

UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION

MAIN EXAMINATION PAPER

December 2015

B. Ed. 11 and PGCE

**TITLE OF PAPER:** Curriculum Studies in Physics/ Curriculum Studies in Physics 1

**COURSE NUMBER:** EDC 282 /CTE 533

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

**INSTRUCTIONS:**

1. This paper contains five (5) questions.
2. Question 1 is **COMPULSORY**. You may then choose **ANY THREE** questions from questions 2,3,4 and 5
3. Each question carries 25marks
4. Any piece of material or work which is not intended for marking purposes should be clearly **CROSSED OUT**.
5. Ensure that responses to questions are **NUMBERED CORRECTLY**
6. Attached is a section of the November 15 and November 16 SGCSE Physics Syllabus.

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

This paper consists of 3 printed pages

### Question 1

Sample situations from the practices of Teacher A and Teacher B are outlined in the following table:

Situation	Teacher A	Teacher B
1. Using Form 1 textbook, 'Water, water everywhere'	Pupils read paragraphs aloud, in turn.	Pupils discuss water conservation ideas, water bill reading and costing.
2. Pupil asks, "sir, does water in a dam boil before evaporation?"	'Eh eh, heat from the sun and moon causes evaporation to happen at all times'	'Evaporation takes place at all temperatures at all times of the day'
3. Perfume sprayed in one corner of the classroom	'Soon you will see the effect of diffusion of the smell'	'In what ways does perfume travel to our noses?'
4. Is Pluto a planet in the solar system?	'Yes, Pluto is the farthest planet, it is very small'	According to new developments let's find out on the internet.

a. For each situation, make a critical comparison of the practices of teachers A and B (20)

b. How would you have tackled such a lesson in your Form 1 class? (5)

[25 marks]

### Question 2

Practical work in Physics aims at developing learners' cognitive, affective, physical and interpersonal abilities.

With the help of specific examples from *Topics P7- P11, Magnetism, Electrostatics, Electricity, Electrical circuits and Practical Electricity*, ( refer to attached sheet on a section of the SGCSE Physical Science syllabus) show how practical work may contribute to the development of abilities in each of the above mentioned domains.

[25 marks]

### Question 3

- a. Identify two concepts which characterize the subject matter knowledge? (2)
- b. Explain with practical examples the meaning of the concepts in (a) (9)
- c. Describe five ways in which the knowledge of the two concepts in (a) is relevant to the teacher of Physics? (10)
- d. Other than Content knowledge and Pedagogic knowledge, describe any two other factors that influence the teaching of a Physics teacher. (4)

[25 marks]

### Question 4

“The use of analogies from everyday life helps students to understand concepts better...”  
Simanck D. E. (undated).

- a. You present a beaker of water with a glass rod in it and you also tell the story of the “soldier” to your class.
  - i. Explain how each of the above two instances would be used to explain refraction. (2x3)
  - ii. Explain the misconceptions or the challenges of using each analogy. (2x3)
  - iii. Describe any other analogy you are familiar with in Physics. (4)
- b. Describe three precautions to be taken when teaching physics concepts through the use of mathematical models? (9)

[25 marks]

### Question 5

In Swaziland, most of the schools have managed to buy and open up computer laboratories.

- a. Explain five ways in which the computer can be used effectively in the teaching of Physics in Swaziland. (15)
- b. What challenges are teachers likely to face in using the computers to teach Physics in Swaziland? (10)

(25 marks)

<ul style="list-style-type: none"> <li>- use the law of angle of incidence = angle of reflection.</li> <li>- describe refraction, including the angle of refraction, in terms of the passage of light through a parallel sided glass block.</li> <li>- describe the action of a thin converging lens on a beam of light.</li> <li>- use the term focal length.</li> </ul> <p><b>P6.3 Electromagnetic spectrum</b></p> <ul style="list-style-type: none"> <li>- describe the main features of the electromagnetic spectrum and state that all e.m. waves travel at the same speed in vacuo.</li> <li>- state the approximate value of the speed of the electromagnetic waves in a vacuum.</li> </ul> <p><b>P6.4 Sound</b></p> <ul style="list-style-type: none"> <li>- state the approximate range of audible frequencies.</li> <li>- state that sound waves are longitudinal.</li> <li>- show understanding that a medium is required for the transmission of sound waves.</li> <li>- relate the loudness and pitch of sound waves to amplitude and frequency.</li> <li>- describe how the reflection of sound may produce echoes.</li> <li>- describe an experiment to determine the speed of sound in air and make the necessary calculations.</li> </ul>	<p>magnifying glass.</p> <ul style="list-style-type: none"> <li>- use the term monochromatic.</li> </ul>
<b>P7. Magnetism</b>	
<p>All learners should be able to:</p> <p><b>Basic magnetism</b></p> <ul style="list-style-type: none"> <li>- state the properties of magnets.</li> <li>- describe experiments to investigate magnetic fields.</li> <li>- give an account of induced magnetism.</li> <li>- distinguish between ferrous and non-ferrous materials.</li> <li>- describe experiments to identify the pattern of field lines round a bar magnet.</li> <li>- distinguish between the magnetic properties of iron and steel.</li> </ul>	<ul style="list-style-type: none"> <li>- explain magnetism using simple domain theory.</li> </ul>
<b>P8. Electrostatics</b>	
<p>All learners should be able to:</p> <ul style="list-style-type: none"> <li>- describe simple experiments to show the production and detection of electrostatic charges.</li> <li>- state that there are positive and negative charges.</li> <li>- state that like charges repel and unlike charges attract.</li> <li>- state that charge is measured in coulombs.</li> <li>- carry out and interpret experiments with the gold leaf electroscope.</li> </ul>	<ul style="list-style-type: none"> <li>- explain in simple terms the occurrence of the phenomenon of lightning.</li> </ul>

<b>P9. Electricity</b>	
<p>All learners should be able to:</p>	
<p><b>P9.1 Current and potential difference</b></p> <ul style="list-style-type: none"> <li>- show understanding that current is related to the rate of flow of charge.</li> <li>- use and describe the use of ammeters and voltmeters in measuring current and potential difference.</li> <li>- state that e.m.f. of a source of electrical energy is measured in volts.</li> </ul> <p><b>P9.2 Resistance</b></p> <ul style="list-style-type: none"> <li>- state that potential difference across a circuit component is measured in volts.</li> <li>- state that resistance is = p.d/current.</li> <li>- describe an experiment to determine V/I characteristics.</li> <li>- plot and interpret the V/I characteristic graphs for metallic conductors.</li> <li>- recall and use the equation <math>V = IR</math></li> </ul>	<ul style="list-style-type: none"> <li>- recall and use the equation <math>I = Q/t</math></li> <li>- show understanding that e.m.f. is defined in terms of energy supplied by a source in driving charge round a complete circuit.</li> <li>- distinguish between e.m.f. and potential difference.</li> <li>- recall and use quantitatively the proportionality between resistance and the length and the inverse proportionality between resistance and cross-sectional area of a wire.</li> </ul>
<b>P10. Electric Circuits</b>	
<p>All learners should be able to:</p>	
<p><b>P10.1 Basic circuits</b></p> <ul style="list-style-type: none"> <li>- draw and interpret circuit diagrams containing sources, switches, resistors (fixed and variable), ammeters, voltmeters, magnetising coils, bells, fuses, relays.</li> </ul> <p><b>P10.2 Resistors in series and parallel</b></p> <ul style="list-style-type: none"> <li>- state that current is the same at every point in a series circuit.</li> <li>- state that for a parallel circuit, the current from the source is larger than the current in each branch.</li> <li>- calculate the combined resistance of two or more resistors in series.</li> <li>- state that the combined resistance of two resistors in parallel is less than either resistor by itself.</li> </ul>	<ul style="list-style-type: none"> <li>- draw and interpret circuit diagrams containing diodes and rectifiers.</li> <li>- 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.</li> <li>- 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.</li> <li>- calculate the effective resistance of two resistors in parallel.</li> </ul>
<b>P11. Practical electricity</b>	
<p>All learners should be able to:</p>	
<ul style="list-style-type: none"> <li>- describe how to wire a three pin-plug.</li> <li>- describe the uses of electricity in heating, lighting (including lamps in parallel), motors</li> <li>- state the hazards of:             <ul style="list-style-type: none"> <li>• damaged insulation,</li> <li>• overheating of cables,</li> <li>• damp conditions.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- recall and use the equations <math>P = IV</math>, <math>E = IVT</math></li> <li>- describe the use of fuses and earthing as safety measures.</li> </ul>