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| QP Code: D143638 | | Total Pages:1 | Name: |
| | | | Register No. |
| FOURTH SEMESTER (CUFYUGP) DEGREE EXAMINATION, APRIL 2026 | | | |
| APPLIED PHYSICS /PHYSICS | | | |
| APH4CJ203/PHY4CJ203: Electrodynamics I | | | |
| 2024 Admission onwards | | | |
| Maximum Time :2 Hours | | | Maximum Marks :70 |
| Section A | | | |
| All Questions can be answered. Each Question carries 3 marks (Ceiling: 24 Marks) | | | |
| 1 | State and explain the fundamental theorem for divergences. Give its geometrical interpretation. | | |
| 2 | Using a suitable example, show that the curl of a vector is a vector quantity. | | |
| 3 | State and explain Stokes' theorem. Give its geometrical interpretation. | | |
| 4 | State superposition principle in electrostatics. Why is it valid in electrostatics? | | |
| 5 | Express Gauss's theorem in integral form. | | |
| 6 | Define electric potential. How is the electric field related to the electric potential? Express the relation mathematically. | | |
| 7 | Magnetic force cannot accelerate a particle. Explain why. | | |
| 8 | Find the magnetic field at a perpendicular distance s of an infinitely long straight conductor carrying a steady current I . | | |
| 9 | State and explain Kirchhoff's laws. | | |
| 10 | Find the expression for the torque acting on a current loop when it is placed in a magnetic field. | | |
| Section B | | | |
| All Questions can be answered. Each Question carries 6 marks (Ceiling: 36 Marks) | | | |
| 11 | The height of a certain hill in feet is given by $h(x, y) = 10(2xy - 3x^2 - 4y^2 - 18x - 28y + 12)$. Find the position of the top of the hill and the height of the hill using the method of differential calculus. | | |
| 12 | Obtain the divergence of an electric field due to a volume charge distribution. | | |
| 13 | Starting from the expression of the electric field, find the potential inside and outside of a spherical shell of radius R that carries a total charge Q . | | |
| 14 | Obtain the expression for the cyclotron frequency. | | |
| 15 | Show that the divergence of a magnetic field always vanishes. | | |
| 16 | Apply Ampere's law to find the magnetic field outside and inside a current-carrying solenoid. | | |
| 17 | Draw a neat diagram of Wheatstone's bridge. Apply Kirchhoff's law to deduce Wheatstone's condition for balancing the bridge | | |
| 18 | State and prove the maximum power transfer theorem. | | |
| Section C | | | |
| Answer any ONE. Each Question carries 10 marks (1x10=10 Marks) | | | |
| 19 | Define electric potential. Find the electric potential of a uniformly charged spherical shell; outside the shell, on the surface of the shell, and inside the shell. | | |
| 20 | Discuss in detail the theory of a moving-coil ballistic galvanometer. Define current sensitivity and voltage sensitivity. | | |