Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
**Final Examination, Spring – 2026**

Course Code: 0541-111
Section: A,B,C
Full Marks: 40

Course Title: Differential & Integral Calculus
Level-Term: L1-T1
Exam Date: April 29, 2026

Teacher's Initial: TRS
Time: 2 Hours

[Answer all the following questions]

[The second right most column indicates the course outcomes with respective Bloom's level and right most column indicates the allocated marks]

**Marks**

**Q1.** **(a) Discuss** the concept of partial differentiation with suitable example. [5]

If $u = x^2 + y^2 lnx + 2e^{-x}y$ then **demonstrate** $\frac{\partial^2 u}{\partial x^2}$ and $\frac{\partial^2 u}{\partial y^2}$. **CO-1 (C2)**

(b)**Explain** Euler's Theorem for homogeneous functions. Also, **interpret** how the theorem applies to the given function $u = \cos^{-1}(\frac{x+y}{\sqrt{x}+\sqrt{y}})$. [4]

**Q2.** **(a) Apply** appropriate integration technique to **evaluate** the following integrals: [9]

i) $\int \frac{dx}{(x+1)(x+2)}$ ii) $\int_1^2 \int_x^{e^x} \frac{x}{y} dydx$ iii) $\int_0^{\frac{\pi}{2}} lncosx\, dx$ **CO-2 (C3)**

**(b) Solve** the following integrals: [8]

i) $\int_0^1 \frac{x^6}{\sqrt{1-x^2}} dx$ ii) $\int_0^1 x^4 \sqrt{x^2 - x^3} dx$

**Q3.** The region is bounded by the curves $y = x^2 + 1$ and $y = 7 - x$. **Apply** the concept of double integration to **determine** the area of the region enclosed between the given curves. **CO-3 (C3)** [5]

**Q4.** **(a)** The electrostatic potential on all parts of a conducting circular disc of radius r is given by the equation: $V = 2\pi\sigma \int_0^9 \frac{R}{\sqrt{R^2+r^2}} dR$. **Apply** appropriate integration technique to **evaluate** the integral and determine the potential distribution. **CO-3 (C3)** [4]

**(b)** A series RC circuit is connected to DC voltage source. The current flowing through the circuit during the charging process is given by $i(t) = \frac{V}{R} e^{-\frac{t}{RC}}, t \geq 0$, here $V$ is the applied voltage, $R$ is the resistance and $C$ is the capacitance of the circuit. **Determine** the total charge transferred in the circuit. [5]