Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Probability, Computing and Statistics
Semester: IV
Program: B-SC-CS **Time: 03 hrs.**
Course Code: CSEG2061 **Max. Marks: 100**

Instructions: Use of non-programmable scientific calculators is allowed.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Define moment generating function.	**04**	**CO1**
Q 2	State two properties of cumulative distribution function.	**04**	**CO2**
Q 3	A sample of 36 students has an average height of 164 cm. The population mean is 160 cm with a standard deviation of 9 cm. At 5% significance level, test whether the sample mean is significantly different from the population mean.	**04**	**CO4**
Q 4	What is the principle of least squares?	**04**	**CO3**
Q 5	Explain Euler's Method with formulas and steps.	**04**	**CO5**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Let X be a random variable with the following probability function: xi: -5 -3 0 2 4 6 p(xi): n 0.2 n 0.1 3n 0.3 Determine: i. The constant n. ii. $P(X \leq 0)$. iii. $P(-4 < X \leq 5)$. iv. The mean of X. v. The standard deviation of X.	**10**	**CO1**
Q 7	Fit a straight line to the following data using least squares method: X: 1 2 3 4 5 Y: 2 4 5 4 5	**10**	**CO3**
Q 8	A random sample of 1000 items gave 400 defective. Can the sample be regarded as taken from a population in which 42% of the items are defective? Test at 5% level of significance.	**10**	**CO4**
Q 9	Find the eigenvalues of the matrix	**10**	**CO5**

	$A = \begin{bmatrix} 4 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & 2 \end{bmatrix}$ **OR** Solve the initial value problem using the Runge-Kutta method of order 2 method: $$\frac{dx}{dy} = x + 2y, \quad y(0) = 1$$ with step size h = 0.2, up to 3 iteration and find y(1).		
SECTION-C (2Qx20M=40 Marks)			
Q 10	Define Chi-Square Test, its Assumptions and Decision Criteria, and solve the following problem A beverage company claims that its four new drink flavors are equally popular among consumers. A random sample of 120 people gave the following preferences: **Flavor** **Observed** Apple 28 Berry 30 Citrus 33 Guava 29 Test whether the company's claim is valid at **5% level of significance (α = 0.05)** using the **Chi-Square Goodness of Fit Test**. From Chi-Square table, at α=0.05, df=3 is 7.815 **OR** Write a short Introduction to ANOVA test and solve the following problem A researcher wants to test whether there is a significant difference in the mean productivity of workers trained using three different training programs. The productivity scores (in units produced per day) are given below: • **Program A:** 92, 95, 91 • **Program B:** 88, 85, 87 • **Program C:** 90, 89, 91 Test at the 5% significance level whether the training program has a significant effect on productivity. Given $F_{0.05}(2,6) \approx 5.14$	**20**	**CO4**
Q 11	Explain Gauss-Jacobi Methode with formulas and steps, and solve the system: $10x_1 + 2x_2 - x_3 = 27$ $-3x_1 - 6x_2 + 2x_3 = -61$ $x_1 + x_2 + 5x_3 = -21$ using Gauss-Jacobi method with initial guess x(0) = (0, 0, 0).	**20**	**CO5**