Seat No. : _______________

XY-123

April-2013

B.B.A. (Sem.-IV)

CC-210 : Business Statistics

Time : 3 Hours] **[Max. Marks : 70**

1. (a) Give the mathematical form of normal distribution. State its properties. **4**

OR

The observation of the population are 10, 14, 20, 36. Take all possible sample of size 2 with replacement form the population and verify the following results :

(i) $E(\bar{y}) = \bar{Y}$

(ii) $V(\bar{y}) = \dfrac{\sigma^2}{n}$

(b) The observation of a population are 12, 14, 15, 16, 18. Taking all possible samples of size 2 without replacement verify the following results : **5**

(i) $E(\bar{y}) = \bar{Y}$

(ii) $V(\bar{y}) = \dfrac{N-n}{N} \cdot \dfrac{S^2}{n}$

(iii) $E(s^2) = S^2$

OR

1000 units of a population are divided into three strata. The information regarding them is as follows :

Stratum	**No. of units in stratum**	**Variance of Stratum**
1	200	96
2	500	120
3	300	72

If a sample of 80 observations is drawn from the population with proportional allocational find $V(\bar{y}_{st})$.

(c) The diameter of shafts produced in a factory conforms to normal distribution. 31 percent of the shafts have a diameter less than 45 mm and 8 percent have more than 64 mm. Find the mean and standard deviation of the diameter of shafts. **5**

OR

The mean yield for one 'acre plot is 662 kgs with a standard deviation of 32 kgs. Assuming normal distribution, how many one acre plots in a batch of 10,000 plots would except yield :

(a) over 700 kgs

(b) below 650 kgs

2. (a) Define the following terms : **4**

(1) Null hypothesis

(2) Degree of Freedom

(3) Parameter

(4) Critical Region

OR

A sample of 900 member has a mean 3.4 cm and S.D. 2.61 cms. Can the sample be regarded as one drawn from a populations with mean 3.25 cms ? Using the level of significance as 0.05 is the claim acceptable.

(b) A random sample of 50 male employee is taken at the end of a year and the mean number of hours of absenteeism for the year is found to be 63 hours. A similar sample of 50 female employees has mean of 66 hours. Could these samples be drawn from a population with the same mean and S.D. 10 hours ? **5**

OR

The mean yield of two sets of plots and their variability are as given below. Examine whether the difference in the variability is yield is significant.

	Set of 40 plots	**Set of 60 plots**
Mean yield per plot	1258 kg	1243 kg
S.D. per plot	34	28

(c) In a sample of 400 burners, there were 12 whose internal diameters were not within tolerance. Is this sufficient evidence for concluding that the manufacturing process is turning out more than 2% defective burners. Take $\alpha = 0.05$ **5**

OR

The quality control manager of a tyre company has sample of 100 tyres and has found the mean life time to be 30214 km. The population S.D. is 860. Construct a 95% confidence interval for the mean life time for this particular brand of tyres.

3. (a) A random sample of size 16 has 53 as mean. The sum of the squares of the deviation taken from mean is 150. Can this sample be regarded as taken from the population having 56 as mean ? Using 0.05 level of significance. **4**

OR

The standard deviation calculated from two random samples of sizes 9 and 13 are 2.1 and 1.8 respectively. May the samples be regarded as drawn from the normal populations with the same standard deviation ?

(b) The following data shows the costs in hundred rupees per square metre of the floor area concerning randomly selected 7 schools and 5 blocks from those completed during the period 1997 to 2002.

School	28	31	26	27	23	38	37
Office blocks	37	42	34	37	35	–	–

Do the data support the hypothesis that the cost per square meter for the office blocks was greater than that for the schools ? Test at 5% level of significance. **5**

OR

Ten students were given intensive coaching for a month in statistics. The scores obtained in tests 1 and 5 are given below :

S. No. of Students	1	2	3	4	5	6	7	8	9	10
Marks in 1st test	50	52	53	60	65	67	48	69	72	80
Marks in 2nd test	65	55	65	65	60	67	49	82	74	86

Does the score from test 1 and test 5 show an improvement ? Test at 5% level of significance.

(c) Following are the weekly sale records (in ₹) of three salesman A, B and C of company during 13 sales call.

A :	300	400	300	500	–
B :	600	300	300	400	–
C :	700	300	400	600	500

Test whether the sales of three salesmen are different. **5**

OR

In a test given on two groups of students drawn from two normal populations, the marks obtained were as follows :

Group A	18	20	36	50	49	36	34	49	41
Group B	29	28	26	35	30	44	46	–	–

Examine at 5% level, whether the two population have the same variance.

4. (a) Define χ^2 and give its uses. **4**

OR

The following is the arrangement of 25 min (M) and 15 women (W) lined up to purchase tickets for a premier picture show

M | WW | MMM | W | MM | W | M | W | M | WWW | MMM | W | MM | WWW | MMMMMM | WWW | MMMMMM |

Test for randomness at 5% level of significance.

(b) The nicotine contents of two brands of cigarettes, measured in muilligrams, was found to be as follows :

Brand A :	2.1	4.0	6.3	5.4	4.8	3.7	6.1	3.3		
Brand B :	4.1	0.6	3.1	2.5	4.0	6.2	1.6	2.2	1.9	5.4

Using Mann-Whitney U-Test test the hypothesis, at the 0.05 level of significance, that the average nicotine contents of the two brands are equal against the alternative that they are equal. **5**

OR

The following data value are obtained for the sample. Check whether the populations median is more than 50 or not ?

47, 93, 82, 94, 70, 61, 29, 90, 17, 27, 64, 84, 7, 11, 95, 45, 52, 47, 59, 47, 64, 12, 68, 42, 85, 93, 1, 16

(c) In a sample survey of public opinion answers to the questions :

(i) Do you drink ?

(ii) Are you in favour of local option on sale of liquor ? Are tabulated below :

Question

	Yes	**No**	**Total**
Yes	56	31	87
No	18	6	24
Total	74	37	111

Can you infer whether or not the local option on the sale of liquor is dependent on individual drink ? **5**

OR

The following table gives the number of aircraft accidents that occurred during the various darp of the week. Find whether the accidents are uniformly distributed over the week.

Darp	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
No. of accidents	14	16	8	20	11	9	14

5. Answer the following : **14**

(1) In normal distribution Mean, Median and Mode are __________.

(2) The total area under the normal curve is __________.

(3) Find the number of all possible samples of size 2 from a population of observation 2, 4, 9, 18, 20 with replacement.

(4) Define degree of freedom.

(5) Define the term parameter.

(6) The mean of a sample of size 400 is 82 and S.D. is 18. Find 95% confidence limits for population mean.

(7) To test the independence of attribute we use which test.

(8) The degree of freedom to test the independence of two attribute in a $r \times c$ table is __________.

(9) The degree of freedom for small sample test to test the significance of paired t test for difference of two Mean.

(10) A sample of 4 observations from a normal population gave the following results $\Sigma x_i = 7$, $\Sigma x_i^2 = 5$. Calculate standard error of $\bar{x}$.

(11) A sample is said to be small sample if the size of sample is __________.

(12) If t_{cal} value is 0.15 and t_{tab} value is 2.26 is the H_o accepted or not.

(13) The following information is obtained for two samples drawn from two normal population :

Sample	**Size**	**Mean**	**S.D.**
I	10	12	3.162
II	12	15	5.115

Calculate the value of F – [F_{cal}]

(14) The mean of a normal distribution is 120 and its S.D. = 15. Therefore its mean deviation is approximately __________.

Table values

Z = 0.5	A = 0.915	$F_{(8, 6, 0.01)} = 4.15$
Z = 1.4	A = 0.42	$F_{(8, 12\ 0.05)} = 2.85$
Z = 1.19	A = 0.3830	$F_{(2, 10, 0.05)} = 4.10$
Z = 0.38	A = 0.1480	$F_{(2, 13, 0.05)} = 3.81$
$t_{0.05,15} = 2.131$		$\chi^2_{1, 0.05} = 3.841$
$t_{0.05,9} = 1.833$		$\chi^2_{(6, 0.05)} = 12.59$
$t_{0.05,10} = 1.812$		