THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

731/1 **PHYSICS 1**

Time: 3 Hours **Year: 2021**

Instructions

1. This paper consists of sections **A, B** and **C** with a total of **sixteen (16)** questions**.**
2. Answer **all** questions in section **A** and any two (2) questions from each of section **B** and **C.**
3. Section **A** carries **forty (40)** marks , and section **B** and **C** carry **thirty (30)** marks each.
4. Non-programmable calculators may be used
5. Cellular phones and any unathorized materials are not allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet (s).

SECTION A (40 Marks)

Answer **all** questions in this section

1. Use the equation to compute the dimensions of the constants x and y from $\left(P+\frac{x}{V}\right)(V-y)=RT$ given that P is pressure, V is volume, T is temperature and R is universal molar gas constant.
2. Calculate the speed acquired by the electron when an electron is emitted from a hot cathode in an evacuated tube is accelerated by a potential difference (p.d) of 1.0 $x10^3$ V .
3. (a) Give the meaning of the term "fixed point" as used in Simple Harmonic Motion.

   (b) Deduce the maximum magnitudes of velocity of the bob and acceleration of the bob given that the period and amplitude of swing of a simple pendulum are 2.0 s and 5.0 cm respectively.
4. (a) Explain why a soap solution is a better cleansing agent than ordinary water.

   (b) Find the energy stored in a steel wire of length 4 m and cross-section area of $3x10^{-6}$ m^2 when extended by 1 mm, given the Young modulus of steel wire =2.0 $x10^{21}$ Pa.
5. Differentiate the following terms as applied in Fluid Mechanics:

   (a) viscous fluid and streamline flow

   (b) compressible fluid and incompressible fluid.
6. State

   (a) Two differences between progressive and stationary waves

   (b) Four methods used to form interference patterns.
7. Outline four importance of teacher's guide book in teaching Physics subject.
8. Give four measures to be considered in ensuring safety in a Physics laboratory.
9. Argue using four points the statement, "before conducting any physics lesson a teacher must prepare a lesson plan".

10. Show the four basic rules under the principle "students learn better when they approach materials from simple ideas to complex" when teaching and learning physics.

SECTION B (30 Marks)

Answer any **two (2)** questions from this section

11. (a) Explain why Ohm's law cannot be verified using a filament lamp.

    (b) explain why the electrical conductivity of electrolytes is less than that of metals.

    (c) find the time used to deposit 0.254 kg of copper on the cathode of copper voltammeter when a steady current of 100A is maintained.

12. (a) Estimate the steady temperature of the filament when the tungsten filament of an electric lamp has a length of 0.5 m and a diameter of $6x10^{-5}$ m and the power rating of the lamp is 60 W. Assuming that the radiation from the filament lamp is equivalent to 80% of a perfect black body radiator at the same temperature.

    (b) Determine the thickness of brick which conduct the same quantity of heat per second per unit area as 0.1 m of air given that a cavity wall is made of a 0.1 m thick bricks with an air space of 0.1 m thick between them. Assuming the thermal conductivity of brick is 20 times that of air.

13. (a) Explain the basic condition for proper functioning of transistor as an amplifier.

    (b) Use the circuit shown in **Figure 1**, calculate the load resistor RL, base current IB and the base resistor RB, given $\beta = 100$.

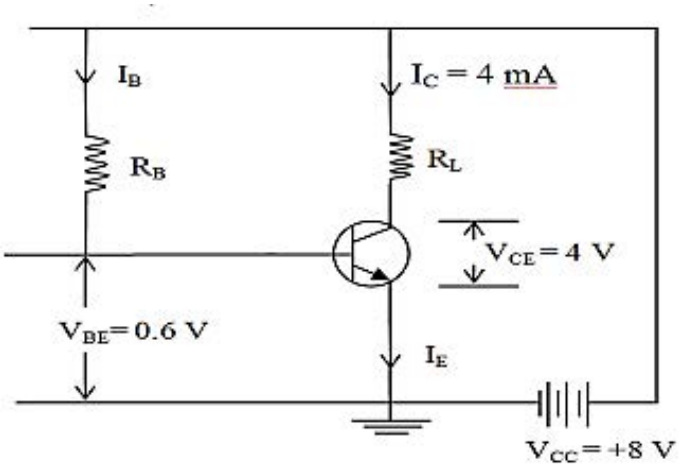


Figure 1

(c) Derive a truth table for the circuit shown in **Figure 2.**

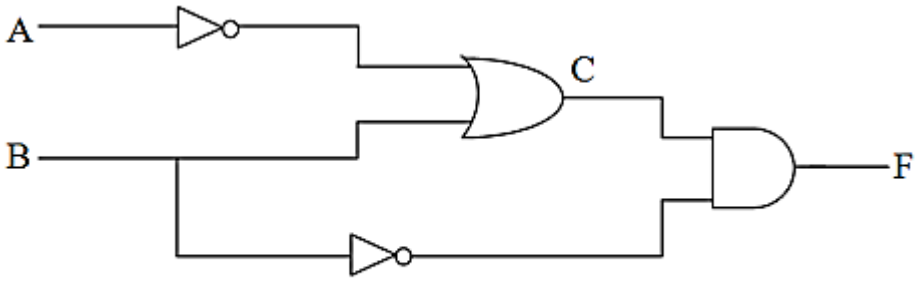


Figure 2

SECTION C (30 Marks)

Answer any **two (2)** questions from this section

14. (a) Differentiate between general instructional objectives and specific instructional objectives as used in a lesson plan.

(b) explain by giving three reasons, why the "instructional objectives" and "reinforcement stage of a lesson plan" are important in teaching Physics.

15. (a) Five give advantages of using multiple choice items in Physics test.

(b) Study a table of specification and to answer the questions that follow:

Contents	**Learning Instructional Objectives**					
	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Forces in equilibrium	1	1	1	-	1	1
Simple machines	-	1	2	2	-	2
Motion in a straight line	1	1	1	-	1	-
Temperature	2	1	1	2	-	1
Sustainable energy sources	1	1	1	-	-	-

(i) Which learning objectives were given equal emphasis in the test

(ii) Which content were least emphasized in the test

(iii) How many test items were set on Forces in equilibrium and Temperature?

(iv) How many test items were set for the summative test?

(v) What percentage of the test items was devoted to simple machines?

(vi) What percentage of the test items was devoted to analyzing?

(vii) Explain three criteria that have been considered to determine the relative weight of each learning objective and area content.

16. Show six steps to be followed when teaching the topic of "global warming" using cooperative and participatory methods to Form Four students.