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.
B.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - V
20UMAET5001 - Numerical Methods

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

Section A

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

1. Use the method of iteration to solve the equation $3x$ - $\log_{10} x = 6$.

2. Find a positive root of x $e^x = 2$ by the method of false position.

3. Show that $\delta = \Delta E^{-1/2}$ and $E = \left(\dfrac{\Delta}{\delta}\right)^2$.

4. State and Prove fundamental theorem for finite differences.

5. Compute a cubic polynomial which takes the following values

x	0	1	2	3
f(x)	1	2	1	10

6. Use Lagrange's interpolation formula to examine the value of y when $x =10$, given the following data.

x	5	6	9	11
y	12	13	14	16

7. Solve $\displaystyle\int_0^1 \dfrac{dx}{1 + x^2}$ using Trapezoidal rule with $h = 0.2$.

8. Use Runge – Kutta method of the fourth order to determine y(0.1),given that $\dfrac{dy}{dx} = \dfrac{1}{x + y}$, y(0) = 1.

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks$)$

9. (i) Evaluate the order of convergence of the Newton – Raphson method.
   (ii) Describe the algorithm for Bolzano method.

10. Solve by Gauss – Elimination method:
    3x + 4y + 5z = 18, 2x − y + 8z = 13, 5x - 2y + 7z = 20 .

11. Using Newton's divided difference formula evaluate f(8) given that

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

Contd...

12. The population of a certain town is shown in the following table

Year x	1931	1941	1951	1961	1971
Population y	40.62	60.80	79.95	103.56	132.65

Compute the rate of the growth of population in 1961.

13. Given $\dfrac{dy}{dx} = \dfrac{1}{2}(1 + x^2)y^2$ and

y(0) = 1, y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21

Evaluate y(0.4) by Milne's Predictor corrector method.

*****

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.
B.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - V
20UMAET5001 - Numerical Methods

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

Section A

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

1. Use the method of iteration to solve the equation $3x$ - $\log_{10} x = 6$.

2. Find a positive root of x $e^x = 2$ by the method of false position.

3. Show that $\delta = \Delta E^{-1/2}$ and $E = \left(\dfrac{\Delta}{\delta}\right)^2$.

4. State and Prove fundamental theorem for finite differences.

5. Compute a cubic polynomial which takes the following values

x	0	1	2	3
f(x)	1	2	1	10

6. Use Lagrange's interpolation formula to examine the value of y when $x =$10, given the following data.

x	5	6	9	11
y	12	13	14	16

7. Solve $\displaystyle\int_0^1 \dfrac{dx}{1+x^2}$ using Trapezoidal rule with $h = 0.2$.

8. Use Runge – Kutta method of the fourth order to determine y(0.1),given that $\dfrac{dy}{dx} = \dfrac{1}{x+y}$, y(0) = 1.

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks$)$

9. (i) Evaluate the order of convergence of the Newton – Raphson method.
   (ii) Describe the algorithm for Bolzano method.

10. Solve by Gauss – Elimination method:
    3x + 4y + 5z = 18, 2x − y + 8z = 13, 5x - 2y + 7z = 20 .

11. Using Newton's divided difference formula evaluate f(8) given that

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

Contd...

12. The population of a certain town is shown in the following table

Year x	1931	1941	1951	1961	1971
Population y	40.62	60.80	79.95	103.56	132.65

Compute the rate of the growth of population in 1961.

13. Given $\dfrac{dy}{dx} = \dfrac{1}{2}(1 + x^2)y^2$ and
y(0) = 1, y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21
Evaluate y(0.4) by Milne's Predictor corrector method.

*****