Seat No. : _______________

AA-102

April-2019

BBA, Sem.-IV

CC-210 : Business Statistics

Time : 2:30 Hours] **[Max. Marks : 70**

Instructions : (1) Use of simple calculator is permitted.
(2) Statistical table values are given at last.

1. (A) (1) Give the mathematical form of normal distribution. State its properties. **7**

(2) For studying some characteristics of population, observations of the population are 6, 10, 12, 20. Taking all possible sample of size 2 without replacement from this population, verify the following results : **7**

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

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

OR

(1) State the difference between sample study and population study. **7**

(2) For a set of 1000 observations known to be normally distributed, the mean is 534 cm and S.D. is 13.5 cm. How many observations are likely to exceed 561 cm ? How many will be between 520.5 cm and 547.5 cm ? **7**

(B) Answer the following : (any **four**) **4**

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

(ii) What is the aim of sample survey ?

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

(iv) In sampling with replacement the total number of sample of size n from a population of size N is NC_n. (True / False)

(v) Find P $[-1.2 \le Z \le \infty]$

(vi) If x is a normal variate with mean 50 and variance 9, find its quartile deviation.

2. (A) (1) Define the following terms : **7**

(i) Parameter

(ii) Null hypothesis

(iii) Critical region

(iv) Two-tailed and one-tailed test

(v) Type-I and Type-II errors.

(2) A sample of 400 individuals is found to have mean height of 67.47 inches. Can it be reasonably regarded as a sample from a larger population with mean height of 67.39 inches and standard deviation 1.30 inches ? ($\alpha = 5\%$) **7**

OR

(1) A dice was thrown 9,000 times and of these 3,220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased ? **7**

(2) The information regarding two groups is given below : **7**

	Mean	**S.D.**	**Number**
Group-I	1260	35	40
Group-II	1240	40	60

Examine whether the variabilities of the two groups differ significantly.

(B) Answer the following : (any **four**) **4**

(i) If the computed value of Z falls in the critical region, the null hypothesis may be _____.

(ii) When a sample is called large sample ?

(iii) Type-I and Type-II errors are related to non-parametric test only. (True / False)

(iv) If the population is finite with N units, the S.E. should be multiplied by the factor _____.

(v) Aasha wants to determine on the basis of sample study the man time required to complete a certain job so that she may be 95% confident that the mean may remain within ±3 days of the true mean. As per the available record the population S.D. is 8 days. How large should be the sample for this study ?

(vi) Define Level of Significance.

3. (A) (1) Give properties and uses of t-distribution. **7**

(2) From the following information find the value of F-statistic and test the hypothesis the population variances are equal. **7**

Sample	**Size**	**S.D.**
I	20	3.9
II	15	2.8

OR

(1) Is the difference between the mean scores of the two groups with 8 and 7 members respectively significant from the following data ? **7**

Group I	19	14	13	16	19	18	16	17
Group II	21	19	16	22	18	20	19	

(2) A random sample is selected from each of three makes of ropes and their breaking strength (in kg) are measured with the following results : **7**

I	35	36	38	40	42		
II	50	55	54	56	57	60	54
III	30	33	29	42	44	37	

Test whether the breaking strength of the ropes differs significantly.

(B) Answer the following : (any **three**) **3**

(i) For ANOVA table, number of rows = number of columns is must. (True / False)

(ii) Give one difference between large sample test and small sample test.

(iii) Write formula for paired t-test for difference of mean.

(iv) Define degree of freedom.

(v) A sample is said to be small sample if the size of sample is ______

4. (A) (1) Give advantages and dis-advantages of non-parametric test. **7**

(2) In an experiment to study the dependence of hypertension on smoking habits, the following data were taken from 180 individuals : **7**

	Non-Smokers	**Moderate Somkers**	**Heavy Smokers**	**Total**
Hypertension	21	36	30	87
No-hypertension	48	26	19	93
Total	**69**	**62**	**49**	**180**

Test the hypothesis at 5% level of significance that the presence or absence of hypertension is independent of smoking habits.

OR

(1) Define χ^2 and give its uses. **7**

(2) Test the randomness of the following sample : **7**

XY XXX YY X YY XX Y XY XX YYYY X
YY XXX Y X Y XX YY X YY XXX YY XX
Y XXX

(B) Answer the following : (any **three**) **3**

(i) RUN test is used to check the randomness of the given data set. (True/False)

(ii) Which test is to be used to find relation between two attributes ?

(iii) Can we apply non-parametric test for ANOVA ?

(iv) Write down different methods of non-parametric test.

(v) A sample of size 20 drawn from a normal population gave mean and S.D. as 40 and 6 respectively. Test the hypothesis that population S.D. is 8.

STATISTICAL VALUES

Area under SNC between

$Z = 0$ to $Z = 2 = 0.4772$

$Z = 0$ to $Z = 1 = 0.3413$

$Z = 0$ to $Z = 2.4 = 0.4918$

$Z = 0$ to $Z = 1.2 = 0.3849$

$F_{(19, 14)\ (0.05)} = 2.42$

$F_{(14, 19)\ (0.05)} = 2.26$

$t_{13,\ 0.05} = 2.16$

$F_{(2, 15)} = 3.68$

$\chi^2_{2,\ 0.05} = 5.99$

$\chi^2_{19,\ 0.05} = 30.14$

$\chi^2_{1,\ 0.05} = 3.841$