FACULTY OF EDUCATION

MAIN EXAMINATION PAPER

MAY 2017

B.Ed. III and PGCE (Full Time)

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

COURSE NUMBER: EDC 382/ 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 **4** printed pages

Question 1 {COMPULSORY}

a. Study the passage below and answer the two sub-questions **i)** and **ii)** below it.

i) Suggest a topic for a lesson involving this passage. **[1]**

ii) List three physics concepts that could be taught from information this passage. **[3]**

b. What do you understand by contextualization? **[4]**

c. Comment on the statement given by one of your students to Mkhulu's question: "The torch gets dim because electricity gets finished from the batteries." **[4]**

d. What four considerations should the teacher of physics make when using contextualized instruction? **[4]**

e. What benefits are derived from using contextualized instruction? **[4]**

f. What challenges do teachers of physics find in utilizing contextualized instruction? **[5]**

Question 2

a. Write down the characteristics of the nature of science addressed by each of the questions given below. **Explain** why you say so?

i. After scientists have developed a theory (e.g. atomic theory), dos the theory ever change?
ii. What does an atom look like? How certain are scientists about the structure of the atom?
iii. Is there a difference between a scientific theory and a scientific law?
iv. How are science and art similar? How are they different?
v. Is there a difference between scientific knowledge and opinion?

[10]

b. Taking a concept from the attached copy of the SGCSE Physics Syllabus 6888, prepare a lesson plan that follows the 5E Instructional Model. **[15]**

Question 3

The following items are supplied for a Physics practical Examination:

i. meter rule
ii. boss and clamp
iii. strong thread x 2
iv. retort stand
v. 100g mass
vi. Graph paper.

Task:

A. Design a practical test where the students are going to find the mass of the meter rule by finding the centre of gravity G first and using the moments of force.

Additional information:

i. The students need to balance the meter rule first
ii. Mass of meter rule (m) = 100 x gradient **[15]**

B. What do you understand by the term 'practical work' in Physics? **[5]**

C. What challenges can students have from learning physics through practical work? **[5]**

Question 4

a. Briefly outline any five approaches to teaching science that promote scientific literacy in Swaziland. **[10]**

b. How would a teacher check that the children are achieving scientific literacy as a result of the learning experiences in school? **[5]**

c. (i) what do you understand by a code of ethics? **[2]**

(ii) What is the advantage of the code of ethics to the teacher of science? **[3]**

(iii) What challenges does Swaziland face in implementing the code of ethics? **[5]**

Question 5

a.Two parents are disappointed by the failure of their children in Physical science. One goes on to say, 'The schools are teaching this difficult subject which we don't see its relevance except to make our students fail.' Write down four reasons you can give to these parents in order to convince them on the relevance of science in the curriculum. **[16]**

b. Discuss areas in the Swaziland Physical Science curriculum that are relevant to the lives of the people of Swaziland. **[9]**

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