

- d) If Lagrange's polynomial passes through [2]

x	0	1
y	-4	-4

then $\frac{dy}{dx}$ at $x = 1$ is given by

- i) 0 ii) 2
 iii) 1 iv) $\frac{1}{2}$

- e) To compare the variability of two or more than two series, coefficient of variation is obtained using (\bar{x} is arithmetic mean and σ is standard deviation) [1]

- i) $\frac{\bar{x}}{\sigma} \times 100$ ii) $\frac{\sigma}{\bar{x}} \times 100$
 iii) $\sigma \times \bar{x} \times 100$ iv) $\frac{\bar{x}}{\sigma} \times 100$

- f) If x_0 is initial approximation to the root of the equation $f(x) = 0$ by Newton - Raphson method, first approximation x_1 is given by [1]

- i) $x_0 = \frac{x_0 + x_1}{2}$ ii) $x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$
 iii) $x_1 = x_0 + \frac{f(x_0)}{f'(x_0)}$ iv) $x_1 = x_0 + \frac{f'(x_0)}{f(x_0)}$

- Q2) a) Find arithmetic mean and coefficient of variation for x if the data is,

x	1	2	3	4
f	9	6	5	3

[5]

- b) Fit a straight line of the form $y = ax + b$ for the data $\begin{matrix} x & -2 & -1 & 0 & 1 & 2 \\ y & 5 & 3 & 1 & -1 & -3 \end{matrix}$ [5]

- c) Given the information: $\bar{x} = 8.2, \bar{y} = 12.4, \sigma_x = 6.2, \sigma_y = 20, \gamma(x, y) = 0.9$. Find line of regression of x on y . Estimate x for $y = 10$ [5]

OR

Q3) a) The first four moments of a distribution about the value 2 are 2, 10, 20 and 25. Find first four moments about mean, coefficient of skewness and kurtosis. [5]

b) Fit a parabola of the type $y = ax^2 + bx + c$ for the data $\begin{vmatrix} x & -1 & 0 & 1 & 2 \\ y & 3 & 1 & 3 & 9 \end{vmatrix}$ [5]

c) Find the coefficient of correlation for following distribution,

$\begin{vmatrix} x & 5 & 7 & 9 & 11 & 13 \\ y & 9 & 6 & 12 & 3 & 15 \end{vmatrix}$ [5]

Q4) a) A box contains 6 red balls, 4 white balls and 5 blue balls. Three balls are drawn successively from the box. Find the probability that they are drawn in the order red, white and blue if each ball is not replaced. [5]

b) A coin is so biased that appearance of head is twice likely as that of tail. If a throw is made 6 times, using Binomial distribution, find the probability that at least two heads will appear. [5]

c) In a distribution, exactly normal, 7% of the items are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution. [Given $A(z = 1.48) = 0.43$, $A(z = 1.23) = 0.39$] [5]

OR

Q5) a) The average number of misprints per page of a book is 1.5. Assuming the distribution of number of misprints to be poisson, find the number of pages containing more than one misprint if the book contains 900 pages. [5]

b) A random sample of 200 screws is drawn from a population which represents the size of screws. If a sample is distributed normally with mean 3.15 cm and standard deviation 0.025cm, find expected number of screws whose size falls between 3.12 cm and 3.2 cm. [5]

[Given $A(z = 1.2) = 0.3849$, $A(z = 2) = 0.4772$]

c) A nationalised bank utilizes four teller windows to render fast service to the customers. On a particular day, 800 customers were observed. They were given service at the different windows as follows. [5]

Window number	Expected no. of customers
1	150
2	250
3	170
4	230

Test whether the customers are uniformly distributed over the windows at 5% level of significance.

[Given $\chi_{3,0.05}^2 = 7.815$]

- Q6)** a) Using the Bisection method up to fifth iteration, find a real root of the equation $x^3 - 4x - 9 = 0$. [5]
- b) Find the real root of the equation $2x^3 - 2x - 5 = 0$ by applying Newton - Raphson method at the end of fourth iteration. [5]
- c) Solve by Gauss - Seidel method, the system of equations: [5]
- $$45x_1 + 2x_2 + 3x_3 = 58$$
- $$-3x_1 + 22x_2 + 2x_3 = 47$$
- $$5x_1 + x_2 + 20x_3 = 67$$

OR

- Q7)** a) Solve the following system by Cholesky's method: [5]
- $$4x_1 + 2x_2 + 14x_3 = 14$$
- $$2x_1 + 17x_2 - 5x_3 = -101$$
- $$14x_1 - 5x_2 + 83x_3 = 155$$
- b) Solve the following system by Gauss elimination method: [5]
- $$2x_1 - 2x_2 + 3x_3 = 2$$
- $$x_1 + 2x_2 - x_3 = 3$$
- $$3x_1 - x_2 + 2x_3 = 1$$
- c) Use method of false position to find the fourth root of 32 correct to three decimal places. [5]

- Q8) a)** Using Newton's forward interpolation formula, find the polynomial satisfying the data. [5]

x	0	1	2	3	4
y	-4	-4	0	14	44

- b) Use Simpson's $\frac{1}{3}$ rd rule to obtain $\int_1^2 \frac{1}{x} dx$ dividing the interval into four parts. [5]

- c) Use Euler's method to solve $\frac{dy}{dx} = \frac{x-y}{2}$, $y(0) = 1$. Tabulate values of y for $x = 0$ to $x = 2$. Take $h = 0.5$. [5]

OR

- Q9) a)** Use Runge - Kutta method of fourth order to solve $\frac{dy}{dx} = x^2 + y^2$; $x_0 = 1$, $y_0 = 1.5$ to find y at $x = 1.1$ taking $h = 0.1$ [5]

- b) Using modified Euler's method, find $y(0.1)$ given that $\frac{dy}{dx} = 1 + xy$; $y(0) = 1$ and $h = 0.1$. Consider accuracy to four decimal places. [5]

- c) Using Newton's backward interpolation formula, find the polynomial satisfying the data. Also, find y when $x = 4.5$. [5]

x	1	2	3	4	5
y	14	30	62	116	198

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