

**19U409S**

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Name: .....

Reg. No.....

**FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2021**

(CUCBCSS-UG)

**CC15U PH4 C04 - ELECTRICITY, MAGNETISM AND NUCLEAR PHYSICS**

(Physics- Complimentary Course)

(2015 to 2018 Admission – Supplementary/Improvement)

Time: Three Hours

Maximum: 64 Marks

**Section A**

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

1. Work done in moving a charge between two equipotential points is .....
2. When a dielectric is placed between the plates of a capacitor, the electric field between the plates .....
3. The unit of resistivity is .....
4. What is the unit of temperature coefficient of resistance?
5. The magnetic susceptibility is negative for .....
6. The angle of dip at equator is .....
7. What nuclear reaction takes place in sun?
8. Mention a unit of radioactivity.
9. Particles which are made up of three quarks are known as .....
10. LHC is .....

**(10 × 1 = 10 Marks)**

**Section B**

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

11. The electric field, E is zero at a point. Is the electric potential V necessarily zero at that point? Give example.
12. Compare between Coulomb force and Nuclear force.
13. How Galvanometer, Voltmeter and Ammeter differ?
14. Define the three elements of earth.
15. Distinguish between half life and mean life.
16. Find the ratio of the nuclear radii of Gold isotope  ${}_{79}\text{Au}^{197}$  and Silver isotope  ${}_{47}\text{Ag}^{107}$ .
17. What do you mean by resonance particles?

**(7 × 2 = 14 Marks)**

**Section C**

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

18. Distinguish between diamagnetic, paramagnetic and ferromagnetic materials.
19. Write a note on nuclear waste disposal

20. Discuss the phenomenon of cosmic ray showers.
21. Discuss the working of semiconductor detector.
22. Distinguish between nuclear fission and nuclear fusion. Give an equation for each process.

**(3 × 4 = 12 Marks)**

#### **Section D**

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

23. A parallel plate capacitor of plate area  $10^{-2}\text{m}^2$  and plate separation  $10^{-2}\text{m}$  is charged to 100Volts. Then, after removing the charging battery, a slab of insulating material of thickness  $0.5 \times 10^{-2}\text{m}$  and relative permittivity 7 is inserted between the plates. Calculate the potential difference between the plates and the capacitance (with dielectric present)
24. Two charges  $+Q$  and  $-3Q$  are separated by a distance of 1m. At what points on its axis is the potential zero?
25. One gram of a radioactive substance disintegrates at the rate of  $3.7 \times 10^{10}$  disintegrations per second. The atomic weight of the substance is 226. Calculate its mean life.
26. A galvanometer has a resistance of  $50\Omega$  and a current of 1mA is needed to give full scale deflection. What is the resistance needed and how is to be connected to convert the galvanometer into (a) an ammeter of 1A range (b) a voltmeter of 5V range?
27. A tangent galvanometer has a coil of 50 turns of mean radius 50cm. If the value of  $B_H$  at a place is  $0.3 \times 10^{-4}\text{T}$ , calculate the current in amperes to produce a deflection of  $45^\circ$ .

**(3 × 4 = 12 Marks)**

#### **Section E**

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

28. With a neat diagram and necessary theory, describe the working of a cyclotron accelerator. Obtain the expression for kinetic energy of the accelerated ion. Also discuss the limitations
29. State and prove Gauss's law. Use this to find the electric field due to infinitely plane parallel sheets
30. Describe how will you find out the ratio of magnetic moment of two magnets using Searle's vibration magnetometer.
31. Explain how Carey Foster's Bridge can be used to determine the temperature coefficient of resistance

**(2 × 8 = 16 Marks)**

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