Hall Ticket Number:

Code No. : 15136 S (D)

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. V-Semester Supplementary Examinations, July-2022

Numerical Methods (OE-III)

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	State Intermediate value property.	2	1	1	1,12
2.	Find the second approximation root using bisection method to the equation $x \log_{10} x = 1.2$	2	1	1	1,12
3.	Write the difference between direct and iterative method of solving simultaneous linear equations.	2	1	2	1,12
4.	Define well conditioned, ill-conditioned system of equations.	2	1	2	1,12
5.	State Newton's forward and backward interpolation formulae.	2	1	3	1,12
6.	Write Lagrange's interpolation formula.	2	1	3	1,12
7.	Write Gauss forward & backward difference formula.	2	1	4	1,12
8.	Write Bessel's Formula.	2	1	4	1,12
9.	Using Euler's method, solve for y at x = 0.2 from $\frac{dy}{dx} = 1 - 2xy, y(0) = 0$ taking h = 0.1.	2	2	5	1,12
10.	Write the Taylor's series solution of $\frac{dy}{dx} = xy, y(0) = 1$.	2	2	5	1,12
	Part-B (5 × 8 = 40 Marks)				
11. a)	Find the real root of the equation $\cos x - xe^x = 0$ using Newton-Raphson method correct to four decimal places.	4	2	1	1,2
b)	Find the root of the equation $3x = \cos x + 1$ using Regula-Falsi method correct to four decimal places.	4	3	1	1,2
12. a)	Solve the equations $3x + 2y + 7z = 4, 2x + 3y + z = 5, 3x + 4y + z = 7$ by Factorization method.	4	3	2	1,2
b)	Apply Gauss-Seidal iteration method to Solve the equations $20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = 25$.	4	3	2	1,2
13. a)	Find f (43) from the following data using Newton's interpolation formula:	4	2	3	1,2

x	40	50	60	70	80	90
f(x)	184	204	226	250	276	304

Contd... 2

b)	If $y(1) = -3, y(3) = 9, y(4) = 30, y(6) = 132$, find the Newton's divided difference interpolation polynomial.	4	3	3	1,2
14. a)	Find f (32) from the following data using Gauss forward difference formula:	4	3	4	1,2

x	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

b)	Apply Stirling's formula to find f (27.5) from the table:	4	3	4	1,2

x	25	26	27	28	29	30
f(x)	4.000	3.846	3.704	3.571	3.448	3.333

15. a)	Find by Taylor's series method, the value of y at x = 0.1 and 0.2 to four places of decimals from $\frac{dy}{dx} = y^2 + x, y(0) = 1.$	4	3	5	1,2
b)	Using Runge – Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y-x}{y+x}$ with $y(0) = 1$ at $x = 0.2$ in steps of 0.1.	4	3	5	1,2
16. a)	Use Newton-Raphson method to derive the formula to find $\sqrt[k]{N}, N > 0, k$ is a positive integer.	4	2	1	1,2
b)	Solve $2x + 2y + z = 12, 3x + 2y + 2z = 8, 5x + 10y - 8z = 10$ by Gauss elimination method.	4	2	2	1,2
17.	Answer any ***two*** of the following:				
a)	Using Lagrange's interpolation formula, find $y(3)$, given that $y(1) = -26,\ y(2) = 12, y(4) = 256, y(6) = 844.$	4	2	3	1,2
b)	Interpolate by means of Gauss backward difference formula, the population of a town for the year 1974, given that	4	3	4	1,2

Year	1939	1949	1959	1969	1979	1989
Population (in thousands	12	15	20	27	39	52

c)	Find by Modified Euler's method, the value of y at x = 0.2 and 0.4 to four places of decimals from $\frac{dy}{dx} = y + e^x, y(0) = 0.$	4	3	5	1,2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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