## Q. No. 1.   Choose the most correct alternative.

1)  The residual $X_{1.23}$ is called as residual of order   -------
   a)  0          b) 1          c) 2         d)  3

2)  The three regression planes coincides if  -----, where  |R|  is the determinant of simple correlation coefficients
   a)  |R|  =  0                          b)  |R|  =  1
   b)  |R|  > 0                          d)   |R|  <  0

3) The partial correlation coefficient $r_{12.34}$ is of order ----
   a) 1                    b)  3                    c)  0                    d)  2

4) Partial regression coefficients are independent of change of -----
   a) scale          b) origin    c)  both origin and scale     d) neither  origin nor scale

5)  The multiple correlation coefficient lies between …….
   a) -1 to +1                    b) 0 to 1
   c) - ∞  to + ∞                d) 0 to  ∞

6)  If population is homogeneous then ---- is better method of sampling.
     a) SRS          b) Stratified   c) Systematic      d) two stage

7)  Sampling frame is a term used for   -----------
   a)  sampling units in the sample          b)  subgroups of sampling units
   c)  sampling units in the population     d) none of these

8)  In SRSWOR the same unit be included in the sample -----
   a)  only two times                          b)  only once
   c)   more than once                         d)  none of these

9)  Specific death rate may be calculated according to  ………
  a) age    b) sex    c) region or locality     d) all  a), b), c)

10)  If NRR < 1, then we say that the population is -----
   a) increases      b) decreases          c) no increase or decrease   d) none of these

11)  S.T.D.R. of standard population is ---
   a) CBR          b) IMR                    c) CDR                    d) none of these

12)  The weighted average of SDR's is ---
   a) STDR          b) IMR                    c) CDR                    d) none of these

13) The collection of information (data) about each & every individual of a country is known as ---

a) sample survey        b) demography        c) population studies        d) census

14) The fertility rate depends on---
   a) total  population                b)  total female population
   c) total  male population           d)  total female population   in reproductive age group

15).A set of all units of interest in a study is called ---
   a) sample        b) parameter            c) population            d) statistic

16) .In a good questionnaire, questions should  be ---
   a) up-to-date        b) in brief            c) clearly mentioned            d) all a,b,c

17). .In sampling without replacement an element can be chosen ---
   a) less then one        b) zero times            c) only once            d) none of these

18) Random sampling is also called ----- sampling
   a) scientific        b) probability            c) non-probability            d) systematic

19) In SRSWOR method, from a population of N units n  units  are selected  in --- ways.
   a) $n^2$        b) $N^2$            c) n!            d) none of these

20) In SRSWR method, from a  population of N units n  units  are selected  in --- ways.
   a) $N^n$        b) $N^2$            c) N×n            d) none of these

21) A coefficient of any independent variable in a multiple linear regression equation is known as  --
   a) multiple correlation coefficient        b) partial regression coefficient
   c) partial correlation coefficient         d) multiple  regression coefficient

22)  Mean of any order residual is always …….
   a) 0        b) 1            c) infinity            d) none of these

23)  If  $X_{1.23}$  is residual of order 2 then   -------
   a) $\Sigma X_{1.23} > 0$        b) $\Sigma X_{1.23} < 0$        c) $\Sigma X_{1.23} => 0$        d) $\Sigma X_{1.23}$  is minimum

24) The partial correlation coefficient lies between …….
   a) -1 to +1                b) 0 to 1        c) $-\infty$ to $+\infty$                d) 0 to $\infty$

25) Which of the following is true ?
   a) $Var(X_1) \le Var(X_{1.2}) \le Var(X_{1.23})$        b) $Var(X_1) \ge Var(X_{1.2}) \ge Var(X_{1.23})$
   c) $Var(X_1) \le Var(X_{1.2})$                          d) $Var(X_1) \le Var(X_{1.23})$

26) With usual notations,  $\Sigma X_2 X_{1.23} =$  ----
   a) 0        b) 1            c) infinity            d) none of these

27) The partial correlation coefficient $r_{13.2.}$ is the geometric mean of ----…….
   a) $b_{12.3}$ and $b_{21.3}$    b) $b_{13.2}$ and $b_{31.2}$     c) $b_{23.1}$ and $b_{32.1}$    d) none of these

28) A measure of extent of relationship between $X_1$ with the other two variables $X_2$ and $X_3$ is given
   by ------
   a) simple correlation  coefficient        b) partial correlation  coefficient
   c) multiple  correlation  coefficient     d) multiple  regression coefficient

29) The correlation coefficient between any two variables when the third variable is held constant is called as ------
   a) simple correlation  coefficient        b) partial correlation  coefficient
   c) multiple  correlation  coefficient      d) multiple  regression coefficient

30) With usual notations, the coefficient of multiple determination is -----
   a) $R^2_{1.23}$          b) $r^2_{12.3}$          c) $R_{1.23}$     d)    $r_{12.3}$

31) If NRR = 1, then we say that the population is -----
   a) increases     b) decreases        c) no increase or decrease   d) none of these

32) If NRR > 1, then we say that the population is -----
   a) increases     b) decreases        c) no increase or decrease   d) none of these

33) A survey in which information is collected from a selected few members of the population is called ---
   a) sample survey      b) census        c) complete enumeration  d) both b and c

34)  In vital statistics the rates of vital events are measured in ---
   a) per million      b) per thousand        c) per hundred   d) none of these

35)  -------overestimates the growth rate.
   a) GRR      b) NRR        c)  TFR    d) CBR

36)  The survival factor used in the computation of NRR lies between ---
   a) 0 and 1      b) -1 and +1        c) -1 and 0   d) 0 and -1

37)  A sample consists of -------- of the population.
   a) all units      b) 50 percent units        c) 5 percent units        d) any fraction

38)  Probability of selection varies at each subsequent draw in------
   a) SRSWR      b) SRSWOR        c) neither a nor b   d) both a and b

39)  In SRSWOR method, from a population of 5 units 2 units are selected in --- ways.
   a) 10          b) 25          c) 32          d) 7

40)  In SRSWR method, from a population of 6 units 2 units are selected in --- ways.
   a) 6          b) 36          c) 15          d) 12

41) In regression analysis the difference between observed value and estimated value of a variable is called …..
   a) error of estimate      b) residual        c) neither a nor b    d) both a and b

42) Partial regression coefficients are independent of the change of......
   a) origin      b) scale        c) neither a nor b    d) both a and b

43) Partial regression coefficients are not independent of the change of......
   a) origin      b) scale        c) neither a nor b    d) both a and b

44)  The residual $X_{2.134}$  is called as residual of order    -------

a) 0       b) 1       c) 2       d) 3

45) The order of partial correlation coefficient $r_{12.34}$ is ----
     a) 1       b) 3       c) 0       d) 2

46) The Partial regression coefficient is invariant under the change of ......
    a) origin      b) scale       c) neither origin nor scale      d) both origin and scale

47) The Multiple regression coefficient is invariant under the change of ......
    a) origin      b) scale       c) neither origin nor scale      d) both origin and scale

48) The maximum value of $Corr(X_1, aX_2+bX_3+c)$ is -----
     a) $R_{2.13}$             b) $r_{12.3}$           c) $R_{1.23}$     d)    $R_{3.12}$

49) If S.D. of $X_{1.23}$ is zero , then $R_{1.23}$ is----
     a) 0       b) 0.5       c) 1       d) -1

50) If $R_{1.23}$ is one , then $R_{2.13}$ is----
     a) 0       b) 0.5       c) 1       d) -1

51) If $X_{1.23}$ is residual of order 2 then    $E(X_{1.23}) = $-------
     a) 0       b) > 0       c) 1       d) none of these

52) The order of residual $X_{1.23 \ldots (k+1)}$ is----
     a) k+1       b) k       c) 1       d) 2

53) If $R_{1.23} = 0$ , then ----
     a) $r_{12} = r_{13} = 0$       b) $r_{12} = r_{23} = 0$       c) $r_{13} = r_{23} = 0$      d) $r_{23} = 0$

54) If $r_{12} = -0.5$, $r_{13} = 0.6$ , then minimum value of $R_{1.23}$ is ----
     a) -0.6       b) -0.5       c) 0.5       d) none of these

55) Mortality or health conditions of persons in two cities are efficiently compared by using----------
     a) CDR          b) SDR          c) STDR       d) None of these

56) The partial correlation coefficient $r_{12.3}$ is of order ----
     a) 1            b) 3           c) 0          d) 2

57) If $X_1 = aX_2 + bX_3 + c$ is the best regression plane of $X_1$ on $X_2$ and $X_3$ then _____

a) $a = b_{12.3}$, $b = b_{13.2}$      b) $a = b_{12}$ , $b = b_{13}$    c) $a = b_{23}$, $b = b_{32}$      d) $a = b_{23.1}$ , $b = b_{32.1}$

58) Vital statistics is a branch of biometry which deals with data and laws of _____
a) marriages      b) births      c) deaths         d) all of the these

59) Sampling error can be reduced by _____.
i) choosing a proper probability sampling     ii) selection of sample of adequate size

iii) using suitable formula for estimation    iv) all of the above.

60) Probability of drawing a unit at each selection remains same in_____.

 i) SRSWOR        ii) SRSWR       iii) both i) and ii)        iv) none of  i) and ii)

## 2.  Attempt any two of the following three.

1)  Define GRR and NRR.  How they are computed? Give their interpretations.

2)  Define partial correlation coefficient ($r_{12.3}$).  Obtain an expression for $r_{12.3}$  in terms of simple correlation coefficients.

3)  Define the residual of  $X_1$ on $X_2$ and $X_3$  ($X_{1.23}$). State the properties of residuals and prove any one of them.

4)  Define multiple correlation coefficient ($R_{1.23}$).  Obtain an expression for $R_{1.23}$ in terms of simple correlation coefficients.

5)  Define the residual of $X_1$ on $X_2$ and $X_3$ ($X_{1.23}$). Find its mean and variance.

6)  State and prove any two properties of residuals.

7) Define  i) CBR ii) CDR iii) SDR  iv) GRR  v)  NRR.

8)  Define partial correlation coefficient ($r_{13.2}$). Obtain an expression for $r_{13.2}$  in terms of simple correlation coefficients.

9)  Define partial correlation coefficient ($r_{23.1}$).  Obtain an expression for $r_{23.1}$  in terms of simple correlation coefficients.

10)  Define multiple correlation coefficient ($R_{2.13}$).  Obtain an expression for $R_{2.13}$ in terms of simple correlation coefficients.

11)  Define multiple correlation coefficient ($R_{3.12}$).  Obtain an expression for $R_{3.12}$ in terms of simple correlation coefficients.

12) Obtain the equation of regression plane of variable $X_1$ on $X_2$ and $X_3$ by the method of least squares.

13) Explain sampling and non-sampling errors in detail

. 14) Obtain the equation of regression plane of variable $X_3$ on $X_1$ and $X_2$ by the method of least squares.

15) State and prove the necessary and sufficient condition for coincidence of three regression planes.

16) Explain the direct and indirect methods of obtaining standardized death rates (STDR).

17) Define the t reproduction rates ( GRR and NRR). Interpret the cases i) NRR = 1 ii) NRR  > 1 and   iii) NRR < 1

18) Explain SRSWOR and SRSWR with example. Mention various methods of drawing a random sample.

19) Explain the concept of sample and census survey. Compare sample survey with a census survey.

20) Define sample and population. State the advantages of sampling method over census

method.

21) What are random sampling numbers? Outline how these are used to select a simple random sample

## 3. Attempt any four of the following

1) Explain the terms CDR and SDR,
2) State the characteristics of a good questionnaire.
3) Define the terms population and sample with illustration.
4) Show that in SRSWR the probability of drawing a sample of size n from a population of size N units is $\frac{1}{N^n}$

5) With usual notations prove that $r^2_{12.3} = b_{12.3} \times b_{21.3}$
6) Show that multiple correlation coefficient lies between 0 and 1.

7) State any two properties of residual. Verify or prove any one of them.

8) Define the term vital statistics. Describe the methods for collection of vital statistics. .

9) Define the net reproduction rate (NRR). Interpret the cases i) NRR = 1 ii) NRR > 1 and iii) NRR < 1

10) Prove that in SRSWOR the probability of specified unit included in the sample of size n drawn from a population of size N units is $\frac{n}{N}$ .

11) With usual notations show that $Var(X_1) \geq Var(X_{1.2}) \geq Var(X_{1.23})$
12) With usual notations show that $1 - R^2_{1.23} = (1 - r^2_{12})(1 - r^2_{13.2})$
13) With usual notations show that $1 - R^2_{1.23} = (1 - r^2_{13})(1 - r^2_{12.3})$
14) Explain the terms GFR and TFR.
15) Write a note on Specific Death Rate (SDR).
15) Write a note on standardized death rate (STDR).
16) What are the uses of vital statistics?
17) Show that in SRSWR the probability of drawing a sample of size n from a population of size N units is $\frac{1}{{}^N_nC}$ .

18) In SRSWOR, the probability of a specified unit being selected in the sample at any given draw is $\frac{1}{N}$ .

19) Explain SRSWR and SRSWOR.

20) Write a note on sampling errors.

21) Write a note on non-sampling errors.

22) Define partial regression coefficient ($b_{12.3}$) and give its interpretation.

23) State the properties of partial correlation coefficients and prove any one of them.

24) State the properties of multiple correlation coefficients and prove any one of them.

25) With usual notations show that $X_{1.23}$ is uncorrelated with $X_2$ and $X_3$.

26) With usual notations show that $0 \leq R_{1.23} \leq 1$.

27) With usual notations show that $0 \leq r_{12.3} \leq 1$.

28) With usual notations obtain Cov $(X_{1.23}, X_{2.13})$.

29) With usual notations show that $b_{12.3} = \dfrac{b12 - b13\,b32}{1 - b23\,b32}$.

30) Explain the term partial correlation and multiple correlations.

31) Define SDR and STDR. State their utility.

32) Explain data collection methods in sampling.