Seat No. : _______________

AJ-124

April-2016

BBA, Sem.-IV

CC-210 : Business Statistics

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

1. (a) Write probability function of normal distribution. Also state its properties. **4**

OR

State difference between population study and sample study.

(b) The observations of population are 6, 8, 12, 16, 20 and 22. If simple random sample of size 2 without replacement are taken from it, then verify that, $E(\bar{y}) = \bar{Y}$. **5**

OR

600 units are divided into two strata. The following results are obtained.

Stratum	No. of Units	Variance
1	400	180
2	200	120

A sample of 90 observations is taken from it with proportional allocation, find $V(\bar{y}_{st})$.

(c) The mean and S.D. of normal distribution are 52 and 8 respectively. Find **5**

(i) $P(X \leq 60)$

(ii) $P(X \geq 56)$

(z = 0 to z = 1; A = 0.3413, z = 0 to z = 0.5; A = 0.1915)

OR

In a normal distribution 7% of observations are less than 35 and its S.D. is 10.33, then find its mean.

(z = 0 to z = 0.43; A = 0.1664, z = 0 to z = 1.48, A = 0.43)

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

(i) Critical Region

(ii) Null Hypothesis

(iii) Type I Error

(iv) Parameter

OR

Write (i) 95% (ii) 99% confidence interval for population mean and population proportion.

(b) The mean of sample of 400 units is 82 with S.D. 18. Test the hypothesis that population mean is 80 at 1% level of significance. **5**

OR

In a big city 300 men out of 700 men are smokers. Does this information support the hypothesis that majority of men in city are smokers ? (Take $\alpha = 0.05$)

(c) A machine produced 20 defective articles in a batch of 400 articles. After service it produced 10 detective articles in a batch of 300 units. Has the machine improve ? (Take $\alpha = 0.05$) **5**

OR

From following information test whether the difference in means is significant at 1% level of significance.

Sample	**Mean**	**S.D.**	**Sample Size**
1	83	10	100
2	81	12	80

3. (a) State difference between small sample and large sample tests. **4**

OR

What is pair t-test ? Explain how it can be applied.

(b) For a sample of 16 observations we have **5**

$\bar{x} = 48, \Sigma(X_i - \bar{x})^2 = 250.$

Test the hypothesis that population mean is 50 at 5% level of significance.

$(t_{(15,\ 0.05)} = 2.131)$

OR

From the following result test significance of difference between variances at 5% level of significance.

Sample	**Size**	**S.D.**
I	20	3
II	15	4

($F_{((14, 19), 0.05)} = 2.65$)

(c) From the following information test significance of difference between means at 5% level of significance. **5**

Sample	**Size**	**Mean**	**Variance**
I	10	500	100
II	12	560	121

($t_{(20, 0.05)} = 2.086$)

OR

Carry out ANOVA for following data :

Fertilizers	**Yield**			
A	1	4	3	3
B	6	5	4	2
C	7	3	5	6

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

4. (a) A die is thrown for 300 times and following result is obtained. Can the die be regarded unbiased ? ($\alpha = 0.05$) **4**

Number	1	2	3	4	5	6
Frequency	41	44	49	53	57	56

($\chi^2_{(5, 0.05)} = 11.07$)

OR

A sample of size 25 drawn from a population has mean 42 and S.D. 6. Test the hypothesis that population S.D. is 9 at 5% level of significance.

($\chi^2_{(24, 0.05)} = 36.42$)

(b) Test the hypothesis that attributes A & B are independent at 5% level of significance. **5**

	B	Not B
A	1	6
Not A	9	6

($\chi^2_{(1,\ 0.05)} = 3.84$)

OR

In a survey of 200 boys, of which 75 are intelligent, and of them 40 have skilled fathers, while 85 of the unintelligent boys have unskilled fathers. Do these figures support the hypothesis that skilled fathers have intelligent boys ?

($\alpha = 0.05$, $\chi^2_{(1,\ 0.05)} = 3.84$)

(c) From a population with median 12 following sample is drawn : **5**

19, 18, 11, 9, 13, 15, 17, 13

Check whether population median is 12 or not ? (Take $\alpha = 0.05$) (Critical value at 5% is 0)

OR

Check randomness of following sample :

+, +, –, –, –, +, +, +, –, +, +, –, –, +, +, –, +, +, –, –

(Critical values : $C_1 = 6$, $C_2 = 16$)

5. Answer the following questions : **14**

(1) In SRSWOR, N = 5, n = 2, $S^2 = 46$. Find $V(\bar{y})$.

(2) Define : Sample.

(3) In SRSWR, N = 4, n = 2, $\bar{y} = 6$. Find $E(\bar{y})$.

(4) In normal distribution, if mean deviation is 10 then find its S.D.

(5) In normal distribution, if $\mu = 50$ and $\delta = 12$, the find Q_1.

(6) Define : One tailed test.

(7) Define : Level of significance.

(8) When a sample is called large ?

(9) Define : Statistic.

(10) What is degree of freedom of test statistic for comparing two population mean ?

(11) F-test is used to test difference between variances of two large samples. (True/False)

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

(13) Which test is used to check randomness of sample ?

(14) What is d.f. for 2×2 contingency table in χ^2-test ?