QP CODE: 22100036

22100036

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, JANUARY 2022

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)

2017 Admission Onwards

08186CD8

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. Show that the power consumed per cycle is zero for a circuit containing inductance only.
2. How various energy losses in a transformer can be minimised?
3. When an LCR circuit is said to be damped oscillatory?
4. State and explain divergence theorem.
5. State Coulomb's Law.
6. Distinguish between Scalar and vector fields.
7. Prove that the tangential component of the electric field is continous across a boundary.
8. What is Lorentz Force?
9. State Biot- Savart Law.
10. Explain the concept of magnetic vector potential. Obtain its relation with magnetic field.
11. What is the physical significance of Lenz's law?
12. State and explain one dimensional wave equation.

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. Calculate the average value and rms value of an alternating voltage for its half cycle.

14. An LCR series circuit with L= 100μH, R= 5Ω and C= 0.0002μF. A voltage 10V is applied at resonant frequency. Verify that $E^2 = E_R^2 + (E_L - E_C)^2$

15. A lead acid accumulator of emf 24V has an internal resistance of 0.01Ω. If the total power supplied is 100W, show that the system behaves as a constant voltage source

16. A thermocouple is constructed of gold and iron whose thermoelectric powers are (2.8+0.01θ) and (17.5 – 0.048θ) microvolts per degree centigrade respectively. What is the neutral temperature and maximum emf obtainable with this thermocouple?

17. Obtain expression for gradient operator in Cartesian, cylindrical and spherical coordinate systems.

18. Obtain an expression for the potential due to a point charge at a point r from the charge.

19. Obtain an expression for magnetic field at point due to a long cylindrical wire carrying a current I using Ampere's Circuital Law.

20. Find the magnitude and direction of magnetic flux if the magnetic vector potential is given by $2xz^2$ î ?

21. State and explain Poynting's Theorem.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. Analyse the LR and CR circuit with AC is applied.

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

24. What is Gauss's Law in electrodynamics and discuss its significance? Using Gauss's law obtain an expression for the electric field due to a point charge at a point r distance from charge. A charge q sits at the back corner of cube. What is the flux of E through the opposite side of charge?

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

(2×10=20)

22103395

QP CODE: 22103395

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, NOVEMBER 2022

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

2017 Admission Onwards

811250A0

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. Why does a capacitor blocks DC?
2. What is the condition for resonance in a parallel LCR circuit?
3. State any two differences between Peltier effect and Joules effect.
4. Explain curl of a vector field.
5. Why electric field inside a charged conductor is zero?
6. Distinguish between Scalar and vector fields?
7. Prove that the tangential component of the electric field is continous across a boundary.
8. State Ampere's Circuital Law?
9. Explain the concept of magnetic vector potential. Obtain its relation with magnetic field.
10. Derive the Faraday's law in differential form.
11. State and Explain Lenz's law.
12. What are monochromatic plain waves?

(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= 25sin(2000t+30^0). If the current leads the applied voltage by 60^0, what is the capacitance?

14. A 60V, 10W lamp is to be run on 100V, 60 cycles main. Calculate the inductance of the choke coil required in the circuit. How much pure resistance is required would be required to achieve the same result?

15. Show the efficiency of a power system supplying maximum power to the load is 50%.

16. Find whether the discharge of a capacitor through the circuit consisting of the following elements connected in series is oscillatory, or not. C = 0.1 μF; L = 10 milli henry; R = 200 Ω. If the circuit is oscillatory determine the frequency.

17. State and explain Gauss's law in electrostatics.

18. Charges +10^{-7}C, -2 x10^{-7}C, +3 x10^{-7}C and +5 x10^{-7}C are placed at the four corners of a square of side 1m. Find the potential at the point of intersection of the diagonals?

19. A wire bent in the form of a semicircle of radius R meters carries a current of 1 ampere. It is placed in a magnetic field B web/m2 acting perpendicular to the plane of the semicircle. Calculate the force acting on the wire?

20. Obtain an expression for the magnetic field due to a current in a straight wire.

21. Prove by using Maxwell's equation that the velocity of propagation of electromagnetic waves through empty space is 3 x 10^8 m/s, same as velocity of light.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. Define capacitive reactance,Inductive reactance and impedence of a circuit.

23. Explain the charging and discharging of a capacitor through a resistor.

24. State and explain the fundamental theorems of divergence and curl. Give also the geometrical interpretation of them.

25. Assuming the expression for the work to assemble static charge distribution, arrive at Poynting's theorem.

(2×10=20)

23129052

QP CODE: 23129052

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, OCTOBER 2023

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

2017 Admission Onwards

E46EF5DA

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. What is skin effect?
2. What is a constant current source?
3. Define Seebeck effect.
4. Explain curl of a vector field?
5. Give some basic properties of electric charges.
6. Distinguish between Scalar and vector fields.
7. Prove that the tangential component of the electric field is continous across a boundary.
8. Explain why magnetic monopoles doesn't exist.
9. Distinguish between scalar and vector potentials.
10. Derive the Faraday's law in differential form.
11. State and explain Flemming's right hand rule.
12. What are monochromatic plain waves?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. Calculate the average value and rms value of an alternating voltage for its half cycle.

14. An alternating voltage of 230V and frequency 50 Hz is applied to a 5H choke of resistance 100Ω. Find the power factor and power absorbed.

15. 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

16. Discuss growth current in an L - R circuit.

17. Show that for a point charge, curl of electric field is zero.

18. Two very long parallel non conducting sheets, both carrying equal positive charges of charge density 3.6×10^6 C/m^3 face each other. Find the electric fields at a point
a) Left to the sheets, b) Right to the sheets, c) Between the sheets

19. A long vertical wire carrying a current of 6 amperes is placed in the Earth's magnetic field. Find the position of the neutral point. Earth's horizontal component is BH = 4.3×10^{-5} web/m^2 .

20. Obtain an expression for magnetic field due to a solenoid.

21. State and explain Poynting's Theorem?

(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. A charged condenser discharges through an inductance and a resistance. Discuss the nature of the discharge with special reference to oscillatory discharge.

24. What is electric potential energy? Obtain an expression for the potential energy of continues charge distribution.

25. Discuss Maxwell's equations in vacuum, charge free region and matter.

(2×10=20)

QP CODE: 19102435

19102435

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)

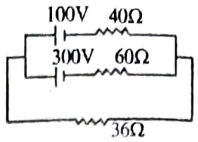
Part B

*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

QP CODE: 21100036

21100036

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, FEBRUARY 2021

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

43537958

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. What is meant by wattles current?
2. What is resonance curve?
3. State law of intermediate metals in thermo electric circuits.
4. State and explain Stokes theorem?
5. Distinguish between Scalar and vector fields?
6. State Gauss's law?
7. What is electric potential energy?
8. Prove that the tangential component of the electric field is continous across a boundary.
9. Explain why magnetic monopoles doesn't exist?
10. Explain the significance of Faraday's Law of Electromagnetic Induction.
11. State and explain Lenz's law.
12. Define Poynting's Vector and explain its significance? Represent it mathematically.

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. An electric lamp which runs at 40V and consumes 10A current is connected to AC mains at 100V, 50Hz. Calculate the inductance of the coil.

14. A 60V, 10W lamp is to be run on 100V, 60 cycles main. Calculate the inductance of the choke coil required in the circuit. How much pure resistance would be required to achieve the same result?

15. A generator develops 200V and has an internal resistance of 100Ω. Find the power delivered to the load of (i) 100Ω (ii) 300Ω. Find their efficiencies also.

16. Discuss decay current in an L - R circuit.

17. What is meant by divergence and curl of a vector field? Explain its significance. If $V = 2x^3y^2z^2\hat{\imath}$, find the divergence and curl of V?

18. The distance between the electron and proton in the hydrogen atom is 5.35×10^{-9} cm. Compare the magnitude of the Electrical and Gravitational Forces between these particles?

19. If a charge is allowed to move in the direction in the vicinity of a current carrying rod such that current flows in same direction as the outside charge is moving. Find the work done by the magnetic field?

20. A solenoid of 1200 turns is wound uniformly in a single layer on a glass tube 2m long and 0.03m in diameter. Find the magnetic flux density at
a)the centre of solenoid b) the ends, when a current of 2 amp flows through it.

21. Obtain differential form of wane equation?

(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. 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. Explain magnetic vector potential and its physical significance. If $\vec{A} = (x^2 + y^2+z^2)^{-1}\hat{i}$. Find B.

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

(2×10=20)