Q.1   Solve any Two.   **10**

a) Solve by using Bisection method. If $f(x) = xe^x - 2 = 0$
Using intial roots $x_1 = 0$ & $x_2 = 1$ upto 5 iteration.

b) Use the N-R method to estimate root of equation.
$f(x) = x\sin x + \cos x = 0$ using $x_0 = \pi$ to obtain an accuracy up to 0.00001.

c) Evaluate integral $\int_0^{\frac{\pi}{2}} (\sin x)dx$ using simpson's $3/8^{th}$ rule & $1/3^{rd}$ rule using 11 ordinents.

d) By using False position method for $f(x) = xe^x - \cos(3x) - 0.51$ use intial roots $x_1 = 0$ & $x_2 = 1$ perform 5 iteration.

Q.2   Solve any Two.   **10**

a) Apply simple Euler method to solve
$\frac{dy}{dx} = x^2 + 9y^2$ if $y(0) = 2$ find y at x=1 with h=0.1.

b) Obtain by Modified Euler method $\frac{dy}{dx} = 4x + y^2 + 7xy$ $y(0)=1$ find y at x=0.1

c) Solve by Gauss seidal $x_1 + 4x_2 - 5x_3 = 4$;$3 x_1 + 5x_2 + 3x_3 = 4$; $x_1 + 3x_2 + 10x_3 = 2$

d) Solve by Gauss Jordan $2x+2y+3z=4$; $4x-2y+z=9$; $x+5y+4z=3$.

Q.3   Solve any Two.   **10**

a) Fit a equation of Second degree of parabola by least square method

x	0	1	2	3	4	5	6
y	1	1.4	1.5	2.7	2.3	3.3	3.7

b) For a bivariate data n=10 $\sum x = 117$
$\sum x^2 = 1491$ $\sum y = 78$ $\sum y^2 = 662$ $\sum xy = 98$ if find correlation coefficient.

c) Marks in to subject A & B in a test for 10 students are given. find the spearman rank coefficent.

Marks A	3	8	9	2	7	10	4	6	1	5
Marks B	5	9	10	1	8	7	3	4	2	6

d) In apartially destroyed laboratery record only the lines of regression of y on X and X on Y available as $4x-5y+33=0$ and $20x-9y=107$. Find mean of x and y and coefficient of correlation between x and y.

Q.4   Solve any Two.   **10**

a) Weight in kg of 10 student are given below 38,40,45,53,47,45,55,48,52,49 can we say that variance of the distribution of weights of all students from which the above sample of 10 students was drawn is equal to 20 square kg? Test whether intelligence is associated with 1% of significance(x^2 at 0.01 = 13.28)

b) A typist in a company commits the following number of mistake per page in typing 432 pages

No. of mistake per page	0	1	2	3	4	5
No. of Girls	223	142	48	15	4	0

fit a poission distribution & test the goodness of fit. (v=5 x^2 at 5% is 11.07)

c) In an experiment on vaccination of human being form polio the following table are obtained.

	Affected	Non-affected	Total
Inoculated	6	32	38
Not inoculated	14	8	22
Total	20	40	60

Given ($v=1$, x^2 at 5% is 3.84)

d) The following data pertain to two types of Tube Bulbs tested for their length of life

Type of music	Sample size	Mean	Varience
I	6	550	100
II	5	450	90

Test whether there is a significant difference between the two means at 5% level.

Q.5 Solve any Two 10

a) Define : i) Central limit theorem.

    ii)poission distribution &Normal distribution with properties & condition.

b) A Mohan kept a record of mistake made per day during 300 working days of a year

Mistake per day		0	1	2	3	4	5	6
No of days		123	100	32	22	9	3	1

fit a binomial distribution distribution to the data.

c) Calculate 1st four moments about the mean and also find β_2 from data.

M	0	1	2	3	4	5	6	7	8
F	1	8	20	156	170	56	28	8	1

d) The mean and variance of binomial distribution are 6 & 3 find probability that variate takes values

i) Less than or equal to 2   ii) Greater than equal to 7

Q.6 Solve any two. 10

a) Define student t-distribution with conditions and properties.

b) A random sample of 160 people is taken and 120 were in favour of liberalizing licensing regulation with 95% confidence what proportion of all people are in favour .

c) In a city A 20% of a random sample of 900 school had a certain slight physical defect In another city B 18.5% of a random sample of 1600 school boys had the same defect Is the difference between the propotion significant?

d) A test given to two groups of students the marks obtained are as

1st group	23	20	19	21	18	20	18	20	18	17
2nd group	24	34	22	30	42	31	40	30	32	35

Examine the significance of difference between the marks secured the students of above two group. (t at 5% when V=14 is 1.753)

Q.7 Solve any three. 15

a) Solve by using Langranges interpolation if
f(2)=1.5 , f(4)=3, f(6)=2.5 , f(8)=1.9 find f(5).

b) Using R-K 4th order method find y if $\frac{dy}{dx} = x^3 + 4y^2 + 3$ when y(1)=0 at x=1.2 taking h=0.1

c) Fit the equation of line with the help of data

x	1	2	3	4	5	6	7	8
y	2.1	2.4	3.6	3.7	1.8	4	4.2	5.3

d) Let X be a discrete random variable with probability mass function
p(X=x)=x/11   X=1,2,3,4,5
      =0   otherwise
find E(x) & E(x^2).

e)   Solve by Simplex method,

Max $z = 2x_1 + 3x_2 + x_3$

sub to $3x_1 + 2x_2 + 4x_3 \leq 100$

$x_1 + 4x_2 + 2x_3 \leq 100$

$x_1 + x_2 + 3x_3 \leq 100$

$x_1 \quad x_2 \quad x_3 \geq 0$

f)   Two samples of sizes 9 and 8 give the sum of square of deviation from their respective means equal to 160 inches and 81 inches can these be regarded as drawn from same population.