1B4A23211 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Physics Degree Examination, April 2023

BPH4B04 – Electrodynamics – II

(2019 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)

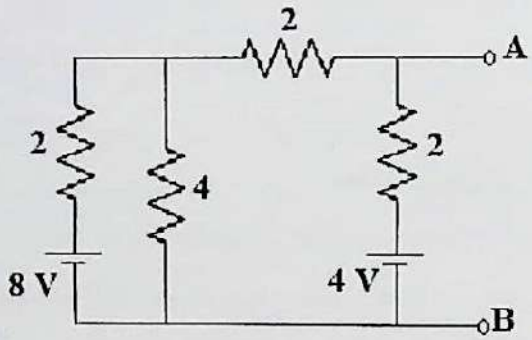
1. Discuss Faraday's laws of electromagnetic induction.
2. Define intensity of electromagnetic wave and write down its expression in terms of amplitude of electric field vector.
3. What do you mean by time constant?
4. Compare an ideal constant-voltage source and an ideal constant-current source.
5. Write down an equation for a plane wave polarized in Z-direction and propagating in X-direction and mention the terms involved.
6. Discuss maximum power transfer theorem.
7. Define Poynting vector and write down its equation in terms of **E** and **B** vectors.
8. Show that the standing wave $f(z,t)=A\ sin(kz)\ cos(kvt)$ satisfies the wave equation.
9. Write down the steps involved in replacing a circuit with its Norton's equivalent circuit.
10. Write down the expression for the energy density of an electromagnetic wave and describe the terms involved.
11. What do you meant by resonance in an electrical circuit? What is it's condition?
12. Write down the wave equations for **E** and **B** vectors.

(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. State and explain Ampere's circuital theorem. Discuss how Maxwell modified Ampere's law.
14. How large an inductance, in Henrys, should be connected in series with a 120 V, 60 watt light bulb if it is to operate normally when the combination is connected across a 240 V, 60 Hz line?
15. Discuss Coulomb gauge and Lorentz gauge and show that in the Lorentz gauge scalar and vector potentials satisfy inhomogeneous wave equations.
16. There is a uniform magnetic field straight up through a circular horizontal region. If the magnetic field is decreased from 1.2 to 0.4 T in 0.4seconds. What is the induced electric field 30cm away from the centre of the region?
17. Use Thevenin's theorem to find the current in a load resistance of 2Ω connected between the terminals A and B of the network given below.



18. The intensity of sunlight hitting the earth is about 1300 W/m^2. If sunlight strikes a perfect absorber, what pressure does it exert? If it is on a perfect reflector, what will be the radiation pressure?
19. A current of 5A flows through a non-inductive resistance in series with a choke coil when supplied at 250 V, 50 Hz. If the voltage across the resistance is 125 V and across the coil is 200V, calculate the impedance, reactance and resistance of the coil.

(Ceiling- 30)

Section C- Essay Type

Answer any one question. Answer carries 10 marks

20. Explain double energy transients and discuss the undamped, under-damped, over damped and critical damped conditions.
21. Write down differential form of Maxwell's equations in matter. Obtain the electromagnetic boundary conditions.

(1x10= 10)

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B4A23212 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Degree Examination, April 2023

BPH4C04 – Electricity, Magnetism & Nuclear Physics

(2019 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 2marks

1. Write any four properties of electric field lines.
2. Derive coulomb's law from Gauss's theorem.
3. Define electric flux. How it is related to the charge enclosed by a surface?
4. Explain the Meisner effect.
5. Why resistivity of a metal varies with change in temperature?
6. Differentiate retentivity and coercivity.
7. Derive the relation between magnetic susceptibility and relative permeability
8. Define neutron reproduction factor .
9. What are the qualities of a substance to be taken as a moderator in nuclear fission?
10. Why nuclear fusion reaction called thermo nuclear reaction?
11. List out any four elementary particles from lepton family.
12. Differentiate between primary and secondary cosmic rays. (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. With the help of diagram, explain the conversion of a galvanometer to an ammeter.
14. Find the resistance of a hollow cylindrical pipe of length 2m whose inner and outer radii are 20 cm and 30 cm respectively. Given the resistivity of the material of cylinder as $2 \times 10^{-6} \Omega m$.

15. Derive the equation for reduction factor of Tangent Galvanometer
16. Prove that half-life of radioactive disintegration is inversely proportional to decay constant
17. Calculate binding energy per nucleon of $^{20}_{10}Ne$ .Given$m_H = 1.007825\ u$, $m_n = 1.008665\ u$, m(Ne)= 19.99244 u
18. Write a short note on classification of elementary particles.
19. Write the quark combination of following particles
    a) proton b)neutron c) pion d) kaon

(Ceiling – 30)

SECTION C – Essay type

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

20. Explain the terms capacitor and capacitance. How the capacitance of a parallel plate capacitor varies when a dielectric slab introduced between the plates
    1) partially 2) completely
21. A) Describe how a deflection magnetometer is used to find the moment of a magnet by arranging in Tan A position
    B) Calculate horizontal and vertical components of earth's magnetic field at a place where the angle of dip is $45^0$and total intensity of earth's field is $3 \times 10^{-4}\frac{\text{Wb}}{m^2}$

(1 × 10 = 10 marks)