

16U409

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Name:

Reg.No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2018

(Regular/Supplementary/Improvement)

(CUCBCSS-UG)

CC15U PH4 C04 - ELECTRICITY, MAGNETISM AND NUCLEAR PHYSICS

(Physics- Complementary course)

(2015 Admission onwards)

Time: Three Hours

Maximum: 64 Marks

Section A

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

1. Electrostatics deals with the behavior of
2. Differential form of Gauss Law is
3. The coaxial cable is an example of type of capacitor.
4. If all the points on a surface are at the same electric potential, then the surface is called
5. The increase of resistance per unit area per unit degree rise of temperature is called
6. Measurement of any electrical quantity by converting into a proportionate D.C. potential difference can be done using
7. The temperature at which anti-ferromagnetic material converts to paramagnetic material is called
8. The variants of an element that differ in the number of neutrons their nuclei contain are called
9. The process by which a positron combines with an electron producing two quanta of gamma rays are called
10. Antiparticle of the electron is

(10 x 1 = 10 Marks)

Section B

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

11. Define the principle of superposition of charges.
12. Define current density. Give the relation between current and current density at a point inside the conductor.
13. Write short note on super conductivity.
14. What is meant by hysteresis?
15. Write short note on nuclear waste disposal.
16. What is meant by 'color and flavor'?
17. Explain Latitude effect in cosmic rays.

(7 x 2 = 14 Marks)

Section C

Answer any *three* questions. Each question carries 4 marks.

18. Using suitable diagrams explain lines of force of electric field.
19. Explain how a Carey Fosters bridge can be used to compare two nearly equal resistances.
20. Discuss the atomic origin of dia-, para- and ferro-magnetism.
21. Explain radiometric dating.
22. Explain how we can determine the stability of a nuclei using binding energy.

(3 x 4 = 12 Marks)

Section D

Answer any *three* questions. Each question carries 4 marks.

23. A positive charge of $q_1 = 2 \times 10^{-7} \text{ C}$ is placed at a distance of 0.15 m from another positive charge of $q_2 = 8 \times 10^{-7} \text{ C}$. Find the point on the line joining them at which electric field cancels out.
24. A copper wire of diameter 0.5 mm and length 20 m is connected across a battery of emf 1.5 V and internal resistance 1.25Ω , calculate the current density in the wire and the drift velocity assuming one conduction electron per atom of copper.
25. A soft iron ring has a mean diameter of 0.2 m and area of cross-section $5 \times 10^{-4} \text{ m}^2$. It is uniformly wound with a coil of 2000 turns and a current of 2 A is passed through it. The magnetic flux produced in the ring is $8 \times 10^{-3} \text{ Wb}$. Calculate the relative permeability of iron.
26. One gram of ^{226}Ra has an activity of nearly 1 Curie . Determine the half life of ^{226}Ra .
27. . What is the charge of λ particle consisting of a u , d and s quark? Find the quark composite of a neutron and a proton.

(3 x 4 = 12 Marks)

Section E

Answer any *two* questions. Each question carries 8 marks.

28. Define polarization density. Derive an expression for the electric displacement vector in terms of polarization vector.
29. Discuss the principle of deflection magnetometer to find the moment of the magnet in Tan A, Tan B and Tan C positions.
30. Briefly describe the different types of particle accelerators according to the shape and path of the particle.
31. Explain the basic forces in nature and discuss the classification of elementary particles.

(2 x 8 = 16 Marks)
