

**FOURTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION
APRIL 2021**

Physics/Applied Physics

PHY 4C 04—ELECTRICITY MAGNETISM AND NUCLEAR PHYSICS

Time : Two Hours

Maximum : 60 Marks

The symbols used in question paper have their usual meanings.

Section A (Short Answers)

Answer at least eight questions.

Each question carries 3 marks.

All questions can be attended.

Overall Ceiling 24.

1. Give the differential form of Gauss's law in electrostatics. What are the terms involved in the expression ?
2. What are the properties of equipotential surfaces ?
3. What do you mean by the capacitance of a capacitor ? Give the basic expression for the same.
4. Give the vector statement of Ohm's law. What are the terms involved ?
5. Give the value of the angle of dip at the magnetic pole and magnetic equator.
6. Give any *four* properties of ferromagnetic materials.
7. What is the use of a deflection magnetometer ? How will you arrange a deflection magnetometer in tan C position ?
8. What is nuclear fusion ? Give an example.
9. What are cosmic ray showers ?
10. What are the fundamental interactions in nature ?
11. What do you mean by hypercharge ? What is the hypercharge of π^+ particle ?
12. Name the different leptons.

(8 × 3 = 24 marks)

Turn over

Section B (Paragraph/Problem Type)

Answer at least five questions.

Each question carries 5 marks.

All questions can be attended.

Overall Ceiling 25.

13. How much electric flux will come out through a surface $S = 10j$ kept in an electrostatic field $E = 2i + 4j + 7k$?
14. Determine the capacitance of a sphere of 20 cm diameter inside which there is an earth-connected sphere of 10 cm diameter, the medium between the spheres being air.
15. A galvanometer of resistance 15 ohms gives full scale deflection for a current of 2 milli-ampere. Calculate the shunt resistance needed to convert it to an ammeter of range 5 A.
16. What is the origin for a hysteresis loop in ferromagnetic materials? Use a typical hysteresis loop indicating retentivity and coercivity.
17. Discuss the working principle of a tangent galvanometer. What do you mean by the reduction factor of a tangent galvanometer?
18. How long will it take for 60 % of a sample of radon to decay? Given, the half-life of radon = 3.82 days.
19. Explain the distinction between particles and antiparticles. Illustrate using two examples.

(5 × 5 = 25 marks)

Section C (Essay Type)

Answer any one question.

The question carries 11 marks.

20. Explain the working principle of a potentiometer. How will you determine the resistance of a wire using a potentiometer?
21. Using a suitable figure, explain the working principle of a linear accelerator.

(1 × 11 = 11 marks)