Note : 1) Figures to Right indicates full marks.
2) All questions are Compuslory.

Q. 1 Solve any two 10

1) Using bisection method find the root of $x^2 - \log x - 12$ in the interval [3, 4]
2) Solve the equation $x^3 - 20$ by taking initial root $x_0 = 2$ by using Newton-Rapshon method.
3) Given f (1) = 7 f (2) = 18 f (3) = 35 f (4) = 38 find f (2.5) by Lagranges interpolation.
4) Using Newton interpolation formula find f (1.7) from the table

x	–2	–1	0	1	2
f(x)	4	26	58	112	466

Q. 2 Solve any two 10

1) Use Gauss Jordon method to solve system of equation if $2x + y + 6z = 9$; $8x + 3y + 2z = 13$, $x + 5y + z = 7$
2) Solve the given system of equation of Gauss Seidal Method $10x + y + z = 12$; $2x + 10y + z = 13$, $2x + 2y + 10z = 15$
3) Given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ $y_{(1)} = 1$ find y at $x = 2$ in step of 0.2 using Euler's Modified Method.
4) Using R - K 4th order find y at $x = 1.2$ if $\frac{dy}{dx} = x^2 + y^2$ $y(1) = 1.5$ taking h = 0.1

Q. 3 Solve any two 10

1) Find regression equation y on x and x on y, regressioin cofficient with the help of given data.

x	2	3	4	5	6	7	8
y	1	5	3	6	4	8	9

2) Fit a second degree of Parabola by least squre method with the help of given data

x	1	2	3	4	5
y	3	7	9	11	14

3) Ten students got the following marks in Mathematics & Java

Student (Roll no)	1	2	3	4	5	6	7	8	9	10
Marks in Maths	78	36	98	25	25	82	90	90	65	65
Marks in Java	84	51	91	60	68	62	86	58	53	47

Calculate Rank by Spearmen.

4) Find Karl Pearson's coefficient of correlation from data if n = 10 $\Sigma(x - 43)^2 = 1712$ $\Sigma x = 430$ $\Sigma y = 145$ $\Sigma (y - 14)^2 = 85$ $\Sigma (x - 43)(y - 14) = 353$

Q. 4 **Solve any two** 10

1) Define Binomial, poisson and normal distribution and give the difference between Binomial & normal with their properties.

2) Calculate first four central moments, $\beta 1$, $\beta 2$ if

x	2	3	4	5	6
f	1	3	7	3	1

3) The mean and variance of a binomial distribution are 3 and 2 find probability that variate takes place i) less than or equal to two ii) greater than equal to seven. Also find S.D., Kurtosis, Skewness.

4) One fifth percent of the blades produced by a blade manufacturing factory turn out of defective the blades are supplied in packets of 10 use poisson distribution to find approximate number of packets containing 1) no defective 2) one defective 3) two defective 4) mean, variance, skewness and kurtosis.

Q. 5 **Solve any two** 10

1) The number of bike accidents per month in a city was found as below 20, 17, 12, 6, 7, 15, 8, 5, 16 and 14 test goodness of fit (Given that η^{Ω} at 5% is 19.02, v = 9)

2) Define Chi-squre test with properties and uses

3) The certain drug is claimed to be effective incuring colds In an experiment on 164 people with cold, half of given drug and half of them given sugar pills the patients reactions to the treatment are recorded in following table test the hypothesis that the drug is not better than sugar pills for curing cold.

	Helped	Harmed	No effect	Total
Drug given	52	10	20	82
Sugar pill given	44	12	26	82
Total	96	22	46	164

(Given that when V = 2 η^2 at 5% = 5.99)

4) Solve the following LPP by Simplex Method Min $z = x_1 - 3x_2 + 2x_3$

Subject to $3x_1 - x_2 + 2x_3 \leq 7$; $-2x_1 + 4x_3 \leq 12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$ $x_1, x_2, x_2 \geq 0$

Q. 6 **Solve the following (any two)** 10

1) Define i) Test of hypothesis ii) level of significance A die was thrown 9000 times and a throw of 5 or 6 was obtained 3240 times on the assumption of random throwing do the data indicates an unbaised die?

2) A random sample of size 16 has 53 mean the sum of the square of the deviation taken from the mean is 150 can this sample be regarded as taken the population having 56 mean obtain 95% and 99% coffidence limits of mean population
[Given - V = 15 t at 1% 2.95 V = 15 t at 5% 2.13]

3) A test given two groups of students the marks obtained are as -

1st group	18	20	36	50	49	36	34	49	41
2nd group	29	28	26	35	30	44	46	46	38

Check the significance of difference between marks obtained the students of two group (Given V = 14 t at 5% is 2.14)

4) Define student t - distribution with properties.

Q. 7 **Solve any three** 15

1) Find the root of equation by false position upto four iteration if $f(x) = x^3 + 3x^2 - 7$

2) Find $\int_1^4 (4x+1)\,dx$ using Simpson's $1/3$ rd and $3/8$ th rule using six interval.

3) Find the equation of line by least square method with the help of given data

x	1	2	3	4	5	6	7
y	1.1	1.3	1.5	1.7	1.9	2.1	2.3

4) In an experiment on immunization of cattle from T.B. the following table are obtained.

	Affect	Non-Affect	Total
Inoculated	12	26	38
Non-Inoculated	16	06	22
Total	28	32	60

(Given V = 1 η^2 at 5% is 3.84)]

5) The following data pertain to two types of tube-bulbs tested for their length of life

Type	Sample size	Mean	Variance
Type-I	5	550	100
Type-II	7	500	81

test whether there is significant difference between two means at 5% level.

6) A random variable x has following probability

Values of x	0	1	2	3	4	5	6	7
p (x)	0	2k	3k	k	2k	k^2	$7k^2$	$2k^2+k$

find i) k ii) P ($x < 6$) iii) P ($x \geq 6$)

—— The End ——