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G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.



UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2025.

(For those admitted in June 2023 and later)

PROGRAMME AND BRANCH: B.Sc., MATHEMATICS

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
V	PART - III	CORE ELECTIVE-2	U23MA5E2A	NUMERICAL METHODS

Date & Session: 13.11.2025/FN

Time : 3 hours

Maximum: 75 Marks

Course Outcome	Bloom's K-level	Q. No.	SECTION – A (10 X 1 = 10 Marks) Answer <u>ALL</u> Questions.
CO1	K1	1.	Give the name of any two iteration methods for solving algebraic equations. a) Jacobi and Raphson b) Gauss Jacobi and Gauss-seidel c) Horner's and Jacobi d) Raphson and Horner's
CO1	K2	2.	Newton Raphson method is also known as the method of _____. a) tangents b) sines c) cosines d) secants
CO2	K1	3.	$\Delta [f(x)] = \underline{\hspace{2cm}}$. a) $f(x+h)-f(x)$ b) $f(h)$ c) $f(x+h) + f(x)$ d) $f(x-1)$
CO2	K2	4.	$\Delta [2^x] = \underline{\hspace{2cm}}$. a) $2x$ b) $2^x(2^h-1)$ c) $h-1$ d) $x-1$
CO3	K1	5.	UnNewton's forward interpolation formula is used only for _____. a) finite b) unequal c) infinite d) equal
CO3	K2	6.	Newton's___ interpolation formula is used when interpolation is required near the end of the table value. a) Backward b) forward c) divided difference d) linear
CO4	K1	7.	The order of the difference equation $y_{n+2} - 2y_{n+1} + y_n = 2^n$ is _____. a) 1 b) 3 c) 2 d) 4
CO4	K2	8.	If $E^2y = x^2$, then the value of y is _____ if $h=1$. a) $x-2$ b) $(x-2)^2$ c) $x-1$ d) $(x-3)$
CO5	K1	9.	Error in simpson's rule is of order _____. a) h b) $h+1$ c) h^2 d) h^4
CO5	K2	10.	_____ rule approximates the integral by the sum of the areas of n trapezoids. a) triangular b) simpson's c) trapezoidal d) Horner's

Course Outcome	Bloom's K-level	Q. No.	SECTION – B (5 X 5 = 25 Marks) Answer <u>ALL</u> Questions choosing either (a) or (b)							
CO1	K3	11a.	Find the value $\sqrt{12}$ of to four places of decimals by Newton-Raphson method.							
			(OR)							
CO1	K3	11b.	Find the positive real root of $x \log_{10} x = 1.2$ using the bisection method in four iterations.							
CO2	K3	12a.	Find the first and second order differences for $f(x) = ab^{ex}$.							
			(OR)							
CO2	K3	12b.	Find the sixth term of the sequence 2,6,12,20,30,...							
CO3	K4	13a.	If $y(75) = 246$, $y(80) = 202$, $y(85) = 118$, $Y(90) = 40$ find $y(79)$.							
			(OR)							
CO3	K4	13b.	Use Lagrange's interpolation formula to fit a polynomial to the following data . Also find the value of y when $x=2$.							
			X	0	1	3	4			
			Y	-12	0	6	12			
CO4	K4	14a.	Given $u_0 = 5$; $u_1 = 15$, $u_2 = 57$ and $u'(x) = 4$ at $x=0$ and 72 at $x=2$. Find $\Delta^3 u_0$ and $\Delta^4 u_0$.							
			(OR)							
CO4	K4	14b.	Find the gradient of the road at the middle point of the elevation above a datum line of seven points of a road which are given below:							
			X	0	300	600	900	1200	1500	1800
			Y	135	149	157	183	201	205	193
CO5	K5	15a.	Evaluate $\int_0^1 e^{-x^2} dx$ by dividing the range into 4 equal parts using Trapezoidal rule.							
			(OR)							
CO5	K5	15b.	Find the value of $\log 2^{1/3}$ from $\int_0^1 \frac{x^2}{1+x^3} dx$ using simpson's 1/3 rule with $h=0.25$.							

Course Outcome	Bloom's K-level	Q. No.	SECTION – C (5 X 8 = 40 Marks) Answer ALL Questions choosing either (a) or (b)
CO1	K3	16a.	Solve the following system of equations using Gauss Seidel iteration method. $6x+15y+2z = 72$; $x+y +54z = 110$; $27x+6y-z = 85$.
CO1	K3	16b.	(OR) Find the real root lying between 1 and 2 of the equation $x^3-3x + 1 = 0$ upto 3 places of decimals by using Regula-falsi method.
CO2	K4	17a.	Find the second difference of the polynomial $f(x) = x^4 -12 x^3 +42 x^2 - 30x +9$ with $h=2$.
CO2	K4	17b.	(OR) If $y = \frac{1}{(3x+1)(3x+4)(3x+7)}$ show that $\Delta^2 y = \frac{108}{(3x+1)(3x+4)(3x+7)(3x+10)(3x+13)}$

CO3	K4	18a.	Construct Newton's forward interpolation polynomial for the following data. Use it to find the value of y for x=5.									
			x	4	6	8	10					
			y	1	3	8	16					
(OR)												
CO3	K4	18b.	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			
CO4	K5	19a.	Find y'(x) given									
			X	0	1	2	3	4				
			y(x)	1	1	15	40	85				
Hence find y'(x) at x=0.5.												
(OR)												
CO4	K5	19b.	From the following data obtain the first and second derivatives of y=log _e x (i) at x= 500 (ii) at x= 550 (iii) at x=520.									
			Also calculate the actual values of the derivatives at these points.									
			Comment on your result.									
x	500	510	520	530	540	550						
y=log _e x	6.2146	6.2344	6.2538	6.2729	6.2916	6.3099						
CO5	K5	20a.	A curve passes through the points as given in the table. Find (i) the area bounded by the curve the x-axis, x=1 and x=9.									
			ii) the volume of the solid generated by revolving this area about the x-axis.									
			x	1	2	3	4	5	6	7	8	9
y	0.2	0.7	1	1.3	1.5	1.7	1.9	2.1	2.3			
(OR)												
CO5	K5	20b.	Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Romberg's method correct to 4 decimal places. Hence deduce an approximate value of π.									