

# CHANCHAL COLLEGE

## ASSIGNMENT - 2021 MATHEMATICS (**GENERAL**) Paper: MATH-G-DC-04

Full Marks : 32

4<sup>TH</sup> SEM-2021

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable. Notations and symbols have their usual meanings.

### Group – A

Answer any four questions      1X4=4

1. (a) If  $X$  follows  $X \sim B(n, p)$  such that mean 3 and variance  $\frac{3}{2}$  then find the value of  $n$ .
- (b) Write down the Condition of convergence of Newton Raphson method.
- (c) Prove that  $E \cdot \Delta = \Delta \cdot E$
- (d) Write the Newton's Forward interpolating polynomial for three points  $(x_0, y_0)$ ,  $(x_1, y_1)$  and,  $(x_2, y_2)$ .
- e) A speaks the truth in 75% cases and B speaks the truth in 80% cases. Find the % of cases are they likely to contradict the same fact?

### Group-B

Answer any two questions      2X5=10

2. A can hit a target 4 times out of 5, B 3 times out of 4 and C 2 times out of 3. Each is allowed to once. What is the probability of shoot that the target is hit? What is the probability that the target is hit exactly two times? What is the probability that two shots at least hit the target?
3. a) When a system of equations  $AX = B$  where  $A = (a_{ij})_{n \times n}$  is called diagonally dominant.
- b) Using Lagrange's Interpolation formula, find the value of  $y(10)$  from the following table

x	5	6	9	11
y(x)	12	13	14	16

4. a) Prove that  $\Delta + \nabla \equiv \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$

b) Two News paper X and Y are published in a certain city. It is estimated from a survey that 16% read X, 14% read Y and 5% read both the news papers. Find the probability that a randomly selected person 1) does not read any news paper . [3]

5. Find by Newton Raphson method a root of the equation  $x \sin x + \cos x = 0$

### Group-C

Answer any two questions      2X9=18

6. Using Gauss- Seidel method solve the following systems of equations  
 $3x + y + 5z = 13$ ,  $5x - 2y + z = 4$ ,  $x + 6y - 2z = -1$ .

7. a) If a R.V X has the following p.d.f  $f(x) = \{C(x-1)(2-x) \quad 0 < x < 2$  , then i) Find, C?

ii) Compute  $P(\frac{1}{2} < X < \frac{3}{2})$  and the distribution function F(x).

b) Prove that the order of convergence of Newton Raphson method is quadratic.

8. a) Compute the following integration correct upto four decimal places by

Simpson's one third rule  $\int_0^1 \frac{1}{1+x^2} dx$ . Hence evaluate the value of  $\pi$ .

b) Write down geometrical interpretation of the Trapezoidal Rule.

9. a) Using **Chebyshev's inequality** to show that for  $n \geq 36$ , the probability that in n throws of a fair die the number of sixes lies between  $\left(\frac{n}{6} - \sqrt{n}\right)$  and  $\left(\frac{n}{6} + \sqrt{n}\right)$  is

at least  $\frac{31}{36}$ .

b) If A and B are two events such that

$P(A^c \cup B^c) = \frac{5}{6}$  and  $P(A) = \frac{1}{2}$ ,  $P(B^c) = \frac{2}{3}$ . Show that A and B are independent.