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(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
Fourth Semester B.Sc Physics Degree Examination, April 2025

BPH4B04 – Electrodynamics II

(2022 Admission onwards)

Time: 2 hours

Max. Marks : 60

The symbols used in this question papers have their usual meanings

Section A- Short Answer Type

(Answer all questions in two or three sentences, each correct answer carries a maximum of 2 marks)

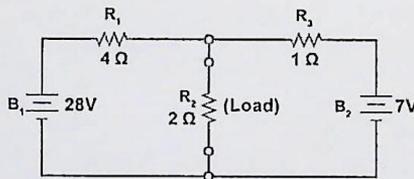
1. State laws of electromagnetic induction.
2. Define time constant in a CR circuit and what is its significance.
3. How the average value of momentum density of an electromagnetic wave is related to the amplitude of the electric field vector?
4. From differential form of Faraday's law, obtain its integral form.
5. What is the impedance of a circuit containing an inductor (L), capacitor (C), and a resistor (R) connected in series to an alternating source of emf ' E ' with frequency ' ω '.
6. Write down the boundary conditions for electrodynamic fields.
7. What do you mean by Norton's equivalent circuit?
8. Define reflection coefficient of an electromagnetic wave and write down its formula in terms of the field amplitude.
9. Write down Neumann formula for mutual inductance and mention the terms involved.
10. Compare ideal constant voltage source and ideal constant current source.
11. Discuss source conversion technique.
12. What do you mean by gauge transformation? Give an example.

(Ceiling-20)

Section B- Paragraph/ Problem Type

(Answer all questions in a paragraph of about half a page to one page, each correct answer carries a maximum of 5 marks)

13. Discuss the growth of current in a series LR circuit with a neat diagram.
14. Establish the phase relation between the alternating current and emf in a circuit containing an inductor and a resistor connected in series.
15. Obtain the expression for the energy stored in a magnetic field.
16. An alternating emf of 10V and 100 cycles/second is applied to a 5H choke having ohmic resistance of 200 Ω . Find the power factor of the coil and power absorbed.
17. Deduce the expression for the Poynting vector in terms of the electric and magnetic field vectors.
18. With necessary theory describe the method to measure a high resistance by discharging a capacitor through a resistor and BG.
19. Obtain the Thevenin equivalent of the circuit given below and hence find the current through the load resistance R_2 .



(Ceiling- 30)

Section C- Essay Type

Answer any one question. Answer carries 10 marks

20. From the Maxwell's equations in free space show that electric and magnetic field fluctuations constitute an electromagnetic wave and also show that electromagnetic waves are transverse in nature.
21. Write down Maxwell's equations in electrodynamics. Modify them in terms of free charges and currents to fit for materials by introducing the concepts of bound charges, bound currents and polarization currents.

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(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Degree Examination, April 2025

BPH4C04 – Electricity, Magnetism & Nuclear Physics

(2022 Admission onwards)

Time: 2 hours

Max. Marks : 60

The symbols used in this question paper have their usual meanings

Section A-Short Answer type.

Answer all questions in two or three sentences

Each correct answer carries a maximum of 2 marks

1. What is meant by electrostatic shielding?
2. What is equipotential surface? Mention one property.
3. Explain the principle of a potentiometer.
4. How does the drift velocity of an electron in a metallic conductor vary with increase in temperature?
5. Why is manganin used for making standard resistance? Give two reasons.
6. State and explain the tangent law in magnetism.
7. Define reduction factor of a tangent galvanometer. What is its significance?
8. List the various methods of nuclear waste disposal.
9. What is the principle of working of a nuclear bomb?
10. Differentiate between leptons and hadrons.
11. What are resonance particles?
12. What is cosmic background radiation?

(Ceiling-20)

Section B-Paragraph/ Problem type.

Each correct answer carries a maximum of 5 marks

13. A galvanometer of resistance 10 ohms gives full scale deflection for a current of 1 mA. Calculate the shunt resistance needed to convert it to an ammeter of range 5A.
14. Draw the circuit diagram to determine the resistance of a wire using potentiometer. Deduce an equation to find the resistance.
15. Explain the magnetic elements of earth.
16. Distinguish between diamagnetic, paramagnetic and ferromagnetic substances.
17. A radioactive substance has a half life period of 30 days. Calculate the time taken for $\frac{3}{4}$ of its original number to disintegrate.
18. Explain primary and secondary cosmic rays. What is meant by cosmic ray shower?
19. Explain standard model and Higgs Bosons.

(Ceiling-30)

SECTIONC-Essaytype

(Essays- Answer in about two pages, any one question. Answer carries 10 marks)

20. State and prove Gauss' law in electrostatics. Find the electric field due to a plane sheet of charge.
21. Describe, with necessary theory and diagram, the construction and working of a linear accelerator.