22STU205N/ 22STU205/ 19STU05

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(Second Semester)

Branch - **STATISTICS**

NUMERICAL METHODS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Mention 3x-cosx-1=0 is a a) Algebraic equation b) Transcendental equation c) both (a) and (b) d) done	K1	CO1
	2	When $x = \varphi(x)$, the iteration process converges quickly if, a) $\lvert\varphi(x)\rvert = 1$ b) $\lvert\varphi(x)\rvert < 1$ c) $\lvert\varphi(x)\rvert > 1$ d) $\lvert\varphi(x)\rvert = 0$	K2	CO1
2	3	State the differences of constant function $\Delta(c)$= a) 0 b) <0 c) >0 d) 1	K1	CO2
	4	Find the relation between the difference operators E and Δ _____. a) E > 1+ Δ b) E <1+ Δ c) E=1+ Δ d) E=1- Δ	K2	CO1
3	5	When the arguments $x_1, x_2, \ldots x_n$ are not equally spaced then, we can use a) Gauss method b) Newton's forward method c) Newton's backward method d) Lagrange's method	K1	CO2
	6	Gauss backward interpolation formula useful when a) 0< n < 1 b) -1 < n < 1 c) -1 < n < 0 d) -2 < n < 0	K2	CO2
4	7	Indicate in numerical integration, the accuracy of the result can be improved by ---------- the interval 'h'. a) increasing b) decreasing c) increasing or decreasing d) none	K1	CO3
	8	Mention Truncation error arises in a) numerical integration b) numerical differentiation c) numerical interpolation d) numerical extrapolation	K2	CO1
5	9	In an Euler's method, which of the following is called local error? a) $O(h^4)$ b) $O(h^3)$ c) $O(h^2)$ d) O(h)	K1	CO3
	10	To use Milne's predictor-corrector formula, we need atleast ------- values prior to the required value. a) 1 b) 2 c) 3 d) 4	K2	CO2

Cont ...

SECTION – B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Find a real root of the equation $x^3+x^2-1=0$ by iteration method.	K2	CO2
		(OR)		
	11.b.	Explain Newton-Raphson method.		
2	12.a.	Show that $E\nabla = \nabla E = \Delta$	K3	CO4
		(OR)		
	12.b.	Find f(0.2) by suitable formula. x: 0, 1, 2, 3, 4, 5, 6 f(x): 176, 185, 194, 203, 212, 220, 229		
3	13.a.	State central differences for interpolation.	K2	CO3
		(OR)		
	13.b.	Using Bessel's formula, find f(25) given f(20)=2854 , f(24)=3162 , f(28)=3544 and f(32)=3992.		
4	14.a.	Explain Trapezoidal rule.	K3	CO2
		(OR)		
	14.b.	Calculate $\int_0^1 e^{-x^2} dx$ by dividing the range of integration in to 4 equal parts using Simpson's $\frac{1}{3}$ rule.		
5	15.a.	Using Taylor series method to compute y(0.1) correct to 4 decimal places if y(x) satisfies $y'=x+y$, $y(0)=1$	K3	CO5
		(OR)		
	15.b.	Explain the procedure for Euler's method for solving differential equation.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Enumerate the root of $xe^x = 3$ by Regula -Falsi method correct to three decimal places.	K1	CO1
2	17	Enumerate the missing values in the following data. x: 0, 5, 10, 15, 20, 25 y: 6, 10, -, 17, -, 31	K1	CO4
3	18	Enumerate the value of x when y= 85 , using Lagranges's formula from the following table. x: 2, 5, 8, 14 y: 94.8, 87.9, 81.3, 68.7	K3	CO2
4	19	Highlight Newton's Forward and Backward formula to compute the derivatives.	K1	CO3
5	20	By applying the fourth order Runge-Kutta method Enumerate y(0.2) from $y'= y-x$, $y(0)=2$ taking $h=0.1$	K3	CO5

Z-Z-Z END