Seat No. : _______________

NG2-120

December-2015

S.Y. M.Sc., (CA & IT)

Computer Oriented Statistical Methods

Time : 3 Hours] **[Max. Marks : 100**

1. Attempt any **two** : **20**

(a) For the data given below, find the missing frequency if the Arithmetic Mean is ₹ 33. Also find the quartiles (Q_1, Q_2 and Q_3) of the series : **10**

Loss per shop (₹)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of Shops	10	15	30	–	25	20

(b) Find the median and mean deviation about median and mean. Also find coefficient of mean deviation (from median and mean) of the following data : **10**

Size	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	7	12	18	25	16	14	8

(c) For the following distribution, calculate the first four central moments and two beta coefficient : **10**

Class Interval	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
Frequency	5	14	20	25	17	11	8

2. Attempt any **two** : **20**

(a) (1) Compute Karl Pearson's coefficient of correlation in the following series relation to cost of living and wages : **5**

Wages (₹)	100	101	103	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

(2) Ranking of 10 trainees at the beginning (x) and at the end (y) of a certain course are given below : Calculate Spearman's rank correlation coefficient. **5**

x	1	6	3	9	5	2	7	10	8	4
y	6	8	3	7	2	1	5	9	4	10

(b) From the following data of the age of husband and the age of wife, form two regression lines and calculate the husband's age when the wife's age is 16. **10**

Husband's age	36	23	27	28	28	29	30	31	33	35
Wife's age	29	18	20	22	27	21	29	27	29	28

(c) What do you mean by Linear and Non-Linear regression ? Write short note on Correlation Analysis Vs. Regression Analysis. **10**

3. Attempt any **two** : **20**

(a) Define Time Series. Explain the various components of a Time Series. **10**

(b) Four Cards are drawn at random from a pack of 52 cards. Find the probability that :**10**

(i) They are a king, a queen, a jack and an ace.

(ii) Two are kings and two are aces.

(iii) All are diamonds.

(iv) Two are red and two are black.

(v) There is one card of each suit.

(vi) There are two cards of clubs and two cards of diamonds.

(c) The following table shows the number of salesmen working in a certain concern. Use the method of least squares to fit a straight line trend and estimate the number of salesmen in 1995. **10**

Year	1990	1991	1992	1993	1994
No. of Salesmen	28	38	46	40	56

4. Attempt any **two** : **20**

(a) (1) A random variable X has the following probability function : **5**

Values of X	-2	-1	0	1	2	3
P(x)	0.1	k	0.2	2k	0.3	k

Find the values of k, and calculate mean and variance of X.

(2) Prove that $\mathrm{Var}(aX) = a^2 \, \mathrm{Var}(X)$ and where a is a constant. **2**

(3) A die is thrown at random. What is the expectation of the number on it ? **3**

(b) Fit a Poisson distribution to the following data : Given that $e^{-0.89} = 0.410656$. **10**

X	0	1	2	3	4	5	6
f	143	90	42	12	9	3	1

(c) The following data refer to visual defects found during inspection of the first 10 samples of size 100 each. Use them to obtain upper and control limits for percentage defective in sample of 100. And plot *np-chart*. **10**

Sample No.	1	2	3	4	5	6	7	8	9	10
Number of defectives	4	8	11	3	11	7	7	16	12	6

OR

(c) Explain the following terms :

(i) Acceptance Quality Level (AQL)

(ii) Average Outgoing Quality Limit (AOQL)

(iii) Operating Characteristic Curve (OC Curve)

(iv) Average Total Inspection Curve (ATI Curve)

(v) Lot Tolerance Fraction Defectives (LTFD)

5. Attempt any **two** : **20**

(a) (i) Two types of drug were used on 5 and 7 patients for reducing their weight. Drug A was imported and Drug B was indigenous. The decrease in weight after using the drugs for six months was as follows :

Drug A	10	12	13	11	14		
Drug B	8	9	12	14	15	10	9

Is there a significance difference in the efficacy of the two drugs ?

[Given : for $\vartheta = 10$, $t_{0.05} = 2.223$] **5**

(ii) A random sample of 27 pairs of observation from a normal population gives a correlation coefficient of 0.42. Is it likely that the variables in the population are uncorrelated ? [Given : $T_{tab} = 2.06$] **5**

(b) Two independent samples have 28 and 19 pairs of observations with correlation coefficient 055 and 0.75 respectively. Are these values of r consistent with hypothesis that both the samples are drawn from the same population ? **10**

[Given : $Z_{cal} = 1.96$]

(c) The following table gives the number of units of production per day turned out by four different types of machines : **10**

Employee	**Types of Machine**			
	$\mathbf{M_1}$	$\mathbf{M_2}$	$\mathbf{M_3}$	$\mathbf{M_4}$
$\mathbf{E_1}$	40	36	45	30
$\mathbf{E_2}$	38	42	50	41
$\mathbf{E_3}$	36	30	48	35
$\mathbf{E_4}$	46	47	52	44

Using analysis of variance

(i) Test the hypothesis that the mean production is the same for the four machines.

(ii) Test the hypothesis that the employee do not differ with respect to mean productivity.