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S.No. 4401

NSYIT 1/NSYCS 1

(For candidates admitted from 2018–2019 onwards)

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Part III — Allied

NUMERICAL AND STATISTICAL METHODS

Time : Three hours

Maximum : 100 marks

SECTION A — (10 × 2 = 20)

Answer ALL questions.

1. What is the criterion for the convergence in Newton Raphson method.
2. Use method of iteration to find a root between 0 and 1 of the equation $e^x - 3x = 0$ correct to four decimal places upto second iteration.
3. State the condition for convergence of Gauss Seidel method.
4. State the Newton's forward interpolation formula.
5. Write modified Euler formula.

6. Write the Runge-Kutta method of second order formula.
7. The mean and standard deviation of a Binomial distribution are 5 and 2. Determine the distribution.
8. Give the mean and variance of a Poisson distribution.
9. State Karl-Pearson's co-efficient of correlation.
10. Write two regression equations.

SECTION B — (5 × 6 = 30)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find the positive root of $x - \cos x = 0$ by bisection method.

Or

(b) Find a real root of the equation $\cos x = 3x - 1$ correct to 4 decimal places by iteration method.

12. (a) From the following table, find the value of $\tan 45^\circ 15'$.

x°	45	46	47	48	49	50
$\tan x^\circ$	1.00000	1.03553	1.07237	1.11061	1.15037	1.19175

Or

- (b) Solve the system of equation by Gauss Jordan method.

$$\begin{aligned} x + 2y + z &= 3, & 2x + 3y + 3z &= 10, \\ 3x - y + 2z &= 13. \end{aligned}$$

13. (a) Evaluate $I = \int_0^6 \frac{dx}{1+x}$ using Trapezoidal rule.

Or

- (b) Using Euler's method, solve numerically $y' = x + y$, $y(0) = 1$, for $x = 0.0(0.2)(0.6)$

14. (a) If X and Y are two random variables then prove that $\cos(X, Y) = E(XY) - E(X)E(Y)$.

Or

- (b) Ten coins are thrown simultaneously. Find the probability of getting atleast seven leads.

15. (a) Calculate the correlation co-efficient for the following data.

x	51	63	63	49	50	60	65	63	46	50
y	49	72	75	50	48	60	70	48	60	56

Or

- (b) Prove that $-1 \leq r \leq 1$.

SECTION C — (5 × 10 = 50)

Answer ALL questions.

16. (a) Find the positive root of $x^3 = 2x + 5$ by False Position method.

Or

- (b) Using Newton's method, find the root between 0 and 1 of $x^3 = 6x - 4$ correct to 4 decimal places.

17. (a) Solve by Gauss-Seidel method, the following system; $28x + 4y - z = 32$, $x + 3y + 10z = 24$, $2x + 17y + 4z = 35$.

Or

- (b) Using Lagrange's interpolation formula, find $y(10)$ from the following table.

x :	5	6	9	11
y :	12	13	14	16

18. (a) Using Milne's method find $y(2)$ if $y(x)$ is the solution of $\frac{dy}{dx} = \frac{x+y}{2}$ given $y(0) = 2$
 $y(0.5) = 2.636$, $y(1) = 3.595$ and $y(1.5) = 4.968$.

Or

- (b) Obtain $y(0.6)$ given $\frac{dy}{dx} = x + y$, $y(0) = 1$ with $h = 0.2$ by Adam's method.

19. (a) (i) Derive $\mu_{r-1} = pq \left[nr\mu_{r-1} + \frac{d\mu_r}{dp} \right]$
 (ii) Obtain the moment generating function of Binomial distribution.

Or

- (b) If X is a normal variate with mean 30 and S.D.S. Find the probabilities that
 (i) $26 \leq x \leq 40$ (ii) $x \geq 45$ (iii) $|x - 30| > 5$.

20. (a) Obtain the two regression equation for the following data.

x	25	28	30	32	35	36	38	39	42	45
y	20	26	29	30	25	18	26	35	35	46

Or

- (b) Obtain the lines of regression from the data given below:

x	62	64	65	69	70	71	72	74
y	126	125	139	145	165	152	180	208