



DEPARTMENT OF MATHEMATICS
NATIONAL INSTITUTE OF TECHNOLOGY KURUKSHETRA

B.Tech. Second Semester (CE/EE/ECE/ME/PI)

Mid Term – I Examination

Integral Calculus and Difference Equations (MAIC 102)

Max. Marks: 20

Time: 8:30 am – 9:20 am

Note: Answer all the questions.
Calculator is not allowed into the examination hall.

- Q1. Find the singular points of $x^2(x+1)^2 y'' + (x^2 - 1)y' + 2y = 0$ and also, determine the nature of the singularities. (4M)
- Q2. Use Frobenius method to find series solution of $x(x-1)y'' + (3x-1)y' + y = 0$ about $x = 0$. (8M)
- Q3. Find all the eigenvalues and eigenfunctions of Sturm-Liouville boundary value problem $y'' + \lambda y = 0$, $y(0) = y(L) = 0$. (4M)
- Q4. Evaluate $\iint_R r^2 \sin \theta \, d\theta \, dr$, where R is the region bounded by $r = 2 \cos \theta$ above the initial line. (4M)