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Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2021

First Degree Programme under CBCSS

Physics

Core Course VI

PY 1542 : STATISTICAL MECHANICS, RESEARCH METHODOLOGY AND DISASTER MANAGEMENT

(2018 and 2019 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** the questions. **Each** carries **1** mark.

1. Define macrostates.
2. Define statistical ensemble.
3. What are fermions?
4. What do you mean by objectives of research?
5. What is research methodology?
6. Define random error.
7. Define significant figures with example.
8. What are hazards?

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9. On what factors do the control of communicable diseases depend?

10. Give the number of significant figures in 0.00052.

(10 × 1 = 10 Marks)

SECTION – B

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

11. What is phase space?

12. Explain velocity distribution.

13. The radius of a thin wire is 0.24 mm. Find the area of cross section by taking significant figures into consideration.

14. Briefly describe the different steps involved in a research process.

15. Give the importance of literature survey.

16. Describe the different types of research.

17. Write down the significance of research.

18. What are random and systematic errors?

19. Differentiate between absolute and relative error.

20. Explain the importance of control of communicable diseases in emergencies and disasters.

21. What are the health consequences of radiation?

22. State Boltzmann's entropy relation.

23. Give the postulate of equal probability.

24. What do you mean by fragile natural eco-environment?

25. Explain three kinds of particles with examples.

26. Explain canonical ensemble with suitable diagram.

(8 × 2 = 16 Marks)

SECTION – C

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

27. Write a note on indistinguishability of identical particles?

28. Calculate the Fermi energy of sodium assuming that the metal has one free electron per atom. Given h = 6.625×10^{-34} Js; mass of electron = 9×10^{-31} kg; density of sodium = 970 kg/m^3; Avogadro's number = 6.02×10^{26} and atomic weight of sodium = 22.99.

29. Explain scientific methods in research.

30. Explain the importance of estimating errors.

31. Write on thesis writing preliminary section.

32. Give the criteria for good research.

33. The length of a rod measured in an experiment is recorded as 2.51 m, 2.56 m, 2.49 m, 2.58 m, 2.48 m, 2.55 m respectively. Find the mean length, absolute error, mean absolute error.

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

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

36. Explain combination of errors with equations.

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

38. What is the difference between the measurements 8.00 cm and 8.0000 cm?

(6 × 4 = 24 Marks)

SECTION – D

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

39. Explain Bose-Einstein and Fermi-Dirac distribution function and a comparison on three statistics.

40. Give the layout of the research report writing.

41. Explain the basic ideas of error analysis and standard deviation in measurements with suitable examples.

42. What are the health consequence and measurements to prevent health emergencies due to radiation?

43. Briefly explain different types of errors.

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

(2 × 15 = 30 Marks)

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