QP CODE: 19102435

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Reg No : .....

Name : .....

BSc DEGREE (CBCS) EXAMINATION, OCTOBER 2019

Fifth Semester

Core Course - PH5CRT05 - ELECTRICITY AND ELECTRODYNAMICS

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

2017 Admission Onwards

DAA431BF

Maximum Marks: 60 Time: 3 Hours

Part A

Answer any ten questions.

Each question carries 1 mark.

1. Write down an expression for the average power dissipated per cycle in a circuit containing capacitance only.
2. How various energy losses in a transformer can be minimised?
3. Show graphically the growth and decay of current in an C - R circuit.
4. Explain Gradient of a scalar field?
5. Give expression for the electric field due to a point charge?
6. Difference between flux and flux density of an electric field?
7. Give Gauss's law in differential form?
8. Prove that the tangential component of the electric field is continous across a boundary.
9. State Ampere's Circuital Law?
10. Explain the concept of magnetic vector potential. Obtain its relation with magnetic field?
11. What is the physical significance of lenz law?
12. Write the continuity equation for a steady current and explain the term.

(10×1=10)

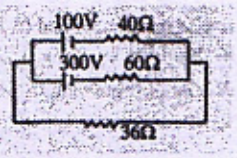
Part B

Answer any six questions.

Each question carries 5 marks.

13. Derive the phase relation between voltage and current in an AC circuit containing L and R.

14. In a series LCR circuit R=10Ω, L=0.1H and C= 150μF and supply voltage is 200V with 50Hz. Find (i) the current (ii) power factor and (iii) voltage across the coil and condenser

15. 

Find the voltage and current through 36Ω in the figure, using Thevinin

16. Calculate the neutral temperature and temperature of inversion of Cu-Ni thermocouple. Given $\alpha = 16.3\mu V^0C^{-1}$ and $\beta = -0.042\mu V^0C^{-2}$.

17. Three point charges +2, +4 and -5 microcoulombs are placed respectively at the vertices A,B and C of an equilateral triangle of side 0.2 metre .Find the magnitude of the force experienced by the charge at C?

18. Obtain an expression for electric potential due to a group of point charges? And also derive an expression for Electric potential energy of the charged particle?

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. A long vertical wire of radius 0.2mm of infinite length is placed through which a current of 5 A is flowing. Find the magnitude and direction of magnetic flux at a point 30cm from the wire?

21. Explain the terms reflection and transmission in electrodynamics?

(6×5=30)

Part C

Answer any two questions.

Each question carries 10 marks.

22. Explain how an AC generator is producing an alternating voltage. Give the wave form of an alternating voltage

23. A charged capacitor having a charge q_0 is discharged through a resistance. Find an expression for instantaneous charge q in terms of time t and charge q_0. Explain the significance of time constant?

24. State and explain Biot- Savart Law. Derive an expression for magnetic field due to a circular current loop.

25. Derive the expression for energy density of an electromagnetic wave in free space.

(2×10=20)