

FOURTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION, APRIL 2020

Physics/Applied Physics

PHY 4C 04—ELECTRICITY MAGNETISM AND NUCLEAR PHYSICS

Time : Three Hours

Maximum : 64 Marks

Section A (One Word)*Answer all questions.**Each question carries 1 mark.*

1. If the radius of a wire of constant length is doubled, its resistance becomes _____.
2. When the temperature of a conductor is increased, its resistance _____.
3. The direction of magnetic lines of force is from _____.
4. The angle of dip at earth pole is _____.
5. The principle of Carey Foster's bridge is _____.
6. For diamagnetic material, the value of χ is _____.
7. The unit of magnetic flux density is _____.
8. The energy released by the nuclear bomb that destroyed Hiroshima was equivalent to 12.4 kilotons of TNT. This is equivalent to $9.0 \cdot 10^{26}$ MeV. The mass that was converted into energy in this explosion was _____.
9. 1 Curie = _____ radioactive decay per second.
10. Particles that participate in the strong nuclear interaction are called _____.

(10 × 1 = 10 marks)

Section B (Short Answer Questions)*Answer all questions.**Each question carries 2 marks.*

11. What do you mean by electrostatic shielding ?
12. What do you mean by drift velocity ?
13. What is Hysteresis ?
14. Define reduction factor of a T G.
15. Write down any two characteristics of nuclear force.

Turn over

16. What is nuclear binding energy ?
17. What are resonance particles ?

(7 × 2 = 14 marks)

Section C (Paragraph Questions)

Answer any three questions.

Each question carries 4 marks.

18. Compare electric and magnetic field.
19. What is a deflection magnetometer ? Describe the Tan A and Tan B position
20. How will you determine unknown resistance using potentiometer ?
21. Discuss the biological effects of nuclear radiation.
22. What are leptons ? Name the six leptons.

(3 × 4 = 12 marks)

Section D (Problems)

Answer any three questions.

Each question carries 4 marks.

23. A spherical drop of water carrying a charge of $3 \times 10^{-6}\text{C}$ has a potential of 500V at its surface. What is the radius of the drop ?
24. The resistance of a coil of wire are 11.2ohm and 14ohm at 303K and steam point respectively. Calculate the temperature coefficient of the material of the coil.
25. A rod of paramagnetic material, 0.6m in length has a coil of 300turns wound over it uniformly. If a current of 2A is send through it, calculate (a) the magnetic field H, (b) the intensity of magnetisation M, (c) the magnetic induction and (d) the relative permeability of the material. Given $\chi = 6 \times 10^{-3}$.
26. Calculate the time required for 10% of a sample of thorium to disintegrate. Assume the half life of thorium to be 1.4×10^{10} years.
27. What is the structure of neutron, proton, π^+ , K^+ in terms of the quark model.

(3 × 4 = 12 marks)

Section E (Essays)

Answer any two questions.

Each question carries 8 marks.

28. State and prove Gauss's law. Find the electric field due to a plane sheet of charge.
29. Discuss the construction and working of a nuclear reactor.
30. State the law of radioactive disintegration and derive expression for the number of atoms present at any instant, half life and mean life.
31. What do you mean by ferromagnetism ? Explain the hysteresis curve.

(2 × 8 = 16 marks)