# PARUL UNIVERSITY
## COLLEGE OF AGRICULTURE
### B.Sc.(Hons.) Agriculture Winter 2019 - 20 Examination

Semester: 3                                                  Date: 27/11/2019
Subject Code: 20111202                                       Time: 2:00 pm to 4:30 pm
Subject Name: Statistical methods                            Total Marks: 50

**Instructions**
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1 Do as Directed.**

**A. Fill in the blanks. (Each of 0.5 mark)**                                    (05)
1. For a sample 15 observations, degree of freedom for mean is _____.
2. _____.error occurs in sampling.
3. If sum of squares for samples is 4 and degrees of freedom is 2, then the mean sum of squares for samples is _____.
4. If $p = 0.6$, then $q =$_____.
5. If $b_{xy} = -1.4$ and $b_{yx} = 0.9$, then is it true or false? _____.
6. If the coefficient of correlation between x and y i.e. $r = 0$, then x and y have _____.correlation.
7. If the number of observation can be counted and is definite then it is called _____.population.
8. For a two tail t-test at 5% significance level with degrees of freedom = 5, the table value of t i.e. $t_{tab} =$_____.(use table)
9. For a Poisson variable, mean = 6.2 and variance =_____.
10. For x=1,1,1,2,2,5,4,2,7,2  mode=_____.

**B. Multiple choice type questions. (Each of 0.5 mark)**                        (10)
1. The observation occurring most frequently is known as _____
   a) mode                                    c) median
   b) mean                                    d) none of these
2. If mean=median = mode then the data distribution is said to be _____
   a) symmetric                               c) asymmetric
   b) irregular                               d) none of these
3. The probability that we are living in the year of 2018 is _____ .
   a) 0                                       c) 1
   b) 0.5                                     d) 1.5
4. A hypothesis complementary to the null hypothesis is called _____ hypothesis.
   a) alternate                               c) null
   b) initial                                 d) none of these
5. If $\beta_1 > 0$, then the data distribution is _____.skewed
   a) negatively                              c) positively
   b) not                                     d) none of these
6. If a coin is tossed once what is the probability of getting a tail?
   a) 1.1                                     c) 0.5
   b) 0.3                                     d) 0
7. _____.is the procedure to decide whether to accept or reject the null hypothesis .
   a) census                                  c) hypothesis testing
   b) sampling                                d) none of these
8. ANOVA stands for _____.
   a) Analysis of variable                    c) Analysis of variance
   b) Analysis of various attributes          d) none of these
9. If $F_{cal} < F_{tab}$ , then the null hypothesis for F-test is _____.
   a) rejected                                c) not applicable
   b) accepted                                d) none of these
10. For the hypothesis, $H_0: \mu_1 = \mu_2$ and $H_1: \mu_0 \neq \mu_1$, the it is _____.- tail t-test
    a)one                                     c) three
    b) two                                    d) none of these
11. Which of the following is true ( $p$ =probability)?

a) $0 < p < 1$                                          c) $p > 1$
b) $0 \le p \le 1$                                      d) $p < 0$

12. If $n(A) = 6$ and $n(S) = 12$, then find $P(A) = $ _____
   a) 0.1                                               c) 0.3
   b) 0.5                                               d) 0

13. In complete enumeration _____ units of population are under study
   a) few                                               c) all
   b) zero                                              d) none of these

14. If $n = 10$ and $p = 0.5$ for binomial distributed random variable X, then the mean = _____
   a) 4                                                 c) 5
   b) 6                                                 d) 7

15. The median for the data $x = 1,4,5,6,7$ is _____
   a) 4                                                 c) 5
   b) 6                                                 d) 7

16. Which of the following is the measure of central tendency?
   a) mean                                              c) mode
   b) median                                            d) all the three options

17. If a dice is rolled, what are the total number of outcomes possible?
   a) 4                                                 c) 3
   b) 7                                                 d) 6

18. $P(A) + P(B) - P(A \cap B) = $ _____
   a) $P(A)$                                            c) 0
   b) P(B)                                              d) $P(A \cup B)$

19. Relation between mean, median and mode is _____
   a) Mode=3 median-2 mean                              c) Mode=3 median+2 mean
   b) 2Mode=3 median-2 mean                             d) None of these

20. If the coefficient of correlation between x and y i.e. $r < 0$, then x and y have
   _____ correlation.
   a) no                                                c) positive
   b) strong                                            d) negative

**Q.2 Do as Directed.**

**A. Define the following. (Any five out of seven)** (05)
   1. Sample space
   2. Sampling
   3. Null hypothesis
   4. Probability of an event A
   5. Mode
   6. Statistic
   7. Infinite population

**B. Answer the following. (Any five out of seven)** (05)
   1. If $\sigma = 6$ and $\bar{x} = 12$, then find $CV$.
   2. Find the mode of the following:

| $x$ | 1 | 2 | 4 |
|-----|---|---|---|
| $f$ | 4 | 3 | 2 |

   3. The two regression coefficients are $b_{xy} = 0.785$ and $b_{yx} = 1.1746$. Find the correlation coefficient between $x$ and $y$.
   4. State the formula to find mean.
   5. For poisson variable, $\lambda = 1.8$, find P(X=0)
   6. Sampling is better than complete enumeration. (True/ false)
   7. Find mean, if mode=4 and median=3.7

**Q.3 Write short notes. (Any five out of six)** (10)
   1. Two workers on the same job show the following results over a long period of time:

|                          | Worker A | Worker B |
|--------------------------|----------|----------|
| Mean time (min)          | 30       | 25       |
| Standard deviation (min) | 6        | 4        |

   Find coefficient of variation (CV) for each of the workers. Determine who is more variable.
   2. Find the number of all the possible samples when a sample of size 4 units is selected from the population of size 7 units if the sampling is done (a) with replacement (b) without replacement.
   3. Form a sample of size 7 with replacement from a population of size 40 using the following random numbers:

$$14, 02, 75, 10, 24, 10, 07, 57, 11, 62, 55, 46, 71, 69, 09$$

4. If A and B are two events and $P(A) = 0.5$, $P(B) = 0.2$, $P(A \cap B) = 0.3$ then find $P(A \cup B)$.

5. Find the missing values in the following one-way ANOVA table:

| Source | SS | df | MS | $F_C$ |
|--------|------|------|------|------|
| Samples | | 5 | | |
| Error | 30 | | | |
| Total | 130 | 15 | | |

6. The mean and standard deviation of binomial distribution is 5 and 2 respectively, find n, p and q.

**Q.4 Long Questions/Example (Attempt any three out of four)**                                    **(15)**

1. In an industry for 100 workers are classified according to their performance and training received or not received as the given below table. Test the independence of performance and training performed using $\chi^2$ test at 5% significance level.

| | Performance | |
|--------|------|------|
| | Good | Not good |
| Trained | 30 | 20 |
| Untrained | 40 | 10 |

   $(\chi^2_{tab} = 3.84 \ at \ \alpha = 5\% \ and \ df = 1)$

2. A sample of 10 observations have mean $\bar{x} = 67.8$ and standard deviation $s = 2.8566$. test the hypothesis that the population mean is 66 at 5% significance level.

3. A card is selected from a pack of 52 playing cards. Find the probability that the selected card is (a) a king card (b) a red card (c) a face card (d) a spade card (e) with number between 2 and 7 (not including 2 and 7).

4. Prepare one-way ANOVA table for the following data:
   Number of samples: 3
   Total number of observations: 15 (5 in each sample)
   Sum of squares due to samples: 40
   Total sum of squares: 100

# *t* Table

| cum. prob | $t_{.50}$ | $t_{.75}$ | $t_{.80}$ | $t_{.85}$ | $t_{.90}$ | $t_{.95}$ | $t_{.975}$ |
|-----------|------|------|------|------|------|------|------|
| one-tail | 0.50 | 0.25 | 0.20 | 0.15 | 0.10 | 0.05 | 0.025 |
| two-tails | 1.00 | 0.50 | 0.40 | 0.30 | 0.20 | 0.10 | 0.05 |
| df | | | | | | | |
| 1 | 0.000 | 1.000 | 1.376 | 1.963 | 3.078 | 6.314 | 12.71 |
| 2 | 0.000 | 0.816 | 1.061 | 1.386 | 1.886 | 2.920 | 4.303 |
| 3 | 0.000 | 0.765 | 0.978 | 1.250 | 1.638 | 2.353 | 3.182 |
| 4 | 0.000 | 0.741 | 0.941 | 1.190 | 1.533 | 2.132 | 2.776 |
| 5 | 0.000 | 0.727 | 0.920 | 1.156 | 1.476 | 2.015 | 2.571 |
| 6 | 0.000 | 0.718 | 0.906 | 1.134 | 1.440 | 1.943 | 2.447 |
| 7 | 0.000 | 0.711 | 0.896 | 1.119 | 1.415 | 1.895 | 2.365 |
| 8 | 0.000 | 0.706 | 0.889 | 1.108 | 1.397 | 1.860 | 2.306 |
| 9 | 0.000 | 0.703 | 0.883 | 1.100 | 1.383 | 1.833 | 2.262 |
| 10 | 0.000 | 0.700 | 0.879 | 1.093 | 1.372 | 1.812 | 2.228 |