**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**M.Sc. BIOTECHNOLOGY - II SEMESTER**

**SEMESTER EXAMINATION: APRIL 2022**

**(Examination conducted in July 2022)**

**BT 8421: Research Methodology and Scientific Writing**

**Time- 2 ½ hrs Max Marks-70**

**This question paper contains TWO printed pages and THREE parts**

**Part A (Answer *ANY TEN* questions) 2mx10=20marks**

1. Science is the observation, collection, and analysis of facts. Mention any two examples, were observable ‘facts’ can be different to different people.
2. State two important differences between Qualitative and Quantitative research.
3. What are the main differences between parametric and non-parametric tests?
4. What is referred to as model myopia? What is a potential solution for model myopia?
5. Write a brief note on peer review in publishing.
6. What are the characteristics of a good hypothesis?
7. Comment on the need for ethical clearances in research.
8. Write a note on H index.
9. Name any two reference management systems, and mention what the advantages of such reference management systems are.
10. What is the importance of reproducibility or repeatability in science?
11. What is power in the context of statistical analyses?
12. What are the major differences between narrative and systematic literature reviews?

**Part B (Answer *ANY FIVE* questions) 6mx5=30marks**

1. The criterion of the scientific status of a theory is its falsifiability, or refutability, or testability. Elaborate, using a relevant example.
2. Given here is an excerpt from an article on “Risk of Long Covid in people infected with SARS-CoV-2 after two doses of a COVID-19 vaccine: community-based, matched cohort study”, by Ayoubkhani *et al*, posted on the preprint server medRxiv in February 2022:

Of 3,333 eligible participants who were double-vaccinated before their first test-confirmed SARS-CoV-2 infection, 3,090 (92.7%) were 1:1 matched to participants who were unvaccinated when infected (from a pool of 9,854 potential control participants). Among double-vaccinated participants, 2,287 (74.0%), 788 (25.5%) and 15 (0.5%) received Oxford/AstraZeneca, Pfizer/BioNTech, and Moderna vaccines, respectively.

Based on this excerpt, comment on a) Possible research question for this study, b)Sample size and c) Control versus experimental groups.

1. Study the following graphical abstract from Su *et al*., 2022, Multiple early factors anticipate post-acute COVID-19 sequelae, *Cell* (185), 881–895. (PASC: post-acute sequelae of COVID-19 s defined as a range of new, returning, or ongoing health problems people can experience four or more weeks following initial SARS-CoV-2 infection. PASC may include memory loss, gastrointestinal distress, fatigue, shortness of breath, and other symptoms.)

Comment on the methods used in this study, and the highlights of the study that you can deduce from this abstract.



1. Describe the major broad categories of scientific misconduct in research.
2. Using an example, explain Type I and Type II errors.
3. What are some ways to spot predatory scientific journals?
4. What are the general rules for responsible referencing?

**Part C (Answer *ANY TWO* questions) 10mx2=20marks**

1. Consider the group project using Drosophila as a model organism, that you did during your Cell and Molecular Biology labs.
2. What was your hypothesis? In hindsight, would you alter the hypothesis? Why or why not? (4 marks)
3. Describe your research design. Given another chance to do the same project, what changes in your research design would you implement, and why?
4. Outline the general structure/anatomy of a peer reviewed research article. Describe how you would critique individual sections of a given research article.
5. Based on the research proposal you worked on during this course, answer the following questions:
6. What were the main highlights of your literature review? What were the gaps you identified when you surveyed existing literature?
7. Briefly describe the objectives of your research proposal.
8. Describe why what you are proposing to do is relevant.
9. Describe your plan for data collection and analysis.
10. What do you anticipate could go wrong? Have you considered how you might trouble shoot this? What is your plan B?