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Daffodil International University

Department of Electrical and Electronic Engineering

Faculty of Engineering

Mid-term Examination, Fall – 2026

Course Code: 0714-225 Course Title: Electromagnetic Fields and Waves

Section: A, B, C, D Level-Term: L2-T3 Teacher's Initial: MFI

Full Marks: 25 Exam Date: November 03, 2026 Time: 1.5 Hours

[**Notes:** Answer all the following questions
CO's represent one of the learning outcomes of the course.
Figures on the right hand side indicate marks allocated for the questions.]

Q1. If $\mathbf{E} = \rho cos\phi \mathbf{a}_\rho + sin\phi \mathbf{a}_\phi$, **evaluate** $\oint \mathbf{E}.\,\mathbf{dl}$ around the path shown in Fig. 1 using Stokes's theorem. **CO-1 C4** **[5]**

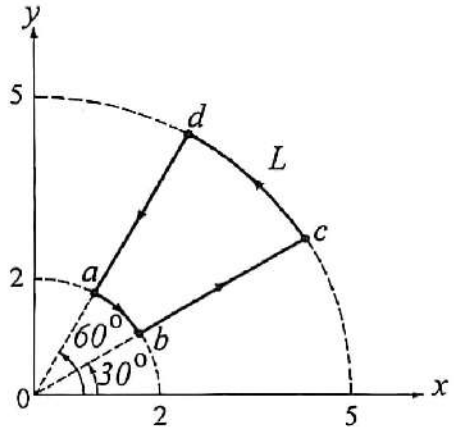


Fig. 1

Q2. **Determine D** at (4, 0, 3) if there is a point charge -5π mC at (4, 0, 0) and a line charge 3π mC/m along the y-axis. **CO-1 C4** **[5]**

Q3. A charge distribution with spherical symmetry has density $\rho_v = \frac{\rho_0 r}{R}$ for $0 \leq r \leq R$ and zero otherwise. **Determine E** everywhere. **CO-1 C4** **[5]**

Q4. For an electric dipole centered at $\mathbf{r}'$ with dipole moment **p**, **show** that the potential at **r** is given by $V(\mathbf{r}) = \frac{\mathbf{p}.(\mathbf{r}-\mathbf{r}')}{4\pi\varepsilon_0|\mathbf{r}-\mathbf{r}'|^3}$. **CO-1 C3** **[5]**

Q5. The point charges -1 nC, 4 nC and 3 nC are located at (0,0,0), (0,0,1) and (1,0,0) respectively. **Find** the energy in the system. **CO-1 C4** **[5]**