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# Daffodil International University

**Faculty of Science & Information Technology**
**Department of Software Engineering**
**Final Examination, Fall 2025**
**Course Code: MAT101**
**Course Title: Mathematics I**
**Batch: 45; Section: All**
**Teachers Initial: MMR (AKA), DMMK, DK, HSA, NRA, AAR**

**Time: 2 Hours** **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]***

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|---|---|---|---|
| 1. | **Explain** the following terms<br>**a.** Condition of a function to have maximum & minimum values.<br>**b.** Condition of a function to have inflection point. | $2.5 \times 2.5 = 5$ | CLO-1<br>L-2 |
| 2. | **Compute** the maximum and minimum values of $y = x^6 - 12x^5 + 36x^4 + 4$<br>Also, **identify** the critical points and inflection points (if any), of the above function. | 6+2+2=10 | |
| 3. | **Calculate** the followings:<br>**a.** $\int \frac{(1+x)e^x}{\cos^2(xe^x)}\, dx$<br>**b.** $\int Sin^4x\, dx$<br>**c.** $\int_0^{\frac{\pi}{2}} sin2x\, sinx\, dx$<br>**d.** $\int_0^2 \int_0^z \int_0^{x\sqrt{3}} \frac{x}{x^2+y^2}\, dy\, dx\, dz$<br>**e.** $\int_0^1 x^4(1-x)^{\frac{3}{2}}\, dx$ | $5 \times 3 = 15$ | CLO-2<br>L-3 |
| 4. | **a.** **Calculate** the area of the circle $x^2 + y^2 = a^2$<br>**b.** **Calculate** the area of the region enclosed by the curve $y^2 = 4ax$ from $x = 0$ and $x = a$. | 6<br>4 | CLO-3<br>L-4 |