BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER: IV**
BRANCH: MATHS & COMPUTING **SESSION: SP/2023**

SUBJECT: MA209 INTEGRAL EQUATIONS AND GREEN'S FUNCTION

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1	Show that the function $y(x) = cos\ 2x$ is a solution of the integral equation: $$y(x) = cos\ x + 3\int_0^{\pi} k(x,t)y(t)dt,$$ $$when, \quad k(x,t) = \begin{cases} sin\ x\ cos\ t, & 0 \le x \le t \\ cos\ x\ sin\ t, & t \le x \le \pi \end{cases}$$	[5]	CO-1	BT-1
Q.2	Convert the following IVP into the corresponding integral equation: $$y''(x) + (x^2+1)y(x) = cos\ x$$ subject to the conditions: $y'(0) = 2, \quad y(0) = 0$	[5]	CO-1	BT-3
Q.3	If exists, find the Eigen values and Eigen functions of the following homogeneous Fredholm integral equations with degenerate kernels: $$y(x) = \lambda\int_0^1 (6x - t)y(t)$$	[5]	CO-2	BT-1
Q.4	Solve the following non homogeneous Fredholm Integral equations: $$y(x) = 1 + \lambda\int_0^1 \left(1 + e^{(x+t)}\right)y(t)dt$$	[5]	CO-2	BT-3
Q.5	Solve the following Fredholm integral equations with the help of resolvent kernels: $$y(x) = e^x - \frac{e}{2} + \frac{1}{2} + \frac{1}{2} + \int_0^1 y(t)dt$$	[5]	CO-2	BT-3

::::::24/02/2023::::::M