delta (mesh) to a 3-phase, 50Hz supply with 400V between lines.

Calculate the total power absorbed and the lines current in each case. **(10 marks)**

16. Discuss the typical electromechanical elements of hydropower plant **(10 marks)**

17. Write down and explain the classification of hydraulic features. **(10 marks)**

18. 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

Determine the following:

a) Draw the load curve

b) Maximum demand

c) Units (kwh) generated per day

d) Average load

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

Do not write anything on this page !