AM-129

April-2015

S.Y. B.B.A., Sem.-IV

Business Statistics

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

1. (a) For a normal distribution of 100 items, $Q_1 = 73$ and $\sigma = 15$,

   Find :

   (i) Median

   (ii) Quartile Deviation

   (iii) Mean Deviation

   (iv) Mode   **4**

   OR

   The observations of a population about some characteristics are 2, 5, 8, 9. How many different random samples of size 2, can be taken with replacement and verify the following results.

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

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

   (b) 600 units of a population are divided in two strata. The following results are obtained :

Stratum	No. of units in the stratum	Variances of stratum
1	400	180
2	200	120

   A sample of 90 observation is taken from this population with proportional allocation. Find $V(\overline{y}_{st})$ **5**

   OR

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For studying some characteristic of a populations, observations of the population are 5, 9, 11, 19. Taking all possible samples of size 2 without replacement from this population verify the following results :

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

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

(c) The mean and standard deviation of marks of 500 students in an examination are 50 and 6 respectively. If the marks are normally distributed, find

(i) the no. of students getting marks more than 56.

(ii) The no. of students getting marks between 47 and 53. **5**

<center>OR</center>

In a normal distribution 31% of the observation are less than 45 and 8% are more than 64. Find Mean and S.D. of the distribution.

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

(1) Statistics

(2) Null hypothesis

(3) Critical Region

(4) Degree of Freedom

<center>OR</center>

An auto company decided to introduce a new six cylinder car whose mean petrol consumptions is claimed to be lower than that of the existing auto engine. It was found that the mean petrol consumptions for 50 cars was 10 kms per litre with a standard deviations of 3.5 km per litre. Test for the company at 5 percent level of significance, the claim that in the new car petrol consumption is 9.5 km per litre on the average.

(b) The mean of a random sample of 1000 units is 14.6 and the mean of another random sample is 800 units is 15. Can it be concluded that both the samples come from the same population with S.D. = 2.6 (5% level of significance) **5**

<center>OR</center>

An auditor claims that 10 percent of a company invoices are incorrect. To test this claims a random sample of 200 invoices is checked and 24 are found to be incorrect at 5% percent level of significance. Test whether the auditor's claim is supported by the sample evidence.

(c) The information regarding two groups is given below :   **5**

	Mean	S.D.	Number
Group I	1360	35	40
Group II	1340	40	60

Examine whether the variabilities of the two groups differ significantly ($\alpha = 0.05$)

OR

The average monthly electricity consumption for a sample of 100 families is 1250 units. Assuming the standard deviation of electric consumption of all families is 150 units, construct 95 percent confidence interval estimates of the actual mean electric consumption.

3. (a) A company is producing steel tubes of mean inner diameter of 2.00 cms. A sample of 10 tubes gives mean inner diameter of 2.01 cms, and a variance of 0.004 cms squares. Is the difference in the mean significant ?   **4**

OR

Samples of two types of electric bulbs were tested for length of life and the following data were obtained :

	Type – I	Type – II
No. of units	8	7
Mean (in hours)	1134	1024
S.D. (in hours)	35	40

Test at 5% level whether the difference in the sample mean is significant.   **4**

(b) A drug is given to 10 patients and the increments in their blood pressure were recorded as

–2, –6, 3, 1, 0, 2, 3, 10, 8, 6

Is it reasonable to believe that the drug has no effect on change of blood pressure. **5**

OR

Two random samples drawn from normal population are

| Sample 1 | 20 | 16 | 26 | 27 | 23 | 22 | 18 | 24 | 25 | 19 | | |
| Sample # | 27 | 33 | 42 | 35 | 32 | 34 | 38 | 28 | 41 | 43 | 30 | 37 |

Obtain estimates of the variances of the population and test whether the two populations have the same variance.

(c) The price of a commodity of a 3 cities are given below : **5**

Surat   16   8   12   14

Baroda   14   10   10   6

Bharuch   4   10   8   8

Do the data indicate that the price in the three cities are significantly different.

OR

Nine items of a sample had the following values

45, 47, 50, 52, 48, 47, 49, 53 and 50. The mean is 49 and the sum of the square of the deviation from mean is 52. Can this sample be regarded as taken from the population 47 as mean ?

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

OR

If the 1000 workers in a factory exposed to an epidemic, 700 in all were attacked, 400 had been inoculated, and of these 200 were attacked. On the basis of this information, can it be believed that inoculation and attack are independent ?

(b)   The following table show that awake time in bed before getting to sleep by 10 young men and old men.

Using u-test, test the hypothesis that there is no difference in time to get to sleep between young and old men.   **5**

Young Men	58	42	68	20	15	35	26	40	47	28
Old men	100	152	147	70	40	95	68	90	112	58

OR

A queue of male (M) and Female (F) is observed at a station in the following form :

MMMMMMM,   FFFF,   MMMMMM,   FFFFF,   MMMMMMM,   FFFF, MMMMMMMMM, FFFFF, MMMMMMMMM, FFFFFF

Check the randomness of samples.

(c)   In a 20 tosses of a coin following sequence is observed. Can we say that the experiment is random.

H, H, H, T, T, T, H, H, T, H, H, H, T, T, H, T, H, H, T, T   **5**

OR

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

47, 92, 85, 96, 76, 60, 29, 90, 16, 30, 64, 84, 9, 12, 99, 47, 52, 46, 62, 45, 69, 15, 69, 45, 80, 90, 0, 18

5.   Answer the following :   **14**

(1)   The total area under the normal curve is _____.

(2)   In normal distribution if mean is 5, then mode is _____.

(3)   The no. of possible samples of size 2 from a population of 6, 9, 11, 10 with replacement is _____.

(4)   A sample is said to be large if the size of sample is _____.

(5)   If t_{cal} valve is 0.95 and t_{tab} valve is 2.447, then H_0 is rejected. (true/false)

(6)   The degree of freedom for R to test the difference of means of two sample is _____.

(7) The mean of normal distribution is 230 and its S.D. is 20. Then its mean deviation is _____.

(8) The degree of freedom to test the independence of two attribute in a r × c table is _____.

(9) Chi-square is a parametric test. (true/false)

(10) To test population variance are equal or not for a small sample test χ^2-test is use. (true/false)

(11) Write formula for paired t-test for difference of Mean.

(12) To check the randomness of the data _____ test is used.

(13) Write formula for Mean for run test.

(14) Define Parameter.

_____

Statistical Values
The area under SNC between

$Z = 0$ to $1 = 0.3413$

$Z = 0$ to $0.84 = 0.2955$

$Z = 1.4$ Area $= 0.42$

$Z = 0.5$ Area $= 0.1915$

$t_{9, \, 0.05} = 2.262$

$t_{8, \, 0.025} = 2.31$

$t_{11, \, 0.05} = 2.201$

$t_{13, \, 0.05} = 2.16$

$t_{14, \, 0.05} = 2.15$

$t_{4, \, 0.025} = 4.6$

$F_{(11,9, \, 0.05)} = 4.63$

$F_{(8,10,0.05)} = 3.07$

$F_{(2, \, 9, \, 0.05)} = 4.26$

$F_{(9, \, 2, \, 0.05)} = 19.4$

$F_{(9, \, 11, \, 0.05)} = 2.90$

$\chi^2_1, \, 0.05 = 3.841$

$\chi^2_4, \, 0.05 = 9.488$

$n_1 = 11$ table -1 $C_1 = 6$

$n_2 = 9$ table -2 $C_2 = 16$