FOURTH SEMESTER B. Sc. DEGREE EXAMINATION, APRIL 2024

(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. Give an account on the origin of cosmic rays.

2. What do you mean by half-life of a radioactive material?

3. Define electric polarization in a dielectric.

4. State and explain Coulomb's law.

5. Define Temperature Coefficient of Resistance.

6. What is superconductivity?

7. State Curie's law of magnetism.

8. What is meant by isotope? Give examples.

9. Comment on binding energy of a nucleus.

10. Give the differential form of Gauss's Law.

11. What is meant by color of quarks?

12. Define electric filed intensity at a point.

SECTION B: Answer the following questions. Each carries *five* marks.

(Ceiling 30 Marks)

13. Charges +15 μC, -15 μC, +20 μC and -50 μC are placed in order at each of the corners of a square of side 20 cm. Determine the intensity of electric field at the center of the square.

14. A parallel plate capacitor is maintained at a certain potential difference when a 3 mm thick dielectric slab is introduced between the plates, the distance between the plates is increased by 2.4 mm to keep the potential difference same. Find the dielectric constant of the slab.

15. Find the earth's magnetic field at a place where the angle of dip is 60° and horizontal component of earth's field is 0.3 G.

16. Calculate the mass of deuterium if the binding energy per nucleon is 1 MeV. Mass of proton=1.007825 u, Mass of neutron=1.008665 u, 1u=931.49 MeV.

(PTO)

17. The half life of radon is 3.8 days. After what time does the element present in the specimen reduce to 5% of the original value?

18. On the basis of lepton number conservation law, check whether the reaction is possible: $\mu^+ --> e^+ + \upsilon_e + \upsilon_\mu$.

19. Explain cosmic ray showers.

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

20. Define drift velocity of electrons in a conductor. Find out the relation between electric current and drift velocity in a conductor.

21. Explain the theory of vibration magnetometer. Explain how Searl's vibration magnetometer can be used to determine the moment of a magnet.

(1 x 10 = 10 Marks)