NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

PLB – Fluid knowledge, water catchment and treatment

T113

Tuesday, 20/7/2021

Names:.....

Index number:.....

TVET NATIONAL EXAMINATION, RTQF LEVEL 5, 2020-2021

QUESTIONS and ANSWERS BOOKLET

OPTION/TRADE: **PLUMBING**

SUBJECT: **Fluid knowledge, water catchment and treatment**

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: PLUMBING

SUBJECT: Fluid knowledge, water catchment and treatment

DURATION: 3 hours

INSTRUCTIONS TO CANDIDATES: PART II (Quetion paper)

The paper is composed of two (2) 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 or 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. Mention at least five (5) applications of Hydraulics. **(5 marks)**

02. Define the following terms:

a) pressure gauge
b) Centre of buoyancy
c) Piezometer
d) Surface tension **(5 marks)**

03. Discuss the stages of waste water treatment process. **(5 marks)**

04. Explain the term "Hydrostatic paradox" in static fluid. **(5 marks)**

05. Give the difference between Newton and Non-Newtonian fluids. **(5 marks)**

06. State the name of this formula : $H_f = f \frac{\rho L V^2}{2gD}$ **(5 marks)**

07. Differentiate laminar flow from turbulent flow. **(5 marks)**

08. A vertical tube open at the top contains 5.00cm of oil with 820kg/m^3, foating on 5.0 cm of water. Calculate the gauge pressure at the bottom of the tube. **(5 marks)**

09. Differentiate inviscid flow from viscous flow. **(5 marks)**

10. The water is flowing through a tapering pipe having diameters 300 mm and 150 mm at sections 1 and 2 respectively. The discharge through the pipe is 40 l/sec. The section 1 is 10 m above the datum and section 2 is 6 m above the datum. Find the intensity of pressure at section 2 if that at section 1 is 400 KN/m^2. **(5 marks)**

11. Identify the types of channel. **(5 marks)**

12. Identify the sources of waste water treatment. **(5 marks)**

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

13. A rectangular plate 3 meters long and 2 meter wide is immersed vertically in water. Its 3 meters side is parallel to the water surface and is 1 meter below it. determine :

a) the total pressure on the plate

b) the position of the centre of pressure. **(10 marks)**

14. A circular drainage pipe o.8 m in diameter conveying a discharge at a depth of o.3 m has a slope of in 90. Determine the discharge through the channel. Assume Manning's number n= 0.015. **(10 marks)**

15. a) Explain the following

i. Water Horsepower
ii. Brake
iii. Horsepower

b) Water is to be raised from a tube wee to an over head storage tank. Find the Brake hose power (B.H.P) of the electro-motor pumping set from the following data:

Discharg from tube wee = 40 l/s
Velocity in rising main = 2 m/s
Length of rising main = 250 m
R.L of ground = 100.00 m
R.L of water in the weel =86.00 m
Depression head = 4.00 m
R.Lof water level in over head tank = 112 m
Coefficient of frictin = 0.0485
Combined efficient of electro-pumping set = 70% **(10 marks)**

16. a) Define the following elements:

i. A pipe

ii. A Pipe flow

b) Water is drawn from a reservoir in which the water level is 240m above the datum at rate of 0.130 m^3/sec. The outlet of the pipeline is at the datum level and fitted with a nozzle to produce a high speed jet to drive a turbine of the Pelton wheel type. If the velocity of the jet is 66 m/sec. Determine:

i. The power of the jet

ii. The power supplied from the reservoir

iii. The head used to overcome losses **(10 marks)**

17. The quantity of water flowing in a canal of rectangle form of 60 cm depth and 50 cm base is 25 l/sec; the velocity of flow of water v is 0.5 m/sec.

a) Find the area of fluid in a canal.

b) Find the mean depth of water. **(10 marks)**

18. A longitudinal canal with a trapezoidal cross section is to be constructed in cut section. The longitudinal slope is 1 in 1800. The soil is clay with manning's rugocity coefficient (n) of 0.024 and the maximum allowable velocity is 2.2 m/sec.

Find:

a) The hydraulic mean depth(r)

b) The area to be drained

c) The perimeter if the discharge for canal is 5cum/sec. **(10 marks)**

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