

Numerical Analysis and Statistics

Part - A

- 1) Write down Newton-Raphson formula.
- 2) State the Lagrange's interpolation formula
- 3) Give an example of transcendental equation
- 4) How many methods for solving the equation  $f(x) = 0$ .
- 5) Using NRM find the root of  $3x - \cos x - 1 = 0$
- 6) State Simpson's  $\frac{3}{8}$  rule
- 7) State any two direct methods to solve the linear systems.
- 8) State Simpson's  $\frac{1}{3}$  rule.
- 9) Write important rule in Gauss Jacobi's method.
- 10) If  $y(75) = 246$ ,  $y(80) = 202$ ,  $y(85) = 118$ ,  $y(90) = 40$  from the difference table.
- 11) Write down the formula of Newton's forward interpolation.
- 12) Difference between forward & Backward Method
- 13) Using Euler's method, find  $y(0.02)$  from  $y = \frac{y-x}{y+x}$ ,  $y(0) = 1$
- 14) Write the Adam's predictor-corrector formula
- 15) Write the Milne's predictor-corrector formula.
- 16) Write down the formula for Euler's method

- 17) Write down the formula for Picard's method
- 18) Write down the formula for Taylor's series
- 19) What is meant by Arithmetic Mean.
- 20) What is meant by Geometric Mean
- 21) What is meant by Harmonic mean
- 22) Define Median & Mode.
- 23) Write the Standard deviation formula
- 24) Write the Quartile deviation formula
- 25) Define Expectation
- 26) Define Variance.
- 27) Find the arithmetic mean of the following  
Mid value of the bounding class. 10, 11, 8, 5, 7, 9, 8
- 28) Find the median of the following values  
(i) 25, 20, 15, 35, 18  
(ii) 8, 20, 50, 25, 15, 30.
- 29) Define Correlation
- 30) Write types of Correlation.
- 31) Write Difference between Positive Correlation and Negative Correlation.
- 32) Define Regression.
- 33) Write difference between regression equation and normal equation.
- 34) Define linear correlation
- 35) Write the formula for Karl Pearson Co-efficient Correlation.

## Part - B

- 1) Find the -ve root of the equation  $x^3 + x^2 - 100 = 0$  using Iteration Method.
- 2) Derive the Lagrange's interpolation Formula  

$x$	0	1	3	4		
$y$	5	6	50	105		

 find  $f(2) = ?$
- 3) Find the real root of the equation  $x^3 - 3x + 1 = 0$  lying between 1 and 2 correct to three places of decimal by using bisection method.
- 4) Find the real root of the equation  $\cos x = 3x - 1$  correct to 4 decimal places using successive approximation method.
- 5) Using NRM, find the root of  $e^{-x} - \sin x$ .
- 6) Solve  $x + 2y + z = 3$ ,  $2x + 3y + 3z = 10$ ,  $3x - y + 2z = 13$  by Gauss Elimination method.
- 7) Find the value of  $y$  when  $x = 1.75$   

$x$	1.7	1.8	1.9	2.0
$y$	5.474	6.050	6.686	7.390
- 8) Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  using Trapezoidal rule with  $h = 0.2$
- 9) The Population of a certain town is shown in the following data  

Year of	$x$	1931	1941	1951	1961	1971
Population	$y$	40.62	60.80	79.95	103.56	132.65

 find the rate of growth of the population in 1961

- 10) Evaluate  $\int_0^{1.2} e^{-x^2} dx$  by using Simpson's rule taking  $h = 0.2$ .
- 11) Solve  $\frac{dy}{dx} = 1 - y$ ,  $y(0) = 0$  using Euler's method find  $y$  at  $x = 0.1$  &  $x = 0.2$
- 12) Using Taylor's series method find  $y$  at  $x = 1.1$  by solving  $\frac{dy}{dx} = x^2 + y^2$  given  $y(1) = 2.3$ .
- 13) Using Runge-kutta method of 2nd order find  $y(0.1)$  Given that  $y' = \frac{1}{2}(1+x)y^2$ ,  $y(0) = 1$  correct to 4 decimal places.
- 14) Solve  $y' = y - x^2$ ,  $y(0) = 1$  by Picard's method upto the 3rd approximation.
- 15) Using R.K method 4th order find  $y(0.2)$  given  $y' = x + y$ ,  $y(0) = 1$ ,  $h = 0.1$
- 16) Calculate the standard deviation from the following data

x	6	9	12	15	18
y	7	12	19	10	12

- 17) Find the mean from the following data
- |     |       |       |        |         |         |         |
|-----|-------|-------|--------|---------|---------|---------|
| x : | 70-80 | 80-90 | 90-100 | 100-110 | 110-120 | 120-130 |
| y : | 12    | 18    | 35     | 42      | 50      | 45      |
- 
- |     |         |         |
|-----|---------|---------|
| x : | 130-140 | 140-150 |
| y : | 20      | 8       |

18) Find arithmetic mean of the following distribution

x :	1	2	3	4	5	6	7
f :	5	9	12	17	14	10	6

19) Calculate the G.M, H.M of the following quantities  
3, 6, 24, 48

20) Calculate the variances for the following table.

x :	2	5	4	6	8
f :	8	16	13	20	7

21) Calculate Rank Correlation Co-efficient obtained by two subject Tamil & English.

Tamil : 7 2 1 10 8 4 9 6 3

English : 9 1 2 10 7 6 5 8 4

22) Properties of Multiple Correlation Co-efficient - Explain

23) Calculate Correlation Co-efficient for the following

data

x :	65	66	67	67	68	69	70	72
y :	67	68	65	68	72	72	69	71

24) Find Rank Correlation

x :	110	100	140	120	80	90
y :	70	60	80	50	10	20

25) The following data there calculated  $\bar{x} = 970$ ,  $\bar{y} = 18$ ,  
 $\sigma_x = 38$ ,  $\sigma_y = 2$ ,  $r = 0.6$  Find the regression line  
x only obtain the value of x when  $y = 20$ .

## Part - c

- 1) Find the root of using Bisection method from  $x^3 - x - 1 = 0$ .
- 2) By Solving iteration method  $x^3 + x^2 - 1 = 0$ .
- 3) The following table given the value of the function  
find  $y(1.8)$ .

$x$ :	0.0	0.5	1.0	1.5	2.0
$y$ :	0.3989	0.3521	0.2420	0.1295	0.0540
- 4) Find  $\tan(0.26)$  from the following values of  $\tan x$  for  $0.10 \leq x \leq 0.30$ .
- 5) Using Lagrange's interpolation formula to find the value corresponding to  $x=10$ , from the following table  
 $x$ : 5 6 9 11  
 $y$ : 12 13 14 16
- 6)  $\int_0^{\pi/4} \sqrt{\cos x} dx$  by using Simpson's rule of integration with 7 ordinaries.
- 7) Solve by Gauss Seidel method  $2x + y - 2z = 17$ ,  
 $3x + 20y - z = 18$ ,  $2x + 20z - 3y = 25$
- 8) Solve the following system of equation using Gauss elimination method,  $x + y + z = 9$ ,  $2x - 3y + 4z = 13$ ,  
 $3x + 4y + 5z = 40$ .
- 9) Evaluate  $\int_0^1 \frac{dx}{1+x}$  using Simpson's rule upto 4 decim  
Take  $h = \frac{1}{6}$  for all cases.

12) Solve the following system of Equation using Gauss Jacobi's method  $28x + 4y - z = 32$ ,  $x + 3y + 10z = 24$ ,  $2x + 17y + 4z = 35$

11) Find the value of  $y(1.4)$  by Adam's Predictor Corrector Method given that  $dy/dx = x^2(1+y)$  and  $y(1) = 1$ ,  $y(1.1) = 1.233$ ,  $y(1.2) = 1.548$ ,  $y(1.3) = 1.979$

12) using Runge-kutta method of 4<sup>th</sup> order find  $y(0.1)$  given that  $\frac{dy}{dx} = 1 + xy$ ,  $y(0) = 2$ .

13)  $y' = x - y^2$ ,  $y(0) = 1$  find  $y(0.1)$  using Taylor series method.

14) Given  $\frac{dy}{dx} = \frac{1}{x+y}$ ,  $y(0) = 2$ ,  $y(0.2) = 2.0933$ ,  $y(0.4) = 2.1755$ ,  $y(0.6) = 2.2493$  find  $y(0.8)$  using Milne's method.

15) using RK method using 2<sup>nd</sup> & 4<sup>th</sup> order given  $dy/dx = \frac{y^2 - x^2}{y^2 + x^2}$ ,  $x_0 = 0$ ,  $y_0 = 1$   $h = 0.2$

16) Calculate mean, median, mode of the following data

C.I :	0-10	10-20	20-30	30-40	40-50	50-60
f :	5	10	14	16	13	9
C.I :	60-70	70-80				
f :	4	5				

17) Find the Standard deviation of the following data

C.I :	1-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f :	3	7	13	17	12	10	8	8
C.I :	80-90	90-100						
f :	6	6						

18) Find the Quartile deviation of the following data

C.I :	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
f :	4	12	16	22	10	8	6	4

19) (a) Find the expansion of the number on dice when thrown (b) two unbiased dice are thrown find the expected values of the sum of number of points on them.

20) Let  $x$  be a random variable with the following Probability distribution

$x$ :	-3	6	9	
$E(x)$ :	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$	

find  $E(x)$ ,  $E(x^2)$  and  $E(2x+1)^2$

21) Find Karl Pearson deviation from the following data

$x$ :	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f :	150	142	130	120	72	30	12	4

22) The two line of regression  $8x - 10y + 66 = 0$ ,  $40x - 18y - 214 = 0$ . The variance of  $x$  is 9. Find the mean value of  $x$  and  $y$  and the Correlation Co-efficient between  $x$  and  $y$ .



23). Ten students obtained the following percentage of marks in the college internal test (x) and in the final semester examination (y). Find the Correlation Co-efficient between the marks of 2 tests

X: 51 63 63 49 50 60 65 63 46 50  
 Y: 49 72 75 50 48 60 70 48 60 56

24) Find the rank Correlation Co-efficient from the following data

Father: 3 6 1 10 8 9 4 5 2  
 Mother: 5 8 3 9 10 7 1 2 4  
 Son: 4 7 2 8 9 6 3 1 5

25) Find the repeated rank correlation Co-efficient from the following table

EVS: 49 34 41 10 17 17 16 25 17 58  
 VED: 14 14 25 7 16 5 21 10 7 20