



Daffodil International University
 Department of Electrical and Electronic Engineering
 Faculty of Engineering
Final Examination, Fall – 2024

Course Code: 0541-111

Course Title: **Differential and Integral Calculus**

Section: A, B, C, D, E, F

Level-Term: L1-T1

Teacher's Initial: SDN(A+B+C+D+E),
HRP(F)

Full Marks: 40

Exam Date: December 28, 2024 Time: 2 Hours

[Answer all the following questions sequentially]

- Q1.** (a) If $u = \ln\sqrt{x^2 + y^2 + z^2}$ then investigate the value of $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}$ in terms of u . CO-2 5
(C4)
- (b) Illustrate Euler's theorem on the Homogeneous function. If $u = \sin^{-1}\left(\frac{x}{y+z}\right)$ then examine the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$. CO-2 5
(C4)
- Q2.** (a) Calculate the integrals i) $\int \cos^3 x \, dx$ ii) $\int e^{qx} \sin px \, dx$ CO-2 9
(C4)
- (b) Calculate the integrals i) $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} \, dx$ ii) $\int_0^a \int_0^x \int_0^y x^3 y^2 z \, dz \, dy \, dx$ CO-2 6
(C4)
- Q3.** Compute the largest area lying above the x -axis and included between the circle $x^2 + y^2 = 8x$ and the parabola $y^2 = 4x$. CO-3 5
(C3)
- Q4.** (a) Examine that Gamma function is the generalization Factorial function. CO-2 3
(C4)
- (b) Identify the value of $\Gamma\left(-\frac{7}{2}\right)$. CO-2 2
(C4)
- (c) Calculate the value of the definite integral i) $\int_0^{\pi/2} \sin^2 x \cos^{\frac{5}{2}} x \, dx$ CO-2 5
(C4)
- ii) $\int_0^1 x^4 (1-x)^{\frac{11}{2}} \, dx$