

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 711403**Date: 03-12-2014****Subject Name: Statistical and Numerical Analysis****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

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

Q.1 (a) Use Lagrange's interpolation formula, fit a polynomial to the data: **[07]**

x	0	1	3	4
y	-12	0	6	12

Also, find the value of y at $x = 2$.**(b)** Solve the following system of equations using Gauss Seidel method. **[07]**

$$10x + y + z = 6$$

$$x + 10y + z = 6$$

$$x + y + 10z = 6$$

Q.2 (a) Evaluate $\int_0^1 \exp(-x^2) dx$ by Gaussian integration formula for three points. **[07]****(b)** Using Gauss elimination method solve the system of equation: **[07]**

$$3x_1 - 0.1x_2 - 0.2x_3 = 7.85$$

$$0.1x_1 + 7x_2 - 0.3x_3 = -19.3$$

$$0.3x_1 - 0.2x_2 + 10x_3 = 71.4$$

OR**(b)** Fit a straight line for the following data of speed at a given time. **[07]**

X	0	20	40	60	80	100	120
Y	0	30	55	90	110	135	160

Find a law of the form $Y = a + bX$ and hence estimate Y at time $X = 105$.**Q.3 (a)** Using Gauss Jordan method find the inverse of the matrix **[07]**

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$$

(b) If two balanced dice are thrown, what is the probability that sum of the faces is **[07]**

- (i) Multiple of 2
- (ii) more than 10
- (iii) 3, 4 or 5

OR

- Q.3 (a)** Evaluate $\int_0^1 (4x - 3x^2) dx$ by Simpson's 1/3 rule by taking $n=10$. [07]
- (b)** If a card is drawn from a well shuffled deck of 52 cards, what is the probability of drawing [07]
- a red card
 - a black king
 - a club or 10?

- Q.4 (a)** A television manufacturing company makes four types of television out of which 30% A type, 45% B type and remaining C type. In A type 6% televisions are defective, in B type 5% are defective and in C type 10% are defective. If a television is selected at random and found to be defective what is the probability that it is of type A? [07]
- (b)** A company makes a profit of 25 rupees on an item if it is in perfect condition and arrives on time, but it is reduced by 2 rupees if it does not arrive on time and by 5 rupees if it is not in perfect condition. If 65% of items are in perfect condition and arrives on time, 20 % are in perfect condition but do not arrive on time and remaining are not in perfect condition. What is the company's expected profit per item? [07]

OR

- Q.4 (a)** If the probability is 0.25 that certain tube will blast under a given pressure, what are the probability that among 15 such tubes [07]
- at most 3 will fail,
 - at least 4 will fail?
- Q.4 (b)** The following is the marks obtained by student in a 50 marks test. Prepare a frequency distribution and Histogram for the breaking strength. [07]

50	43	23	34	48	29
34	26	48	31	37	29
49	47	43	41	33	44
35	37	38	35	20	30
32	24	39	39	37	48
40	44	39	32	29	27
34	36	27	46	28	43

Choose one class as 20.0 ñ 24.9

- Q.5 (a)** A scientist want to determine the time to rotate a tyre of a car and he want to be able to assert with 95% confidence that the mean of his sample is off by at most 0.43 minute. If he can presume from past experience that $\sigma = 1.75$ minutes. Determine the sample size that he can take. [07]
- (b)** Test the null hypothesis $\mu \geq 3000$ with a level of significance 0.01. Given that the sample size is 50 and sample mean is 2799 and standard deviation is 297. [07]

OR

- Q.5 (a)** Construct a 99% confidence interval for the following. The size of sample is 80, variance of the sample 30.77 and mean of the sample is 18.85. [07]
- (b)** Test the null hypothesis $\mu = 450$ is against the alternative hypothesis $\mu > 450$ with a level of significance 0.05. Given that the sample size is 65 and sample mean is 470 and standard deviation is 37. [07]
