SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC) Chromepet, Chennai — 600 044.

M.Sc. END SEMESTER EXAMINATION APRIL/NOV - 2021

SEMESTER - IV

08PAMCE4004 **&** PAM/CE/4004 - **Calculus of Variations and Integral Equations**

Total Duration : 3 Hrs		**Total Marks : 75**	
MCQ	: 30 Mins	MCQ	: 15
Descriptive	: 2 Hrs.30 Mins	Descriptive	: 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Write short note on Iterated kernel and reciprocal kernel.
2. Convert the differential equation y" + y = 0,y(0),y'(0) = 0 into an integral equation.
3. Find the Eigen values and corresponding Eigen functions of $y(x) = \lambda \int_0^1 e^x\ e^t\ y(t)\ dt$.
4. Find the resolvent kernel of the Volterra integral equation with the kernel k(x,t) = 1
5. Solve $y(x) = \frac{5x}{6} + \frac{1}{2} \int_0^1 x(t)\ y(t)\ dt$ using resolvent kernel.
6. Find the extremal of $\int_a^b 3x + \sqrt{\frac{\partial}{\partial x}}\ y(x)\ dx$.
7. Find the Eigen values and corresponding Eigen functions of $g(s) = \lambda \int_1^2 [st + \frac{1}{st}]\ g(t)\ dt$.
8. Investigate the extremal of the functional $\int_{x_0}^{x_1} \frac{y'^2}{x^3} dx$.

Section C

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Solve by successive approximation: $y(x) = 1 + \int_0^x y(t)\ dt$, $y_0(x) = 0$.
10. If ϕ is the solution of $\phi(x) = 1 - 2x - 4x^2 + \int_0^x (3 + 6(x-t) - 4(x-t)^2)\ \phi(t)\ dt$ then find (t)
11. Derive Euler's equation to find extremal of I(y)=$\int_{x_1}^{x_2} F(x, y, y')dx$. Also derive the second and third forms of Euler's equations.
12. Solve $y(x) = x + \int_0^{\frac{1}{2}} y(t)\ dt$ using resolvent kernel.

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. Discuss about the solution of homogeneous Fredholm equation of second kind with separable kernel.