Seat No.	

M.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Biostatistics
INTRODUCTION TO BIOSTATISTICS

Day & Date: Monday, 18-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) The shoe size of most of the people in India is No.8. Which measure does it represent?
    a) Mean   b) Mode
    c) Median   d) First quartile

2) The arithmetic mean of first n natural numbers is _____.
    a) $\dfrac{n(n+1)}{2}$ b) $\dfrac{n(n+1)^2}{2}$
    c) $\dfrac{n+1}{2}$ d) $\dfrac{(n+1)^2}{2}$

3) The coefficient of correlation between the ages of husband and wife at the time of marriage for a given set of 100 couples is 0.72 assume that all these couples survive to celebrate the silver jubilee of their marriage what will be the coefficient of correlation at that point?
    a) greater than 0.72 but not equal to 1
    b) less than 0.72
    c) 0.72
    d) 1

4) Which one of the following scales is the best scale in measurement of data?
    a) nominal scale   b) ordinal scale
    c) interval scale   d) ratio scale

5) The point of intersection of two kinds of Ogives provides _____.
    a) median   b) quartile deviation
    c) mean   d) mode

6) If Y=ax±b, where a and b are any two numbers and a ≠o, then the rang of Y values will be _____
    a) range (x)   b) a. range(x)+b
    c) a range (x) –b   d) |a|. range (x)

7) If X and Y are independent random variable, then S.D. ($\pm Y$) is equal to _____.
    a) $S.D.(X) \pm S.D.(Y)$ b) Var (X) ± Var (Y)
    c) $\sqrt{var(X) \pm var(Y)}$ d) $\sqrt{var(X) + var(Y)}$

8) In a set of observation the variance is 50. All the observations are increased by 100%. The variance of increased observations will become _____.
   a) 50
   b) 100
   c) 200
   d) no change

9) If mean=20, median=16 and standard deviation=2, then coefficient of skewness is _____.
   a) 1
   b) 2
   c) 4
   d) -2

10) The straight line graph of the linear equation Y= a + bx, slope will be upward if _____.
    a) b=0
    b) b<0
    c) b>0
    d) b ≠0

11) The method of least squares indicates that we choose a regression line where the sum of the square of deviations of the points from the line is _____.
    a) Maximum
    b) Minimum
    c) Zero
    d) positive

12) The coefficient of association (Q) always lies between _____.
    a) -1 and +1
    b) 0 and 1
    c) -1 and 0
    d) 0 and 5

13) For n attributes, the total number of ultimate class frequencies are _____.
    a) n^2
    b) n^3
    c) 2^n
    d) 3^n

14) The c.v. of two distributions are 50 and 60 and their arithmetic mean are 30 and 25 resp. Difference of their standard deviations is _____.
    a) 0
    b) 1
    c) 1.5
    d) 2.5

Q.2 A) Answer the following questions. (Any Four) 08
1) Define nominal scale and ordinal scale. Give their illustrations.
2) Give two situations where geometric mean and harmonic mean are proper measures of central tendency.
3) Define regression coefficients and state their properties.
4) Define fundamental set of class frequencies.
5) What is rank correlation?

B) Write Notes. (Any Two) 06
1) Stem and leaf chart
2) Consistency of data
3) Coefficient of variation

Q.3 A) Answer the following questions. (Any Two) 08
1) Explain in brief, graphical method of determination of mode.
2) Two regression coefficients are-1.2 and -0.3. Are they consistent? If yes, find the coefficient of correlation.
3) If attributes A and B are independent, show that attributes $\propto$ and β are independent.

B) **Answer the following questions. (Any One)** 06
1) Explain the construction of ogive curves. How quartiles are located from the less than ogive curve?
2) State and prove the relation between coefficient of association (Q) and coefficient of colligation (Y). Hence deduce that $|Q| \geq |Y|$.

Q.4 A) **Answer the following questions. (Any Two)** 10
1) Explain Karl Pearson's coefficient of skewness. If mode is indeterminate, how Karl Pearson's coefficient is computed?

2) Calculate Yule's coefficient of association between weight of children and their economic condition.

	Poor Children	Rich Children
Below normal weight	75	23
Above normal weight	05	42

3) For two positive observations a and b, show that $HM \leq GM \leq AM$.

B) **Answer the following questions. (Any One)** 04
1) Distinguish between primary data and secondary data.
2) Write down the equations of the line of regression. Draw the lines of regression where (i) $byx = bxy = 1$
(ii) $byx = bxy = -1$
(iii) $byx = bxy = 0$

Q.5 **Answer the following questions. (Any Two)** 14
a) What do you understand by kurtosis? Explain the types of kurtosis with suitable diagram.
b) What do you understand by consistency of given data? Derive the conditions of consistency in case of three attributes A,B,C.
c) Define
   i) Range
   ii) Quartile deviation
   iii) Standard deviation (SD)
   Compare critically these measures of dispersion.

Seat No.

M.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Biostatistics
DESIGN OF SAMPLE SURVEYS

Day & Date: Tuesday, 05-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The target group of interest is called the _____.
   a) population or universe b) Sample
   c) Census d) target segment

2) In a statistical study, the sample is _____.
   a) A subset of people in the United States.
   b) The group of people or objects for which conclusions are to be made.
   c) The collection of data in sample surveys.
   d) The subset of the population on which the study collects data.

3) Listing of elements in population with identifiable number is classified as _____.
   a) regularity experimental frame b) indirect experiment frame
   c) direct experimental frame d) frame for experiment

4) What effect does increasing the sample size have upon the sampling error?
   a) It reduces the sampling error
   b) It increases the sampling error
   c) It has no effect on the sampling error
   d) None of the above

5) Probability of drawing a unit at each selection remain same in _____.
   a) SRSWOR b) SRSWR
   c) Both (A) and (B) d) Neither (A) nor (B)

6) A simple random sample is one in which _____.
   a) From a random starting point, every nth unit from the sampling frame is selected
   b) A non-probability strategy is used, making the results difficult to generalize
   c) The researcher has a certain quota of respondents to fill for various social groups
   d) Every unit of the population has an equal chance of being selected

7) It is helpful to use a multi-stage cluster sample when _____.
   a) The population is widely dispersed geographically
   b) You have limited time and money available for travelling
   c) You want to use a probability sample in order to generalize the results
   d) All of the above

8) Non-probability sampling techniques include all of the following except
   a) convenience sample b) stratified sample
   c) judgment sample d) quota sample

9) The sampling procedure in which the population is first divided into homogenous groups and then a sample is drawn from each group is called _____.
   a) Probability sampling
   b) Simple random sampling
   c) Stratified random sampling
   d) Sampling with replacement

10) When the procedure of selecting the elements from the population is not based on probability, then it is known as _____.
   a) Purposive sampling
   b) Judgment sampling
   c) Subjective sampling
   d) All of the above

11) Suppose a finite population contains 7 items and 3 items are selected at random without replacement, then all possible samples will be _____.
   a) 21
   b) 35
   c) 14
   d) 7

12) Which of the following are true statements about sampling error?
   i) Sampling error can be eliminated only if a survey is both extremely well designed and extremely well conducted.
   ii) Sampling error concerns natural variation between samples, is always present, and can be described using probability.
   iii) Sampling error is generally smaller when the sample size is larger.
   a) I and II
   b) I and III
   c) II and III
   d) I, II, and III

13) Which of the following is NOT a type of non-probability sampling?
   a) Quota sampling.
   b) Convenience sampling.
   c) Cluster sampling.
   d) Snowball sampling.

14) Which of the following is not a characteristic of quota sampling?
   a) The researcher chooses who to approach and so might bias the sample
   b) Those who are available to be surveyed in public places are unlikely to constitute a representative sample
   c) The random selection of units makes it possible to calculate the standard error
   d) It is a relatively fast and cheap way of finding out about public opinions

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is sample in statistics sense?
   2) Define: questionnaire.
   3) What is non-sampling error?
   4) State the difference between probability and non-probability sampling.
   5) What is quota sampling?

B) Write Notes. (Any Two)   **06**
   1) Characteristics of good questionnaire.
   2) Two-stage Sampling
   3) Snowball Sampling

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What is sampling? State the need of sampling.
   2) Describe a purposive sampling.
   3) Explain in brief about multiphase sampling.

B) Answer the following questions. (Any One)   **06**
   1) What is sampling frame? State and explain its use.
   2) State and explain the factors responsible for sample size determination.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Describe the terms: Population, Census and Sampling error
2) Explain in brief about cluster sampling.
3) What is non-probability sampling? State and explain any one non-probability sampling scheme.

B) Answer the following questions. (Any One)   **04**
1) Describe the procedure of incidental sampling with suitable example.
2) Describe the procedure of sample size determination.

Q.5 Answer the following questions. (Any Two)   **14**
a) What is stratified sampling? Describe about proportional and optimum allocations.
b) Explain the following sampling schemes with suitable example: Systematic sampling and multistage sampling.
c) Describe: purposive sampling, convenience sampling and consecutive sampling.

Seat No.		**Set**	**P**

M.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Biostatistics
PROBABILITY & DISTRIBUTIONS

Day & Date: Thursday, 07-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**
1) If A and B are independent events, then _____.
    a) A^c and B^c are also independent events.
    b) A^c and B are also independent events.
    c) A and B^c are also independent events.
    d) All of these

2) In a certain study regarding swine flu patients, a person is selected at random from a particular village and is studied for swine flu symptoms. The sample space for this experiment is collection of _____.
    a) all swine-flu patients from that village
    b) all the diseased patients from that village
    c) all the people of the village
    d) none of these

3) Which of the following distribution best models the data regarding occurrence of a rare event?
    a) Binomial distribution   b) Poisson distribution
    c) Hypergeometric distribution   d) Normal distribution

4) In a certain treatment for a particular disease, the study is taken whether the diseased person gets cured or not by the applied treatment. The best distribution for this situation is _____.
    a) poisson   b) hypergeometric
    c) bernoulli   d) none of these

5) Which of the following distribution possess memory-less property?
    a) exponential   b) gamma
    c) normal   d) none of these

6) For geometric distribution with parameter p, the variance is given by _____.
    a) q/p b) q/p^2
    c) pq d) qp^2

7) If F(.) is a distribution function of a discrete random variable, then it is _____.
    a) right continuous   b) left continuous
    c) both right and left continuous   d) none of these

8) Which of the following distribution possess additive property?
    a) discrete uniform   b) continuous uniform
    c) normal distribution   d) none of these

9) If E(X/Y=y) = 2+y, then the random variables X and Y are _____.
   a) independent
   b) dependent
   c) may or may not be dependent
   d) none of these

10) The standard normal distribution is always _____.
   a) mesokurtic
   b) platykurtic
   c) leptokurtic
   d) none of these

11) If a sample space contains n elements, then the total number of elements in the power set will be _____.
   a) 2n
   b) n^2
   c) 16
   d) none of these

12) If X is a Poisson variate with parameter λ, then the variable Y = X +X follows _____.
   a) Poisson distribution with parameter λ
   b) Poisson distribution with parameter 2λ
   c) Poisson distribution with parameter λ^2
   d) None of these

13) For which of the following distribution/s, the support depends on parameter?
   a) Poisson distribution
   b) geometric distribution
   c) binomial distribution
   d) all of these

14) If two random variables X and Y are independent, then the correlation between them is _____.
   a) > 0
   b) < 0
   c) = 0
   d) All of these

Q.2 A) Answer the following question. (Any Four)   **08**
1) Define sample space.
2) Define discrete uniform distribution.
3) Define expectation of a discrete random variable.
4) Define probability mass function.
5) Give classical definition of probability.

B) Write Notes on. (Any Two)   **06**
1) Poisson distribution.
2) Bivariate normal distribution.
3) Gamma distribution.

Q.3 A) Answer the following question.(Any Two)   **08**
1) State and prove Baye's theorem.
2) Define geometric distribution. Also find its mean and variance.
3) Define exponential distribution. Obtain its mean and variance. Also give atleast two applications of exponential distribution.

B) Answer the following question. (Any One)   **06**
1) Prove or disprove:
   a) $P(A^c) = 1 - P(A)$
   b) $P(\Phi) = 0$
   c) Probability is a monotonic non-decreasing function.
2) If X is following continuous uniform distribution over (0,1), then find the distribution of
   a) 1- X
   b) X^2

Q.4 A) Answer the following question.(Any Two) 10

    1) Give axiomatic definition of probability. Also prove addition theorem of probability.

    2) Give a real life situation, where one can use discrete uniform distribution. Also obtain mean and variance of uniform distribution over {1, 2,..., n}

    3) Write a note on independent events. Give examples of such events.

B) Answer the following question. (Any One) 04

    1) State and prove additive property of Poisson distribution.

    2) What do you mean by moments? Explain the idea of moments. Also examine whether mean and variance can also be considered as moments.

Q.5 Answer the following (Any Two) 14

    1) Write a note on covariance and correlation.

    2) If X_i follows exponential distribution with parameter λ for i=l,2,...,k and X_i's are independent, then find the distribution of $\sum_{i=1}^{k} Xi$

    3) Write a note on discrete bivariate distributions and continuous bivariate distributions.

Seat
No.

M.Sc. (Semester – I) (New) (CBCS) Examination Oct/Nov-2019
Biostatistics
DATA ANALYSIS USING SOFTWARE

Day & Date: Saturday, 09-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                 2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing the correct alternatives given below.   **14**

1) Which of the following is not application software?
   a) Windows   b) MS-Excel
   c) LATeX   d) SPSS

2) Secondary storage devices are _____.
   a) Compact Disc   b) Digital Versatile Disc
   c) Pen Drive   d) All the above

3) MS-Excel uses _____ function to find standard deviation of given dataset.
   a) VAR()   b) STDEV()
   c) SD ()   d) SUMD()

4) MS-Excel worksheet is accepted in which of the following statistical software?
   a) MINITAB   b) SPSS
   c) STATISTICA   d) All of these

5) In SPSS which of the following is a variable type?
   a) Numeric   b) String
   c) Date   d) All the above

6) SPSS stands for _____.
   a) Social Package for Statistical Software.
   b) Statistical Packages for Social Sciences.
   c) Statistical Packages for Statistical Sampling.
   d) None of these

7) In R software, which of the following are input functions _____.
   a) combine   b) scan
   c) replicate   d) All the above

8) In R if x= 5 then x > 10 produce the output _____.
   a) TRUE   b) FALSE
   c) either a and b   d) None of these

9) In R software, list() command can be used to make list of _____.
   a) Matrix   b) Vector
   c) Function   d) All the above

10) In R, which of the following command is used to plot pie chart _____?
   a) pie ()   b) piechart ()
   c) both a) and b)   d) None of these

11) Which of the following are parts of a Minitab project?
   a) Data Window
   b) Session Window
   c) Graph Window
   d) All the above

12) Session command for obtaining summary of a column in Minitab is _____.
   a) DESCRIBE
   b) STAT
   c) SET
   d) None of these

13) Minitab Worksheet can be saved as _____.
   a) Excel worksheet
   b) text file
   c) SPSS worksheet
   d) All the above

14) SORT command in Minitab set data in _____ order by default.
   a) Increasing
   b) Decreasing
   c) as given set
   d) None of these

Q.2 A) Answer the following questions. (Any Four)   08
   1) Write different types of memories in computer.
   2) Write syntax of average and median command in MS-Excel.
   3) Write R command to enter a rectangular matrix.
   4) How to obtain bar diagram in R software?
   5) How to save Minitab worksheet?

B) Write short notes. (Any Two)   06
   1) Write algorithm for obtaining bar plot in R software.
   2) Write down algorithm to obtain descriptive statistics in MS-Excel.
   3) How to insert and delete variables in SPSS?

Q.3 A) Answer the following questions. (Any Two)   08
   1) Explain Graph menu in Minitab.
   2) How to perform proportion test in R?
   3) Write Matrix operations in R.

B) Answer the following questions. (Any One)   06
   1) Describe Data Analysis menu in MS-Excel.
   2) Explain Project Manager window in Minitab.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Write procedure to obtain ogive curve in R software.
   2) Write a short note on input and output devices.
   3) Write procedure to obtain box plot using SPSS.

B) Answer the following questions. (Any One)   04
   1) Write procedure to obtain Steam and leaf diagram using Minitab.
   2) How to obtain correlation between two variables using SPSS?

Q.5 Answer the following questions. (Any Two)   14
   a) Define a computer and explain characteristics of computer.
   b) Explain one sample and two-sample t-test in R software.
   c) Explain any four session commands in Minitab.