**UNIVERSITY OF ESWATINI**

**FACULTY OF EDUCATION**

**DEPARTMENT OF CURRICULUM & TEACHING**

**MAIN EXAMINATION PAPER**

**November 2018**

**PGCE**

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

**COURSE NUMBER:** 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

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 **4** printed pages

**Question 1(Compulsory)**

a. One of the approaches in the teaching of Physics is the use of multiple representations, Kurnaz & Arslan (2013.)

Explain what you understand by "multiple representation" in the teaching of Physics. **(4)**

b. From the copy of Physical science 2017 – 2018 syllabus (p19-20), choose a concept you can develop using "multiple representations". **(6)**

c. According to Magnusson et.al. (1999) one of the components of knowledge a teacher of Physics should have is the "knowledge of Instructional strategies".

i. List any five Instructional strategies that can be used in the teaching of Physics. **(5)**

ii. Describe how you can effectively use any **two** of the strategies in the teaching of Electric circuits to a Form 4 class. **(10)**

**Question 2**

a. Describe with examples **five** roles that can be played by Information Communication Technology (ICT) in science education. **(10)**

b. Explain **four** constraints that make the use of ICT in teaching Physics in the Kingdom of Eswatini difficult to implement. **(8)**

c. Discuss **four** ways in which some of the challenges can be resolved for the benefit of the learners. (7)

**Question 3**

**a.** You are going to teach the concept of Wave Motion to your Form 4 class, write **two** questions you will ask the learners **for each** of the following levels in the cognitive domain as given by Anderson & Krawthwohl (2001):

**i.** Application

**ii.** Analysis and

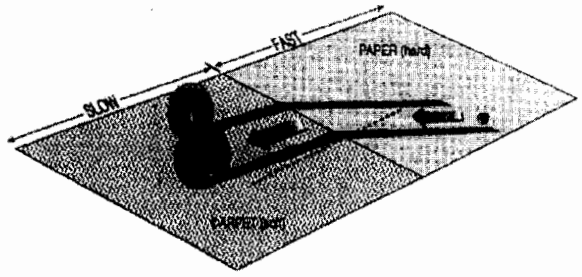
**iii.** Evaluation **(9)**

**b.** A newly qualified teacher tells his colleagues, "Writing instructional objectives is a waste of time."

Write **five** points to convince the teacher that it is a necessary activity to write objectives before one goes to teach. **(10)**

**c.** The same newly qualified teacher defended himself stating three criticisms of the use of objectives. Write the three criticisms of the objectives the teacher could have raised to defend his position. **(6)**

**Question 4**




a.The picture above is an analogy used to teach a certain concept. What concept could this be?**(1)**

b. Describe a systematic approach you would use this analogy to teach the concept you identified in (a) above. **(18)**

c. What **three** precautions should be taken by the teacher when teaching using analogies? **(6)**

**Question 5**

**a.** Choose a concept from the Physical Science syllabus 6888 (Nov 2017-2018) (p 19-20) and create **three** practical activities you can use to develop the concept to a Form 4 class. You can present the work in the given table or in any other form of your own choice.

| **Practical Activity** | **Explanation of how the practical activity is carried out.** |
|---|---|
| 1 | |
| 2 | |
| 3 | |

**(15)**

b. Based on the activities you have outlined in (5a) above, how would you define practical work in Physical science? **(4)**

c. From the **three** practical activities you discussed above, explain two skills that can be developed by the learners from each of the practical activities. **(6)**

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