



MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER

SCHOOL OF EDUCATION

COURSE CODE: ECI 3117-1

**COURSE TITLE: SPECIAL METHODS IN
PHYSICS**

DATE: 13/12/2023

TIME: 1100-1300 HRS

INSTRUCTIONS TO CANDIDATES

*This paper consists of **TWO** printed pages. Please turn over
Answer Question **ONE** and any other **TWO** questions*

QUESTION ONE (COMPULSORY) - 20 MARKS

1(a) As a Form I Physics teacher you intend to use the scientific method to teach the concept 'magnetic and non-magnetic materials'.

- i. Write a suitable statement of the problem **(1mark)**
- ii. Formulate a suitable working hypothesis to guide the investigation **(1mark)**
- iii. Identify the independent variable, the dependent variable and at least two control variables **(4marks)**
- iv. Outline three key steps of the procedure **(3marks)**
- v. By citing two magnetic and two non-magnetic materials, illustrate how you would record the observations. **(2marks)**
- vi. From the hypothesis in (ii) and the findings in (v) above, state a suitable conclusion **(1mark)**

(b) Examine how each of the following factors are likely to influence the Physics curriculum in the ongoing educational reforms from Knowledge-Based to Competency-Based Education:

- i. Approaches to teaching and learning **(2marks)**
- ii. Learners' attitude towards Physics **(2marks)**

(c) Contrast 'expository' and 'heuristic' approaches to teaching and learning of Physics on the following aspects:

- i. Learner involvement
- ii. Knowledge learnt
- iii. Teaching process
- iv. Learning process **(4marks)**

QUESTION TWO - 15 MARKS

2(a) In choice of the appropriate method of teaching, a Physics teacher has to consider a number of factors. Identify two learner-centered and two curriculum-centered factors **(4marks)**

(b) Distinguish between 'deductive' and 'inductive' reasoning as applied in Physics instruction and highlight one characteristic of each. **(6marks)**

(c) You intend to teach the concept 'refractive indices of optical media' on the topic of Refraction. Outline the key steps you would follow in order to develop the lesson through inductive reasoning **(5marks)**

QUESTION THREE - 15 MARKS

3(a) Examine the following aspects of meaningful learning and their implications to teaching and learning of Physics:

- i. Cognitive-structural view of learning
- ii. Associationist view of learning
- iii. Discovery learning

iv. Construvtivism

(8marks)

(b) As a Form I Physics teacher you intend to teach the concept 'Physical quantities, measuring instruments and the SI unit of measure'. By analysing the expected outcomes as outlined in the Physics syllabus, discuss how the student will have achieved one goal of education in Kenya and one aim of teaching science.

(7marks)

QUESTION FOUR - 15 MARKS

4(a) Appraise teaching and learning of Physics using the process-skills approach. **(8marks)**

(b) For each of the following test items indicate the level of assessment in the cognitive domain as categorised by Bloom and Krathwohl (1964):

i. Explain why loading of a bus should be maximized at the bottom rather than the top carrier

ii. Why does Mercury dip while water rises up a capillaries tube?

iii. Label the parts of the electroscope in the diagram provided

iv. Explain the likely sources of error in an experiment to determine the volume of an irregular stone using the displacement method.

(4marks)

(c) In effective use of the Physics laboratory as a resource for teaching outline three considerations you would recommend in the designing of the the gas supply in the laboratory (3marks)

QUESTION FIVE - 15 MARKS

5(a) As a Form II Physics teacher you plan to teach 'types of material in relation to propagation of light - opaque, translucent and transparent'. Select any three process skills and describe how they will be achieved by the end of the lesson.

(6marks)

(b) Examine the 'field trip' as a method of instruction in Physics under the following aspects:

i. When most suitably to be used

(1mark)

ii. Key teacher role before, during and after the excursion.

(3marks)

iii. Two strengths and two limitations.

(4marks)

iv. An improvement for any of the limitations cited in (iii) above

(1mark)

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