Hall Ticket Number:

Code No. : 14164 (I) N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Main & Backlog Examinations, July-2023

Numerical Methods (OE-II)

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.	Define Algebraic & Transcendental equations and give one example each.	2	1	1	1,2,12
2.	Explain False position method geometrically.	2	1	1	1,2,12
3.	Illustrate about Well & Ill conditioned system of equations.	2	1	2	1,2,12
4.	Distinguish among direct and Iterative methods for solving linear system of equations.	2	1	2	1,2,12
5.	Prove the result $E = e^{hD}$.	2	1	3	1,2,12
6.	Using Lagrange's formula, express the function $\frac{x+3}{x^2-5x+6}$ as sum of partial fractions.	2	2	3	1,2,12
7.	Distinguish among Gauss forward and backward interpolation formulae.	2	1	4	1,2,12
8.	Explain the Bessel's interpolation formula.	2	1	4	1,2,12
9.	Illustrate geometrically, how the solution can be approximated through Euler's method.	2	1	5	1,2,12
10.	Distinguish among Euler's and Modified Euler's method.	2	1	5	1,2,12
	Part-B (5 × 8 = 40 Marks)				
11. a)	Using Bisection method, find the real root of $3x - cosx - 1 = 0$.	4	2	1	1,2,12
b)	Find the real root of $e^x = 3x + sinx$, using Newton-Raphson method.	4	2	1	1,2,12
12. a)	Apply LU-Decomposition method to solve the equations $3x + 2y + 7z = 4$, $2x + 3y + z = 5$, $3x + 4y + z = 7$.	5	3	2	1,2,12
b)	Apply Gauss-Seidel iteration method to solve the system $10x + 2y + z = 9$, $-2x + 3y + 10z = 22$, $2x + 20y - 2z = -44$.	3	3	2	1,2,12
13. a)	From the following table:	4	2	3	1,2,12

x^0	10	20	30	40	50	60	70	80
$\cos x$	.9848	.9397	.8660	.7660	.6428	.5000	.3420	.1737

Calculate $\cos 25^0$ using Newton's Forward Interpolation formula.

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b)	Certain corresponding values of x and $y = log_{10}x$ are given below. Find $log_{10}310$ using Newton's divided difference formula.	4	3	3	1,2,12
14. a)	Using Gauss backward formula obtain y_{85} given that $y_{80} = 0.134$, $y_{82} = 0.154$, $y_{84} = 0.176$, $y_{86} = 0.200$, $y_{88} = 0.227$.	4	2	4	1,2,12
b)	Using Sterling's interpolation formula find f(32), given that f(25) = 0.2707, f(30) = 0.3027, f(35) = 0.3386, f(40) = 0.3794.	4	3	4	1,2,12
15. a)	Find $y(0.1)$ *and* $y(0.2)$ by Taylor's series method for the differential equation $y^1 = x^2 - y$, $y(0) = 1$.	4	3	5	1,2,12
b)	Given $\frac{dy}{dx} = x^2 + y^2$ with y(0) = 0. Estimate y(0.4) using Runga-Kutta fourth order method (take $h = 0.2$).	4	3	5	1,2,12
16. a)	Using Regula- Falsi method find the real root of $cosx + xsinx = 0$.	4	2	1	1,2,12
b)	Solve the following equations by Jacobi's iteration method $5x + 2y + z = 12$, $x + 4y + 2z = 15$, $x + 2y + 5z = 20$.	4	3	2	1,2,12
17.	Answer any ***two*** of the following:				
a)	Use Lagrange's interpolation formula to find the form of $f(x)$, given that	4	2	3	1,2,12
b)	From the following table obtain the value of y when x = 3.75 using Gauss forward formula for central differences.	4	2	4	1,2,12
c)	Using Modified Euler's method, find an approximate value of y when x = 0.3 given that $\frac{dy}{dx} = x + y$, y = 1 when x = 0. Compare the result with exact solution.	4	3	5	1,2,12

x	300	304	305	307
y	2.4771	2.4869	2.4843	2.4871

x	0	2	3	6
$f(x)$	648	704	729	792

x	2.5	3.0	3.5	4.0	4.5	5.0
y	24.145	22.043	20.225	18.644	17.262	16.047

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

i)	Blooms Taxonomy Level – 1	22.5%
ii)	Blooms Taxonomy Level – 2	37.5%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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