24002423

QP CODE: 24002423

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) SPECIAL REAPPEARANCE EXAMINATIONS, MARCH 2024

Fifth Semester

CORE COURSE - PH5CRT05 - ELECTRICITY AND ELECTRODYNAMICS

Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications & B.Sc Physics Model III Electronic Equipment Maintenance

2021 Admission Only

2D671490

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Why is choke preferred to rheostat in controlling AC supply?
2. What is the cause of skin effect?
3. What is Peltier effect.?
4. State and explain Divergence theorem.
5. Difference between flux and flux density of an electric field.
6. What is electric potential energy?
7. Prove that the tangential component of the electric field is continous across boundary.
8. State Biot- Savart Law.
9. What is the significance of Magnetic vector potential?
10. Explain the significance of Faraday's Law of electromagneticc Induction.
11. What is the physical significance of lenz law?

12. Write down the expression for the poynting theorem explain the terms.

(10×1=10)

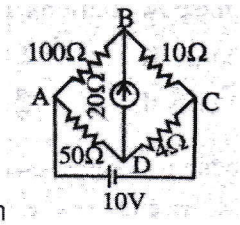
Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. A resistor R= 50Ω and an unknown capacitor are in series. The voltage across the resistor is $V_R = 25\sin(2000t+30^0)$. If the current leads the applied voltage by 60^0, what is the capacitance?

14. A series LCR circuit with L= 25mH and C= 75μF has a lagging phase angle of 25^0 at ω= 200rads^{-1}. At what frequency will the phase angle be 25^0 leading? Find also ω_0

15. 

Find the current through the galvanometer using Thevinin's theorem

16. A circuit consists of a capacitance of 0.01 μF, an inductance of 0.1 mH, and a resistance of 200Ω. Find the frequency at which the circuit will oscillate.

17. State coulomb's law and coulomb's theorem and obtain an expression for electric filed at the surface of a uniformly charged plain conductor?

18. The electric field near the surface of the Earth, assumed to be a conducting sphere, is 500 volts/meter, directed towards its centre. What is the surface charge density of the Earth?

19. A charge of magnitude 3C is placed near a current carrying conductor producing a magnetic field of 6.2 T. If the charge is allowed to move through the field with a velocity 1.2×10^8 m/s, what is magnitude of force experienced by the charge if the electric field strength is 4.2×10^{-3} ?

20. Obtain an expression for magnetic field at point due to a long solenoid carrying a current I using Ampere's Law?

21. Obtain an expression for the electric and magnetic waves in monochromatic plane wave?

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Develop the phase relation between voltage and current in a circuit which contain inductor only, capacitor only and resistor only

23. Discuss the growth of current in an LR circuit. Plot the curve relating the variation of current with time.

24. Explain divergence and curl of a vector field along with their geometrical interpretation and also find $\nabla.A$ if $A = x^2\,\hat{i} + 3xz^2\,\hat{j} - 2xz\,\hat{k}$ at (1,1,1).

25. Show how Maxwell modified Ampere's Law in magnetostatics?

(2×10=20)