ourdiu.com | Shared by PRITOM MUKHERJEE

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 (C4) 5

(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 (C4) 5

Q2. (a) **Calculate** the integrals i) $\int \cos^3 x\, dx$ ii) $\int e^{qx} sinpx\, dx$ CO-2 (C4) 9

(b) **Calculate** the integrals i) $\int_0^{\pi/2} \frac{sinx}{sinx+cosx} dx$ ii)) $\int_0^a \int_0^x \int_0^y x^3 y^2 z\, dz\, dy\, dx$ CO-2 (C4) 6

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 (C3) 5

Q4. (a) **Examine** that Gamma function is the generalization Factorial function. CO-2 (C4) 3

(b) **Identify** the value of $\Gamma\left(-\frac{7}{2}\right)$. CO-2 (C4) 2

(c) **Calculate** the value of the definite integral i) $\int_0^{\pi/2} sin^2 x \cos^{\frac{5}{2}} x\, dx$ CO-2 (C4) 5

ii) $\int_0^1 x^4(1-x)^{\frac{11}{2}} dx$

ourdiu.com