Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2711304 **Date:16/05/2016**

Subject Name: Numerical Methods and statistical analysis

Time:02:30 pm to 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Apply Gauss-Jorden method to solve the equations **07**

$x+y+z=9;\ 2x-3y+4z=13;\ 3x+4y+5z=40$

(b) Apply LU Decomposition method to Solve the system of linear equations **07**

$4x+y+z=4;\ x+4y-2z=4;\ 3x+2y-4z=6.$ Take $u_{ii}=1,$

where $i=1,2,3.$

Q.2 **(a)** Using Gauss _Seidel Method to solve the equations **07**

$20x+y-2z=17;\ 3x+20y-z=-18;\ 2x-3y+20z=25$

(b) Evaluate $\int_1^3 e^{-x}\,dx$ using Gauss quadrature formula of five points. **07**

OR

(b) Find the real roots of equation $xe^x-1=0$ using Regula - falsi method correct to three decimal places between 0 and 1. **07**

Q.3 **(a)** Determine $y(12)$ by Lagrange interpolation from following data **07**

x:	11	13	14	18	20	23
y:	25	47	68	82	102	124

(b) Fit a least square geometric curve of the form $y=ax^b$ **07**

x:	1	2	3	4	5
y:	0.5	2	4.5	8	12.5

OR

Q.3 **(a)** Obtain the Least square approximation of the form $f(x)=ae^{bx}$ to the data **07**

x:	0.5	1.0	2.0	2.5	3.0
$f(x)$:	0.57	1.46	5.10	7.65	9.20

(b) Obtain the cubic spline approximation for the function defined by the data **07**

x:	0	1	2
$f(x)$:	1	2	33

with M(0)=M(2)=0. Find an estimate of $f(1.5)$.

Q.4 **(a)** 1000 light bulbs with a mean life of 120 days are installed in new factory; their length of life is normally distributed with standard deviation 20 days (i) How many bulbs will expire in less than 90 days (ii) If it is decided to replace all the bulbs toghether, what intervals should be allowed between replacements if not more than 10% should expire before replacement. **07**

(b) Explain Binomial distribution. It is known that 5% of the manufactured screws have defects. Find the probability that 4 of 100 screws will have defects, using binomial distribution. **07**

OR

Q.4 **(a)** A manufacturing firm produces steel pipes in three plants with daily production volumes of 500, 1000 and 2000 units respectively. According to past experience, it is known that the fractions of defective output produced by the three plants are respectively 0.005, 0.008 and 0.010. If a pipe is selected from a day's total production to be defective find out from which plant the pipe comes? **07**

(b) Explain Poisson distribution. In a city, 2 accidents take place in a day. Use Poisson distribution, to find probability that there will be (i) no accidents in a day. (ii) One or more accident in day. **07**

Q.5 **(a)** Explain Type –I , Type II error, Critical region and Level of significance associated with testing of hypothesis **07**

(b) A sample of 100 tyres is taken from a lot. The mean life of tyre is 39,350 kms with standard deviation 3,260. Could the sample come from a population with mean life of 40,000 kms? Also, establish 99% confidence interval for mean life of it. **07**

OR

Q.5 **(a)** What is Chi-square distribution? mention its important properties. **07**

(b) A personnel manager is interested in trying to determine whether absenteeism is greater on one day of the week than on another. His records for the past year show this sample distribution **07**

Day of the week	Monday	Tuesday	Wednesday	Thurs
No of absentees	66	57	54	48

Test whether the absence is uniformly distributed over the week.

($\chi^2_{0.05} = 9.49$ for the degree of freedom $v = 4$.)

****