

Name:.....Reg. No.....

BSc DEGREE END SEMESTER EXAMINATION MARCH 2016
SEMESTER - 4 : PHYSICS (CORE COURSE)
 COURSE: U4CRPHY4 - ELECTRICITY AND ELECTRODYNAMICS

Time : Three Hours

Max.

Marks: 60

Part A (Very short answer questions)(Answer **all** questions Each question carries 1 Mark)

1. Define the time constant in L-R circuit.
2. In a moving coil galvanometer, why does the rectangular coil wound on a non conducting frame such as ivory or ebonite?
3. Differentiate between Passive network and Active network.
4. Write down the unit of Electric field (E).
5. Express Gauss's law in electrostatics in differential form.
6. Write down the mathematical expression for the force experienced by an electric charge 'q' moving with a velocity 'v' through a magnetic field 'B' .
7. What is a periodic wave?
8. Write down the one dimensional differential equation of wave motion.

(1 x 8 = 8)

Part B (Short answer)(Answer **any six** questions Each question carries 2 Marks)

9. Plot the graph between time and charge during the critical charging of a capacitor in an LCR circuit.
10. State Kirchhoff's Laws for varying current.
11. Explain the term ' Wattless Current'.
12. State and explain Poynting theorem.
13. What are Electric potential and electric potential energy?
14. What is energy density in a Capacitor? Write down the mathematical expression.
15. Write down the Maxwell-Ampere equation in electromagnetic theory and explain the terms.
16. Write down the expression that represents a sinusoidal wave travelling along the positive X- direction, Explain the terms used.

(2 x 6 = 12)

Part C (Problem/Derivations)

(Answer **any 4** question Each question carries 5 Marks)

17. Determine the value of the time constant in an L R circuit if the current rises to 63.2% of its steady value in one second.
18. Derive the equation for the impedance of a parallel LCR circuit.
19. An ac of 180 volts and 100 Hz is fed to a circuit with a resistance R and capacitance C connected in series. Calculate the value of R and C when the maximum current is 5amp, and active power is 300 watts.
20. State and illustrate Thevenin's Theorem.
21. The electric field near the surface of the earth is 300V/m directed towards its centre. (Assume earth is a conducting sphere). Calculate the surface density of the charge on the earth.
22. Derive the equation for force between two straight parallel conductors carrying current.

(4 x 5 = 20)

Part D (Long answer questions)

(Answer **any 2** question Each question carries 10 Marks)

23. Analyze the ac circuit with L, C and R in series. Deduce the condition for resonance.
24. State and Explain Gauss's law. Using the equation, obtain the electric field due to a uniformly charged spherical conductor at an external point.
25. State and Explain Biot-Savarts law. Apply the law and determine the magnetic field at the centre of a current carrying circular coil.
26. With neat diagrams, discuss the propagation of plane electromagnetic wave in conductors.

(10 x 2 = 20)
