

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.		