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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid-Term Examination, Fall 2025
Course Code: MAT 102, Course Title: Mathematics II
Level: 01, Term: 02, Batch: 69

Time: 01:30 Hrs **Marks: 25**

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)***	**Find** the values of the following integration by using Gamma function, $\int_0^{\infty} e^{-20x^2} x^5 dx$	**[02]**	**CO1**
	b)	**Find** the values of the following integration by using Gamma-Beta function, $\int_0^{\frac{\pi}{2}} \sin^7\theta d\theta$	**[02]**	
	c)	**Interpret** the value of the following integration by using Gamma-Beta function, $\int_0^1 \left(\sqrt[3]{x^2}-1\right)^6 dx$	**[04]**	
2.	***a)***	In a computational model, the cost function is given by $C(x,y,t)=\cot^{-1}\left(\frac{\left(\sqrt[3]{x}-\sqrt[3]{y}-\sqrt[3]{t}\right)^2}{\sqrt[7]{x^2}-\sqrt[7]{y^2}-\sqrt[7]{t^2}}\right)$ Where x is CPU usage, y is memory allocation, and t is execution time. Now, **Apply** Euler's theorem to **Identify** the value of $x\frac{\partial C}{\partial x}+y\frac{\partial C}{\partial y}+t\frac{\partial C}{\partial t}$ to analyze their impact on system optimization.	**[05]**	**CO2**
	b)	**Construct** the Matrix form of the complex number $Z=\frac{Z_1}{2Z_2}+Z_3-Z_4$, where $Z_1=(1-i)^2; Z_2=\begin{bmatrix}0 & 1\\ -1 & 0\end{bmatrix}; Z_3=\left(\sqrt{2},\frac{\pi}{4}\right)^{13}; Z_4=e^{\frac{i\pi}{9}}$	**[07]**	
3.		**Solve** the triple integral $\int_1^e\int_1^e\int_1^e \frac{3}{xyz}dxdydz$	**[05]**	**CO4**

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