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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2, EXAMINATION- 2026

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

COURSE CODE (CREDITS): 20MS1BT216 (2)

MAX. MARKS: 25

COURSE NAME: Research methodology and scientific communication skill

COURSE INSTRUCTOR: GSB

MAX. TIME: 1 Hour 30 Min

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	Question	Marks
Q1	Dr. Mehta, a principal investigator (PI) at a reputed university, leads a multidisciplinary research project on antimicrobial peptides. The project involves a postdoctoral fellow (Anita), two PhD students, and a collaborating statistician. Anita designed the study, conducted most experiments, and drafted the manuscript. One PhD student contributed partially to data collection, while the other assisted in literature review. The statistician performed advanced data analysis but was minimally involved in interpretation. As the manuscript nears submission, Dr. Mehta insists on being listed as the first author, arguing that the grant funding and lab resources were secured through his efforts. Additionally, he includes a senior professor—who had no direct involvement—as a co-author to increase the chances of acceptance. During peer review, Dr. Mehta is invited to review a competing manuscript in the same field. He notices similarities with his team's unpublished data and delays the review process while accelerating submission of his own paper. Anita feels conflicted about authorship fairness and the ethical implications of the peer review process but fears retaliation if she raises concerns. Questions - Evaluate the authorship allocation in this case. Who should rightfully be the first author and why? - Identify and explain the ethical issues related to “guest” or “gift” authorship in this scenario. - Analyze the ethical concerns in Dr. Mehta's handling of the peer review process. - What actions should Anita take to address both authorship and peer review concerns? - Suggest institutional or journal-level mechanisms to prevent such ethical breaches.	[10]
Q2	A biomedical research team at a university is investigating the efficacy of a novel anti-inflammatory drug using Wistar rats. The study aims to evaluate drug toxicity and therapeutic response through repeated dosing over 28 days. The experimental design includes 60 rats divided into control and treatment groups. However, due to limited funding and time constraints, the research team skips a pilot study and increases the number of animals to ensure statistically significant results. Animals are housed in standard cages, but environmental enrichment is minimal. During the study, several rats	[1.5+2.5+2.5]

	show signs of distress, yet humane endpoints are not clearly defined in the protocol. The Institutional Animal Ethics Committee (IAEC) approved the study based on incomplete documentation. A junior researcher raises concerns about animal suffering and protocol deviations but is advised by the principal investigator to proceed to avoid delays in publication. Questions - Identify the violations of the 3Rs (Replacement, Reduction, Refinement) principles in this study. - What are the technical shortcomings in the experimental design and ethical approval process? Why are humane endpoints important, and how should they be implemented in this study? - What responsibilities does the junior researcher have in this situation? Suggest improvements to ensure ethical and scientifically valid animal experimentation.	
Q3	- A manuscript's Discussion section merely repeats the data presented in the Results section. Critique this approach from a peer-review perspective. What essential "Quality Control" elements are missing? - Analyze the characteristics of a good research hypothesis. How would you differentiate between a weak and a strong hypothesis? - Design a research question and hypothesis for a study on antioxidant activity of plant extracts, and justify your choices.	[3+2.5+3]