

## **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, <b>show</b> 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 <b>show</b> 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) $\int \frac{dx}{(1+x^2)(9-(\tan^{-1}x)^2)}$ d) $\int_0^2 \frac{dx}{(x+2)\sqrt{1+x}}$ b) $\int x^2 \sin x dx$ e) $\int_0^1 \frac{x^5}{16-x^{12}} dx$ c) $\int \frac{(x+5)dx}{(x^2+3)\sqrt{x^2+6}}$ 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) $\int_0^2 \int_1^2 (2x - 5y^2) dx dy$ b) $\int_1^3 \int_{-1}^2 \int_0^1 6xy^3z^2 dz dx dy$	[Marks-10]	CO-3 Level-3