

3B4A22541

(Pages : 2)

Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Degree Examination, March/April 2021

BPH4C04 - Electricity, Magnetism and 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 2 marks)

1. What are the properties of equipotential surfaces ?
2. Distinguish between primary and secondary cosmic rays.
3. Write the proton-proton cycle of nuclear fusion.
4. What are magnetic elements of earth ?
5. Explain the principle of Carey Foster Bridge
6. Write down two advantages of linear accelerator.
7. Explain the terms retentivity and coercivity.
8. What are the main observations in the origin of universe ?
9. What is LHC ?
10. Write an expression for the capacitance of a cylindrical capacitor and explain the terms.
11. What are hadrons? Give two examples.
12. Derive an expression for resistivity of a material.

(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. A potentiometer wire of length 1 meter has a resistance of 15 ohm. It is connected to a 5 V source in series with a resistance of  $5\ \Omega$ . Determine the emf of the primary cell which has a balance point at 60 cm.
14. A current 0.5A produces a deflection of  $45^\circ$  in a tangent galvanometer. For what value of current, the deflection will be  $30^\circ$  in the galvanometer?
15. Describe cosmic ray showers.
16. With the help of neat diagram explain the conversion of galvanometer to ammeter.
17. A dipole consisting of an electron and a proton,  $4 \times 10^{-10}$  m apart. Compute the electric field at a distance of  $2 \times 10^{-8}$  m on a line making an angle of  $45^\circ$  with the dipole axis from the centre of the dipole.
18. Explain the domain theory Ferromagnetism.
19. State and prove Gauss's Law.

(Ceiling – 30)

**SECTION C – Essay type**

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

20. What is the theory of deflection magnetometer? How we can determine the moment of magnet by setting the magnetometer in tan A position.
21. State and explain the laws of radioactivity. Derive the expression for half life and mean life.

(1 x 10 = 10 marks)



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(Pages : 2)

Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Degree Examination, April 2022

BPH4B04 - Electrodynamics – II

(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 2 marks)*

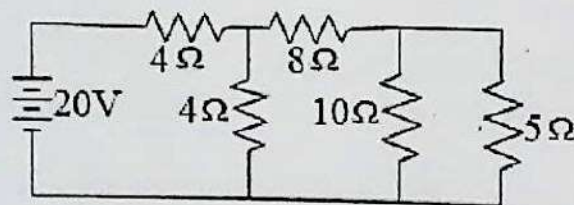
1. What is polarization current density?
2. Define time constant of a series RC circuit.
3. State and explain Thevenin's theorem.
4. State Faraday's laws of electromagnetic induction.
5. Write down the relation between applied alternating voltage and current through a series LCR circuit?
6. Write down 1-D wave equation and one of its possible solutions with description of the terms.
7. Write down Neumann formula for mutual inductance. What are the properties revealed by this formula about mutual inductance?
8. State and explain maximum power transfer theorem.
9. Explain Poynting vector.
10. What is motional emf? Name a device which works by exploiting this phenomenon.
11. State and explain super position theorem for solving electrical networks.
12. Write down the relation between electric field vector, magnetic field vector and wave vector for a plane monochromatic wave propagating through free space.

**(Ceiling-20 Marks)**

### 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. The intensity of sunlight hitting the earth is  $1300 \text{ W/m}^2$ . If the sunlight strikes a perfect absorber, what pressure does it exert? What will be the pressure, if sunlight strikes on a perfect reflector?
14. Discuss the decay of current in a series LR circuit and define its time constant.
15. A heating coil of resistance  $100\Omega$ , a choke of inductance  $0.5\text{H}$  and a capacitor of capacitance  $15\mu\text{F}$  are connected in series across  $200\text{V}$ ,  $50\text{Hz}$  supply. Find,
- (i) Impedance of the circuit
  - (ii) Current taken from the ac source by the circuit.
  - (iii) Potential difference across each element in the circuit.
16. Derive the expression for the energy stored in a magnetic field.
17. (i) Find out whether the discharge of a capacitor through a circuit containing the following elements, is oscillatory  $C=0.2 \mu\text{F}$ ,  $L=10\text{mH}$ ,  $R=250\Omega$ .
- (ii) If so, find the frequency
  - (iii) Calculate the maximum value of 'R' possible so as to make the discharge oscillatory.
18. An ac emf of  $10\text{V}$  and  $100$  cycles/second is applied to a  $5\text{H}$  choke having ohmic resistance of  $200\Omega$ . Find the power factor of the coil and power absorbed.
19. Using Norton's theorem, calculate the current flowing through  $5\Omega$  resistor in the circuit given below,



(Ceiling- 30 Marks)

### Section C- Essay Type

*Answer any one question. Answer carries 10 marks*

20. Write down Maxwell's equations in electrodynamics. Obtain the different electrodynamic boundary conditions using integral form of Maxwell's equations in matter.
21. Show that during normal incidence of a plane monochromatic electromagnetic wave on a surface, the total energy is conserved.

(1x10= 10 Marks)