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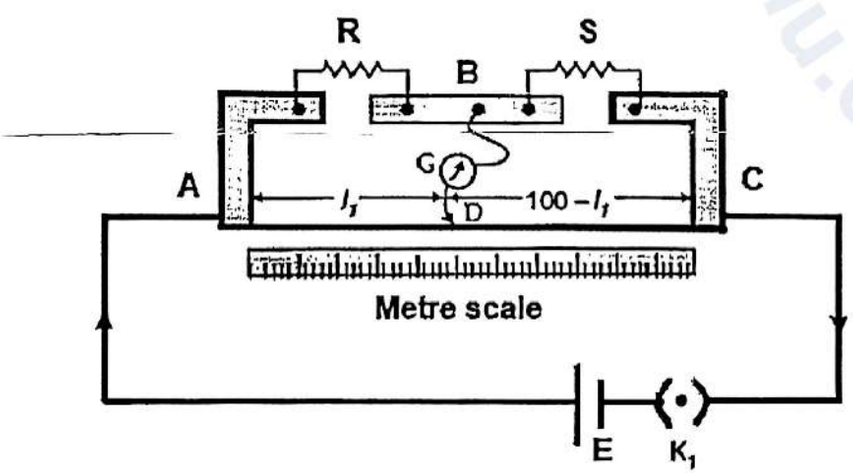
Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Midterm Examination, Summer 2026
Course Code: PHY102, Course Title: Physics II
Level: 1 Term: 3 Batch: 70

Time: 01:30 Hour **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)*	Recall and explain the applications and limitations of Coulomb's law.	**2**	**CO1**
	(b)	List the physical significance of resistivity and electrical conductivity.	**2**	
	(c)	Define the Lorentz force and write its mathematical expression.	**1**	
2.	*(a)*	In a laboratory experiment, a student increases the number of turns per unit length of a solenoid. Apply Ampere's law to analyze the magnetic field in the solenoid.	**3**	**CO2**
	(b)	 A meter bridge is shown with a jockey and sliding contact. Using the diagram, explain the working principle and derive the balance condition of a meter bridge.	**3**	
	(c)	A physics student is analyzing electric field lines passing through different surfaces placed in a uniform electric field in a laboratory experiment. The student observes that the number of field lines passing through the surface depends on its orientation and area. State Gauss's law and apply it to derive Coulomb's law in electrostatics.	**4**	
3.	*(a)*	In a laboratory experiment, a circular coil of diameter 8 μm with 20 turns carries a current of 60 mA. Determine the magnetic flux density at the center.	**2.5**	**CO3**

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(b)	ABC is an equilateral triangle of sides 3 m each. First 250 C charge is placed at point A. Then -250 C charge is placed at point B. (i) What is the potential at C in the first case? (ii) What change of intensity at point C will take place before and after placing the charge at B, and verify the result mathematically.	**2.5**
(c)	The area of each plate of a parallel plate capacitor is 0.06 m^2. If the distance between the plates is 0.003 m and the potential difference is 80 V, determine: (i) Capacitance of the capacitor (ii) Energy stored between the two plates.	**2.5**
(d)	A technician notices that a galvanometer is overheating because excessive current is flowing through it. To reduce the current through the galvanometer, a shunt resistor of 2 Ω is connected across a galvanometer of resistance 98 Ω. If the current through the shunt resistor is 4.9 A, compute the total current flowing through the circuit.	**2.5**