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Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2023

First Degree Programme under CBCSS

Physics

Core Course VI

PY 1542 : STATISTICAL MECHANICS, RESEARCH METHODOLOGY AND DISASTER MANAGEMENT

(2018 Admission onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions in a sentence or **two**, each carries **1** mark.

1. Define an ensemble.
2. How entropy is related to statistical probability?
3. What are fermions?
4. Give any two examples of particles obeying Bose statistics.
5. Write any two criteria of good research.
6. Why literature survey is important in research?
7. Define the term "error" in a Physical quantity.
8. What are random errors?
9. Write ant two health emergencies due to radiation.
10. Define the term epidemic.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer any **eight** questions, in a paragraph. Each question carries **2** marks.

11. Write a short note on macro states.
12. Explain phase space.
13. Explain the differences between FD and BE statistics.
14. What are the important items to be included in conclusion part of research thesis?
15. What do you mean by hypothesis of research?
16. What is the importance of error analysis when we taking measurements?
17. Classify different types of errors.
18. Distinguish between absolute and relative errors.
19. Define climate.
20. How would you account the calamities due to earthquake disaster?
21. What do you mean by pre-disaster activity?
22. What is the significance of water quality testing in the prevention of epidemics?

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. Draw and explain the FD distribution function and explain the concept of Fermi energy.
24. Write a Note on Bose Einstein condensation.
25. Explain various steps in research process.
26. Explain different types of research approaches.

27. Explain the method of rejection of spurious measurements.

28. The length of a rod measured in an experiment are 1.51 m, 1.56 m, 1.50 m, 1.58 m and 1.55 m and 1.54 m respectively. Fid the mean length, the absolute error and mean absolute error and the percentage error.

29. Explain global natural disasters with examples.

30. What is the significance of Ecologically fragile regions?

31. Briefly explain the steps in disaster management.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. Each question carries **15** marks.

32. Write a detailed note on the properties of MB, FD and BE distributions and compare their salient features.

33. Write a detailed note on thesis preparation. Explain the different parts of a thesis.

34. Write detailed notes on
    (a) Estimation and reporting of errors,
    (b) Errors with reading scales,
    (c) Variance in measurements,
    (d) Error bars and graphical representations.

35. Write a detailed account of the control of communicable diseases, management and prevention.

(2 × 15 = 30 Marks)