

Notice:

- a) Term grading policy: Exam-3 (Final) \times **40%**.
- b) Total 105 points in this exam.
- c) Exam Time: 1:00PM–3:00PM, 9 Jan., 2025.

1. (25 pts) Evaluate the following integral:

$$\int_0^{2\pi} \frac{d\theta}{\cos \theta + 2 \sin \theta + 3}.$$

2. (25 pts) Evaluate the following integral:

$$\text{P.V.} \int_{-\infty}^{\infty} \frac{x \cos x}{x^2 - 3x + 2} dx.$$

3. (25 pts) Evaluate the following integral:

$$\text{P.V.} \int_0^{\infty} \frac{x^{1/3}}{(x+1)^2} dx.$$

4. (30 pts) Use residues to find the Fourier transform of $f(t) = \frac{\sin \pi t}{1 - t^2}$.