E-29/2110 9480/NJ

Linear Integral Equations (BHM-505)
(Semester Vth)

Max. Marks: 70
(Attempt any four questions. All questions carry equal marks)

Q1: Solve $u(x) = 1 + \int_0^x u(t)dt$ using method of successive approximations.

Q2: State and prove Abel's problem.

Q3: Form an integral equation from the given boundary value problem $\frac{d^2y}{dx^2} + y = cosx$ with the given conditions y(0) = 0, y'(0) = 1 and y''(0) = 2.

Q4: If K(x,t) is real and continuous and non-zero in R and f(x) is real continuous and non-zero in I. If there exists a function k(x,t) reciprocal to K(x,t) then the Fredholm's equation$u(x) = f(x) + \int_a^b K(x,t)u(t)dt$ has one and only one continuous solution$u(x) = f(x) - \int_a^b k(x,t)f(t)dt$

Q5: State and prove Hadamard's theorem.

Q6: Show that D(x,y:λ) - λK(x,y)D(λ) = $\lambda \int_a^b K(x,t)D(t,y;\lambda)dt$

Q7: Define symmetric kernel and if K(x,t) is real, continuous, non-zero and symmetric in R then $K_n(x,t) \neq 0$ in R.

Q8: Show that λ = 1 is a characteristic constant of $K(s_0,s)$ of index 1.

Q9: Let C be a closed curve with no multiple points and is of class c'' represented by parameter s as x=ξ(s) and y=η(s). Any line parallel to x-axis or y-axis meet the curve almost at m points where m is positive integer dividing the plane into interior and exterior region C_i and C_e, respectively. A function F(s) is continuous on C with $0 \leq s \leq l$, i.e., F(0) = F(l), then u(x,y) is harmonic on I s.t. $u_i(x_0,y_0) = F(s_0)$, i.e., $u(x,y) \rightarrow u_i(x_0,y_0)$ as $s \rightarrow s_0$.