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Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2024

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 **one** or **two** sentences. **Each** carries **1** mark.

1. What is statistical ensemble?
2. Define microstates.
3. Define Pauli exclusion principle.
4. Write two criteria of good research.
5. Define random error.
6. What do you mean by systematic errors.
7. Explain research.
8. What are natural disasters?
9. How to determine the accuracy of the measurement?
10. What are hazards?

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer **any eight** questions. **Each** carries **2** marks.

11. Explain velocity distribution.

12. Explain Gibb's paradox.

13. Explain μ space and Γ space.

14. Explain three kinds of particles with examples.

15. State Boltzmann's entropy relation.

16. What are the steps in disaster management?

17. Differentiate precision and accuracy.

18. Write on random and systematic error.

19. Write the layout of main text of thesis.

20. Write the guidelines for rounding off the numerical values of various quantities.

21. Give the importance of literature survey.

22. Describe the different types of research.

(8 × 2 = 16 Marks)

SECTION – C

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

23. Write a note on indistinguishability of identical particles.

24. Estimate the density of sodium using Fermi energy of sodium if the metal has one free electron per atom. Given $h = 6.625 \times 10^{-34}$ Js; mass of electron = 9×10^{-31} kg; Avogadro's number = 6.02×10^{26} and atomic weight of sodium = 22.99.

25. The length of a rod measured in an experiment is recorded as 3.51 m, 3.56 m, 3.49 m, 3.58 m, 3.48 m, 3.55 m respectively. Find the mean length, absolute error, mean absolute error.

26. Give accounts to human's adaptability to natural disaster.

27. Explain combination of errors with equations.

28. An electron gas obeys the Maxwell-Boltzmann statistics. Calculate the average thermal energy (in eV) of an electron of the system at 300 K.

29. Explain the different ways of data collection.

30. Explain error bars and graphical representation.

31. Write on impact of global climate change and major natural disaster.

(6 × 4 = 24 Marks)

SECTION – D

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

32. Derive Fermi-Dirac distribution function.

33. Describe the importance of literature survey and criteria for good research.

34. Explain random and systematic errors with suitable examples. Write the importance of estimating errors.

35. Explain disaster reduction activity along with achievements and challenges.

(2 × 15 = 30 Marks)