Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (New course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 2711304 **Date:12/05/2015**

Subject Name: Statistical Methods and Numerical Methods

Time: 10:30 am to 1:00 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) Solve the system of linear equations using $LU-$decomposition method by taking $l_{ii}=1;\ i=1,2,3$ to solve the equations : **07**

$3x+2y+7z=4; 2x+3y+z=5; 3x+4y+z=7.$

(b) Apply Gauss ï Seidel method to solve **07**

$83x+11y-4z=95;\ 7x+52y+13z=104;\ 3x+8y+29z=71.$

Q.2 (a) Evaluate $\int_0^1 \frac{dx}{1+x}$ correct to three decimal places using Gaussian quadrature three point formula. Hence find the values of $\log_e 2$. **07**

(b) (i) Check whether system is consistent or not **03**

$2x-3y+z=-2;\ x-y+2z=3; 2x+y-3z=-2.$

(ii) Decompose the tridiagonal system using Thomson method **04**

$$\begin{bmatrix} 4 & -1 & 0 & 0 \\ -1 & 4 & -1 & 0 \\ 0 & -1 & 4 & -1 \\ 0 & 0 & -1 & 4 \end{bmatrix}$$

OR

(b) The following values of x and y are given : **07**

x:	1	2	3	4
y:	1	2	5	11

Find the cubic splines and evaluate $y(1.5)$ and $y'(3)$.

Q.3 (a) Given the values **07**

x:	5	7	11	13	17
$f(x)$:	150	392	1452	2366	5202

Evaluate $f(9)$ using Lagrange method.

(b) (i) Calculate mean and standard deviation for the data **04**

Marks	0 - 10	10 - 20	20 - 30	30 -40	40ï 50	50ï 60
No of Students	5	10	25	30	20	10

(ii) An article manufactured by a company consists of two parts A and B. In the process of manufacture of A, 9 out of 100 are likely to be defective. Similarly, 5 out of 100 are likely to be defective in the manufacture of B. Calculate the probability that the assembled part will not be defective. **03**

OR

Q.3 **(a)** A market research firm is interested in surveying certain attitudes in a small community. There are 125 households broken down according to income. Ownership of company of telephone and ownership of a TV. **07**

	Household with annual Income of Rs.8,000 or less		Household with annual Income of Rs. 8,000 or less	
	Telephone subscriber	No Telephone	Telephone subscriber	No Telephone
Own TV set	27	20	18	10
No TV set	18	10	12	10

(1) What is the probability of obtaining a TV set owner drawing at random?

(2) If household has income over Rs.8,000 and is a telephone subscriber, what is the probability that has a TV?

(3) What is the conditional probability of drawing a household that has owns a TV, given that the household is a telephone subscriber?

(4) Are the events óownership of a TVô and ótelephone subscriberô statistically independent?

(b) Solve the system of equations **07**

$4x - y - z = 3; -x + 4y - 3z = -0.5; -x - 3y + 5z = 0$

using Choleski method .

Q.4 **(a)** (i) In a town 10 accidents take place in a span of 50 days. Assuming that the number of accidents per day follows Poisson distribution, find the probability that there will be three or more accidents in a day. **04**

(ii) A sample of 100 households in a village was taken and the average income was found to be Rs. 628 per month with standard deviation of Rs. 50 per month. Find the standard error of mean and determine 99% confidence limits within which the income of all people in the village are expected to lie. **03**

(b) A sample of 50 household in Gujarat showed monthly average internet bill is Rs. 187, Monthly average internet bill of the India is Rs. 197 with standard deviation Rs.29. Test the hypothesis ótheô mean monthly internet bill in Gujarat is less than mean national billô at $\alpha = 0.01$. **07**

OR

Q.4 **(a)** (i) A grinding machine is so set that its production of shafts has an average diameter of 10.10 cm and standard deviation of 0.20 cm. The product specifications for the shaft diameter is between 10.05 and 10.20 cm. What proportion of output meet the specifications presuming normal distribution. **04**

(ii) The mean of binomial distribution is 20 and standard deviation is 4. Find n, p and q. **03**

(b) A man buys 50 electric bulbs of óPhilipsô and 50 electric bulbs of óHMTô. He finds that bulbs give an average life of 1500 hours with standard deviation of 60 hours and óHMTô bulbs gave an average life of 1512 hours with a standard deviation of 80 hours. Is there a significant difference in the mean life of two makes of bulbs? **07**

Q.5 **(a)** Fit a second degree parabola to the following data: **07**

x :	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y :	1.1	1.3	1.6	2.0	2.7	3.4	4.1

(b) The following table gives the number of good and bad parts product by each of the shifts in a factory. **07**

Shift	Good	Bad	Total
Day	900	130	1030
Evening	700	170	870
Night	400	200	600
Total	2,000	500	2,500

Is there any association between the shift and the quality of parts?

$\chi_{0.05} = 5.991$ when degree of freedom is 2.

OR

Q.5 **(a)** Fit the exponential curve $y = ae^{bx}$ to the following data: **07**

x :	2	4	6	8
y :	25	38	56	84

(b) Find the multiple linear regression equation of X_1, X_2 and X_3 from the data relating to three variables given below: **07**

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

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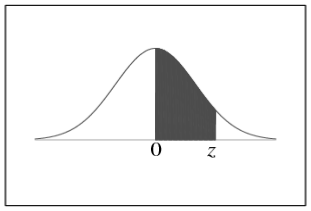
Standard Normal Distribution Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

Gilles Cazelais. Typeset with LaTeX on April 20, 2006.