**FACULTY OF EDUCATION**

**MAIN EXAMINATION PAPER**

**MAY 2018**

**B.Ed. III and PGCE (Full Time)**

**TITLE OF PAPER:** Curriculum Studies in Physics II

**COURSE NUMBER:** CTE 334 / CTE 534

**TIME ALLOWED:** **Three (3) hours**

**INSTRUCTIONS:**

1. This paper contains **FIVE** questions.
2. Question 1 is **COMPULSORY**. You may choose **ANY THREE** questions from questions 2,3,4,5.
3. Each question carries 25 marks.
4. Any piece of material not intended for marking purposes should be clearly **CROSSED OUT**.
5. Ensure that responses to questions are NUMBERED CORRECTLY

**SPECIAL REQUIREMENT:** Attached Copy of SGCSE Physical Science Syllabus 6888.

**THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR**

This paper consists of **5** printed pages

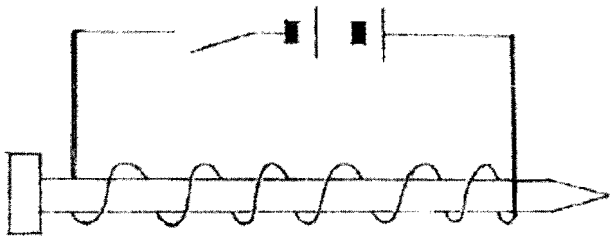
**Question 1 (Compulsory)**

Activity 2.12 was assigned to a Grade 9 class for learners to carry out in groups of 6 each.

## Activity 2.12 How to make an electromagnet

You will need: a thin insulated piece of wire, a nail, two 1.5V cells, a switch and iron filings

1. Wind about twenty turns of insulated wire around an iron nail.
2. Connect the ends of the wire to a circuit containing two cells, and a switch as shown in the diagram below.



3. Hold the nail above some iron filings or steel pins then momentarily switch on the current. What do you observe? What does this tell you about the nail inside a current-carrying coil?

The nail picks up the filings but drops them immediately when the switch is turned off. Can you see that you have made a magnet that can be switched on and off. It is called an **electromagnet** because an electric current causes its magnetism.

**Source: Science in Everyday Life, Learner's Book 2**

There are many process skills the teacher would like to teach and test from the learners.

**a. i.** List five of the process skills the teacher would like to develop and test from the learners. **(5)**

**ii.** How would the teacher use this activity to develop the five process skills? **(10)**

**b.** Explain how the concept in this Activity 2.12 can be taught using the BCSC 5E Instructional Model? **(10)**

## Question 2

Study the pictures in Fig 1 and answer the questions that follow.

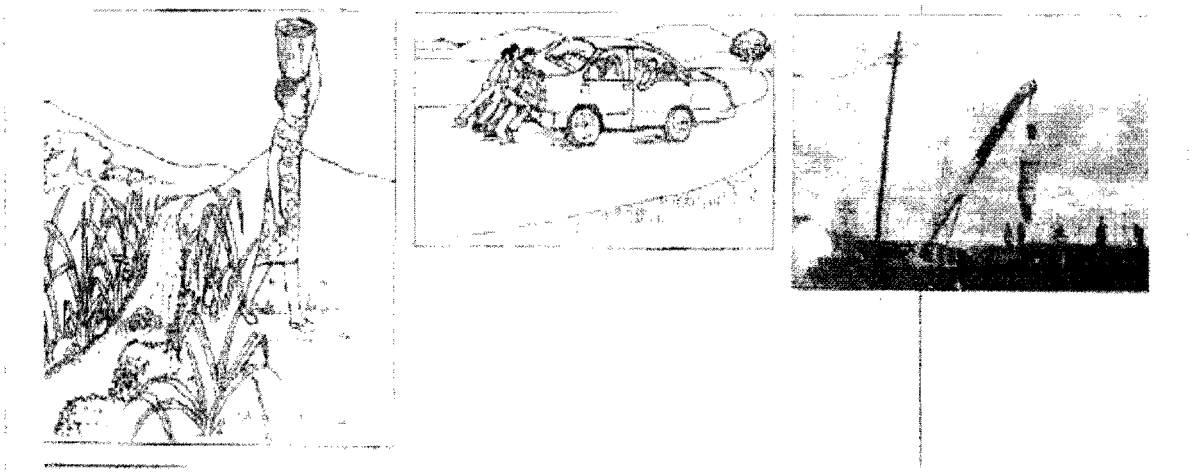


**Fig 1.**

a. i. Identify **ONE** concept that can be taught from **each** of the pictures in Fig 1? **(6)**
   ii. Describe the benefits of using this method of teaching physics? **(8)**
   iii. What challenges can teachers in Swaziland face in using this method of teaching? **(4)**
b. Take one concept from the attached Physical Science syllabus and describe how the teacher can use the application led approach in teaching the concept? **(7)**

**Question 3**

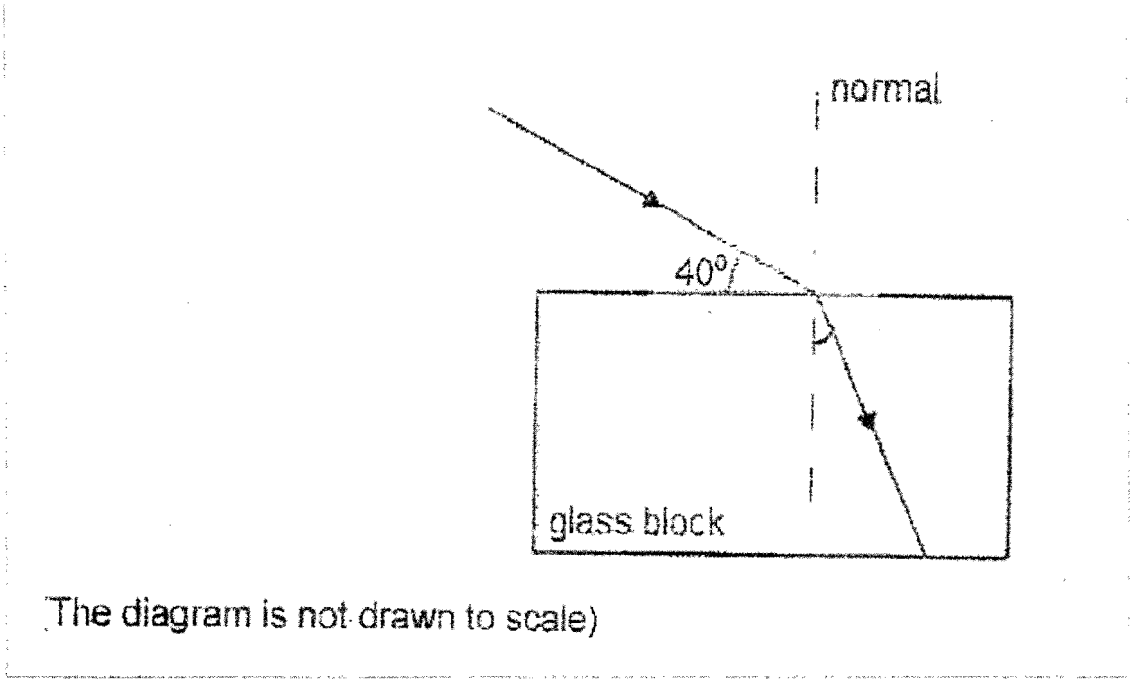



**Fig 2.**

Study Fig 2 and answer the questions that follow:

**3a.**

i. What concept could be taught from this diagram? **(1)**

ii. What pre-requisite knowledge does the student need to learn this concept? **(4)**

**b.** Write **one** objective from each of the domains to cover the conceptual, psychomotor and mathematical knowledge of the concept. **(6)**

**c.** 'There is a general view from learners that Physics is not relevant in their lives'. Unknown author.

As a Physics teacher in Swaziland, demonstrate with **five** examples how physics is relevant to the learner? **(10)**

**d.** Explain what you understand by "socialization of science?" **(4)**

**Question 4**

The definition of Scientific Literacy "goes beyond any notion of reading and writing scientific materials", Holbrook and Rannikmae (2009).

a. In your opinion, describe what a scientifically literate person is or can do? **(10)**
b. What is being done in the Swaziland schools in trying to create a scientifically literate community? **(10)**
c. What challenges are faced by the teachers in creating the scientifically literate pupils? **(5).**

**Question 5**

a. The government of Swaziland through its different arms has tried to reduce the challenges of the girl child especially in science. Describe those efforts that have been put in place to reduce the challenges. **(5)**
b. Despite these interventions by Government, what challenges does the girl child still face in science education? **(10)**
c. How can the physics education teacher in Swaziland help the girl child overcome barriers to equity? **(5)**
d. Describe how the family can encourage the girl child to join science related fields at school and later in life? **(5)**

red radiation
5. identify and explain some of the everyday applications and consequences of conduction, convection, and radiation

## P6.0 Waves

All learners should be able to:

**P6.1 Wave properties**

1. describe what is meant by wave motion
2. name and identify longitudinal and transverse waves as illustrated by vibrations in ropes, springs and by experiments using water waves, and distinguish between longitudinal and transverse waves
3. define and draw wave fronts
4. state what is meant by wave speed, frequency, wavelength and amplitude
5. demonstrate the use of water waves to show:
   - reflection at a plane surface,
   - refraction due to a change of speed
   - diffraction
6. describe reflection, diffraction and refraction in water
7. recall and use the equation $V = f \times \lambda$

**P6.2 Light**

1. perform and describe experiments to find the position of an optical image formed by a plane mirror
2. perform simple constructions, measurements and calculations to show reflection of light and formation of images by a plane mirror
3. use the law of angle of incidence = angle of reflection
4. describe refraction, including the angle of refraction, in terms of the passage of light through a parallel sided glass block
5. describe the action of thin lenses (concave and convex lenses) on light rays
6. perform an experiment to find the focal point and the focal length of a thin converging lens
7. perform simple constructions to show the action of a thin converging lens on light rays
8. determine and calculate the refractive index using $n = \sin i / \sin r$
9. use and describe the use of a single lens as a magnifying glass

**P6.3 Electromagnetic spectrum**

1. describe the main features of the electromagnetic spectrum and state that all e.m. waves travel at the same speed in vacuum
2. state the approximate value of the speed of the electromagnetic waves in a vacuum
3. state the everyday applications of e.m. waves

**P6.4 Sound**

1. state that sound waves are longitudinal
2. state the approximate range of audible frequencies
3. explain why a medium is required for the transmission of sound waves
4. relate the loudness and pitch of sound waves to amplitude and frequency
5. describe how the reflection of sound may produce echoes
6. describe an experiment to determine the speed of sound in air and make the necessary calculations

## P7.0 Electrostatics

All learners should be able to:

1. describe simple experiments to show the production and detection of electrostatic charges
2. state that there are positive and negative charges
3. state that like charges repel and unlike charges attract
4. state that charge is measured in coulombs
5. carry out and interpret experiments with the electroscope
6. explain in simple terms the occurrence of the phenomenon of lightning

## P8.0 Electricity

All learners should be able to:

**P8.1 Current and potential difference**

1. define current as the rate of flow of charge
2. recall and use the equation I = Q/t
3. use and describe the use of ammeters and voltmeters in measuring current and potential difference
4. state that e.m.f. of a source of electrical energy is measured in volts
5. describe how e.m.f. is defined in terms of energy supplied by a source in driving charge round a complete circuit
6. distinguish between e.m.f. and potential difference

**P8.2 Resistance**

1. state that resistance = p.d/current.
2. describe an experiment to determine V/I characteristics for ohmic conductors
3. plot and interpret the V/I characteristic graphs for metallic conductors
4. recall and use the equation V = IR
5. recall and use qualitatively the proportionality between resistance and the length and the inverse proportionality between resistance and cross-sectional area of a wire

## P9.0 Electric Circuits

All learners should be able to:

**P9.1 Basic circuits**

draw and interpret circuit diagrams containing sources, switches, resistors (fixed and variable), ammeters, voltmeters, magnetising coils, bells, fuses, lamps, relays and diodes (LEDs) and rectifiers.

**P9.2 Resistors in series and parallel**

1. state that current is the same at every point in a series circuit
2. state that for a parallel circuit, the current from the source is larger than the current in each branch.
3. the combined resistance of two or more resistors in series
4. state that the combined resistance of two resistors in parallel is less than either resistor by itself
5. recall and use the fact that the sum of the potential differences across the components in a series circuit is equal to the total p.d. across the source
6. recall and use the fact that the current from the source is the sum of the currents in the separate branches of a parallel circuit
7. calculate the effective resistance of two resistors in parallel
8. recall and use the fact that the p.d. across separate branches of a parallel circuit is equal to p.d across a battery

## P10.0 Practical electricity

All learners should be able to:

1. describe how to wire a three pin-plug
2. describe the uses of electricity in heating, lighting (including lamps in parallel), motors
3. state the hazards of:
   - damaged insulation
   - overheating of cables
   - damp conditions
4. recall and use the equations P = IV, E = IVt
5. describe and explain the use of electrical safety measures, to include:
   - fuses
   - double insulations
   - earthing
   - switches