Question Papers

ExamCode: RA_STAT_162015

1.

If A and B are any two events, subsets of sample space S, and are not disjoint then $P(A \cup B) = ?$

A.	$P(A) + P(B) + P(A \cap B)$
B.	$P(A) + P(B) - P(A \cap B)$
C.	$P(A) + P(B)$
D.	$P(A).P(B)$

2.

A bag contains 4 Red and 3 Blue balls. Two drawings of 2 balls are made. Find the chance that the first drawing gives 2 red balls and second drawing gives 2 blue balls. if the balls are not returned.

A.	$\frac{2}{49}$
B.	$\frac{2}{7}$
C.	$\frac{3}{10}$
D.	$\frac{3}{35}$

3.

A random variable 'X' has the following probability function.

X	0	1	2	3	4	5	6	7
p(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Then the value of 'k' is equal to-

A.	-1
B.	$\frac{1}{10}$
C.	+1
D.	$\frac{-1}{10}$

4.

Let 'x' be a random variable. Then for

$$f(x) = \begin{cases} ke^{-2x}, & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$ to be density function.

k must be equal to-

A.	2
B.	$\frac{1}{2}$
C.	0
D.	1

5.

For any two events A and B $P[(A \cap \bar{B}) \cup (B \cap \bar{A})]$ is equal to-	
A.	$P(A)+P(B)-2P(A \cap B)$
B.	$P(A)+P(B)+2P(A \cap B)$
C.	$P(A)+P(B)-P(A \cap B)$
D.	$P(A)+P(B)+P(A \cap B)$

6.

If $X_1, X_2, ... X_n$ are random variables, then $E(X_1+ X_2+....+ X_n) = ?$	
A.	$E(X_1).E(X_2).E(X_3)....E(X_n)$
B.	$E(X_1) + E(X_2) + E(X_3)+....+E(X_n)$
C.	$E(X_1) + E(X_2) + E(X_3)+....+ E(X_n)$ if all the expectations exist
D.	$E(X_1) - E(X_2) - E(X_3).... - E(X_n)$ if all the expectations exist

7. **For two random variables X and Y, the relation E(XY) = E(X).E(Y) hold good-**

1) If X and Y are statistically independent
2) If X and Y are statistically dependent
3) For all X and Y
4) If X and Y are identical

8. **If X is a random variable and 'a' and 'b' are constants, then E(ax + b) = _____, provided all the expectations exist.**

1) a E(X)
2) a E(X) + b
3) E(X) + b
4) a + b

9. **$M_{cx}(t)$ = _____, c being a constant.**

1) $M_x(t)$
2) $M_c(tx)$
3) $M_x(ct)$
4) 0

10.

If X is a random variable and f(x) be the probability function, then subject to the convergence, the function $\sum e^{tx} f(x)$ is known as-	
A.	Moment generating function
B.	Probability density function
C.	Probability distribution function
D.	Characteristic function

11. **If F is the distribution function of the random variable X and if a< b, then $P(a < X \leq b)$ = ?**

1) $P(X = a) + [F(b) - F(a)]$
2) $F(b) - F(a)$
3) $F(b) - F(a) - P(X = b)$
4) $F(b) - F(a) - P(X = b) + P(X = a)$

12.

If f(x, y) is the joint probability density function, then the marginal density function of X, f(x) is:	
A.	$\int_{-\infty}^{0} f(x,y)dy$
B.	$\int_{0}^{\infty} f(x,y)dy$
C.	$\int_{-\infty}^{\infty} f(x,y)dy$
D.	$\int_{-\infty}^{\infty} f(x,y)dx$

13.

If $X_1, X_2, \ldots. X_n$ is a sequence of random variables and if mean μ_n and standard deviation σ_n of X_n exists for all n and if $\sigma_n \to 0$ as $n \to \infty$, then-	
A.	$X_n - \mu_n \xrightarrow{P} 0$ as $n \to \infty$
B.	$X_n - \mu_n \longrightarrow$ constant as $n \to \infty$
C.	$X_n - \mu_n \xrightarrow{P} 1$ as $n \to \infty$
D.	$X_n - \mu_n \xrightarrow{P} \bar{X}_n$ as $n \to \infty$

14.

If $\{X_n\}$ is a sequence of independent and identically distributed with $E(X_i) = \mu$ and $V(X_i) = \sigma^2$ and let $\lim_{n\to\infty} \frac{\sigma^2}{n} = 0$, then:	
A.	$\bar{X}_n \xrightarrow{P} \mu$
B.	$\bar{X}_n \xrightarrow{P} 0$
C.	$\bar{X}_n \xrightarrow{P} 1$
D.	$\bar{X}_n - \mu \xrightarrow{P} 1$

15.

If $X_n \xrightarrow{P} c$, a constant then $E(X_n - c)^2$ converges to-	
A.	Zero
B.	One
C.	Infinity
D.	Almost surely

16.

If $X_n \xrightarrow{P} X$ and $Y_n \xrightarrow{P} Y$ then aX_n converges to-	
A.	aX, if a real
B.	X_n, if a real
C.	X_n+1, if a real
D.	X_n+Y_n, if a real

17.

If X_i's are i.i.d with mean μ_1 and variance σ_1^2 (finite) and $S_n = \sum_{i=1}^{n} X_i$ then:	
A.	$\lim_{n\to\infty} P\left[\frac{S_n - E(S_n)}{\sqrt{var(\bar{S}_n)}} \le 0\right] \to 0$
B.	$\lim_{n\to\infty} P\left[\frac{S_n - E(S_n)}{\sqrt{var(S_n)}} \le 0\right] \to 1$
C.	$\lim_{n\to\infty} P\left[\frac{S_n - E(S_n)}{\sqrt{var(S_n)}} \le 0\right] \to \frac{1}{2}$
D.	$\lim_{n\to\infty} P\left[\frac{S_n - E(S_n)}{\sqrt{var(\bar{S}_n)}} \le 0\right] \to 0.6728$

18.

If $X_n \xrightarrow{L} X, Y_n \xrightarrow{L} C$ then $\frac{X_n}{Y_n} \xrightarrow{L} \frac{X}{C}$ if-	
A.	C is a constant and not equal to zero
B.	C is equal to zero
C.	C is closed
D.	C is bounded

19.

$\int g dF_n \to \int g dF$ iff $F_n \xrightarrow{w} F$ if g is:	
A.	Continuous and bounded
B.	Continuous and unbounded
C.	Continuous and almost surely
D.	Continuous everywhere

20.

WLLN holds iff the following condition is satisfied:	
A.	$\lim \sum_1^n P_r[X_n \neq X_k^n] \to 0$
B.	$\lim \sum_1^n P[X_n = X_k^n] \to 0$
C.	$\lim \sum_1^n P[X_n \neq X_k^n] \to 1$
D.	$\lim \sum_1^n P[X_n \neq X_k^n] \to \infty$

21.

If X_k's are independent and identically distributed random variables then $\frac{S_n}{n} \to c$ almost surely iff $E\|x\| < \infty$ then E(X) is a-	
A.	Infinite number
B.	Finite number
C.	Less than infinite
D.	Greater than infinite

22. **CLT is sometimes stated as the convergence of-**

1) Binomial to normal distribution
2) Normal distribution
3) Exponential distribution
4) Poisson distribution

23.

If $\{X_k\}$ be a sequency of i.i.d random variables with $E(X_k) = 0$ and $\sigma(X_k) = \sigma < \infty$ then the distribution function of $\frac{\sqrt{n}(\bar{X}_n)}{\sigma}$ is converges to-	
A.	Standard normal distribution
B.	Binomial distribution
C.	Poisson distribution
D.	Exponential distribution

24. **Binomial distribution applies to-**
1) Rare events
2) Repeated three alternatives
3) Repeated two alternatives
4) Repeated four alternatives

25. **Mode of binomial distribution when (n+1)p is an integer is:**
1) m and m-1 (two values)
2) m (one value)
3) m - 1 (one value)
4) m and m+1 (two values)

26. **The property of consistency ensures that the difference between the estimator and the parameter would become smaller and smaller in probability sense as:**
1) n is equal to zero
2) n is very small
3) n is large
4) n increases indefinitely

27. **For a binomial distribution, variance is:**
1) Greater than mean
2) Equal to mean
3) Less than mean
4) Not equal to mean

28.

If X and Y are independent Poisson variates then the $P\left(\frac{X}{X+Y}\right)$ is:	
A.	Binomial distribution
B.	Poisson distribution
C.	Negative binomial distribution
D.	Hypergeometric distribution

29. **The distribution which has a variance larger than the mean is:**
1) Negative binomial distribution
2) Binomial distribution
3) Poisson distribution
4) Hypergeometric distribution

30.

The probability generating function of negative binomial distribution is:	
A.	$\frac{p}{(1-qs)}$
B.	$\left[\frac{p}{(1-qs)}\right]^r$
C.	$\frac{p^r}{(1-qs)}$
D.	$\frac{p}{(1-qs)^r}$

31.

The moment recurrence formula for negative binomial distribution μ_r+1 is:	
A.	$\left(\frac{d\mu_r}{dp}+\frac{rk}{p^2}\mu_r\right)$
B.	$\left(\frac{d\mu_r}{dq}+\frac{k}{p^2}\mu_r-1\right)$
C.	$q\left(\frac{d\mu_r}{dp}+\frac{rk}{p^2}\mu_r-1\right)$
D.	$q\left(\frac{d\mu_r}{dq}+\frac{rk}{p^2}\mu_r-1\right)$

32.

The r^{th} factorial moment in hypergeometric distribution is:	
A.	$\frac{M^{(r)} n}{N^{(r)}}$
B.	$\frac{M^{(r)} n^{(r)}}{N}$
C.	$\frac{M^{(r)} n^{(r)}}{N^{(r)}}$
D.	$\frac{Mn}{N}$

33. **The rejectable quality level is :**

1) The quality level having a probability of acceptance
2) The average percentage defective in the outgoing products after inspection
3) The maximum proportion of defectives, which the consumer finds definitely acceptable
4) Proportion of defectives, which the consumers finds definitely unacceptable

34. **For large values of σ in normal distribution, the curve tends to-**

1) Peak
2) Flatten
3) Semi peak
4) Sharp peak

35.

Normal distribution is a limiting case of Poisson distribution when-	
A.	$\lambda \to \infty$
B.	$\lambda \to 1$
C.	$\lambda \to 0$
D.	$\lambda \to -\infty$

36. If X_1 and X_2 are independent cauchy variate then $X_1 + X_2$ is a -

1) Normal variate
2) Uniform variate
3) Cauchy variate
4) Gamma variate

37.

For a Beta distribution first kind $\frac{4(\nu - \mu)^2(\mu + \nu + 1)}{\mu\nu(\mu + \nu + 2)^2}$ is the value of-	
A.	μ_3
B.	β_1
C.	β_2
D.	γ_1

38.

For a Beta distribution of second kind μ_r is:	
A.	$\frac{(\mu - r)\sqrt{(\mu - r)}}{\sqrt{\mu}\sqrt{r-1}}$
B.	$\frac{\sqrt{\mu}\sqrt{\nu}}{\sqrt{r-1}}$
C.	$\frac{\sqrt{(\mu + r)}\sqrt{(\nu - r)}}{\sqrt{\mu}\sqrt{\nu}}$
D.	$\frac{\sqrt{(\nu)}\sqrt{(r-1)}}{\sqrt{r-1}}$

39.

The mean of exponential distribution is:	
A.	θ
B.	θ^2
C.	$\frac{1}{\theta}$
D.	$\frac{1}{\theta^2}$

40.

Moment generating function of gamma distribution is:	
A.	$(1-e^t)^{-\lambda}, \lvert t \rvert < 1$
B.	$(1-t)^{-\lambda}, \lvert t \rvert < 1$
C.	$(1-\lambda)^{-t}, \lvert t \rvert > 1$
D.	$(1+t)^{-\lambda}, \lvert t \rvert > 1$

41.

The r^{th} moment of Weibull distribution is:	
A.	$\sqrt{(r+1)}$
B.	$\sqrt{\left(\frac{r}{c}+1\right)}$
C.	$\frac{\sqrt{r+c}}{1}$
D.	$\sqrt{c}+1$

42.

Gamma distribution tends to normal distribution as-	
A.	$\lambda \to 1$
B.	$\lambda \to \infty$
C.	$\lambda \to 0$
D.	$\lambda \to -\infty$

43. **If X follows cauchy distribution then X^2 follows-**

1) Cauchy distribution
2) Normal distribution
3) Beta distribution of second kind
4) Beta distribution of first kind

44. **The linear combination of independent normal variate is a-**

1) Normal variate
2) Uniform variate
3) Beta variate
4) Gamma variate

45.

An estimator $t_n = t(x_1,x_2,\ldots x_n)$ drawn from a sample of size n is said to be an unbiased estimator of a population parameter θ if-	
A.	$E(t_n) = \theta$
B.	$E(t_n) > \theta$
C.	$E(t_n) < \theta$
D.	$E(t_n) \neq \theta$

46.

An estimator $t_n = t(x_1,x_2,\ldots x_n)$ based on a sample of size n is said to be negatively biased estimator of a population parameter θ if-	
A.	$E(t_n) = \theta$
B.	$E(t_n) > \theta$
C.	$E(t_n) < \theta$
D.	$E(t_n) \neq \theta$

47.

For Cauchy distribution variance of Median is equal to-	
A.	$\frac{\pi^2}{2n}$
B.	$\frac{\pi^2}{4n}$
C.	$\frac{\pi^2}{4}$
D.	$\frac{\pi^2}{n}$

48. If t_1 is the most efficient estimator with variance v_1 and t_2 is any other estimator with variance v_2, then the efficiency E of t_2 is defined as-

A.	$\frac{v_2}{v_1}$
B.	$\frac{v_1}{v_2}$
C.	$\frac{v_2}{v_1}$x100
D.	$\frac{v_1}{v_2}$x100

49. An estimator t_n is said to be sufficient for estimating a population parameter θ, if the joint density function of the sample values can be expressed in the form-

A.	$L(x_1, x_2, ...x_n; \theta) = L_1(t_n, \theta).L_2(x_1, x_2, ...x_n)$
B.	$L(x_1, x_2, ...x_n; \theta) = L_1(t_n, \theta).L_2(x_1, x_2, ...x_n, \theta)$
C.	$L(x_1, x_2, ...x_n; \theta) = L_1(\theta).L_2(x_1, x_2, ...x_n)$
D.	$L(x_1, x_2, ...x_n; \theta) = L_1(t_n).L_2(x_1, x_2, ...x_n, \theta)$

50. **If t is a sufficient estimator for the parameter θ and if ψ(t) is a one to one function of t, then ψ(t) is ______ for ψ(θ)-**

1) Unbiased
2) Efficient
3) Consistent
4) Sufficient

51. Let $x_1, x_2, ...x_n$ be a random sample from a population with probability density function $f(x, \theta) = \theta x^{\theta-1}$; $0 < x < 1, \theta > 0$, then the sufficient estimator for θ is:

A.	$\sum_{i=1}^{n} x_i$
B.	$\prod_{i=1}^{n} x_i$
C.	$\theta\prod_{i=1}^{n} x_i$
D.	$\theta\sum_{i=1}^{n} x_i$

52.

	In Cramer-Rao inequality, the amount of information on θ supplied by the sample $(x_1, x_2, .. x_n)$ is:
A.	$I(\theta) = E\left(\frac{\partial \log L}{\partial \theta}\right)$
B.	$I(\theta) = E\left(\frac{\partial}{\partial \theta}\log L\right)^2$
C.	$I(\theta) = E\left(\frac{\partial^2}{\partial \theta^2}\log L\right)$
D.	$I(\theta) = \frac{1}{E\left(\frac{\partial}{\partial \theta}\log L\right)^2}$

53. **Let θ be an unknown parameter and t_1 be an unbiased estimator of θ, if $var(t_1) \leq var(t_2)$ for t_2 to be any other unbiased estimator, then t_1 is known as-**

1) Minimum variance unbiased estimator
2) Unbiased and efficient estimator
3) Consistent and efficient estimator
4) Unbiased. consistent and minimum variance estimator

54.

	Let X and Y be random variables such that $E(Y) = \mu$ and $Var(Y) = \sigma^2 > 0$. Let $E\left(\frac{Y}{X} = x\right) = \varphi(x)$. Then:
A.	$E[\varphi(X)] = \mu$ and $var[\varphi(X)] \leq var(Y)$
B.	$E[\varphi(X)] = \mu$ and $var[\varphi(X)] = var(Y)$
C.	$E[\varphi(X)] = \mu$ and $var[\varphi(X)] \geq var(Y)$
D.	$E[\varphi(X)] > \mu$ and $var[\varphi(X)] \leq var(Y)$

55. **If a statistical hypothesis specifies the population completely then it is termed as-**

1) Simple hypothesis
2) Composite hypothesis
3) Null hypothesis
4) Alternative hypothesis

56. **The probability of Type I error is denoted by-**

1) α
2) $1 - \alpha$
3) β
4) $1 - \beta$

57.

The critical region 'w' is the most powerful critical region of size α for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ if-	
A.	$P(X \in w / H_0) = \alpha$ and $P(X \in w / H_1) \le P(X \in w_1 / H_1)$
B.	$P(X \in w / H_0) = \alpha$ and $P(X \in w / H_1) \ge P(X \in w_1 / H_1)$
C.	$P(X \in w / H_0) = \alpha$ and $P(X \in w / H_1) = P(X \in w_1 / H_1)$
D.	$P(X \in w / H_0) = \alpha$ and $P(X \in w / H_1) \ne P(X \in w_1 / H_1)$

58.

Let P be the probability that a coin will fall head in a single toss in order to test $H_0: P = \frac{1}{2}$ against $H_1: P = \frac{3}{4}$. The coin is tossed 5 times and H_0 is rejected if more than 3 heads are obtained. Then the probability of Type I error is:	
A.	$\frac{3}{16}$
B.	$\frac{81}{128}$
C.	$\frac{47}{128}$
D.	$\frac{13}{16}$

59.

If $x \ge 1$ is the critical region for testing $H_0 : \theta = 2$ against the alternative $H_1 : \theta = 1$ on the basis of single observation from the population $f(x,\theta) = \theta e^{-\theta x}, x \ge 0$, then the value of Type I error is:	
A.	$\frac{1}{e^2}$
B.	$\frac{e^2 - 1}{e^2}$
C.	e^{-x}
D.	$1 - e^{-x}$

60.

Under certain condition, $-2 \log_e \lambda$ where λ is the likelihood ratio test, has:	
A.	An asymptotic Chi-square distribution
B.	Normal distribution with parameters μ and σ^2
C.	N(0, 1)
D.	Poisson distribution

61. **If β is the probability of type II error, then (1 - β) is called _____ of the test.**

1) Power
2) Power function
3) Level of significance
4) Consumer's risk

62.

If two independent random samples with sample sizes n_1 and n_2 respectively from the same population with standard deviation σ, then the 95% confidence interval for the difference between the means is:	
A.	$\left((\bar{x}_1-\bar{x}_2)-1.96\sigma\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}, (\bar{x}_1-\bar{x}_2)+1.96\sigma\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}\right)$
B.	$\left((\bar{x}_1-\bar{x}_2)-1.96\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}, (\bar{x}_1-\bar{x}_2)+1.96\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}\right)$
C.	$\left((\bar{x}_1-\bar{x}_2)-2.58\sigma\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}, (\bar{x}_1-\bar{x}_2)+2.58\sigma\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}\right)$
D.	$\left((\bar{x}_1-\bar{x}_2)-2.58\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}, (\bar{x}_1-\bar{x}_2)+2.58\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}\right)$

63. **A sample is said to be a small sample if-**

1) $n < 30$
2) $n \geq 30$
3) $n < 20$
4) $n < 15$

64. **Non parametric tests are useful only when-**

1) Location parameter is of interest
2) Scale parameter is of interest
3) Sample size is large
4) Sample size is small

65. **The Kolmogorov statistic is used for-**

1) One sample problem
2) Two sample problem
3) Distribution is known
4) Distribution is not known

66.

Using the technique of factorial movements for the distribution $f_U^{(u)}$, the mean is usually found to be-	
A.	$\frac{mt}{N}$
B.	$\frac{mt^2}{N}$
C.	$\frac{mt^3}{N}$
D.	$\frac{mt^4}{N}$

67.

	The test statistic in the case of Mann Whitney statistic in the case of large sample is:
A.	$Z = \dfrac{U - \frac{mn}{2}}{\sqrt{\frac{mn\,N - 1}{12}}}$
B.	$Z = \dfrac{U - \frac{mn}{2}}{\sqrt{\frac{mn}{N}}}$
C.	$Z = \dfrac{U - \frac{mn}{2}}{\sqrt{\frac{mn\,N - 1}{6}}}$
D.	$Z = \dfrac{U}{\sqrt{mn}}$

68. **The percentage of operating time that an equipment is operational is called as:**

1) Time availability
2) Equipment availability
3) Mission availability
4) System availability

69. **In SPRT, α and β are fixed constants where as the sample size n is not fixed but regarded as-**

1) Normal variable
2) Poisson variable
3) Random variable
4) Type I error

70. **Relative efficiency in non parametric tests is the ratio of-**

1) Power of two tests
2) Size of two tests
3) Size of the samples
4) Size of the tests

71. **The confidence interval based Wilcoxon test leads to same results in the case of-**

1) Median test
2) Run test
3) Mann - Whitney test
4) Kolmogorov test

72.

	A one sided two-sample maximum-unidirectional-deviation test is based on the statistic:
A.	$D^{-}_{m,n} = \underset{n}{Min}[s_m(x) - s_n(x)] - 1$
B.	$D^{-}_{m,n} = \underset{n}{Min}[s_m(x) - s_n(x)]$
C.	$D^{-}_{m,n} = \underset{n}{Max}[s_m(x) - s_n(x)]$
D.	$D^{-}_{m,n} = \underset{n}{Max}[s_n(x) - s_m(x)]$

73.

The distribution of m under the null hypothesis $H_0: f_1(x) = f_2(x)$, then the v(m) under hypergeometric distribution in the case of median test when N is:	
A.	$\frac{n_1 n_2 (N+1)}{4N^2}$
B.	$\frac{n_1 n_2 N}{4}$
C.	$\frac{n_1 n_2 (N+1)^2}{4}$
D.	$\frac{n_1 n_2 N}{16}$

74.

Let Y_1, Y_2, Y_3 be observed random variables such that $Y_1 = \theta_1 + \epsilon_1, Y_2 = \theta_1 + \theta_2 + \epsilon_2, Y_3 = \theta_2 + \epsilon_3$ $\epsilon_i \sim N(0, \sigma^2)$. Find which one of the following is not linearly estimable?	
A.	θ_1
B.	θ_2
C.	θ_3
D.	θ_1 and θ_2

75. **In the general linear model $Y = X\beta + \in$, if the 'X' matrix contains only the constants 0 and 1, the model is called-**

1) Regression model
2) Analysis of variance model
3) Analysis of covariance model
4) Weighted least squares

76. **In the general linear model $Y = X\beta + \in$, to test the linear hypothesis $H_0 : H\beta = 0$, the likelihood ratio statistic follows-**

1) F- distribution
2) t - distribution
3) Chi-square distribution
4) Gamma distribution

77.

For a normal distribution the mean deviation about mean is approximately given by-	
A.	$\frac{4}{5}\sigma$
B.	$\frac{5}{6}\sigma$
C.	$\frac{4}{3}\sigma$
D.	$\frac{4}{9}\sigma$

78.

Let $Y_1, Y_2, \ldots, Y_n$ be n independent observations from a population with Mean μ and Variance σ^2 then the BLUE of μ is:	
A.	$\frac{Y_1 + Y_2}{2}$
B.	$\frac{Y_1 + Y_2 + \ldots + Y_n}{n-1}$
C.	$\bar{Y}$
D.	$\sum_{i=1}^{n} Y_i$

79. Choose the correct option: The estimate of β in the linear model.

1) Maximizes $(Y - X\beta)'(Y - X\beta)$
2) Minimizes the likelihood
3) Minimizes $(Y - X\beta)'(Y - X\beta)$
4) Is biased

80. Under Gauss - Markov theorem BLUE and OLS are-

1) Not equal
2) Cannot be compared
3) Same
4) Greater than the other

81.

To test the hypothesis that the slope equals constant i.e H_0 $\beta_1 = \beta_{10}$ H_1 $\beta_1 \neq \beta_{10}$. we use the test statistic:	
A.	$t = \frac{\hat{\beta}_1 - \beta_{10}}{\sqrt{\frac{MS_{Res}}{Sxx}}} \sim t_n - 2$
B.	$t = \frac{\hat{\beta}_1 - \beta_{10}}{\frac{MS_{Res}}{Sxx}} \sim t_n - 2$
C.	$t = \frac{\hat{\beta}_1 - \beta_{10}}{\frac{MS_{Res}}{\sqrt{Sxx}}} \sim t_n - 2$
D.	$t = \frac{\hat{\beta}_1 - \beta_{10}}{\frac{MS_{Res}}{\sqrt{Sxx}}} \sim t_n - 1$

82. The set of equations in the process of least square estimation are called-

1) Intrinsic equation
2) Simultaneous equations
3) Homogeneous equation
4) Normal equations

83.

The least square regression coefficient of $x_{2\alpha}$ on $x_{1\alpha}$ is:	
A.	$\frac{\sum_{\alpha=1}^{N} x_2\alpha - \bar{x}_2 \; x_1\alpha - \bar{x}_1}{\sum_{\alpha=1}^{N} x_1\alpha - \bar{x}_1 \; ^2}$
B.	$\frac{\sum_{\alpha=1}^{N} x_2\alpha - \bar{x}_2 \; x_1\alpha - \bar{x}_1}{\sum_{\alpha=1}^{N} x_1\alpha - \bar{x}_1 \; ^2}$
C.	$\frac{\sum_{\alpha=1}^{N} x_2\alpha - \bar{x}_1 \; x_2\alpha - \bar{x}_2}{\sum_{\alpha=1}^{N} x_2\alpha - \bar{x}_2 \; ^2}$
D	$\frac{\sum x_2\alpha - \bar{x}_1 \; ^2}{\sum x_1\alpha - \bar{x} \; ^2}$

84. **The vector $X^{(1.2)} = X^{(1)} - \mu^{(1)} - \beta\,(X^{(2)} - \mu^{(2)})$ is the vector of residuals of-**

1) $X^{(2)}$ from its regression on $X^{(1)}$
2) $X^{(1)}$ from its regression on $X^{(2)}$
3) $X^{(1)}$ from its correlation with $X^{(2)}$
4) $X^{(2)}$ from its regression on $X^{(3)}$

85.

The sample multiple correlation coefficient R is:	
A.	$\sqrt{\dfrac{a^{1}_{(1)} A^{-1}_{22} a_{(1)}}{a_{11}}}$
B.	$\sqrt{\dfrac{a^{1}_{(2)} A^{-1}_{11} a_{(1)}}{a_{22}}}$
C.	$\sqrt{\dfrac{a^{1}_{(1)} A^{-1}_{22} a_{(1)}}{a_{22}}}$
D.	$\sqrt{\dfrac{a^{1}_{(2)} A^{1}_{22} a_{(1)}}{a_{11}}}$

86.

Let $x_1, x_2, \ldots x_N$ be N(p-component) vectors, and $\bar{x}$ is the mean vector. Then any vector b, $\sum_{\alpha=1}^{N}(x_\alpha - b)(x_\alpha - b)' = ?$	
A.	$\sum_{\alpha=1}^{N}(x_\alpha - \bar{x})(x_\alpha - \bar{x})' + N(\bar{x} - b)(\bar{x} - b)'$
B.	$\sum_{\alpha=1}^{N}(x_\alpha - \bar{x})'(x_\alpha - \bar{x}) + N(\bar{x} - b)$
C.	$\sum_{\alpha=1}^{N}(x_\alpha - \bar{x})(x_\alpha - \bar{x})' + N\sum_{\alpha=1}^{N}(\bar{x}_\alpha - b)(\bar{x}_\alpha - b)'$
D.	$\sum_{\alpha=1}^{N}(x_\alpha - \bar{x})(x_\alpha - \bar{x})' + (N-1)(\bar{x} - b)(\bar{x} - b)'$

87. **If Y = DX + f, where X is a random vector, then εY = ?**

1) $D\,\varepsilon X + f$
2) $DX + f$
3) $\varepsilon X + f$
4) $\varepsilon X + D$

88.

The multivariate normal density is:	
A.	$(2\pi)^{-\frac{1}{2}p}\,\lvert\Sigma\rvert^{-\frac{1}{2}}\,e^{-\frac{1}{2}(x-\mu)'\Sigma^{-1}(x-\mu)}$
B.	$(2\pi)^{\frac{1}{2}p}\,\lvert\Sigma\rvert^{-\frac{1}{2}}\,e^{-\frac{1}{2}(x-\mu)'\Sigma^{-1}(x-\mu)}$
C.	$(2\pi)^{\frac{1}{2}p}\,\lvert\Sigma\rvert^{\frac{1}{2}}\,e^{-\frac{1}{2}(x-\mu)'\Sigma(x-\mu)}$
D.	$(2\pi)^{\frac{1}{2}}\,\lvert\Sigma\rvert^{\frac{1}{2}p}\,e^{-\frac{1}{2}(x-\mu)'\Sigma(x-\mu)}$

89. **If the m-component vector Y is distributed according to N(v, T), then $Y' T^{-1} Y$ is distributed according to-**

1) X^2 with m degrees of freedom
2) Non central X^2 with m degrees of freedom
3) F with m degrees of freedom
4) Non central F with m degrees of freedom

90.

To test the hypothesis that $\mu = \mu_0$ where μ_0 is a specified vector, the critical region $N(\bar{x} - \mu_0)' \Sigma^{-1} (\bar{x} - \mu_0)$ is :	
A.	Greater than $x_p^2(\alpha)$
B.	Less than $x_p^2(\alpha)$
C.	Greater than $x_{p-2}^2(\alpha)$
D.	Less than $x_n^2(\alpha)$

91.

For testing the null hypothesis $\mu^{(1)} = \mu^{(2)}$, the critical region is:	
A.	$T^2 > \frac{(N_1+N_2-2)p}{(N_1+N_2-p-1)} F_{p_1 N_1+N_2-p-1}(\alpha)$
B.	$T^2 < \frac{(N_1+N_2-2)p}{(N_1+N_2-p-1)} F_{p_1 N_1+N_2-p-1}(\alpha)$
C.	$T^2 > \frac{(N_1+N_2-1)p}{(N_1+N_2-p)} F_{p_1 N_1-N_2-p}(\alpha)$
D.	$T^2 < \frac{(N_1+N_2-2)p}{(N_1+N_2-1)} F_{p_1 N_1+N_2-p-1}(\alpha)$

92. **Which of the following entity does not belong to word processing?**

1) Characters
2) Words
3) Cells
4) Paragraphs

93. **_______ is the lowest level of programming language where the information is represented as 0's and 1's-**

1) FORTRAN
2) C
3) Machine language
4) Assembly language

94. **_______ translates a high level language program to a machine language program.**

1) Compiler
2) Assembler
3) Linker
4) A and B

95. **READ (3, 10) MASS In the above FORTRAN statement, MASS is a _______.**

1) Keyword
2) Variable
3) Constant
4) Symbol

96. **<, > and = are ______ operators.**

1) Arithmetic
2) Relational
3) Logical
4) Ternary

97. **Lotus 1-2-3 is a ______ program.**

1) Word processor
2) Worksheet
3) Database
4) Application

98. **______ function is used to create shortcut formula in Lotus 1-2-3.**

1) #
2) @
3) @@
4) ##

99. **______ key is used only in combination with the ten function keys to produce various line and box drawing characters in word star.**

1) Shift
2) Ctrl
3) Alt
4) Page down

100. **________ statement informs the compiler about the array variable, its size and arrangement of array elements.**

1) DIMENSION
2) SIZE OF
3) MALLOC
4) COMPUTE

101. **The technique of reducing the block size in the factorial experiment by sacrificing one or more effects is known as-**

1) Balanced incomplete design
2) Confounding
3) Lattice Design
4) Strip-plot Design

102. **For the 4 x 4 LSD, the sum of square due to error is 156.37, then Mean sum of square due to error is :**

1) 39.925
2) 52.12
3) 26.06
4) 27.2

103. **Which one of the following is not the assumption of ANOVA?**

1) The effects of blocks, treatments and error are additive
2) The observations are distributed independently
3) The observations have drawn from normal
4) Variance of the observations is not constant

104. **In a 2^2 Factorial experiment, $a_0b_0 = 18$, $a_1b_0 = 17$, $a_0b_1 = 25$ and $a_1b_1 = 30$, then sum of squares for the interaction AB is:**

1) 4
2) 3
3) 6
4) 7

105. **In a randomized block design with 4 blocks and 6 treatments having one missing value, the error degrees of freedom is:**

1) 15
2) 14
3) 22
4) 12

106. **In the split plot design with factor A at p levels in main plots, factor B at q levels in sub-plots and r replications, then the degrees of freedom for main-plot error is:**

1) (q - 1) (r - 1)
2) (p - 1) (r - 1)
3) (p - 1) (q - 1) (r - 1)
4) P (q - 1) (r - 1)

107.

A balanced incomplete block design with the following parameters was used for the trial, $v = b = 13$, $r = k = 4$, $\lambda = 1$ then the efficiency factor E is:	
A.	$\frac{13}{16}$
B.	$\frac{16}{13}$
C.	$\frac{52}{13}$
D.	$\frac{13}{52}$

108. **For the 2^2 Factorial experiment with 4 blocks, the factorial effect totals of [A] = 40, [B] = 28 and [AB] = 28, then the mean sum of square for the treatment B, is:**

1) 100
2) 49
3) 50
4) 25

109.

If s_E^2 is the mean sum of square due to error related with Randomized Block Design with 'r' blocks and K treatments then for the α-level of significance, the critical difference between any two treatments is	
A.	$t_{\frac{\alpha}{2}}$ for $(r-1)(k-1) \times \sqrt{\frac{2s_E^2}{r}}$
B.	$t_{1-\alpha}$ for $(r-1)(k-1) \times \sqrt{\frac{2s_E^2}{k}}$
C.	t_{α} for $(r-1)(k-1) \times \sqrt{\frac{2s_E^2}{r}}$
D.	$t_{1-\frac{\alpha}{2}}$ for $(r-1)(k-1) \times \sqrt{\frac{2s_E^2}{r}}$

110. **If μ, r_i, c_j, t_s (i = j = s =1, 2, ...k) are fixed effects denoting in order the general mean, the row, the column, the treatments effects and E_{ij} is the error component, then the model for LSD, is:**

1) $Y_{ij} = \mu + r_i + c_j + t_s + E_{ij}$
2) $Y_{ij} = \mu - r_i - c_j + t_s + E_{ij}$
3) $Y_{ij} = \mu - r_i + c_j - t_s + E_{ij}$
4) $Y_{ij} = \mu + r_i + c_j - t_s - E_{ij}$

111. **In connection with reliability, the bathtub curve exhibits:**

1) 2 distinct zones
2) 3 distinct zones
3) 4 distinct zones
4) 5 distinct zones

112.

Given $\bar{p} = 0.2, n = 64$, the lower control limit for the np control chart is:	
A.	22.4
B.	3.2
C.	12.8
D.	9.6

113. **In any sampling plan, if c is the acceptance number, then the rejection number is:**

1) 1 - c
2) c + 1
3) c - 1
4) c^2

114.

The OC function of SPRT for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ in sampling from population with density function $f(x, \theta)$. is:	
A.	$L(\theta) = \frac{A^{h(\theta)} - 1}{A^{h(\theta)} - B^{h(\theta)}}$ with $E\left[\frac{f(x,\theta_1)}{f(x,\theta_0)}\right]^{h(\theta)} = 0$
B.	$L(\theta) = \frac{A^{h(\theta)} - 1}{A^{h(\theta)} - B^{h(\theta)}}$ with $E\left[\frac{f(x,\theta_1)}{f(x,\theta_0)}\right]^{h(\theta)} = 1$
C.	$L(\theta) = \frac{A^{h(\theta)} - B^{h(\theta)}}{A^{h(\theta)} - 1}$ with $E\left[\frac{f(x,\theta_1)}{f(x,\theta_0)}\right]^{h(\theta)} = 0$
D.	$L(\theta) = \frac{A^{h(\theta)} - B^{h(\theta)}}{A^{h(\theta)} - 1}$ with $E\left[\frac{f(x,\theta_1)}{f(x,\theta_0)}\right]^{h(\theta)} = 1$

115. **For the control chart for fraction non conforming, if the process is in control with the probability of a point plotting in control is 0.9973, then the average run length is:**

1) 1
2) 170
3) 370
4) 270

116. **Given $\Sigma R = 9.00$, $N = 20$, $D_3 = 0.41$ and $D_4 = 1.59$, the LCL and UCL for R chart are-**

1) 0.185, 7.16
2) 0.185, 0.716
3) 1.85, 7.16
4) 1.85, 0.716

117.

$\overline{X}$ chart indicates-	
A.	Consistency of the process
B.	Variability
C.	Centring of the process
D.	Proportion of defectives

118. The operating characteristic curve for an attribute sampling plan is a -

1) Graph of AQL against RQL
2) Graph of consumer's risk against the producer's risk
3) Graph of fraction defective in a lot against the probability of acceptance
4) Graph of AOQ against the consumer's risk

119.

When the value of the population range R is not known, then for $\overline{x}$ chart, the UCL and LCL with usual notations are-	
A.	$\overline{\overline{x}} + A_3\overline{R}, \overline{\overline{x}} - A_2\overline{R}$
B.	$\overline{\overline{x}} + A_3\overline{R}, \overline{\overline{x}} - A_3\overline{R}$
C.	$\overline{\overline{x}} + A_2\overline{R}, \overline{\overline{x}} - A_3\overline{R}$
D.	$A_3\overline{R}, A_2\overline{R}$

120.

The upper control limit on P-chart is:	
A.	$n\overline{P} + 3\sqrt{n\overline{P}(1-\overline{P})}$
B.	$\overline{P} + \sqrt{\frac{\overline{P}(1-\overline{P})}{n}}$
C.	$\overline{P} + 3\sqrt{\frac{\overline{P}(1-\overline{P})}{n}}$
D.	$n\overline{P} + \sqrt{n\overline{P}(1-\overline{P})}$

121. **Quality control and reliability are-**

1) Same

2) Quality control is associated with relatively short period of time and reliability is associated with quality over long period of time

3) Quality control is checking the quality of the product and reliability is not

4) Reliability is checking the quality of the product but quality control is not

122.

The maintenance action rate 'μ' is given by-	
A.	MTTR
B.	$\frac{1}{MTTR}$
C.	$\frac{1}{MTBF}$
D.	MTBF

123. **The provision of stand-by or parallel components or assemblies to take over in the event of failure of the primary item is known as-**

1) Derating
2) Availability
3) Redundancy
4) Longevity

124. **A certain type of electric component has a uniform failure rate of 0.00001 per hour. Its reliability for a specified period of service of 10,000 hours is ($e^{0.1}$ = 1.1051):**

1) 90.489%
2) 9.483%
3) 0.9483%
4) 94.83%

125.

It is desired to have a reliability of atleast 0.99 for a specified service period of 8000 hours on the assumption of uniform failure rate. The least value of θ that will yield this reliability is (Given that $\log_e^{0.99}$ = -0 01005)?	
A.	7.96×10^5
B.	7.96×10^{-5}
C.	7.96×10^{-6}
D.	7.96×10^6

126. **When the failure rate is plotted against a continuous time scale, the resulting chart is called as-**

1) Bathtub curve
2) OC curve
3) Reliability
4) Hazard rate

127. An equipment which works well and works whenever called upon to do the job for which it is designed is said to be-

1) Good
2) Best
3) Reliable
4) Effective

128. The rate at which failure will occur via certain interval of time $[t_1, t_2]$ is known as-

1) Failure rate
2) Hazard function
3) Hazard rate
4) Availability

129. An equipment is subjected to a maintenance time constraint of 30 minutes. If MTTR is 0.262 hours then the probability that it will meet the specification is (Given that $e^{-1.9083} = 0.14833$):

1) 0.85167
2) 0.15
3) 0.75
4) 0.085

130. When the components of an assembly are connected in series, the reliability of the assembly is given by-

1) Sum of the reliabilities of individual components
2) Average of the reliabilities of individual components
3) Geometric mean of the reliabilities of individual components
4) Product of the reliabilities of individual components

131. A tool used for collecting the data consist of number of questions where in the respondent filled himself/herself is known as-

1) Questionnaire
2) Schedule
3) Data entry sheet
4) Mailed questionnaire

132. Increase in the sample size usually results in the decrease of-

1) Non-sampling error
2) Sampling error
3) Precision error
4) Measurable error

133. The total number of possible samples that can be drawn using SRSWOR in the case of N = 6 and n = 2 is:

1) 25
2) 10
3) 15
4) 35

134.

The variance of the sample mean in the case of SRSWOR is given by the formula-	
A.	$\frac{Nn}{N}S'^2$
B.	$\frac{N^2 n^2}{1-N}S'^2$
C.	$\frac{N-n}{Nn}S'^2$
D.	$\frac{N}{n}S^2$

135. Which of the following statement is true?

1) Population mean increases with the increase in sample size
2) Population mean decreases with the decrease in sample size
3) Population mean decreases with increase in sample size
4) Population mean is a constant value

136.

In stratified random sampling, given the cost function $c = \alpha + \sum_{i=1}^{k} c_i n_i$, then $V(\bar{y}_{st})$ is minimum if the stratum size n_i is proportional to-	
A.	$n_i \alpha \frac{N_i S_i}{C_i}$
B.	$n_i \alpha \frac{N_i S_i}{\sqrt{C_i}}$
C.	$n_i \alpha N_i S_i$
D.	$n_i \alpha \frac{N_i S_i}{\sqrt{N}}$

137.

The following relation must be satisfied in the case of linear trend when compared with stratified, systematic and random sampling methods-	
A.	$V(\bar{y}_{st}) \leq V(\bar{y}_{sys}) \leq V(\bar{y}_N)_R$
B.	$V(\bar{y}_{st}) > V(\bar{y}_{sys}) > V(\bar{y}_N)_R$
C.	$V(\bar{y}_{st}) \geq V(\bar{y}_{sys}) \geq V(\bar{y}_N)_R$
D.	$V(\bar{y}_{st}) < V(\bar{y}_{sys}) < V(\bar{y}_N)_R$

138.

In simple random sampling without replacement for large n, an approximation to the variance of the ratio estimator is given by-	
A.	$V(\hat{R}) = \frac{1-f}{n\bar{X}^2} \sum_{i=1}^{N} \frac{(y_i - Rx_i)^2}{N-1}$
B.	$V(\hat{R}) = \frac{1-f}{n\bar{X}^2} \sum_{i=1}^{N} (y_i - Rx_i)^2$
C.	$V(\hat{R}) = \frac{N}{n\bar{X}^2} \sum_{i=1}^{N} (y_i - Rx_i)^2$
D.	$V(\hat{R}) = \frac{1-f}{n\bar{X}^2} \sum_{i=1}^{N} \frac{(y_i - Rx_i)^2}{N}$

139. Stratified sampling is not preferred when the population is:

1) Well defined
2) Heterogeneous
3) Homogeneous
4) Proportional to size

140. The relative bias of the ratio estimator in the case of SRSWOR is given by-

A.	$\frac{B/R}{R} = \frac{1-f}{n\bar{x}\bar{y}}(RS_x^2 - PS_xS_y)$
B.	$\frac{B/R}{R} = \frac{1-f}{nN}(RS_x^2 - PS_xS_y)$
C.	$\frac{B/R}{R} = \frac{1-f}{n}(RS_x^2 - PS_xS_y)$
D.	$\frac{B/R}{R} = \frac{1-f}{nN\bar{x}\bar{y}}(RS_x^2 - PS_xS_y)$

141. **A systematic sample does not yield good results if-**

1) Variation in units is periodic
2) Only requires large sample
3) Only requires small sample
4) Data are not easily accessible

142. **A solution obtained by setting any n variables among m+n variables equal to zero and solving for the remaining m variables is non-zero is called-**

1) Optimum solution
2) Initial solution
3) Basic solution
4) Feasible solution

143. **The main characteristics of the L_{pp} is :**

1) All the variables are non-negative
2) All the variables are negative
3) All the variables are constant
4) All the variables are linear

144. **A feasible solution that minimises the total transportation cost is called-**

1) Optimal solution
2) Unbounded solution
3) Bounded solution
4) Minimum feasible solution

145. **An alternative optimal solution to a minimization transportation problem exists whenever opportunity cost corresponding to unused route of transportation is:**

1) Positive unit greater than one
2) Positive with atleast one equal to zero
3) Negative with atleast one equal to zero
4) Negative unit less than one

146. **For the formulation of LP model, simplex method is terminated when all values-**

1) $C_j - Z_j \leq 0$
2) $C_j - Z_j \geq 0$
3) $C_j - Z_j = 0$
4) $Z_j \leq 0$

147. **If dual has an unbounded solution, primal has-**

1) No feasible solution
2) Unbounded solution
3) Feasible solution
4) Optimal solution

148. **When the sum of game of one player is equal to the sum of losses to another player in a game, this game is known as-**

1) Balanced game
2) Unbalanced game
3) Zero-sum game
4) Fair game

149. **If the unit cost rises, then the optimal order quantity-**

1) Increase
2) Decrease
3) Either increase or decrease
4) Remains the same

150. **Game which involving more than two players are called-**

1) Conflicting games
2) Three person games
3) N-person games
4) Negotiable games

151.

The expected waiting time of a customer in the queue in the case of M/M/1 model is:	
A.	$\frac{\lambda}{\mu} \cdot \frac{1}{\mu - \lambda}$
B.	$\frac{\lambda}{\mu}$
C.	$\frac{\lambda}{\mu - \lambda}$
D.	$\frac{\mu - \lambda}{\lambda . \mu}$

152. **An additive model of time series with the components T, S, C and R is:**

1) Y = T + S x C + R
2) Y = T + S + C x R
3) Y = T + S x C x R
4) Y = T + S + C + R

153. **In ratio to trend method for seasonal indices, the indices become free from trend components of time series by-**

1) Subtracting the trend line value for each corresponding value
2) Taking the ratio of each seasonal value to the corresponding trend value
3) Taking the ratio of each trend value to the corresponding seasonal value
4) Adding the trend value for each corresponding value

154. **The component of a time series which is attached to short-term variations is termed as-**

1) Cyclic variation
2) Secular trend
3) Irregular variation
4) Seasonal variation

155. **The moving average in a time series are free from the influence of-**

1) Seasonal and cyclic variations
2) Seasonal and irregular variations
3) Trend and cyclical variations
4) Trend and random variations

156. **Value of b in the trend line Y = a + bX is:**

1) Always positive
2) Always negative
3) Either positive or negative
4) Zero

157. **For the equation Y = 148.8 + 7.2X, the quarterly trend is:**

1) Y = 12.4 + 1.8X
2) Y = 37.2 + 0.15X
3) Y = 37.2 + 0.2X
4) Y = 32.4 + 0.2X

158. **A polynomial representing a trend equation of the type $Y = a+bX+cX^2$ is called a-**

1) Parabola
2) Straight line
3) Trend line
4) Non-linear curve

159. **A cycle in a time series is represented by the difference between-**

1) Two successive peaks
2) The end points of a convex portion
3) The mid-points of a trough and the crest
4) Trend values

160. **The equation $Y = a + bX + cX^2 + dX^3$ represents-**

1) Hyperbola
2) Cardioid
3) Cubic parabola
4) Compertz curve

161. **A trend is linear if-**

1) Growth or decay time rate is consistent
2) Growth or decay follow geometric law
3) Change is constant
4) Growth rate is exponential

162. **Suppose the price of a commodity is Rs.20 in 2010 and Rs.30 in 2015. Then the price relative is:**

1) 1.5
2) 150%
3) 0.667
4) 66.7%

163.

The formula for calculating weighted aggregate price index is:	
A.	$\frac{\sum p_1 q_1}{\sum p_0 q_0} \times 100$
B.	$\frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$
C.	$\frac{\sum p_0 q_0}{\sum p_1 q_0} \times 100$
D.	$\frac{\sum p_0 q_0}{\sum p_1 q_1} \times 100$

164. **The geometric mean of Laspeyre's and Paasche's indices is:**

1) Fishers ideal index
2) Unweighted arithmetic mean price relative index
3) Marshall and Edgeworth index
4) Simple aggregate index

165.

Marshall-Edgeworth index number is:	
A.	$\frac{\sum p_1(q_0 + q_1)}{\sum p_0(q_0 + q_1)} \times 100$
B.	$\frac{\sum p_0(q_0 + q_1)}{\sum p_1(q_0 + q_1)} \times 100$
C.	$\frac{\sum p_0}{\sum p_1} \times 100$
D.	$\frac{\sum(q_0 - q_1)}{\sum(p_0 - p_1)} \times 100$

166. **The most suitable average for index numbers is:**

1) Mean
2) Median
3) Harmonic mean
4) Geometric mean

167. **The formula for factor reversal test is:**

1) $P_{01} \times Q_{01} = V_{01}$

2) $P_{01} \times P_{10} = 1$

3) $P_{01} \times V_{01} = Q_{01}$

4) $Q_{01} \times V_{01} = P_{01}$

168.

Under aggregate expenditure method, the formula for the cost of living index number is:	
A.	$\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$
B.	$\frac{\Sigma p_0 q_0}{\Sigma p_1 q_0} \times 100$
C.	$\frac{\Sigma p_1 q_1}{\Sigma p_0 q_0} \times 100$
D.	$\frac{\Sigma p_0 q_1}{\Sigma p_1 q_1} \times 100$

169.

Chain Base Index is equal to-	
A.	$\frac{\text{Current year link relative} \times \text{Previous year link relative}}{100}$
B.	Current year link relative × Previous year link relative
C.	$\frac{\text{Current year link relative}}{100}$
D.	$\frac{\text{Previous year link relative}}{100}$

170.

Link relative for current year is equal to-	
A.	$\frac{\text{Price relative for the previous year}}{\text{Price relative for the current year}}$
B.	$\frac{\text{Price relative for the current year}}{\text{Price relative for the previous year}}$
C.	Price relative for the current year
D.	Price relative for the previous year

171.

The formula for calculating quantity index number using simple aggregative method is:	
A.	$\frac{\Sigma q_0}{\Sigma q_1} \times 100$
B.	$\frac{\Sigma q_1}{\Sigma q_0} \times 100$
C.	$\frac{q_0}{q_1} \times 100$
D.	$\frac{q_1}{q_0} \times 100$

172. For a split plot experiment conducted with 5 concentrations of an insecticide in main plots and 4 varieties of gram in sub-plots and have 3 replications, main plot error degrees of freedom is:

1) 8
2) 10
3) 24
4) 6

173. A contrast constructed while interpreting the results will be categorised as-

1) Posteriori contrast
2) Planned contrast
3) A priori contrast
4) Orthogonal contrast

174.

In a linear regression model. $Var\left[\hat{\beta}_1 - \hat{\beta}_2\right]$ is:	
A.	$Var(\hat{\beta}_1) + Var(\hat{\beta}_2)$
B.	$Var(\hat{\beta}_1) - Var(\hat{\beta}_2)$
C.	$Var(\hat{\beta}_1) + Var(\hat{\beta}_2) + 2\,cov(\hat{\beta}_1, \hat{\beta}_2)$
D.	$Var(\hat{\beta}_1) + Var(\hat{\beta}_2) - 2\,cov(\hat{\beta}_1, \hat{\beta}_2)$

175.

To test the overall significance of the multiple linear regression model with R independent variables, we use-	
A.	$F = \frac{\text{SS due to Residual}}{\text{Total sum of squares}}$
B.	$F = \frac{\text{SS due to Regression}}{\text{Total sum of squares}}$
C.	$F = \frac{R^2/(R-1)}{(1-R^2)/(n-R-1)}$
D.	$F = \frac{R^2}{1-R^2}\frac{n-R}{R}$

176. To detect the auto correlation in a multiple regression model, we use-

1) Chows test
2) Durbin - Watson test
3) Sign test
4) Run test

177. To find whether a particular variable can be included in the model, we use-

1) R^2
2) Adjusted R^2
3) Comparing the mean values
4) Comparing the standard deviations of the variables

178. Choose the correct answer from the following options for regression model.

1) $-1 \leq R^2 \leq 1$
2) $R^2 \leq \text{Adj } R^2$
3) $\text{Adj } R^2 \geq 1$
4) $\text{Adj } R^2 \leq R^2$

179.

In the regression model $Y = X\beta + \epsilon$, if $V(\epsilon) = \sigma^2 V$, V is a known n x n matrix then the generalized least squares estimator of β is:	
A.	$(X^1X)^{-1}(X^1Y)$
B.	$(X^1X)^{-1}V(X^1Y)$
C.	$(X^1V^{-1}X)^{-1}X^1V^{-1}Y$
D.	$(X^1X)^{-1}V^{-1}(X^1Y)$

180. If X_n is the total number of sixes appearing in the first n throws of a die, the state space is:

1) Markov chain
2) Continuous
3) Discrete
4) Bernoulli trials

181.

The probability that starting with state j the system will ever reach state k is denoted by-	
A.	$F_{kj} = \sum_{n=1}^{\infty} f_{kj}^{(m)}$
B.	$F_{kj} = \sum_{n=1}^{\infty} f_{kj}^{(n-1)}$
C.	$F_{jk} = \sum_{n=1}^{\infty} f_{jk}^{(n)}$
D.	$F_{jk} = \sum_{k=1}^{\infty} f_{kj}^{(k)}$

182.

Given the Markov chain with states 0, 1, 2 and the transition probability matrix $P = \begin{pmatrix} \frac{1}{3} & 0 & \frac{2}{3} \\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\ \frac{1}{3} & \frac{2}{3} & 0 \end{pmatrix}$ then $\lim_{n\to\infty} P_{23}^{n} = ?$	
A.	$\frac{2}{3}$
B.	$\frac{1}{3}$
C.	$\frac{1}{2}$
D.	$\frac{1}{4}$

183. **The set of possible values of a single random variable X_n of a stochastic process $\{X_n, n\geq 1\}$ is known as-**

1) State space
2) Sample space
3) Venn diagram
4) Random space

184. **If for all $t_1, t_2,..t_n$, $t_1 < t_2 < \ldots < t_n$, the random variables $X(t_2)-X(t_1)$, $X(t_3)-X(t_2)$,....$X(t_n)-X(t_{n-1})$ are independent, then $\{X(t), t\in T\}$ is called as-**

1) Processes with difference
2) Processes with independent increments
3) Processes with dependent increments
4) Processes with unequal increments

185.

The m-step transition probability matrix is denoted by-	
A.	$p_{jk}^{(n)} = P_r\{x_m = k / x_n = j\}$
B.	$p_{jk}^{(m)} = P_r\{x_{n+m} = k / x_n = j\}$
C.	$p_{jk}^{(m)} = P_r\{x_{m-1} = k / x_{n+2} = j\}$
D.	$p_{jk}^{(m)} = P_r\{x_{m-2} = k / x_{m-3} = j\}$

186. **The interarrival times of a Poisson process are identically and independently distributed random variables which follow-**

1) The negative exponential law with mean $1/\lambda$
2) The binomial distribution
3) The uniform distribution
4) The weibull distribution

187. **If the chain does not contain any other proper closed subset other than the state space, then the chain is called-**

1) Reducible
2) Irreducible
3) Primitive
4) Imprimitive

188.

A relation between $f_{jk}^{(n)}$ and $p_{jk}^{(n)}$ is :	
A.	$p_{jk}^{(n)} = \sum_{r=0}^{n} f_{jk}^{(r)} p_{kk}^{(n)}$
B.	$p_{jk}^{(n)} = \sum_{r=0}^{n} f_{jk}^{(n)} p_{kk}^{(n-r)}$
C.	$p_{jk}^{(n)} = \sum_{r=0}^{n} f_{kj}^{(n-1)} p_{kk}^{(n-j)}$
D.	$p_{jk}^{(n)} = \sum_{r=0}^{n} f_{jk}^{(r)} p_{kk}^{(n-r)}$

189.

The mean recurrence time for the state j is:	
A.	$\mu_{jj} = \sum_{n=1}^{\infty} n f_{kj}^{(n)}$
B.	$\mu_{jj} = \sum_{n=1}^{\infty} f_{jj}^{(n)}$
C.	$\mu_{jj} = \sum_{n=1}^{\infty} n f_{j}^{(n)}$
D.	$\mu_{jj} = \sum_{n=1}^{\infty} f_{ii}^{(n)}$

190.

A persistent state j is said to be null persistent if-	
A.	$\mu_{jj} = 1$
B.	$\mu_{jj} = -\infty$
C.	$\mu_{jj} = \infty$
D.	$\mu_{jj} = -1$

191.

If $v_k = \sum_j v_j p_{jk}$ such that $v_j \geq 0, \sum_j v_j = 1$. then the probability distribution $\{v_j\}$ is called:	
A.	Stationary
B.	Ergodic
C.	Persistent
D.	Transient

192. Social mobility implies-

1) Movements of individuals from one states to another
2) Movements of individuals from one village to another
3) Movements of people from one states to another
4) Movements of people from one country to another

193. While describing, comparing and explaining the determinals and consequences of population phenomena _________ have to be taken into consideration.

1) Economic phenomena
2) Social phenomena
3) Biological phenomena
4) Environmental phenomena

194. The first Indian population conference was held in ______ under the auspices of the university of Lucknow.

1) 1936
2) 1937
3) 1938
4) 1939

195. The Indian Association for the Study of Population (IASP) regularly publishes a journal known as-

1) Indian Economy
2) Demography India
3) Social change
4) Economic change

196. The data required for the study of population are obtained from:

1) Population census
2) Registration of vital events
3) Sample surveys
4) All of these

197.

The Dependency Ratio is given by-	
A.	$\frac{P_{0-14} + P_{60}}{P_{15-59}} \times K$
B.	$\frac{P_{0-14} \times P_{60}}{P_{15-59}} \times K$
C.	$\frac{P_{15-59}}{P_{0-14} + P_{60}} \times K$
D.	$\frac{P_{15-59}}{P_{0-14} - P_{60}} \times K$

198.

Infant mortality rate is given by-	
A.	$\frac{\text{Total no.of deaths below age one}}{\text{No.of births registered}} \times 1000$
B.	$\frac{\text{Total no.of deaths below age one}}{\text{No.of deaths registered}}$
C.	$\frac{\text{Total no.of births registered}}{\text{Total no.of deaths below age one}} \times 100$
D.	$\frac{\text{Total no.of deaths registered}}{\text{Total no.of births}}$

199. The neo-natal mortality is the period:

1) Wherein death occurred before completing four weeks of life

2) Wherein death occurred between 28 days and 365 days

3) Wherein death occurred before completing one year

4) Wherein death occurred after one year

200. One who has not had a single child is regarded as:

1) Fertile

2) Sterile

3) Fecundity

4) Involuntary Sterile