APPSC
Asst. Director

Previous Year Paper
(Statistics) Paper-III 03
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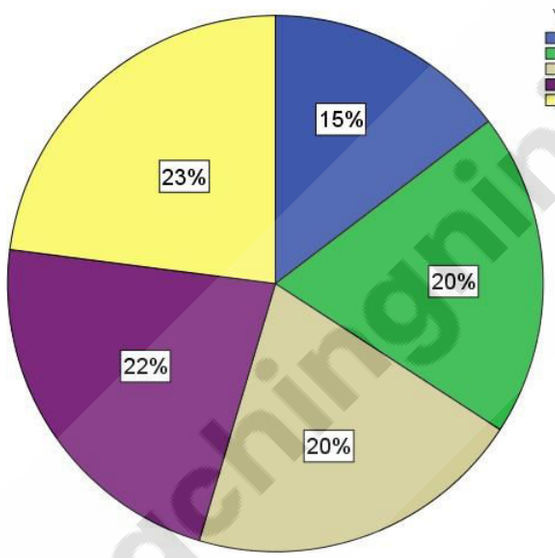
ASSISRANT DIRECTOR IN A.P. ECONOMICS AND STATISTICAL SERVICE
NOTIFICAATION NO.04/2019
STATISTICS
FINAL KEY

Question 1. What type of data is PIN (Postal Index Number) code?

Nominal

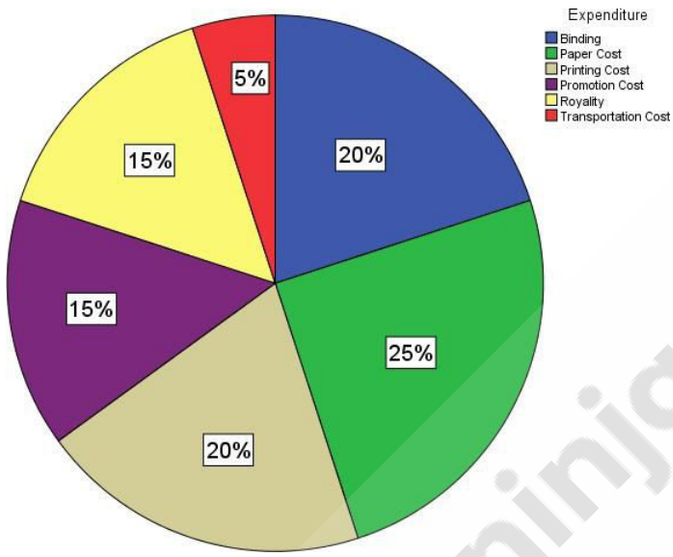
Question 2. The following pie-chart shows the percentage distribution of the production of tea in India by a leading company during 2012 to 2016.



If the production was 420 million kgs. in the year 2012, then the production (in million kgs.) for the year 2015 should be

616

Question 3. The following pie-chart shows the percentage distribution of the expenditure incurred in publishing a book.



The price of the book is marked 25% above the expenditure incurred in publishing a book. If the marked price of the book is Rs. 250, then the cost of the paper used in a single copy of the book is

Rs. 50

Question 4. If *A* and *B* are two events having no common element, the events *A* and *B* are

mutually exclusive

Question 5. Which of the following can be a type of classification of the data?

All of the given options

Question 6. Which one of the following is not a Random sampling method?

Quota sampling

Question 7. The profit earned by 100 companies during 2013-14 are given below:

Profits (| lakh)	No. of companies
20 – 30	4
30 – 40	8
40 – 50	18
50 – 60	30
60 – 70	15
70 – 80	10
80 – 90	8
90 – 100	7

If we represent the above information using a Pie chart, the angle of the slice representing the class interval 50-60 will be

108°

Question 8. Cartograms

All of the given options

Question 9. We cannot use Deviation Bars for representing

heights of male and female

Question 10. What is the main difference between bar charts and histograms?

Bar charts are one-dimensional, whereas histograms are two-dimensional.

Question 11. Consider a population of eight households, say *a, b, c, d, e, f, g* and *h*. If a sample of size 3 is to be chosen using circular systematic sampling, which one of the following cannot be a sample.

gac

Question 12. Consider a population containing 100 units. A sample of size 10 is to be taken from the population using simple random sampling (SRS). Then, the ratio of the variances of sample mean in SRS with replacement and SRS without replacement is

$\frac{11}{10}$

Question 13. 1500 workers are working in an industrial establishment. Their age is classified as follows:

Age (inyears)	No. of workers
18 – 22	120
22 – 30	405
30 – 34	260
34 – 42	339
42 – 46	162
46 – 54	120
54 – 58	94

We represent the above information using a Histogram. Let the heights of the rectangles
representing the class intervals 18-22 and 46-54 be h_1 and h_2, Respectively .
Then $\frac{h1}{h2}$ is..

2

Question 14. The following table shows the frequencies and cumulative frequencies related to the profit earned by 100 companies during 2013-14:

Profits (| lakh)	No. of companies	Cumulative frequencies
20 – 30	4	4
30 – 40	8	12
40 – 50	x	30
50 – 60	30	60
60 – 70	15	y
70 – 80	10	85
80 – 90	8	93
90 – 100	z	100

The values of x, *y* and z are, respectively

18, 75 and 7

Question 15. A six-faced die is loaded in such a way that the probability of each of the face turning up is proportional to the square of the number of dots on the face. What is the probability of getting an odd number in one throw?

35/91

Question 16. Suppose that six fair coins are tossed simultaneously. Suppose *E* is the event that "the number of Heads strictly exceeds the number of Tails" and *F* is the event that "the number of Tails strictly exceeds the number of Heads". What is the probability of the event $E \cup F$?

11/16

Question 17. Consider the two events *A* and *B* such that $P(A) = 1/4$, $P(B \mid A) = 1/2$ and $P(A \mid B) = 1/4$. Which of the following statement is true?

$P(A^c \mid B^c) = 3/4$

Question 18. A machine part is produced by three factories *A*, *B* and *C*. Their proportional production is 25, 35 and 40 percent, respectively. Also, the percentage defectives manufactured by three factories are 5, 4 and 3, respectively. A part is taken at random and is found to be defective. The probability that the selected part belongs to factory *B* is

4/11

Question 19. There are four urns labeled U_1, U_2, U_3 and U_4, each containing 3 blue and 5 red balls. The fifth urn, labeled U_5, containing 4 blue and 4 red balls. An urn is selected from these five urns and a ball is drawn at random from it. Given that the selected ball is red, the probability that it came from the urn U_5 is

1/6

Question 20. The probability that a newly generated virus will attack the computer system and corrupt the file opened is 1/5. Assume that the virus corrupts the opened files independently to each other. If 4 files are opened, the probability that at least 3 files will be corrupted by the virus is

17/625

Question 21. Let E, F and G be three events such that the events E and F are mutually
exclusive, $P(E \cup F) = 1$, $P(E \cap G) = \frac{3}{4}$ and $P(G) = \frac{11}{}$. Then $P(F \cap G)$ equals

1/6

Question 22. Let E and F be two events such that $0 < P(E) < 1$ and $P(E \mid F) + P(E \mid F^c) = 1$. Then

$$P(E^c \mid F) + P(E^c \mid F^c) = 1$$

Question 23. The following table shows each person aboard the Titanic, classified ac- cording to both their ticket Class and their Survival

Survival	Class				
	First	Second	Third	Crew	Total
Alive	203	118	178	212	711
Dead	122	167	528	673	1490
Total	325	285	706	885	2201

Consider the following statements:

I. The percentage of the passengers who were both in first class and survived is 9.2%.

II. The percentage of the first-class passengers who survived is 62.5%.

III. The percentage of the survivors who were in first class is

28.6%. The correct statement(s) is/are

All I, II and III

Question 24. Consider the following statements:

I. In SRSWOR, the probability of drawing a unit from a population of N units at the r^{th} draw is $\frac{1}{N-r+1}$

II. In SRSWR, the probability of drawing a unit from a population of N units at the r^{th} draw is $\frac{1}{N}$

III. In SRSWOR, the probability of selection of any sample of size n from a population of size N is $1/\binom{N}{n}$.

The correct statement(s) is/are

All I, II and III

Question 25. A finite population is divided into five strata of size (20, 30, 40, 50, 60)
having variances (1, 2, 3, 4, 5). A stratified random sample of size 40 was drawn using proportional allocation. Let n_1, n_2, n_3, n_4, n_5 be the number of units to be selected from respective strata. Then, the values of n_1, n_2, n_3, n_4, n_5 are, respectively

4, 6, 8, 10, 12

Question 26. A finite population of size 70 is divided into three strata. Let the strata sizes be N_1, N_2, N_3 and let strata variances be S_1, S_2, S_3. It is given that $N_1 = 2N_2 = 4N_3$ and $S_1 = 2S_2 = 4S_3$. A sample of size 21 is to be selected from the population under Neyman allocation. Let n_1, n_2, n_3 be the number of units to be selected from respective strata. Then

$n_1 = 16, n_2 = 4, n_3 = 1$

Question 27. An archer makes 10 independent attempts at a target and his probability of hitting the target at each attempt is $\frac{5}{6}$. Then the conditional probability that his last attempt is successful given that he has a total of 7 successful attempts is

7/10

Question 28. Let E and F be two mutually disjoint events. Further, let E and F be independent of G. If $p = P(E) + P(F)$ and $q = P(G)$, then $P(E \cup F \cup G)$ is

$p + q - pq$.

Question 29. Let A and B be two events with $P(A \mid B) = 0.3$ and $P(A \mid B^c) = 0.4$. Then $P(B \mid A)$ equals

$$\frac{3P(B)}{4-P(B)}$$

Question 30. A fair die is rolled 3 times. The conditional probability of 6 appearing exactly once, given that it appeared at least once, equals

$$\frac{3(1/6)(5/6)^2}{1-(5/6)^3}$$

Question 31. Consider the data set given below in the form of frequency table:

x	−2	−1	0	1	2	3	4	5	6
f	1	2	3	5	8	5	3	2	1

Let a, b and c denote the mean, median and mode of the data, respectively. Then

$a = b = c$

Question 32. Consider the data set given below in the form of frequency table:

x	2	3	4	5	6	7	8	9	10
f	1	1	2	2	6	5	4	4	3

Let a and b denote the mean and mode of the data, respectively. Then

$a > b$

Question 33. Consider the data set given below in the form of frequency table:

x	20	30	40	50	60	70	80	90	100
f	1	1	2	2	6	5	5	4	3

The median of the data is

70

Question 34. Consider the data 17.5, 2.8, 3.2, 13.9, 14.1, 25.3, 35.7, 45.8. The first (lower) quartile is

3

Question 35. The geometric mean of four observations is 20. If we multiply each observation by 2, then the new geometric mean is

40

Question 36. The harmonic mean of five observations is 20. If we divide each observation by 5, then the new harmonic mean is

4

Question 37. A car travels with a speed of 40 kms per hour for the first half of the way. Then, the car travels with a speed of 60 kms per hour for the second half of the way. What is the average speed (in kms/hour)?

48

Question 38. The times in the men's combined event at the winter Olympics are re- ported in minutes and seconds. The mean and median of the 34 final super combined times at the 2010 Olympics were 168.93 seconds and 175.26 seconds, respectively. Sup- pose instead that we had reported the times in minutes only. What would be the resulting mean and median?

mean = 2.816 minutes, median = 2.921 minutes

Question 39. Consider the following data related to the sales of 100 companies:

Sales (| lakh)	Below 60	60 − 62	62 − 64	64 − 66	66 − 68	68 − 70	70 − 72
No. of companies	12	18	25	30	10	3	2

The mode of the sales (in | lakh) is

64.4

Question 40. Consider the following statements:

I. Arithmetic mean is invariant under the change of origin and scale.

II. Geometric mean is invariant under the change of scale.

III. Median is invariant under the change of

scale. Which of the above statement(s) is/are

not correct?

All I, II and III

Question 41. If the mean of first set of *n* observations is 9 and the mean of second set of 5*n* observations is 15, the combined mean of two sets is

14

Question 42. If the mean of first set of *n* observations is 6, the mean of second set of 3*n* observations is *m* and the combined mean of two sets is 21, the value of *m* is

26

Question 43. Which one of the following is the harmonic mean of the reciprocals of the first 20 positive integers?

2/21

Question 44. Let *X* be a random variable such that $E|X| < \infty$ and

$$P\left[X \geq \frac{1}{3} + x\right] = P\left[X \leq \frac{1}{3} - x\right]$$

for all $x \in R$. Then

E(X)= 1/3 and Median (X)= 1/3

Question 45. A car travels with a speed of 40 kms per hour for the first one-third of the way. Then, the car travels with a speed of 60 kms per hour for the second one-third of the way, and the remaining journey is travelled with a speed of 120 kms per hour. What is the average speed (in kms/hour)?

60

Question 46. Let the random variable *X* has the probability density function

$$f_X(x) = \begin{cases} \lambda e^{-\lambda(x-1)}, & x \geq 1, \lambda > 0 \\ 0, & \text{otherwise.} \end{cases}$$

Then, the mode of the distribution is

1

Question 47. Let the random variable X has the probability density function

$$f_X(x) = \begin{cases} \frac{2x}{\theta^2}, & 0 < x \le \theta, \\ 0, & \text{otherwise.} \end{cases}$$

Then, the first (lower) quartile of the distribution is

θ/2

Question 48. The median and the inter-quartile range, for a symmetric distribution, are 15 and 14, respectively. Then, the first (lower) and third (upper) quartiles of the distribution are, respectively

8, 22

Question 49. Let P_i denotes the i^{th} percentile of a distribution, $i = 1, 2, \ldots, 99$. For a symmetric distribution, if $P_{50} = 25$ and P_{75} $P_{25} = 10$, then the first (lower) and third (upper) quartiles of the distribution are, respectively

20, 30

Question 50. Let P_i denotes the i^{th} percentile of a distribution, $i = 1, 2, \ldots, 99$. Further, let D_j denotes the j^{th} decile of that distribution, $j = 1, 2, \ldots, 9$. Which of the following is **not** correct?

$\boldsymbol{P_{80} - P_{20} = D_9 - D_2}$

Question 51. Let the random variable X has the probability density function

$$f_X(x) = \begin{cases} \frac{1}{2\theta}, & -\theta < x < \theta, \theta > 0 \\ 0, & \text{otherwise.} \end{cases}$$

Then, the quartile deviation of the distribution is

$\frac{\theta}{2}$

Question 52. Let the random variable X has the probability density function

$$f_X(x) = \begin{cases} 2e^{-2(x-1)}, & x > 1, \\ 0, & \text{otherwise.} \end{cases}$$

Then, the median of the distribution is

$1 + \ln\sqrt{2}$

Question 53. Let the random variable X has the probability density function

$$f_X(x) = \begin{cases} \lambda e^{-\lambda(x-\mu)}, & \text{if } x > \mu,\ \lambda > 0, \mu > 0, \\ 0, & \text{otherwise.} \end{cases}$$

Then, the third (upper) quartile of the distribution is

$\mu + \frac{1}{\lambda}\ln 4$

Question 54. Let *a* be the harmonic mean of the reciprocals of the first *n* positive integers, *n* > 1, and let *b* be the arithmetic mean of the first *n* positive integers. Then

***ab* =1**

Question 55. Consider the data set given below in the form of frequency table:

x	1	3	5	7	9	11	13	15	17	19
f	1	3	5	7	9	11	13	15	17	19

The harmonic mean of the data is

10

Question 56. Let the random variable *X* has the probability density function

$$f_X(x) = \begin{cases} -\frac{x}{150}, & \text{if } 10 < x < 20, \\ 0, & \text{otherwise.} \end{cases}$$

Then, the harmonic mean of the distribution is

15

Question 57. Consider the data set given below in the form of frequency table:

x	e	e^2	e^3	e^4	e^5
f	1	2	3	4	5

The geometric mean of the data is

$e^{11/3}$

Question 58. Let the random variable X has the probability density function

$$f_X(x) = \begin{cases} \frac{1}{x}, & \text{if } e < x < e^2, \\ 0, & \text{otherwise.} \end{cases}$$

Then, the geometric mean of the distribution is

$e^{3/2}$

Question 59. Which one of the following is the weighted arithmetic mean of square of the reciprocals of the first 10 positive integers when the weights being the cube of the respective integrs?

$\frac{1}{55}$

Question 60. Given that the mean and the standard deviation of a distribution are 15 and 3, respectively. If Karl Pearson's coefficient of skewness for the distribution is 0.7, the value of the mode is

12.9

Question 61. Given that the mean and the mode of a distribution are 20 and 18, re- spectively. If Karl Pearson's coefficient of skewness for the distribution is 0.5, the value of the standard deviation is

4

Question 62. Let the random variable X has the probability density function

$$f(x) = \frac{1}{2}e^{-|x-3|}, \quad -\infty < x < \infty.$$

Then, the coefficient of skewness equals

0

Question 63. The standard deviation of a set of values is 2.5. Now 64 is added to each of the given set of values. The standard deviation of the new set of values is

2.5

Question 64. The standard deviation of a distribution is 5. The value(s) of the fourth central moment (μ_4), in order that the distribution be mesokurtic, should be

1875

Question 65. A company selling books on the Internet reports that the packages it ships have a median weight of 1.5 kg. and an IQR (Inter Quartile Range) of 1 kg. The company plans to include a sales flyer weighing 10 grams in each package. What will be the new median and IQR?

median = 1.51 kg., IQR = 1 kg.

Question 66. The mean score of the Assistant Statistical Officer's examination was 80 points with a variance of 16 points, and Sanjay's z-score was 2.5. How many points did he score?

70

Question 67. A professor of Statistics graded his latest examination and found that the mean and the standard deviation of the scores are 70 and 9, respectively. He then decided to rescale the scores by adding 5 points to each student's scores. The mean and the standard deviation of the new scores are, respectively:

75, 9

Question 68. The mean of absolute deviations of X from its mean is 15. Then, the mean of absolute deviations of $Y = \frac{1}{5}(X - 3)$ from its mean is

3

Question 69. In the 2010 Winter Olympics men's slalom, Li Lei of China skied in a total time of 120.86 sec for two runs–about 1 standard deviation slower than the mean. If a Normal model is useful in describing slalom times, about how many of the 48 skiers finishing the event would you expect skied the slalom *slower* than Li Lei?
(Given that $\Phi(1) - \Phi(-1) = 0.68$, where $\Phi(\ )$ is the cumulative distribution function of the standard normal variate.)

7

Question 70. A company selling books on the Internet reports that the packages it ships have a median weight of 2 kg. and an IQR (Inter Quartile Range) of 2 kg. The company plans to include a sales flyer weighing 20 grams in each package. If the company recorded the shipping weights of these new packages in grams instead of kg., what would be the new median and IQR?

median = 2020 grams, IQR = 2000 grams

Question 71. 20 outcomes of a random variable were recorded. The sample mean and the sample variance of the recorded data are 0 and 5, respectively. It is discovered later that two outcome were recorded incorrectly: one outcome was recorded as −5 instead of
−6 and another outcome was recorded as 11 instead of 12. What is the correct variance?

6.7

Question 72. Let X_1, X_2 and X_3 be independent random variables with variances 5, 3 and 1, respectively. Let $Z = X_1 + 4X_2 - 5X_3 + 7$. Then, the variance of Z is given by

78

Question 73. For a data taken from the normal distribution with mean 10 and standard deviation 5, approximately what percent of the observations should be less than 25? (Given that $\Phi(3) \quad \Phi(3) = 0.9973$, where $\Phi(\ )$ is the cumulative distribution function of the standard normal variate.)

99.865%

Question 74. Consider the following statements:

I. If a test is too easy, the distribution of scores will be skewed to the left.

II. Many scores will bump against 100%. Then

I is true and II is the correct explaination for I.

Question 75. Consider the following statements:

I. Standard deviation is invariant under the change of origin.

II. Inter quartile range is invariant under the change of scale.

III. Quartile deviation is invariant under the change of origin. Which of the above statement(s) is/are correct?

Only I and III

Question 76. Let $X_1, \ldots, X_5$ be independent and identically distributed standard normal variates. Then, the distribution of $X_1^2 + \cdots + X_5^2$ is

positively skewed

Question 77. Let $X_1, \ldots, X_n$, $n \geq 2$, be independent and identically distributed standard normal variates. Further, let $U = X_1^2 + \cdots + X_n^2$ and $V = X_1 + \cdots + X_n$. Now, consider the following statements:

I. The distribution of U is positively skewed.

II. The distribution of V is symmetric about 0. Which of the above statement(s) is/are correct?

Both I and II

Question 78. If the median of a symmetric frequency distribution is 50 and the coeffi- cient of variation is 40%, then its variance is

400

Question 79. Let X_1, X_2, X_3 be a random sample from $N(\mu, 1)$, $\mu \in \mathbb{R}$. Let

$$T_1 = \frac{2X_1 + 3X_2 + X_3}{6}, \qquad T_2 = \frac{X_1 + 4X_2 + X_3}{6},$$

and $\text{Var}(T_i) = \sigma_i^2$, $i = 1, 2$. Which of the following is correct?

$\sigma_1^2 < \sigma_2^2$

Question 80. Karl Pearson's coefficient of skewness and the coefficient of variation for a distribution are 0.5 and 25%, respectively. If the value of the mode is 70, then the mean and the standard deviation of the distribution are, respectively

80, 20

Question 81. Consider the three sets of data D_1 = {10, 15, 20, 25}, D_2 = {2, 3, 4, 5} and D_3 = {5, 7.5, 10, 12.5}. Let v_1, v_2 and v_3 be the coefficient of variations of the data sets D_1, D_2 and D_3, respectively. Which one of the following is correct?

$v_1 = v_2 = v_3$

Question 82. Let X, Y and Z be the exponentially distributed random variables with respective means λ, 2λ and 3λ. Let v_1, v_2 and v_3 denote the coefficient of variations of the distributions of X, Y and Z, respectively. Which one of the following is correct?

DELETED

Question 83. Let X, Y and Z have Poisson distribution with respective means λ, 4λ and 9λ. Let v_1, v_2 and v_3 denote the coefficient of variations of the distributions of X, Y and Z, respectively. Which one of the following is correct?

DELETED

Question 84. The coefficient of variation of a random variable X having binomial dis- tribution with parameters n and p for which $P(X = 0) = 4P(X = 1)$, is

DELETED

Question 85. Let X be a random variable having binomial distribution with parame- ters n and p for which $P(X = 0) = P(X = 1)$. Then the distribution of X is

DELETED

Question 86. Let X_1, X_2 be a random sample from $N(\mu, 1)$, $\mu \in R$. Let

$$T_1 = \frac{2X_1 - 3X_2}{2}, \qquad T_2 = \frac{X_1 - 4X_2}{5}, \qquad T_3 = \frac{3X_1 + X_2}{3},$$

and Var(T_i) = σ_i^2, i = 1, 2, 3. Which of the following is correct?

$\sigma_1^2 < \sigma_3^2 < \sigma_2^2$

Question 87. Consider the two data sets given below in the form of frequency tables:

x	f
−2	1
−1	2
0	3
1	5
2	8
3	5
4	3
5	2
6	1

x	f
−2	2
−1	3
0	4
1	8
2	6
3	3
4	2
5	1
6	1

Let γ_1 and γ_2 be the Karl Pearson's coefficients of skewness of the above data, respectively. Then

$\gamma_1 = 0, \gamma_2 > 0$

Question 88. Consider the following sets of data: D_1 = {1, 1, 2, 2, 3, 3, 4, 4} and D_2 = {1, 2, 3, 5, 6, 7, 7, 8}.

Let β_1 and β_2 denote the Bowley's coefficient of skew ness of the data sets D_1 and D_2, respectively. Which one of the following is correct?

$\beta_1 = 0, \beta_2 < 0$

Question 89. Consider the three sets of data D_1 = {6, 11, 15, 20}, D_2 = {−1, 4, 8, 13} and D_3 = {1, 3.5, 5.5, 8}. Let σ_1, σ_2 and σ_3 be the standard deviations of the data sets D_1, D_2 and D_3, respectively. Which one of the following is correct?

$\sigma_1 = \sigma_2 = 2\sigma_3$

Question 90. The probable error of the correlation coefficient, r, is given by

$0.6745 \frac{1-r^2}{\sqrt{n}}$

Question 91. Consider the following statements:

I. Correlation ratio is a coefficient of non-linear association.

II. The value of correlation ratio lies between −1 and 1. Which of the above statement(s) is/are true?

Only I

Question 92. Let X and Y be two random variables. Further, let $X^* = X + 5$ and $Y^* = Y - 5$. Then

Cov (X^*, Y^*) = Cov (X, Y)

Question 93. Let X and Y be two random variables. Further, let $X^* = 4X$ and $Y^* = Y/4$. Then

Cov(X^*, Y^*) = Cov(X, Y)

Question 94. Following are the ranks awarded to seven debators in a competetion by two judges:

Debators	A	B	C	D	E	F	G
Ranks given by the first judge (X)	1	2	3	4	5	6	7
Ranks given by the second judge (Y)	7	6	5	4	3	2	1

The Sperman's rank correlation coefficient between X and Y is

−1

Question 95. While calculating the Spearman's rank correlation between X and Y , it is found that the rank 6 is repeated three times in the ranks of X and there is no other tie in the ranks of X and Y. Then, the corrected factor, which should be added to $\Sigma_i d^2_i$ calculate the rank correlation, is

2

Question 96. The correlation coefficient between X and Y is r. Define $U = X - a$ and $V = Y - b$, where $a > b > 0$. Then, the correlation coefficient betwenn U and V is

r

Question 97. The correlation coefficient between X and Y is r. Define $U = X/a$ and $V = Y/b$, where $0 < a < b < 1$. Then, the correlation coefficient betwenn U and V is

r

Question 98. Consider a random variable X with $P(X = i) = \frac{1}{3}$, $\forall i \in \{-1, 0, 1\}$. Let $Y = X^n$, where n is an even number. Then, the correlation coefficient between X and Y is

0

Question 99. Consider a random variable X with $P(X = i) = \frac{1}{3}$, $\forall i \in \{-1, 0, 1\}$. Let $Y = X^6$. Now, consider the following statements:

I. X and Y are uncorrelated.

II. $E(XY) = 0$.

Which of the above statement(s) is/are correct?

Both I and II

Question 100. The correlation coefficient between X and Y is r. Define $U = \frac{1}{1}(X - 5)$ and $V = \frac{1}{5}(10 - Y)$. Then, the correlation coefficient betwenn U and V is

−r

Question 101. Consider the two data sets given below:

x	y
−2	1
−1	2
0	3
1	5
2	8
3	9
4	10
5	11
6	12

u	v
20	40
30	38
35	35
40	31
60	25
62	20
65	15
70	12
80	10

Consider the following statements:

I. There is a positive correlation between x and y.

II. There is no correlation between u and v.

Which of the above statement(s) is/are correct ?

Only I

Question 102. If $r_{12} = r_{13} = r_{23} = \rho$, then the value of $R_{3.12}$ is

$\frac{\sqrt{2P^2}}{1+P}$ (answer is 3)

Question 103. If $r_{12} = r_{13} = r_{23} = \rho$, then the value of $r_{12.3}$ is

$$\frac{-\rho}{1+\rho}$$

Question 104. Let λ be the probable error of the correlation coefficient, r. Consider the following statements:

I. If $r < 3\lambda$, the correlation coefficient is definitely not significant.

II. If $r > 3\lambda$, the correlation coefficient is definitely significant. Which of the above statement(s) is/are correct?

Only I

Question 105. Given that the Spearman's rank correlation coefficient is 0.7 (when there is no tie in the ranks). If $\sum_{i=1}^{n} d_i^2 = 36$, then the number of observations, n, is

9

Question 106. Let X be a random variable with finite variance and let $Y = 10 - X$. What is the correlation coefficient between X and $Z = Y^2 - X^2$?

−1

Question 107. Let X and Y be two random variables such that $X = aY + \beta$, where $a < 0$ and $\beta > 0$. Consider the following statements:

I. $\text{Cov}(X, Y) = a\text{Var}(Y)$.

II. Correlation coefficient between X and Y is 1. Which of the above statement(s) is/are correct?

Only I

Question 108. Given that $\text{Var}(X) = 2\text{Var}(Y) = 2\text{Var}(X - Y)$. What is the correlation coefficient between X and Y ?

$$\frac{1}{\sqrt{2}}$$

Question 109. Given that 2Var(X) = Var(Y) = Var($X + Y$). What is the correlation coefficient between X and Y ?

$-\frac{1}{2\sqrt{2}}$

Question 110. Let $X_1, X_2, \ldots, X_n$ be independent and identically distributed random variables with finite and positive variance. Let $Y = \frac{1}{n}\sum_{i=1}^{n} X_i$. Then, the coefficient between X_1 and Y is

correlation

$\frac{1}{\sqrt{n}}$

Question 111. Given that the correlation coefficient between X and Y is $\frac{1}{2}$, Var(X) = 4 and Var(Y) = 1. Let $Z = aX + Y$, where $a > 0$. If Var(Z) = 7, the value of a is

1

Question 112. Given that the Spearman's rank correlation coefficient beween X and Y is 0.7 (when the rank 3.5 is repeated four times in the ranks of X). If $\sum_{i=1}^{n} d_i^2 = 31$, then the number of observations, n, is

9

Question 113. Suppose we have seven observations on (X, Y). Given that the Spear- man's rank correlation coefficient beween X and Y is 0.5 (when the rank 2 is repeated m times in the ranks of X). If $\sum_{i=1}^{7} d_i^2 = 26$, the value of m is

3

Question 114. Consider a random variable X with $P(X = i) = \frac{1}{5}\ \forall\ i \in \{-2, -1, 0, 1, 2\}$. Let $Y = X^2$ and $Z = XY$. Now, consider the following statements:

I. X and Y are uncorrelated.

II. X and Z have the same mean.

III. $P(Y = 4) = P(Y = 0)$.

Which of the above statement(s) is/are correct?

Only I and II

Question 115. Given that the correlation coefficient between X and Y is $\frac{1}{2}$, Var(X) = Var(Y) = 1. Let $Z_1 = aX + bY$ and $Z_2 = aX - bY$, where $a > b > 0$. If Var(Z_1) = 109 and Var(Z_2) = 39, then

***a* = 7 and *b* = 5**

Question 116. Let X_1, X_2, X_3 be independent and identically distributed random variables with finite and positive variance. Let $Y = \frac{1}{3}\sum_{i=1}^{3} X_i$. Then, the correlation coefficient between $X_1 - Y$ and Y is

0

Question 117. Consider the following statements:

I. Index numbers are known as economic barometers.

II. Index numbers measure changes over time in magnitudes which are not capable of direct measurements.

Which of the above statement(s) is/are correct?

Both I and II

Question 118. Consider the following statements:

I. Index numbers are usually expressed in percentages.

II. Consumer price index is also known as cost of living

index. Which of the above statement(s) is/are **not**

correct?

Neither I nor II

Question 119. Consider the following statements:

I. Fisher's ideal index number is the harmonic mean of Laspeyre's and Paasche's index numbers.

II. The value of homogeneity error lies between −1

to 1. Which of the above statement(s) is/are

correct?

Neither I nor II

Question 120. The measure of joint error, in time reversal test, is given by

$P_{01} \times P_{10} - 1$

Question 121. The measure of joint error, in factor reversal test, is given by

$\frac{P01 \times Q01}{\backslash 01} - 1$

Question 122. If the trend is concave upward, a moving average will always

over estimate the trend values.

Question 123. Consider the following statements:

I. Method of free-hand curve fitting is quite subjective.

II. Method of free-hand curve fitting can only be used for linear trends. Which of the above statement(s) is/are correct?

Only I

Question 124. If the first differences of the logarithm are constant, then for the trend, we should use/prefer

an exponential curve $Y = ab^X$.

Question 125. You are given the trend equation:

$Y = 95 + 3X$; origin : 1985; time unit : 1 year.

If we shift the origin to 1993, the trend equation will be

$Y = 119 + 3X$

Question 126. Which of the following is **not** a method for measuring seasonal variation?

Method of semi averages

Question 127. Consider the following statements:

I. Cyclic variations in a time series are due to ups and downs recurring after a period greater than one year.

II. Seasonal variations in a time series repeat themselves in less than one year time. Which of the above statement(s) is/are correct?

Both I and II

Question 128. The seasonal indices of the sale of ready-made garments of a particular type in a certain store are given below:

Quarter	I	II	III	IV
Seasonal index	108	81	98	87

If the total sale in the first quarter of a year is of | 10, 000, then the total sale in the second quarter will be

Rs. 7, 500

Question 129. Given the trend equation: $Y = 36 + 12X$, where X units are in years and Y is the annual production of computers. The monthly trend equation is given by

DELETED

Question 130. The equation of the geometric trend is $Y = 25(2.5)^X$. If the origin is shifted backward by two years, the resulting trend equation is given by

$Y = 4(2.5)^X$

Question 131. The equation of the straight line trend is $Y = a + bX$. Given that there are 9 data points with $\sum X = 0$, $\sum Y = 639$, $\sum XY = 300$ and $\sum X^2 = 60$. If the trend was fitted by the method of least squares, the values of a and b are, respectively

71, 5

Question 132. The equation of the exponential trend is $Y = ae^X$. Given that there are 10 data points with $\Sigma X = 0$ and $\Sigma \ln Y = 12$. If the trend was fitted by the method of least squares, the value of a is

$e^{1.2}$

Question 133. The equation of the exponential trend, fitted by the method of least squares, is $Y = 2b^X$. Given that there are 10 data points with $\Sigma X = 13.1$ and $\Sigma \ln Y = 20$ What is the value of b? (Given that $\ln 2 = 0.69$)

e

Question 134. The equation of the parabolic trend is $Y = 4 + 3X - 1.3X^2$. If the origin is shifted backward by three years, the resulting trend equation is given by

$Y = -16.7 + 10.8X - 1.3X^2$

Question 135. For the given five values 16, 25, 19, 34, 43, the simple moving averages of three years are

20, 26, 32

Question 136. Consider the following statements:

I. Factor reversal test permits the interchange of price and quantity.

II. Paasche's index formula satisfies the factor reversal test. Which of the above statement(s) is/are correct?

Only I

Question 137. Consider the following statements:

I. Laspeyre's indices have a downward bias.

II. Paasche's indices have an upward bias.

Which of the above statement(s) is/are correct?

Neither I nor II

Question 138. Consider the following statements:

I. Purchasing power of money is given by $\frac{1}{\text{consumer price}} \times 100$.

II. Consumer price index reflects on the price changes experienced by a particular family. Which of the above statement(s) is/are correct?

Only I

Question 139. The Dorbish-Bowley's and Paasche's index numbers are 150 and 130, respectively. Then, the Laspeyre's index numbers is

170

Question 140. If the Paasche's and Fisher's index numbers are 169 and 143, respectively, then, the Laspeyre's index number is

121

Question 141. Per capita income of a person from 1980-81 to 1984-85 and the consumer price index with 1980-81 as base were as follows:

Year	Income per capita (₹)	Price index number
1980 – 81	1627	100
1981 – 82	1863	103.5
1982 – 83	1993	103.4
1983 – 84	2290	109.4
1984 – 85	2494	110.9

Then, the real income (or deflated income) of 1980-81 and 1981-82 are, respectively

1627, 1800

Question 142. The seasonal indices of the sale of ready-made garments of a particular type in a certain store are given below:

Quarter	I	II	III	IV
Seasonal index	135	108	81	87

If the total sale in the first quarter of a year is of Rs. 10, 000, then the total sale in the second and third quarters will, respectively, be

Rs. 8, 000, Rs. 6, 000

Question 143. Given the trend equation: $Y = 24 + 4X$, where X units = 6 months and Y is the annual production of cars. The monthly trend equation is given by

$$Y = 2 + \frac{1}{1} X$$

Question 144. For the given six values 10, 22, 25, 33, 40, 45, the simple moving averages of five years are

26, 33

Question 145. Given the following information:

Group	Weight	Group index
Food	40	300
Fuel and lighting	20	180
Clothing	10	210
Miscellaneous	30	150

The consumer price index is

222

Question 146. Given the following information:

Group	Weight	Group index
Food	40	200
Fuel and lighting	30	220
Miscellaneous	30	x

If the consumer price index is 179, the value of x will be

110

Question 147. For the section of middle class people in cities *A* and *B*, we have the following information:

Group	Group index	Weight	
		City *A*	City *B*
Food	x	40	50
Other items	y	60	50

If the consumer price indices for cities *A* and *B* are 160 and 150, respectively, the values of *x* and *y* are, respectively

100, 200

Question 148. The geometric mean of Laspeyre's and Paasche's index numbers is 150 while their sum is 305. Then, the Laspeyre's and Paasche's index numbers are

180, 125

Question 149. The geometric mean of Laspeyre's and Paasche's index numbers is 150 while their difference is 55. Then, the Dorbish-Bowley's index number is

152.5

Question 150. If the Paasche's and Fisher's index numbers are 144 and 132, respectively, then, the Dorbish-Bowley's index number is

132.5