

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

M.Sc.-I Semester 2nd (BT)

COURSE CODE (CREDITS): 20MS1BT216 (2)

MAX. MARKS: 35

COURSE NAME: Research methodology and scientific communication skill

COURSE INSTRUCTOR: GSB

MAX. TIME: 2 Hour

*Note: (a) All questions are compulsory.**(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems**(c) Use of calculator is not allowed*

Q.No	Questions	Marks
Q1	a) Critically analyze the impact of competitive research funding on the innovation output of academic institutions in the biological sciences. b) Assume you are appointed as the chairperson of a national biotechnology funding agency. Design a comprehensive funding program specifically aimed at supporting early-career researchers in biological sciences.	[5] [5]
Q2	A biology researcher initiates experiments to evaluate the toxicological effects of a newly developed pesticide on laboratory rats without obtaining prior approval from the Institutional Animal Ethics Committee (IAEC). During an internal audit, the researcher argues that the experiments were "harmless," involved only a small number of animals, and were conducted solely for "preliminary screening purposes." Critically analyze the ethical and regulatory violations involved in the above scenario. Discuss the scientific and ethical importance of obtaining prior approval from the Institutional Animal Ethics Committee (IAEC), even for preliminary animal studies.	[5]
Q3	A microbiology research laboratory at Centre for Infectious Disease Research initiated a study to evaluate the effectiveness of a newly synthesized antimicrobial compound, BX-17, against multidrug-resistant (MDR) <i>Staphylococcus aureus</i> isolated from hospital-acquired infections. The primary objective was to determine whether BX-17 could inhibit bacterial growth and biofilm formation more effectively than conventional antibiotics. The researchers collected 20 clinical isolates of MDR <i>S. aureus</i> from a tertiary care hospital and performed antimicrobial susceptibility testing using the broth microdilution method according to CLSI guidelines. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) values were calculated. Biofilm inhibition assays were conducted using crystal violet staining in 96-well microtiter plates. Additionally, scanning electron microscopy (SEM) was used to observe morphological changes in bacterial cells following treatment. The study reported that BX-17 exhibited significantly lower MIC values compared to vancomycin and reduced biofilm formation by approximately 80%. However, during manuscript review, several concerns were identified. The investigators had selected only "highly responsive" bacterial isolates for SEM imaging and excluded isolates showing weak susceptibility without providing scientific justification. Furthermore, laboratory	[10]

	personnel conducting colony counts were aware of treatment allocation, and no inter-observer validation was performed. Reviewers also noted that experiments were conducted in duplicate rather than triplicate, and no statistical power analysis had been performed before sample collection. The researchers used patient-derived bacterial isolates but failed to document institutional biosafety committee approval or patient sample anonymization procedures. In addition, residual cultures containing MDR pathogens were discarded in regular laboratory waste instead of following biomedical waste disposal protocols. The institutional review committee questioned whether the observed antimicrobial efficacy of BX-17 truly reflected unbiased scientific findings and whether the study complied with accepted microbiological biosafety and ethical standards. - Critically analyze the methodological flaws, sources of experimental bias, and biosafety concerns present in the above antimicrobial resistance study. Explain how these issues could affect the reliability, reproducibility, and scientific validity of the findings. - Evaluate the ethical and scientific implications of improper biosafety practices and experimental bias in antimicrobial resistance research. Propose a revised experimental and biosafety framework that improves methodological rigor, minimizes bias, and ensures ethical compliance.	
Q4	- The increasing availability of commercially operated ghost-writing services has raised serious concerns regarding academic integrity in scientific research. Some individuals argue that scientific merit depends primarily on experimental work rather than writing skills. Critically evaluate this viewpoint. Do you consider the publication of ghost-written scientific papers ethically justifiable? Support your answer with arguments related to research ethics, authorship responsibility, scientific credibility, and integrity in scholarly communication. - Critically discuss the different forms of plagiarism encountered in academic and scientific research. Explain the commonly used methods and tools for detecting plagiarism, and suggest effective strategies that researchers and students can adopt to prevent plagiarism in scientific writing.	[10]