



FreeExams.co.ke

**UNIVERSITY EXAMINATIONS  
2022/2023 ACADEMIC YEAR**

**THIRD YEAR SECOND SEMESTER  
MAIN EXAMINATIONS**

**FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWBLE  
ENERGY AND BIOFUELS TECHNOLOGY**

**COURSE CODE: REN 326**

**COURSE TITLE: RESEARCH METHODS**

**DURATION: 2 HOURS**

**DATE: 21/04/2023**

**TIME: 9:00-11:00AM**

---

**INSTRUCTIONS TO CANDIDATES**

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

**QUESTION 1 (30 marks)**

- a. Define the following terms:
- i. Research methods (1 mark)
  - ii. Statistics (1 mark)
  - iii. Probability (1 mark)
  - iv. Random variable (1 mark)
  - v. Project planning (1 mark)
- b. State any five (5) applications of probability distribution. (5 marks)
- c. State any five (5) purposes of research. (5 marks)
- d. State any ten (10) components of an academic project report. (5 marks)
- e. State the ten (10) project planning steps. (5 marks)
- f. Find the mean and standard deviation of three energy saving bulbs given their Watts and their probability of consuming power in a month in Table below. (5 marks)

Watts (x)	Probability [P(x)]
5	0.0625
9	0.375
12	0.5625

**QUESTION 2 (20 marks)**

- a. Explain any three (3) stages in research. (3 marks)
- b. Discuss the role of research in the following:
- i. Problem identification. (2 marks)
  - ii. Situational analysis. (2 marks)
- c. State any six (6) data analysis techniques. (3 marks)
- d. Sketch the four (4) Continuous probability Distribution curves. (4 marks)
- e. A research is done on the use of renewable energy technologies (X). The probability that renewable energy is used is  $p = 0.2$  and only two ( $n = 2$ ) renewable energy Technologies are used. Find the probability that:
- i. No renewable energy Technology is used. (2 marks)
  - ii. Only one renewable energy Technology is used. (2 marks)
  - iii. The two renewable energy Technologies are used. (2 marks)

**QUESTION 3 (20 marks)**

The University wishes to establish a Biogas plant project to serve the community. Write a short project proposal for the university:

- a. Introduction. (5 marks)
- b. Objectives. (5 marks)
- c. Methodology. (5 marks)
- d. Budget. (3 marks)
- e. Work schedule. (2 marks)

**QUESTION 4 (20 marks)**

- a. Explain any five (5) sections included in the introduction of a project proposal. (5 marks)
- b. Explain any five (5) main elements to be included in an abstract. (5 marks)
- c. Explain the two broad types of data giving three (3) examples of each. (5 marks)
- d. Compare and contrast qualitative and quantitative data collection techniques using examples. (5 marks)

**QUESTION 5 (20 marks)**

- a. State any five (5) purposes of Literature review. (5 marks)
- b. Explain any five (5) ways of identifying a project problem. (5 marks)
- c. Describe any five (5) information presentation methods. (5 marks)
- d. Find the range of the mean  $\mu$  of a population using  $\alpha = 0.05$ ,  $n = 20$ ,  $\bar{x} = 151.6$ ,  $\sigma = 10$  and  $Z_{0.95} = 1.96$ . (5 marks)