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.(Physics) END SEMESTER EXAMINATIONS APRIL - 2023
SEMESTER - II

22PPHCT2007 - Computational Methods and C Programming

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

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

1. If $y(75) = 246$, $y(80) = 202$, $y(85) = 118$, $y(90) = 40$ find $y(79)$.
2. Use Lagrange's formula to find the value of y at $x = 6$ from the following data:

x	3	7	9	10
y	168	120	72	63

3. Prove that every square matrix and its transpose have the same eigen values.
4. Solve the following simultaneous equations to second approximation using Jacobi's method.
   20x + y - 2z = 17
   3x +20y - z = -18
   2x - 3y + 20z = 25
5. Write a C program to find the real root of a given equation using bisection method.
6. Evaluate using trapezoidal rule considering five subintervals. $\int_o^1 \frac{1}{1+x}\, dx$
7. Arrive at Simpson's three-eighth rule from Newton-Cote's quadrature formula.
8. Describe on Born Oppenheimer approximation.

Section C

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

9. Write a C program to find out the value of y for a corresponding value of x using Lagrange's interpolation if a data set is given as the input
10. Solve the following system of equations using Gauss elimination method:
    28x + 4y - z = 32
    x + 3y + 10z = 24
    2x + 17y + 4z = 35

Contd...

11. Write a C program to compute the solution of the initial value problem using fourth order Runge - Kutta method for the function $xy + y^2$.
12. Discuss in detail on the theories on exchange correlation functions.

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

13. Find the root of the equation $\sin x = 1 + x^3$ between $(-2, -1)$ to 3 decimal places by Newton - Raphson method.

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