FACULTY OF EDUCATION

SUPPLEMENTARY /RE-SIT EXAMINATION PAPER

MAY 2017

B.Ed. / 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

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

This paper consists of **4** printed pages

Question 1

a. Outline any five guidelines for writing multiple choice test items. **[10]**

b. Write **three (3)** multiple choice questions from a physics topic of interest where students are required to choose one correct answer from **four (4)** **[15]**

Question 2

a.The Swaziland' National Education Science Policy is "to enable learners individually or collectively, to develop essential skills and provide a broad learning experience...." SGCSE Physical Science Syllabus 6888 Nov.2015 and Nov 2016.

i. List five of the skills which are supposed to be developed in the learners within the two years of learning senior secondary science in Swaziland. **[5]**

ii. With the use of examples, explain how Swaziland science teachers try to develop in the learners the skills you have listed above. **[10]**

b. From the attached section of the November 2017-2018 Syllabus 6888, choose one topic and prepare a scheme of work for one week. **[10]**

Question 3

"The development of the different Science, Technology and Society (STS) projects attempts to bring the teaching of science closer to the needs of the science student as a member of society," (Solbes & Vilches, 1996.)

a. What are the goals of STS science education? **[4]**

b. Show how the students would be able to understand their everyday experiences through STS science education? **[9]**

c. Describe how STS science education can be taught in our schools in Swaziland? **[10]**

d. State any two challenges that Swaziland is likely to face in implementing the STS approach to science education teaching **[2]**

Question 4

Two examination items from an SGCSE Physical Science Paper 3 examination paper are shown below.

4 (a) Fig. 4.1 shows the graph of the motion of a sky-diver after jumping off a plane and before opening his parachute.

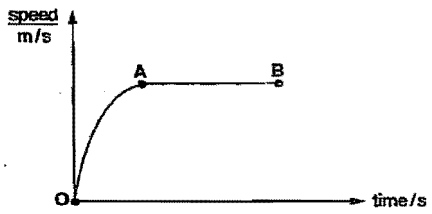

Fig. 4.1

(i) Explain, in terms of the forces acting on the sky-diver, why the acceleration is decreasing in the section OA.

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.....

.....

..... [3]

(ii) State why the speed is constant in section AB.

..... [1]

(b) After point B, the sky-diver opens his parachute.

Explain how the parachute helps the sky-diver to land safely on the ground.

.....

..... [3]

5 (a) (i) A student gets an electric shock when changing the bulb of a bedside lamp even though the switch is off. On opening the plug connecting the lamp, he finds that the live and neutral wires were swapped.

Explain how this mistake caused the student to get the electric shock.

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..... [2]

(ii) The bedside lamp is rated 240 V, 11 W.

The lamp is switched on for one hour (3600 s).

Calculate the energy, in Joules, converted by the lamp.

..... [2]

(b) An electric multiplug socket is rated 5 A.

Explain, with a numerical reason, why it would be dangerous to connect an appliance rated 250 V, 2 kW, to this socket.

.....

..... [3]

a. Construct a specification grid that covers the two items. [15]
b. Explain why it is necessary for the teacher of physics to prepare a specification grid when setting tests to assess students' performance? [6]
c. With the help of examples, explain what you understand by continuous assessment? [4]

Question 5

Study the picture Fig. 5 and answer questions (a) and (b) that follow:

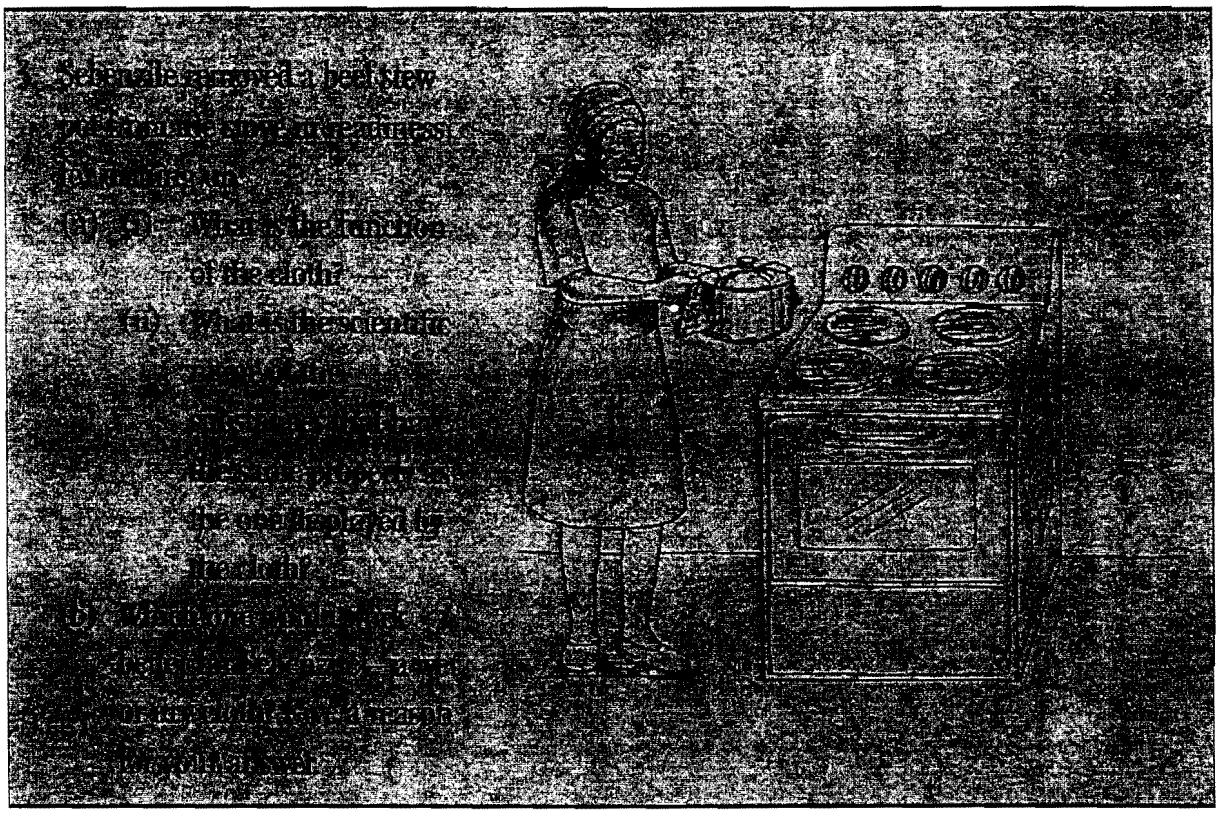

Fig. 5

a. What is the context of the picture shown in Fig.5? [1]

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

c. Explain **two** physics concepts that could be taught from the picture. [4]

d. What three advantages does contextualizing instruction provide in science teaching? [6]

e. Mention four precautions a teacher must take in using this method of instruction. [4]

f. In what ways could Fig. 5 be used to address equity issues in Physics? [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