FACULTY OF EDUCATION

MAIN EXAMINATION PAPER

MAY/JUNE 2014

PGCE (Full Time)

TITLE OF PAPER: Curriculum Studies in Physics

COURSE NUMBER: EDC 382

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

INSTRUCTIONS:

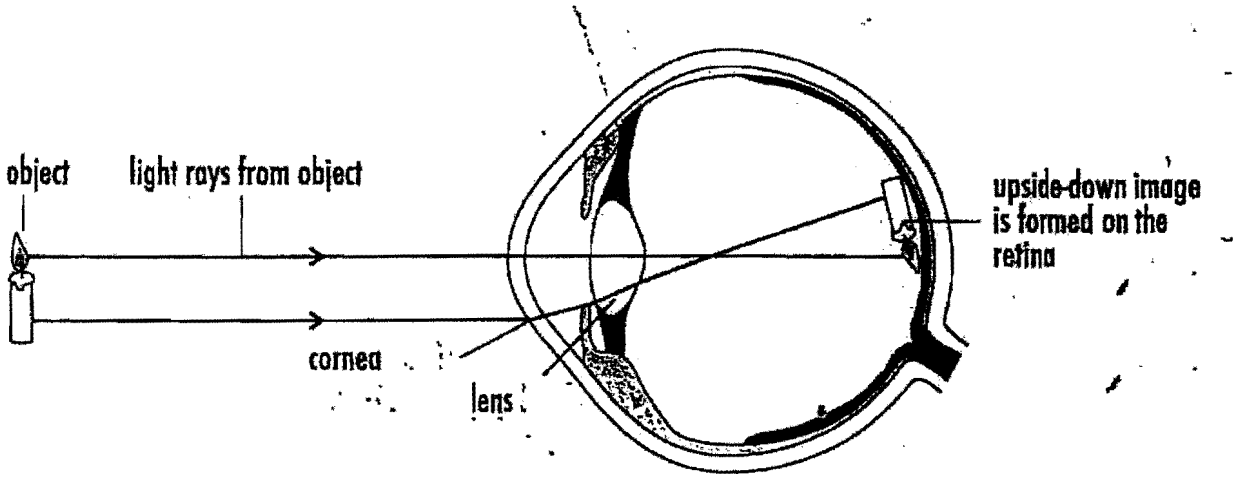
1. This paper contains FIVE questions.
2. Question 1 is COMPULSOR. You may choose ANY THREE questions from questions 2,3,4,5.
3. Each question carries 25 marks.
4. Any piece of material not intended for marking purposes should be clearly CROSSED OUT.
5. Ensure that responses to questions are NUMBERED 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 **6** printed pages

Question1 { Compulsory}



The following questions refer to the diagram above:

a) What context is being described by the diagram? **[1]**

b) Write any two concepts that could be taught from the above context. **[4]**

c) What misconception are students likely to get when using the diagram? **[1]**

d) Describe four main concepts that form the basis for contextualized instruction in science? **[4]**

e) What are the challenges faced by Swazi teachers in contextualizing instruction in science? **[4]**

f) "Everything we encounter in our daily lives contains some radioactive material, some naturally occurring and others man-made." Describe three examples to support the statement. **[9]**

g) Radioactive material has to be handled with care always. Why is it that no precautions are raised on the day to day material we encounter and use in our homes? **[2]**

Question 2

a) Explain why Scientific literacy is so important that it must be included in the curriculum? **[10]**

b) As a teacher of physics, what measures can you take to develop a scientifically literate group of students in your class? **[10]**

c) What are the likely challenges Swaziland is facing in an attempt to create a scientifically literate group of students as they leave school? **[5]**

Question 3

a) In your school, you are asked to lead a discussion with your colleagues on the challenges faced by teachers in integrating Science- Technology-Society (STS) in Science teaching in Swaziland. Outline five aspects you can emphasize in the discussion. **[10]**

b) Choose one social problem from the community you live in and discuss the sequence through which you, as a teacher ,could teach it through STS science. **[10]**

c) Explain what you understand by "socialization of science?" **[5]**

Question 4

a) Describe the purposes of science education in Swaziland under the following subheadings:

i Utilitarian, **[4]**

ii Economic, **[4]**

iii Cultural and **[4]**

iv Democratic argument. **[4]**

b) How far does the Swaziland system of education fulfill any three of the purposes in part (a) above? (3 marks each). **[9]**

Question 5

a) Using the attached copy of the SGCSE Physical Science Syllabus 6888 November 2013 and 2014, choose one concept from P9 and P10 and prepare activities to develop the concept to a Form iv class following the BSCS 5E instructional model. **[15]**

b) Students are required to investigate the conditions affecting the rate of cooling of a beaker of hot water. They are supplied with the following:

Two 250cm^3 beakers labeled **A** and **B** respectively.

Beaker **A** is insulated with a layer of an insulating material about 0.5cm thick.

Lid to fit beaker **B**. The lid must have a small hole to accept a thermometer

A supply of hot water about 400 cm^3.

Thermometer, -10°C to 110°C, capable of reading to the nearest 1°C.

Stopwatch or stop clock.

250 cm^3 measuring cylinder.

The following have to be considered in the experiment:

i. Temperature **Θ** readings from t=0s recorded every 30s for a total of **5** readings for beaker **A**.

ii. Temperature readings for beaker **B** and recorded as for beaker **A.** This beaker has a lid which needs to be replaced soon hot water has been poured into the beaker.

iii. A table of results should be shown.

iv. From the table of results, state whether the insulation round beaker **A** or the lid on beaker **B** or neither of these is more effective in keeping the water hot.

v. State three variables that could have affected the results of this experiment to be reliable.

Task: You are required to prepare a marking guide for this experiment. **[10]**

electromagnetic waves in a vacuum. **P6.4 Sound** - state the approximate range of audible frequencies. - state that sound waves are longitudinal. - show understanding that a medium is required for the transmission of sound waves. - relate the loudness and pitch of sound waves to amplitude and frequency. - describe how the reflection of sound may produce echoes. - describe an experiment to determine the speed of sound in air and make the necessary calculations.	- use the term monochromatic.
P7. Magnetism	
All learners should be able to: **P7.1 Basic magnetism** - state the properties of magnets. - describe experiments to investigate magnetic fields. - give an account of induced magnetism. - distinguish between ferrous and non-ferrous materials. **P7.2 Electromagnets** - describe experiments to identify the pattern of field lines round a bar magnet. - distinguish between the magnetic properties of iron and steel. - distinguish between the design of permanent magnets and electromagnets.	- explain magnetism using simple domain theory.
P8. Electrostatics	
All learners should be able to: - describe simple experiments to show the production and detection of electrostatic charges. - state that there are positive and negative charges. - state that like charges repel and unlike charges attract. - state that charge is measured in coulombs. - carry out and interpret experiments with the gold leaf electroscope.	- explain in simple terms the occurrence of the phenomenon of lightning.
P9. Electricity	
All learners should be able to: **P9.1 Current and potential difference** - show understanding that current is related to the rate of flow of charge. - use and describe the use of ammeters and voltmeters in measuring current and potential difference. - state that e.m.f. of a source of electrical energy is measured in volts.	- recall and use the equation I = Q/t - show understanding that e.m.f. is defined in terms of energy supplied by a source in driving charge round a complete circuit. - distinguish between e.m.f. and potential difference.

P9.2 Resistence - state that potential difference across a circuit component is measured in volts. - state that resistance is = p.d/current. - describe an experiment to determine V/I characteristics. - plot and interpret the V/I characteristic graphs for metallic conductors. - recall and use the equation V = IR	- recall and use quantitatively the proportionality between resistance and the length and the inverse proportionality between resistance and cross-sectional area of a wire.
P10. Electric Circuits	
All learners should be able to: **P10.1 Basic circuits** - draw and interpret circuit diagrams containing sources, switches, resistors (fixed and variable), ammeters, voltmeters, magnetising coils, bells, fuses, relays. **P10.2 Resistors in series and parallel** - state that for a parallel circuit, the current from the source is larger than the current in each branch. - calculate the combined resistance of two or more resistors in series. - state that the combined resistance of two resistors in parallel is less than either resistor by itself.	- draw and interpret circuit diagrams containing diodes and rectifiers. - 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. - 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. - calculate the effective resistance of two resistors in parallel.
P11. Practical electricity	
All learners should be able to: - describe how to wire a three pin-plug. - describe the uses of electricity in heating, lighting (including lamps in parallel), motors - state the hazards of: • damaged insulation, • overheating of cables, • damp conditions.	- recall and use the equations P = IV, E = IVT - describe the use of fuses and earthing as safety measures.
P12. Electromagnetic effects	
All learners should be able to: **P12.1 Electromagnets** - state the factors affecting the strength of an electromagnet. - state that a current carrying wire has a magnetic field. **P12.2 Electromagnetic induction**	- describe an experiment which shows that a changing magnetic field can induce an e.m.f. in a circuit. - state the factors affecting the magnitude of the induced e.m.f.