



MACHAKOS UNIVERSITY

University Examinations 2022/2023 Academic year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN ANALYTICAL CHEMISTRY

BACHELOR OF SCIENCE IN APPLIED PHYSICS AND TECHNOLOGY

SAN 308/SPH 305: RESEARCH METHODOLOGY

DATE: 19/4/2023

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

- The paper consists of **two** sections.
- Section **A** is **compulsory** (30 marks).
- Answer any **two** questions from section **B** (each 20 marks)

QUESTION ONE (COMPULSORY) (30 MARKS)

- (a) Scientific research plays an important role in the development of any country's economy.
- (i) Explain what scientific research is and show how your explanation supports the statement above (a). (4 marks)
 - (ii) Differentiate clearly between basic research and applied research. (4 marks)
- (b) Research is accomplished through research methodology.
- (i) List down all components of a research proposal which can enable one to carry out a research study. (8 marks)
 - (ii) State clearly how the statement of the problem for the research you intend to study is arrived at. (4 marks)
 - (iii) Explain the importance of the background to a study and how is it arrived at (4 marks)
- (c) Describe what a logical framework is and its importance in a scientific research study. (6 marks)

QUESTION TWO (20 MARKS)

- (a) An important input in research methodology is literature review.
 - (i) Explain what literature review involves. (3 marks)
 - (ii) Describe the role of literature review in the entire research methodology. (3 marks)
- (b)
 - (i) Explain the role of research ethics in data generation. (2 marks)
 - (ii) Explain why it is necessary to collect many replicate samples for both quantitative and qualitative analyses. (2 marks)
- (c) There are three major sources of available literature citations.
 - (i) Name the three sources. (3 marks)
 - (ii) Show clearly what each source contributes towards achieving the purpose of literature review. (3 marks)
- (d) Citation of literature in the text is referred to as in-text citation.
 - (i) Show clearly how the in-text citation is done directly and indirectly. (2 marks)
 - (ii) Explain how the cited literature is referenced at the end of the research proposal, report or thesis. (2 marks)

QUESTION THREE (20 MARKS)

- (a) Describe in details what research design entails. (6 marks)
- (b) Explain the following terms as applied to research design
 - (i) Independent variables. (2 marks)
 - (ii) A control group. (2 marks)
 - (iv) Experimental group. (2 marks)
 - (iv) Randomization. (2 marks)
- (c) Explain the major difference between experimental study and non-experimental study in research. (6 marks)

QUESTION FOUR (20 MARKS)

- (a) Discuss in details the steps involved in research process. (10 marks)
- (b)
 - (i) Explain how the analytical instruments are handled to ensure they generate credible analytical data. (3 marks)
 - (ii) Explain briefly how quality assurance is ensured in every step in the entire research process. (4 marks)
- (c) Explain briefly how data generated is statistically treated and presented. (3 marks)

QUESTION FIVE (20 MARKS)

- (a) Scientific research findings after research study have to be inevitably published in a peer reviewed journal.
- (i) Explain why it is necessary to publish the findings of a scientific research study in a peer reviewed journal. (2 marks)
 - (ii) List down the major components of a manuscript. (4 marks)
 - (iii) Explain why it is necessary to incorporate literature review in your manuscript. (3 marks)
 - (iv) Explain what open access journals are. (3 marks)
- (b) Explain the series of steps a manuscript is subjected to by a credible publisher before it is accepted or rejected for publication. (6 marks)
- (c) Explain the difference between a predatory journal and a credible journal that is Ranked according to the Thomsons Reuters' rankings in terms of impact factors. (2 marks)