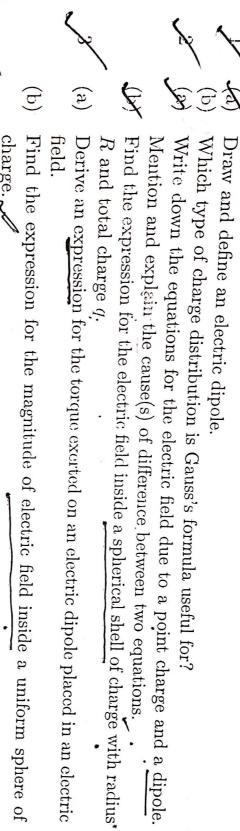
sujan prodhan ru.cse-29

Class Test, First Semester, 2021
Course: Basic Electricity and Electrical Circuits (PHY 1211)

Dept. of CSE, University of Rajshahi

Time: 30 minutes

Answer any ONE from each question



A neutral water molecule (H₂O) of electric dipole moment 6.2×10^{-30} C.m is placed in an electric field of 1.5×10^4 N/C. What maximum torque can the field exert on

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it?

<u></u> A particle of charge +q is placed at one corner of a Gaussian cube. of q/ϵ_0 gives the flux through each cube face forming that corner? What multiple, 4

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Class Test 03, First Semester, 2021

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Course: Basic Electricity and Electrical Circuits (PHY 1211) Dept. of CSE, University of Rajshahi

inswer any ONE question. lime: 30 minutes; Marks: 16

(a)Is Ampere's law suitable to use for all types of current distribution? Justify your

(b)

(c) A long, straight wire of radius R carries a steady current I that is uniformly distributed through the cross section of the wire. Calculate the magnetic field a distance r from the center of the wire in the regions r > R and r < R.

Show that the charge on the capacitor in an RC circuit increases according to q =

(a) $C\mathcal{E}(1 - e^{t/RC})$ Define capacitive time constant and show that it has the dimension of time

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R. After how many time constants is the charge on the capacitor one-fourth its initial A capacitor of capacitance C that is being discharged through a resistor of resistance

value?

(a) State and explain Faraday's law of induction.

Explain Lenz'z law.

A coil consists of 200 turns of wire. Each turn is a square of side d 5 18 cm, and a

If the field changes linearly from 0 to 0.50 T in 0.80 s, what is the magnitude of the uniform magnetic field directed perpendicular to the plane of the coil is turned on.

induced emf in the coil while the field is changing?



(a)

Class Test, First Semester, 2021

Course: Basic Electricity and Electrical Circuits (PHY 1211) Dept. of CSE, University of Rajshahi

Time: 30 minutes

Answer any ONE from each question Marks: 15

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(b)	(a)	(b)		(a)	(b)	(a)
Find the expression for the magnitude of electric field inside a uniform sphere of 5	Derive an expression for the torque exerted on an electric dipole placed in an electric 5	Find the expression for the electric field inside a spherical shell of charge With Faulus	Mention and explain the cause(s) of difference between two equations.	Write down the equations for the electric field due to a point charge and a dipole. 3	Which type of charge distribution is Gauss's formula useful for?	Draw and define an electric dipole.

in an electric field of 1.5×10^4 N/C. What maximum torque can the field exert on

A neutral water molecule (H₂O) of electric dipole moment 6.2×10^{-30} C.m is placed

(b) A particle of charge +q is placed at one corner of a Gaussian cube. What multiple of q/ϵ_0 gives the flux through each cube face forming that corner?

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Class Test, First Semester, 2021

Course: Basic Electricity and Electrical Circuits (PHY 1211) Dept. of CSE, University of Rajshahi

nswer question 1 and any one from 1 - 3. me: 30 minutes; Marks: 15

and $1.69 \times 10^{-8} \Omega$ m). What is mean free path for the conduction electrons in copper? (conduction electron density and resistivity in copper are $8.49 \times 10^{28} \text{ m}^{-3}$ What is the mean free time τ between collisions for the conduction electrons in copper, assuming that their effective speed 1.6×10^6 m/s.

4

- Discuss the effect of dielectric on the capacitance. Discuss the effect of dielectric on the electric field
- Derive Gauss's law with dielectrics.
- Explain the electron theory of conductivity and derive the equation $\rho = \frac{m}{ne^2\tau}$.
- Why are small units used instead of Farad?
- Define current and current density.