Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Final Examination, Fall 2022
Course Code: MAT101; Course Title: Mathematics-I
Sections & Teachers: All

Time: 2:00 Hrs **Marks: 40**

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)** $u = (x^2 + y^2 + z^2)^{-\frac{1}{2}}$, Is it symmetric? Using the rules of partial differentiation, **show** that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$. **b)** $u = \tan^{-1}\left(\frac{x^3 - y^3}{x - y}\right)$, Is it a Homogeneous function? Using Euler's theorem **show** that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$	**[Marks- 10]**	**CO-2** *Level-1*
2.	**Solve** the following integrals by using the appropriate method. **a)** $\int \frac{dx}{(1+x^2)(9-(\tan^{-1}x)^2)}$ **b)** $\int x^2 \sin x dx$ **c)** $\int \frac{(x+5)dx}{(x^2+3)\sqrt{x^2+6}}$ **d)** $\int_0^2 \frac{dx}{(x+2)\sqrt{1+x}}$ **e)** $\int_0^1 \frac{x^5}{16-x^{12}} dx$ **f)** $\int_0^3 \frac{x^2-1}{(x+1)^2(x-2)} dx$	**[Marks-20]**	**CO-3** *Level-3*
3.	Using the proper method, **solve** the following multiple integrals. **a)** $\int_0^2 \int_1^2 (2x - 5y^2) dxdy$ **b)** $\int_1^3 \int_{-1}^2 \int_0^1 6xy^3z^2 dzdxdy$	**[Marks-10]**	**CO-3** *Level-3*