

UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**FOURTH YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF BIOMEDICAL SCIENCE AND
TECHNOLOGY**

BMED 417: RESEARCH METHODS IN BIOMEDICAL SCIENCES

STREAM: R

TIME: 2 HRS

DAY: WEDNESDAY [11.30 – 1.30 P.M]

DATE: 04/02/2026

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

Instructions:

Answer **ALL** questions in Section **A**, and any **TWO** in **B**.

SECTION A (40 MARKS)**QUESTION ONE (10 MARKS)**

- (i) From the following identify a study where the investigator assigns participants to receive one of **two** or more interventions. **(1 Mark)**
- a) Observational Study
 - b) Randomized Controlled Trial (RCT)
 - c) Case-Control Study
 - d) Cohort Study
- (ii) State the primary purpose of a literature review in a research project. **(1 Mark)**
- a) To list all the papers ever written on a topic.
 - b) To prove the hypothesis before starting the experiment.
 - c) To establish the current state of knowledge, identify gaps, and justify the research question.
 - d) To write the 'Results' section of the final paper.
- (iii) Identify the statistical test is most appropriate for comparing the means of three or more independent groups. **(1 Mark)**
- a) Student's t-test
 - b) Chi-square test
 - c) Analysis of Variance (ANOVA)
 - d) Correlation analysis
- (iv) The probability of rejecting a null hypothesis when it is actually true is known as: **(1 Mark)**
- a) Type II Error
 - b) Statistical Power
 - c) Type I Error
 - d) Confidence Interval

(v) State the ethical principle required by a researcher to protect the identity of participants. **(1 Mark)**

- a) Beneficence
- b) Justice
- c) Autonomy
- d) Confidentiality

(vi) The entire group of individuals or items that the researcher is interested in studying is called the:

(1 Mark)

- a) Sample
- b) Sampling frame
- c) Population
- d) Study group

(vii) Which sampling method gives every member of the population an equal chance of being selected?

(1 Mark)

- a) Convenience sampling
- b) Stratified sampling
- c) Quota sampling
- d) Simple Random Sampling

(viii) A measure of how close a series of measurements are to one another is referred to as: **(1 Mark)**

- a) Accuracy
- b) Validity
- c) Precision
- d) Reliability

(ix) Which section of a research paper describes how the study was conducted, including the materials used, participant selection, and laboratory procedures? **(1 Mark)**

- a) Introduction
- b) Results
- c) Discussion
- d) Materials and Methods

- (x) The dependent variable in an experiment is the one that: **(1 Mark)**
- a) Is manipulated by the researcher.
 - b) Remains constant throughout the study.
 - c) Is measured or observed to see if it changes in response to the independent variable.
 - d) Causes the change in the independent variable.

QUESTION TWO (10 MARKS)

You are planning a study to assess the prevalence of hypertension among diabetic patients in a large metropolitan area.

- a) Outline the difference between probability and non-probability sampling methods. Give an example of a specific probability sampling technique (e.g., stratified random sampling) that would be most appropriate for this study and justify your choice. **(6 Marks)**
- b) Discuss two potential ethical considerations related to data collection from this patient population, and suggest a way to address each. **(4 Marks)**

QUESTION THREE (10 MARKS)

- a) Explain the process of identifying a significant and researchable problem in the biomedical field, emphasizing the role of the literature review in this process. **(5 Marks)**
- b) Write short notes on the steps you would take to effectively organize and synthesize the information gathered during a comprehensive literature review to ensure it directly supports your identified research problem. **(5 Marks)**

QUESTION FOUR (10 MARKS)

A study compared the mean cholesterol levels in two groups: patients receiving a new drug (Group A) and patients receiving a placebo (Group B). A p-value of 0.015 was obtained from an independent samples t-test.

- a) Explain what the p-value of 0.015 signifies in the context of this study. You must explicitly state the conclusion regarding the null hypothesis ($\alpha=0.05$). **(5 Marks)**
- b) Explain the difference between descriptive statistics and inferential statistics **(5 Marks)**

SECTION B (30 MARKS)

QUESTION FIVE (15 MARKS)

- a) Discuss the key components of a research project final report for an institutional committee **(10 Marks)**
- b) Describe the elements you would prioritize when preparing an engaging and effective oral presentation of your final project findings to a panel of researchers, including a discussion on the strategic use of visual aids (e.g., slides/posters). **(5 Marks)**

QUESTION SIX (15 MARKS)

Select one major current trend in biomedical research (e.g., precision medicine, CRISPR technology, or AI in diagnostics).

- a) Write an account on the scientific basis of the selected trend. **(10 Marks)**
- b) Discuss the potential impact and future direction of this trend on patient care or drug discovery. **(5 Marks)**

QUESTION SEVEN (15 MARKS)

Discuss the ethical issues concerning research subjects **(15 Marks)**