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22STU205N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(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	$x^3-3x+1=0$ is a a) Algebraic equation b) Transcendental equation c) both (a) and (b) d)done	K1	CO1
	2	Which of the following is an iterative method? a) Gauss-Seidel b) Gauss-Jordan c) Factorization d) Gauss-Elimination	K2	CO1
2	3	The shifting operator E is defined by a) E[f(x)] = f(x+h) b) E[f(x)] = f(x-h) c) E[f(x)] < f(x+h) d) E[f(x)] > f(x+h)	K1	CO1
	4	Recall 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	CO2
3	5	Stirling's formula useful when a)-1 < n < +1 b)-1 < n < 0 c) -0.5 < n < 0 d)-0.5 < n < +0.5	K1	CO2
	6	Gauss forward interpolation formula useful when a) 0< n < 1 b) -1 < n < 1 c) -1 < n < 0 d) -2 < n < 0	K2	CO2
4	7	In numerical integration, which of the methods yields least accuracy? a)Trapezoidal rule b) Simpson's 1/3 c) Simpson's 3/8 d) all are equal accuracy	K1	CO2
	8	Simpson's 3/8 rule can be applied only if the number of sub-intervals is a multiple of a) 2 b) 3 c) 4 d) 5	K2	CO1
5	9	The numerical solution of any ordinary differential equation a) terminal condition is necessary b) initial condition is not necessary c) initial condition is may or may not necessary d) initial condition is necessary	K1	CO2
	10	Identify the method that is not used for solving differential equations. a) Taylor Series Method b) Runge- Kutta Method c) Newton's Method d) Picard's Method	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.	Use the iteration method to find root of the equation $x = \frac{1}{2} + \sin x$	K3	CO1
		(OR)		
	11.b.	Find the approximate root of $xe^x = 3$ by Newton's – Raphson method correct three decimal places.		
2	12.a.	Find Δ [cot(ax + b)]	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.	Use Gauss's forward formula to find f(32) from the following data.	K2	CO1

x	25	30	35	40
Y=f(x)	0.2707	0.3027	0.3386	0.3794

		(OR)		
	13.b.	Explain the Stirling's procedure for central differences.		
4	14.a.	Write a note on Simpson's $\frac{1}{3}$ rule.	K3	CO3
		(OR)		
	14.b.	Evaluate $\int_0^1 \frac{dx}{1+x^2}$, using Trapezoidal rule with h=0.2		
5	15.a.	Describe Runge- Kutta method for second order differential equations.	K3	CO4
		(OR)		
	15.b.	Given $y' = x^2 - y$, $y(0)=1$, find the value of y(0.1) correct to four decimal places by Euler's method.		

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	Find the approximate value of the real root of $x \log_{10} x = 1.2$ by Regula -Falsi method.	K3	CO4
2	17	State and prove fundamental theorem of finite differences.	K3	CO3
3	18	Find the value of x when y= 85 , using Lagranges's formula from the following table.	K3	CO2

x	2	5	8	14
y	94.8	87.9	81.3	68.7

4	19	Compute the first and second derivatives of the function tabulated below at x =0.6	K3	CO5

x	0.4	0.5	0.6	0.7	0.8
y	1.5836	1.7974	2.0442	2.3275	2.6511

5	20	Using Taylors series method, compute the value of y(0.2) from $\frac{dy}{dx} = 1 - 2xy$ given that y(0) = 0.	K4	CO1

Z-Z-Z END