Seat No. : _____

DE-123

December-2013

5 Years MBA Integrated (KS) TY MBA

Quantitative Techniques

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

Instructions : (1) Non-Programmable Scientific Calculator can be used.
(2) Graphs and statistical tables will be provide on request.

1. (a) Explain in detail (any **two**) : **10**
   (1) Difference between Population Study and Sample Study.
   (2) Sampling and non-sampling errors.
   (3) What do you mean by sampling frame ?

   (b) Solve following (any **two**) : **10**
   (1) Suppose a production facility purchase a particular component part in large lots from a supplier. The production manager wants to estimate the proportion of defective parts received from this supplier. She believes the proportion defective is no more than 0.20 and wants to be within 0.02 of the true proportion of defective parts with a 90% level of confidence. How large a sample should she take ?

   (2) A population has a mean of 50 and a standard deviation of 10. If a random sample of 64 is taken, about is the probability that the sample mean is each of the following ?
   (i) Greater than 52
   (ii) Less than 51
   (iii) Less than 47
   (iv) Between 48.5 and 52.4
   (v) Between 50.6 and 51.3

   (3) The values of y_i in the population of size 12 are 16, 14, 18, 24, 16, 20, 32, 28, 12, 28, 10, 34. Taking all possible systematic sample of size 4 from it, prove that $E(\bar{y}_{sy}) = \bar{y}$. Also find $V(\bar{y}_{sy})$.

2. Solve following (any **two**) : **20**
   (1) A random sample of size 39 is taken from a population of 200 members. The sample mean 66 and the population standard deviation is 11. Construct a 96% confidence interval to estimate the population mean. What is the point estimate of the population mean ?

(2) Eleven employees were put under the care of the company nurse because of high cholesterol readings. The nurse lectured them on the dangers of this condition and put them on a new diet. Shown are the cholesterol readings of the 11 employees both before the new diet and one month after use of the diet began. Use 5% level of significance to estimate the population mean difference of cholesterol readings for people who are involved in this program has decreased or not. Assume differences in cholesterol readings are normally distributed in the population.

Employee	Before	After
1	255	197
2	230	225
3	290	215
4	242	215
5	300	240
6	250	235
7	215	190
8	230	240
9	225	200
10	219	203
11	236	223

(3) The value of r obtained from a random sample of 19 pairs of observations from a normal population is 0.8. Is this value consistent with the hypothesis that the correlation in the population is 0.6 ? Use 5% level of significance.

3. Solve following (any **two**) : **20**

(1) Board of Directors of a Labour Union wishes to sample the opinion of its members before submitting a change in its constitution at a forthcoming annual meeting. Questionnaires are sent to a random sample of 200 members in three union locals. The result of the survey are given below :

Reactions	Union Locals		
	A	B	C
In favour	35	45	20
In against	15	25	16
In response	10	10	24

Do you think there is a significance difference in the reactions of the membership of the three locals to the proposal change ? use 1% level of significance.

(2) A book has 700 pages. The number of pages with various numbers of misprints is recorded below. At 5% level are the misprints distributed according to Poisson law ?

No. of misprints	0	1	2	3	4	5
No. of pages with misprints	616	70	10	2	1	1

(3) Four coins are tossed for 100 times and the following distribution of number of heads is obtained.

No. of Heads	0	1	2	3	4
frequency	12	15	43	21	9

Using 1% level of significance hit binomial distribution to the data and test its goodness of hit.

4. Solve following (any **two**) **20**

(1) The time taken by workers in performing a job by Method-I and Method-II is given below :

Method – I	20	16	26	27	23	22	–
Method – II	27	33	42	35	32	34	38

Do the data show that the variance of time distribution from population from which these samples are drawn do not differ significant ? Use 5% level of significance.

(2) It is suspected that few machines in a canning operation fills cans to different levels on the average. Random sample of cans produced from each machine were taken and the Fill in ounces was measured. The results are tabulated below :

Machines			
A	**B**	**C**	**D**
10.20	10.22	10.17	10.15
10.18	10.27	10.22	10.27
10.36	10.26	10.34	10.28
10.21	10.25	10.27	10.40
10.25	–	–	10.30

Do the machines appear to be Filling the cans at different average levels ? Use 5% level of significance.

(3) The price of a certain commodity was ascertained in each of four towns and at each of four dates, one in each quarter of the year. Prices, in rupees are shown in the table. Are the variations between the different localities and between the different seasons differ significantly at 1 % level of significance. Also prepare ANOVA table for your findings.

Quarter	**Towns**			
	A	**B**	**C**	**D**
I	6	5	6	5
II	5	4	6.5	5
III	4.5	3.5	4.5	5
IV	6.5	4.5	6	7

5. (a) Explain in detail (any **two**) : **10**

(1) Three sigma limits.

(2) Producer's and consumer's risk.

(3) Theory of runs.

(b) Solve following (any **one**) **10**

(1) The following data give the diameter of engine piston rings. On the basis of these data, decide whether the production process is under control or not by drawing $\bar{X}$ and R chart.

(Note : for n = 5, $A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.11$)

Day	Observations (Cms.)				
	X_1	X_2	X_3	X_4	X_5
1	25.3	25.4	26.2	23.8	24.9
2	26.2	26.0	23.4	25.9	25.2
3	26.8	26.0	23.8	25.8	25.7
4	25.9	26.2	25.9	24.7	25.3
5	23.8	26.3	25.8	24.9	25.3
6	24.7	26.4	25.9	25.2	25.7
7	26.3	26.3	26.0	25.7	25.9
8	25.7	26.7	28.0	26.9	26.2
9	25.3	26.9	27.1	27.2	27.1
10	25.9	26.4	27.2	27.3	27.2

(2) For single sampling plan (50, 8, 0) draw on O.C. curve.

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