

B. Sc. DEGREE END SEMESTER EXAMINATION MARCH - 2020**SEMESTER – 4: PHYSICS (CORE COURSE)****COURSE: 15U4CRPHY4 – ELECTRICITY AND ELECTRODYNAMICS**

(For Regular - 2018 Admission and Supplementary / Improvement 2017, 2016, 2015, 2014 Admissions)

Time: Three Hours

Max. Marks: 60

PART A (Very short answer questions)

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

1. Define time constant of a CR circuit and its importance.
2. Give the growth curve of LR circuit for small and large time constant.
3. Compare peak factor and form factor of ac.
4. What do you mean by the resonant frequency of a circuit?
5. What is Thevenin's theorem?
6. Give the work done to move a charge in an electric field.
7. What is magnetic vector potential?
8. Give the equation of continuity and explain the terms. (1 x 8 = 8)

PART B (Short answer)

Answer **any Six** questions. Each question carries **2** Marks

9. Explain the expression for the decay of current in an L-R circuit at any instant t and obtain the graphical variation.
10. Explain critical discharging of a capacitor in an LCR circuit and plot the charge-time curve.
11. Compare ideal constant voltage source and current source.
12. Explain the electric potential of a continuous charge distribution.
13. Obtain Poisson's and Laplace's equations.
14. Explain Biot-Savart Law.
15. How did Maxwell fix the Ampere's law?
16. Define Poynting vector. (2 x 6 = 12)

PART C (Problem/Derivations)

Answer **any Four** question. Each question carries **5** Marks

17. Show that charge flowing through the coil of a Ballistic Galvanometer is proportional to first ballistic throw and hence define ballistic reduction factor.
18. Find the value of the time constant in an L-R circuit when the current rises to 63.2% of its steady value in one second.

19. An alternating emf 220 volts 50 cps is applied to a circuit containing an inductance of 0.5H, a capacitor 15 μ F and a resistance 100ohms in series. Find the current and the phase lag.
20. The atomic number of lead is 82 and the charge of the proton is 1.6×10^{-19} C. Calculate the electric potential at the surface of nucleus of lead if the nuclear radius is 6.6×10^{-15} m.
21. Derive the magnetic field due to current I in a straight wire.
22. Derive the Maxwell's equations in matter. (5 x 4 = 20)

PART D (Long answer questions)

Answer any Two question. Each question carries 10 Marks

23. With necessary theory, circuits and graph discuss the discharging of a capacitor through a resistance and inductance and discuss the special cases.
24. Discuss in detail the theory and experiment to measure high resistance by the leakage method.
25. Derive the electrostatic energy stored in a continuous charge distribution and state and prove the Poynting's theorem.
26. a) Derive the energy and momentum of electromagnetic waves b) Give an account on the experimental method for the production and detection (Hertz experiment) of electromagnetic waves. (10 x 2 = 20)
