



# MACHAKOS UNIVERSITY

University Examinations 2021/2022

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

THIRD YEAR SECOND SEMESTER EXAMINATION FOR  
BACHELOR OF SCIENCE (APPLIED PHYSICS AND TECHNOLOGY)  
BACHELOR OF SCIENCE (ANALYTICAL CHEMISTRY)  
SAN 308/SPH 305: RESEARCH METHODOLOGY

DATE: xx/12/ 2022

TIME: 2 Hrs

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**INSTRUCTIONS:**

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

## SECTION A

### QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define the following terms as used in research (5 marks)
- i. Research Process
  - ii. Dependent variable
  - iii. Independent variable
  - iv. Sampling design
  - v. Research problem
- b) Differentiate between the following
- i. Research Justification and Significance (2 marks)
  - ii. Research methods and research methodology (2 marks)
  - iii. True experimental and quasi-experimental research (2 marks)
  - iv. A sample and a population (2 marks)
  - v. Qualitative and quantitative research (2 marks)
- c) There are different types of research based on classification by purpose and methods. Discuss the classification by purpose. (5 marks)
- d) Correlation research provides information about the relationship between variables but doesn't provide any information on cause and effect. Discuss the type of research that can provide that information. (2 marks)
- e) Provide the main characteristics of research. (2 marks)
- f) Outline six potential sources of a research problem. (6 marks)

## SECTION B

### QUESTION TWO (20 MARKS)

- a) Discuss the six main steps involved in a research process. (12 marks)
- b) Briefly outline what is meant by peer review in scientific writing (3 marks)
- c) Historical research relies on both primary and secondary sources for information. Define historical research and discuss the two sources of information. (5 marks)

**QUESTION THREE (20 MARKS)**

- a) Researchers conducted a study investigating the correlation between amount of sleep and concentration. First, participants were asked how long they had slept the previous night in hours and minutes. This was then recorded as ‘total minutes slept’. Concentration was then assessed using a letter cancellation task in which subjects had two minutes to read an extract from a book, counting the number of times that the letter ‘f’ appeared. (4 marks)
- i. Explain what is meant by a negative correlation.
  - ii. Explain what is meant by a positive correlation.
  - iii. Explain what is meant by no correlation.
  - iv. Identify one strength and one weakness of the correlational method.
- b) Discuss the following terms as applied in research ethics. (6 marks)
- i. Falsification
  - ii. Fabrication
  - iii. Plagiarism
- c) Discuss the purpose of literature review in research (5 marks)
- d) Discuss five points to consider when settling on a given research problem/research area. (5 marks)

**QUESTION FOUR (20 MARKS)**

- a) Discuss the components of a good problem statement. (5 marks)
- b) Examine the following quantitative research question: “Do fifth grade students who participate in a supplemental daily calendar math program learn more math content as demonstrated on the Virginia SOLs than those who do not receive this supplementary math program?” Identify the independent and dependent variables and explain your answer. (4 marks)
- c) Identify the key differences between probability and non-probability sampling and discuss the types of sampling in each category. (7 marks)
- d) Using relevant examples, define and show the difference between integral and non-integral citation. (4 marks)

**QUESTION FIVE (20 MARKS)**

- a) Outline the main difference between a proposal and project report. (2 marks)
- b) Discuss what constitutes a successful research proposal in terms of its key elements. (10 marks)
- c) Outline two ways of disseminating scientific results. (2 marks)
- d) Discuss the importance of referencing in any write up. (6 marks)