



ST JOSEPH'S UNIVERSITY, BENGALURU -27
M.Sc. Biotechnology- I SEMESTER
SEMESTER EXAMINATION: OCTOBER 2023
(Examination conducted in November/December 2023)
BT 7422: RESEARCH METHODOLOGY AND SCIENTIFIC WRITING
(For current batch students only)

Registration Number:

Date & session:

Time: 2 hours

Max Marks: 50

This paper contains THREE printed pages and THREE parts

PART A

Answer any SEVEN of the following

2m x 7 = 14 marks

1. Mention any four criteria for relevance of a hypothesis.
2. What is information literacy?
3. What are the components of a generic research design?
4. What are the typical assumptions for parametric statistical tests?
5. In hypothesis-testing research, what is the Principle of Replication?
6. Name any two reference management systems, and mention the need and advantages of reference management systems in research.
7. Write a note on H index.
8. What are some practical ways in which you can spot pseudoscientific claims? Mention any four.
9. Comment on the need for ethical clearances in research.

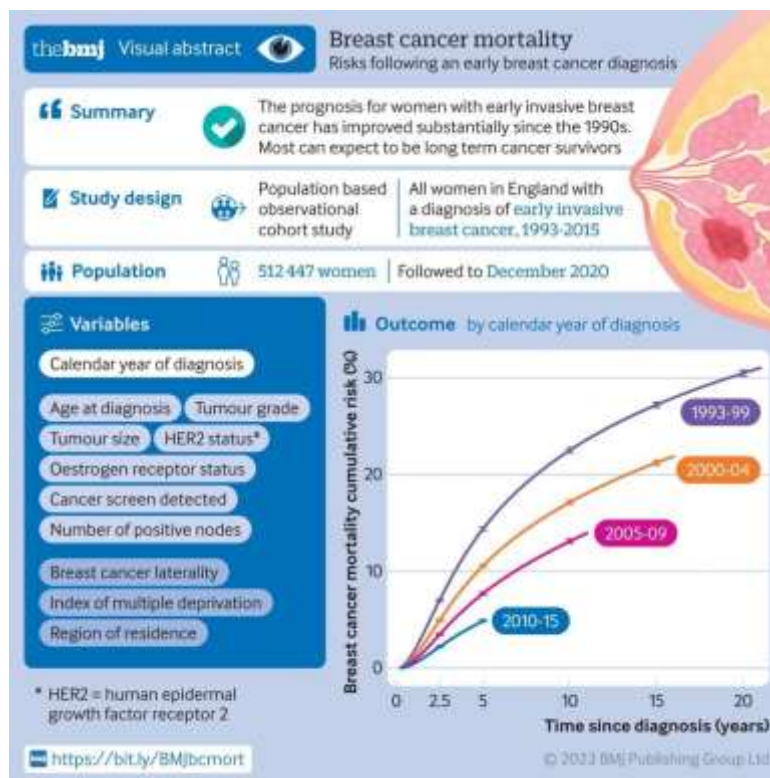
PART B

Answer any FOUR of the following:

5m x 4 = 20 marks

10. If you are doing an RT-PCR test to test for the presence of the SARS Cov-2 virus, describe the various controls you need to use to be able to accurately report results, and mention why you need to use them.
11. What are the differences between Qualitative and Quantitative research?
12. Describe the major broad categories of scientific misconduct in research.
13. 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 the following:
 - a. Possible research question for this study.
 - b. Sample sizes.
 - c. Control versus experimental groups.

14. Donated blood is tested for infectious diseases and other contaminants. Since most donated blood is safe, it saves time and money to test batches of donated blood rather than test individual samples. A certain test is performed to see if a certain toxin is present, and the entire batch is discarded if the toxin is detected.
- State the null and alternative hypotheses in this case. (1 m)
 - What would be a Type I error in this case and what would be its consequence? (2 m)
 - What would be a Type II error in this case and what would be its consequence? (2 m)
15. Consider the graphical abstract (Taylor C, *et al.* Breast cancer mortality in 500000 women with early invasive breast cancer diagnosed in England: population based observational cohort study *BMJ* 2023; 381:e074684) given below, and answer questions a – c.



- Comment on the methodology used in this study (2 m).
- Describe the results represented in the graph. Use numbers to describe trends (1 m).
- Give a brief summary of this study. (2 m)

PART C

Answer any TWO of the following:

8m x 2 = 16 marks

16. Consider the research proposal you worked on during this course, and answer the following:
- What was your research question? Why is what you are proposing relevant? (2 m)
 - What were the main highlights of your literature review? What were the gaps you identified when you surveyed existing literature? (2 m)

- c. Briefly describe the objectives of your research proposal. (2 m)
 - d. What do you anticipate could go wrong? Have you considered how you might troubleshoot this? What is your plan B? (2 m)
17. Outline the general structure/anatomy of a peer reviewed research article. Describe how you would critique individual sections of a given research article. Briefly describe why an article critique is valuable.
18. Triclosan is a commonly used antimicrobial agent in consumer products like antibacterial soaps, that enters wastewater treatment plants (WWTPs) and the environment, and there is concern about its potential impact on antimicrobial resistance. You want to study the effect of triclosan on the emergence of antimicrobial resistance. Describe, using a step-by-step outline, how you will use the scientific method to conduct this research.