



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Midterm Examination, Fall 2025

Course Code: PHY102, Course Title: Physics II

Level: 1 Term: 3 Batch: 68

Time: 01:30 Hrs

Marks: 25

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	Identify the limitations of Coulomb's Law.	1	CO1
	b)	State Ampère's Law.	1	
	c)	Relate drift velocity with current density.	1	
	d)	Recall the concept "Lorentz Force".	1	
	e)	Distinguish between resistivity and conductivity.	1	
2.	a)	A father teaches his daughter how to protect sensitive equipment from high current by using a low resistance in parallel. Explain how this protects the equipment and determine the current flowing through the low resistance.	3	CO2
	b)	An engineer is designing a touch sensor using two flat metal plates placed parallel to each other with a thin insulating layer in between. Demonstrate the capacitance of this type of capacitors.	3	
	c)	During an electronics workshop, a technician notices that a compass needle deflects near a long, straight current-carrying wire. Using the Biot-Savart law, derive the expression for the magnetic field at a distance r from the wire carrying a steady current I .	4	
3.	a)	A copper wire of cross-sectional area 1 mm^2 carries a current of 10 A. If the number of free electrons per cubic meter is 1×10^{28} , determine a) the drift velocity of the electrons, and b) the current density.	2.5	CO3
	b)	A large, non-conducting sheet carries a uniform surface charge density of $\sigma = 3 \times 10^{-6}\text{ C/m}^2$. a) Calculate the electric field intensity near the surface of the sheet. b) If a test charge of $q = 2 \times 10^{-9}\text{ C}$ is placed at some distance from the sheet, determine the magnitude of the electrostatic force acting on it.	2.5	
	c)	The magnetic flux through a flat surface of area 40 cm^2 in a uniform magnetic field of 1.2 T is $2.4 \times 10^{-3}\text{ Wb}$. What is the angle (in radians) between the plane and the magnetic field?	2.5	
	d)	The primary coil of a transformer has 200 turns and is connected to a 120 V supply. If the secondary coil has 800 turns, determine the secondary voltage.	2.5	