

[illegible]

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- h. Let X be the random variable such that $P(X = -2) = P(X = -1)$, $P(X = 2) = P(X = 1)$ and $P(X > 0) = P(X < 0) = P(X = 0)$. Obtain the probability mass function of X and its distribution functions.
- i. Discuss the order of the convergence of the Newton's method for nonlinear equation $f(x) = 0$.
- j. Write the normal equation for the curve $y = a + bx$, for n points by the method of least squares.

SECTION-B

2. Perform six iterations of the bisection method to find the root of the equation $\cos x = xe^x$ correct to four decimal places.
3. Solve the equations $27x + 6y - z = 85$, $x + y + 54z = 110$, $6x + 15y + 2z = 72$ by Gauss-Seidel method.
4. Using Newton's divided difference formula, find the missing value from the table :

X	1	2	4	5	6
Y	12	15	5	----	9

5. The amount of time, in hours, that a computer functions before breaking down is a continuous random variable with probability density function given by :

$$f(x) = \begin{cases} \lambda e^{\frac{-x}{100}} & ; x \geq 0 \\ 0 & ; x < 0 \end{cases}$$

What is the probability that a computer will function between 50 and 150 hours before breaking down?

6. A sample analysis of examination results of 500 students was made. It was found that 220 had failed, 170 had secured a third class, 90 was placed in second class and 20 got a first class. Are these figures commensurate with the general examination result which is in a ratio of 4:3:2:1 for the various categories respectively? The table value of chi-square for 3 d.f. at the 5% level of significance is 7.81.

SECTION-C

7. a. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.
- b. Apply Runge-Kutta fourth order method to find the approximate value of y for $x = 0.2$.

Given that $\frac{dy}{dx} = x + y$, and $y = 1$ where $x = 0$.

8. a. Find the coefficient of correlation and obtain the lines of regression from the given data

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

- b. Samples of sales in similar shops in two rooms are taken for a new product with the following results :

Town	Mean sales	Variance	Size of samples
A	57	5.3	5
B	61	4.8	7

Is there any evidence of difference in sales in the two towns? Use 5% level of significance for testing this difference between the mean of two samples.

Use $t_{10}(0.05) = 2.228$

9. The results of a survey on the sales of a product (Y) as a function of time period (X) are summarized as below :

	X	Y
Mean	40	125
Standard deviation	2.5	16
Correlation coefficient (r)	0.85	

- a. Fit a regression line of Y on X and estimate the value of Y when X is 45.
- b. Fit a regression line of X on Y and estimate the value of X when Y is 135.

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