

DUMKAL COLLEGE

2nd Semester Internal Examination - 2026

Subject: Physics (Minor) — Mathematical Physics I

Full Marks: 10

Date: 14/08/2026

Time: 1 Hour

Answer any two questions. All questions carry equal marks. ($2 \times 5 = 10$)

1. Define Dirac delta function. Solve the following integrals:

i. $\int_{-5}^5 \cos(3x) \delta(x - \pi/3) dx$

ii. $\int_0^{10} (e^{2x-7} + 4) \delta(x + 3) dx$

2. Find the Taylor expansion of the function $f(x) = 1/(1-x)$ at $x = 0$. Verify the result at $x = 2$ and $x = 0.2$. Comment on your result.

3. Evaluate:

i. $\nabla^2 (1/r)$

ii. $\nabla \cdot [|\vec{r}| \nabla (1/r^3)]$

4. Plot the following functions:

i. $y = |x + 2|$

ii. $y = \cosh x$

iii. $y = e^{-x^2}$

iv. $y = 1/x^2 + 2$

v. $y = \sin^2 x$

***** End of Question Paper *****