

23U404

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Name :

Reg. No :

FOURTH SEMESTER B.Sc. / M.Sc. INTEGRATED GEOLOGY DEGREE EXAMINATION,

APRIL 2025

(CBCSS-UG)

(Regular/Supplementary/Improvement)

CC19U PHY4 C04 / CC20U PHY4 C04 / CC23 PHY4 IC04 -

ELECTRICITY, MAGNETISM AND NUCLEAR PHYSICS

(Physics - Complementary Course)

(2019 Admission onwards)

Time: 2 Hours

Maximum: 60 Marks

Credit: 2

Part A (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. State Gauss's Law.
2. What are the factors on which resistance of a conductor depend? Hence define resistivity.
3. What is the cause of superconductivity?
4. Draw a labelled diagram of a potentiometer experiment to measure the resistance of a coil.
5. What is a Carey foster bridge? What is its principle?
6. What is magnetic mapping?
7. Define (i) Retentivity (ii) Coercivity
8. What is the principle of deflection magnetometer? How can we set up deflection magnetometer in Tan B position?
9. What is nuclear magneton? Why is it lesser than Bohr magneton?
10. Mention any two methods of disposal of nuclear wastes.
11. What are Primary and Secondary cosmic rays?
12. Explain briefly about LHC.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. State and explain Coulomb's law. Write down the Coulomb's inverse square law in vector form and explain the symbols.
14. Describe the behaviour of Dielectrics in electrostatic fields.

15. Derive an expression for the capacitance of a spherical capacitor.
16. Define nuclear fusion. Explain the phenomenon on the basis of liquid drop model of nucleus.
17. What is the role of a moderator in a nuclear reactor?
18. Determine the amount of having activity equal to 5 millicurie. The half life of Po is 138 days.
19. Complete the following reaction and verify the conservation of baryon number and electron lepton number $n \rightarrow \dots + e^- + \bar{\nu}_e$

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

20. a) Explain the theory of vibration magnetometer. With the help of Searle's vibration magnetometer, how can we find the magnetic moment of a bar magnet?
b) How can we compare earth's horizontal magnetic fields at different places using Searle's vibration magnetometer?
21. a) With a neat diagram explain the working principle of a linear accelerator.
b) Derive an expression for the final kinetic energy acquired by the accelerated particles.
c) What are the limitations of this accelerator.

(1 × 10 = 10 Marks)
