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**FOURTH SEMESTER B. Sc. DEGREE EXAMINATION, APRIL 2025****(Regular/Improvement/Supplementary)****PHYSICS: Complementary Course for Chemistry & Mathematics****GPHY4C04T: ELECTRICITY, MAGNETISM AND NUCLEAR PHYSICS****Time: 2 Hours****Maximum Marks: 60****SECTION A: Answer the following questions. Each carries two marks.****(Ceiling 20 Marks)**

1. What are elementary particles? Give an example.
2. Write down the equation of continuity in electricity. What does it mean?
3. What are primary cosmic rays? What is its content?
4. Comment on resonance particles.
5. What do you mean by the term angle of declination? How is it expressed?
6. Distinguish between paramagnetic and ferromagnetic materials.
7. Write down any two characteristics of nuclear force.
8. What is the use of a deflection magnetometer? How will you arrange a deflection magnetometer in tan A position?
9. Define the term current density. What is its unit?
10. Give two uses of super conducting materials.
11. What do you mean by electrostatic shielding?
12. Define half-life of a radioactive element.

**SECTION B: Answer the following questions. Each carries five marks****(Ceiling 30)**

13. Using a suitable figure, explain the arrangement of a Searle's vibration magnetometer.  
Give an application of a Searle's vibration magnetometer.
14. The resistance of a galvanometer is 200 ohms. It gives full scale deflection for a current of 2 milli ampere. How will you convert it to a voltmeter of range 100 volts?
15. Obtain an expression for finding the moment of a bar magnet using deflection magnetometer in Tan C position.
16. In an experiment with Carey Foster bridge, the shift in the balance point is 5.4 cm when the thick copper strip and the one-ohm resistance are interchanged. The one-ohm resistance is then replaced by an unknown resistance. Now the balancing point shifts by 10 cm on interchanging. Determine the unknown resistance.

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17. Estimate the binding energy of C nucleus. Also determine its density.
18. What is the structure of neutron, proton,  $\pi^+$ ,  $K^+$  in terms of the quark model?
19. Discuss briefly the fundamental interactions in nature indicating the exchange particles in each.

**SECTION C: Answer any *one* question. The question carries *ten* marks.**

20. Explain Gauss's law in electrostatics. Obtain an expression for the electric field due to an infinite plane sheet of charge.
21. Discuss the construction and working of a nuclear reactor. How is nuclear waste disposed?

**(1 × 10 = 10 Marks)**