Id	**1**
Question	It is given that, $P(A\|B)=0.4$ and $P(A\|B^c)=0.6$ then
A	$P(A)=0.5$
B	$0\leq P(A)\leq 1$
C	$0.4\leq P(A)\leq 0.6$
D	$0.6\leq P(A)\leq 1$
Answer	C

Id	**2**
Question	E and F are independent events such that, the probability of at least one occur is 1/3 and the probability that E occurs but F does not occurs in 1/9. Then P(F) is,
A	4/9
B	2/9
C	1/9
D	1/3
Answer	B

Id	**3**
Question	Suppose that, the distribution of r.v. X is given by, P(X= -1)=1/6=P(X=4) and P(X=0)=1/3=P(X=2) then, find E(X/X+2)
A	1/6
B	1/9
C	1/18
D	1/36
Answer	B

Id	**4**
Question	Let ~ N(1,4). Given that, $\frac{X^2}{4} - \frac{X}{2} + \frac{K}{4}$ is distributed as Chi-square with one degree of freedom. The value of K is
A	0
B	4
C	1.414
D	1
Answer	D

Id	**5**
Question	Let X have the distribution function $$F(X)=\begin{cases} 0, if\ X<-1 \\ \frac{2+X}{4}, if -1\leq X\leq 1 \\ 1, if\ X\geq 1 \end{cases}$$ The V(X) is ,
A	1/2
B	1/4
C	1
D	2/3
Answer	A

Id	**6**
Question	If x has a pdf, $f(x)=2(1-x), 0\le x\le 1$. What is the median of the distribution.
A	$1+\frac{1}{\sqrt{2}}$
B	$1-\frac{1}{\sqrt{2}}$
C	$\frac{1}{\sqrt{2}}$
D	$\sqrt{2}-1$
Answer	B

Id	**7**
Question	The characteristic function of $U(-\alpha, \alpha)$ is
A	$\frac{1}{\alpha t}\cos(t\alpha)$
B	$\alpha t \sin(t\alpha)$
C	$\frac{1}{\alpha t}\sin(t\alpha)$
D	$\alpha t \cos(t\alpha)$
Answer	C

Id	**8**
Question	If $b_{yx}=0.4$ and $b_{xy}=0.16$ are the regression coefficient on Y on X and X on Y respectively, then the correlation coefficient between X and Y,
A	0.08
B	-0.088
C	0.0064
D	None of these
Answer	D

Id	**9**
Question	If Markov chain is finite then,
A	There exist at least one state which is transient
B	There exist at least one state which is recurrent
C	All states are absorbing or reflecting barriers
D	All states are either recurrent or transient
Answer	B

Id	**10**
Question	If random sample of size n is chosen from a population with pdf, $f(x,\theta)=\begin{cases}\frac{1}{2}e^{-(x-\theta)}; x\geq\theta \\ \frac{1}{2}e^{(x-\theta)}; x<\theta\end{cases}$ Then the m.l.e. of θ is,
A	Mean of the sample
B	Standard deviation of the sample
C	Median
D	$X_{(n)}$
Answer	C

Id	**11**
Question	For testing $H_0 : \mu = 0$ against $H_1 : \mu > 0$ on the basis of a random sample $X_1, \ldots, X_n$ a proposed tests rejects H_0 if and only if the number of positive observations is too large. The test is:
A	UMP for the problem
B	Not UMP but UMPU for the problem
C	Not UMP but unbiased for the problem
D	Not UMP and not unbiased for the problem
Answer	D

Id	12
Question	If T_1 and T_2 are unbiased estimators of θ and θ^2 $(0<\theta<1)$ and T is sufficient statistics, then $E(T_1/T)-E(T_2/T)$ is :
A	The minimum variance unbiased estimator of θ
B	Always the minimum variance unbiased estimator of $\theta(1-\theta)$
C	Always an unbiased estimator of $\theta(1-\theta)$, which has variance not exceeding that of T_1-T_2
D	Not and unbiased estimator of $\theta(1-\theta)$
Answer	C

Id	13
Question	If $X_1, \dots, X_n$ is a random sample from Poisson distribution with mean λ , The Cramer – Rao lower bound to the variance of any unbiased estimator of λ is given by:
A	λ^2/n
B	λ/n
C	$\lambda^{1/2}/n$
D	$e^{-\lambda}/n$
Answer	B

Id	**14**
Question	Let $X_1, X_2, \ldots\ldots, X_n$ be a sequence of i.i.d. r.v. With $P(X_i=-1)=P(X_i=1)=1/2$. Suppose the standard normal variable Z, $P[-1<Z\leq 0.01]=0.08$. If $S_n=\sum_{i=1}^{n^2} X_i$ then $\lim_{n\to\infty} P(S_n>\frac{n}{10})=?$
A	0.42
B	0.46
C	0.50
D	0.54
Answer	B

Id	**15**
Question	For which of the following distributions, the WLLN does not hold?
A	Normal
B	Gamma
C	Beta
D	Cauchy
Answer	D

Id	**16**
Question	Let X be r.v. Such that , $E[X]=E[X^2]=1$. Then $E[X^{100}]$ is :
A	0
B	1
C	2^{100}
D	$2^{100}+1$
Answer	B

Id	**17**
Question	Suppose X is real valued r.v. Which of the following values cannot be attained by the following values cannot be attained by E[X] and $E[X^2]$ respectively?
A	0 and 1
B	2 and 3
C	1/2 and 1/3
D	2 and 5
Answer	B

Id	**18**
Question	Suppose, $X \sim \text{Exp}(1/\lambda)$, where $\lambda > 0$. For testing the hypothesis $H_0 : \lambda = 3$ Vs. $H_1 : \lambda = 5$, a test is given as, " Reject H_0 is $X \geq 4.5$ " The probability of type-I error and power of this test are respectively?
A	0.1353 and 0.4466
B	0.1827 and 0.379
C	0.2021 and 0.4493
D	0.2231 and 0.4066
Answer	D

Id	19
Question	Let $\{X_i\}$ be a sequence of independent Poisson (λ) variables and let $W_n = \frac{1}{n}\sum_{i=1}^{n^2} X_i$ Then limiting distribution of $\sqrt{n}(W_n - \lambda)$ is the normal distribution with mean zero and variance is given by:
A	1
B	$\sqrt{\lambda}$
C	λ
D	λ^2
Answer	C

Id	**20**
Question	Which of the following distribution have Coefficient of variation is one?
A	Normal
B	Poisson
C	Gamma
D	Exponential
Answer	D

Id	**21**
Question	Consider a LPP : Maximize $Z=4X_1+3X_2$, subject to, $X_1+X_2\geq 3$, $X_1-X_2\geq 2$, $X_1, X_2\geq 0$. An optimal solution of its dual problem is given by,
A	$X_1=0, X_2=3$
B	$X_1=1, X_2=1$
C	$X_1=2, X_2=0$
D	Unbounded solution
Answer	D

Id	**22**
Question	Branch and bound method is
A	Not used to solve any kind of programming problem
B	Cannot divide the feasible region into smaller parts
C	Cannot employ in problems when there are finite numbers of solution
D	Standard method and can applied differently for different problems
Answer	A

Id	**23**
Question	The quadratic form $X^T QX$ is said to be positive semi-definite, if
A	$X^T QX > 0$
B	$X^T QX < 0$
C	$X^T QX \geq 0$
D	$X^T QX \leq 0$
Answer	C

Id	**24**
Question	In the EOQ problem without shortages with finite replenishment, the optimum lot size is
A	$\sqrt{\dfrac{2DC_S}{C_1(1-\frac{1}{k})}}$
B	$\sqrt{\dfrac{2DC_S}{C_1(1-\frac{r}{k})}}$
C	$\sqrt{\dfrac{2DC_S}{C(1-\frac{r}{k})}}$
D	$\sqrt{\dfrac{DC_S}{IC(1-\frac{r}{k})}}$
Answer	B

Id	**25**
Question	In $\{(M\|M\|1):(N\|FIFO)\}$ queuing model, the average waiting time in the queue is,
A	$E(w)=E(v)-1/\mu$
B	$E(w)=E(v)-1/\lambda$
C	$E(w)=E(n)-1/\mu$
D	$E(w)=E(n)+1/\lambda$
Answer	A

Id	**26**
Question	Consider a BIBD with λ , a , r and k as the design parameters in the usual notation. Which of the following is a consistent specification of the parameters?
A	$\lambda=2, a=4, r=3, k=3$
B	$\lambda=4, a=2, r=3, k=3$
C	$\lambda=3, a=4, r=2, k=2$
D	$\lambda=2, a=3, r=2, k=3$
Answer	A

Id	**27**
Question	A 2^n design in which some effects have been totally confounded is:
A	Always a connected design
B	Sometimes a connected and sometimes a disconnected design depending on the effects confounded
C	Always a disconnected design
D	Always the union of a connected and disconnected design
Answer	B

Id	**28**
Question	A simple random sample of 25 unit is being drawn from a population of 500 units, draws being without replacement. The probability that the first population unit will be drawn in the 25^{th} draw is:
A	Zero
B	1/500
C	25/500
D	475/500
Answer	B

Id	29
Question	For a given a finite population and specified sample size n. Let D1, D2, D3 respectively denote SRSWR, SRSWOR and Stratified random sampling (with Proportional allocation schemes). These can be placed in the ascending order of sampling variability:
A	D_1, D_2, D_3
B	D_3, D_1, D_2
C	D_3, D_2, D_1
D	D_2, D_3, D_1
Answer	C

Id	**30**
Question	A finite population of N-5 units has mean $\overline{Y_N}=12$, $S^2=100$. A simple random sample of n=2 units is drawn without replacement and the sample mean is denoted by $\overline{y_n}$, then $E(\overline{y_n^2})$ is
A	30
B	50
C	144
D	174
Answer	D

Id	**31**
Question	The total number of samples of size 2 that can be drawn with replacement from a population of 10 units is
A	10^2
B	2^{10}
C	90
D	45
Answer	A

Id	**32**
Question	The regression estimator is equally efficient to the mean per unit estimator if:
A	$0 < \rho < 1$
B	$\rho = 0$
C	$-1 < \rho < 0$
D	$\rho = 1$
Answer	B

Id	**33**
Question	Let $x_1, x_2, \ldots.., x_n$ be a random sample from $U(0,\theta)$. Let $\delta(x)=2\bar{x}$. Which of the following statement is true?
A	$\delta(x)$ is biased & $V(\delta(x))>\frac{\theta^2}{n}$
B	$\delta(x)$ is biased & $V(\delta(x))<\frac{\theta^2}{n}$
C	$\delta(x)$ is unbiased & $V(\delta(x))>\frac{\theta^2}{n}$
D	$\delta(x)$ is unbiased & $V(\delta(x))<\frac{\theta^2}{n}$
Answer	D

Id	**34**
Question	A random sample of size 4 is drawn from normal distribution with unknown mean μ and variance σ^2 known but unspecified. For testing $H_0: \mu = 0$ v/s $H_1: \mu > 0$. The best critical region of the test is given by $X_1 + X_2 + X_3 + X_4 \geq 19.6$. Which of the following values of σ should be specified so that the significance level (size) of this test is 0.025?
A	5
B	15
C	10
D	20
Answer	A

Id	**35**
Question	Suppose X is random variable with p.d.f. $f(x;\theta)=\begin{cases}(\theta+1)x^{\theta};0<x<1\\ 0;otherwise\end{cases}$ The hypothesis $H_0:\theta=1$ is rejected in favour of $H_1:\theta=2$ if x>0.90 . What is the probability of Type-I error?
A	0.05
B	0.095
C	0.81
D	0.19
Answer	D

Id	**36**
Question	If for a given α , $0 \leq \alpha \leq 1$, non-randomized NP & LRT of a simple hypothesis V/s simple alternative exists then
A	They are equivalent
B	They are one and the same
C	They are exactly opposite
D	One can't say anything about it
Answer	A

Id	**37**
Question	Mann- Whitney test statistic U depends on the fact that:
A	How many times Yi's precede Xi's
B	How many times Xi's precede Yi's'
C	Both (A) and (B)
D	None of (A) and (B)
Answer	C

Id	**38**
Question	The statistic H under the Kruskal-Wallis test is approximately distributed as:
A	Student t
B	Snedecor's F
C	Chi-square
D	Normal deviate-Z
Answer	C

Id	**39**
Question	Randomness of a sequence through runs test is adjusted by comparing the observed number of runs with:
A	Two critical values
B	One upper critical value
C	One lower critical value
D	None of the above
Answer	A

Id	**40**
Question	Let the regression lines of Y on X and X on Y are respectively $Y=\alpha X+\beta$ and $X=\theta Y+\delta$. Then the ratio of the variances of X and Y is:
A	$\frac{\theta}{\alpha}$
B	$\sqrt{\frac{\theta}{\alpha}}$
C	$\sqrt{\theta\alpha}$
D	$\frac{\alpha}{\theta}$
Answer	A

Id	**41**
Question	If an unknown potential parameter of a model is equalised to one or more parameters of the model, then the parameters of the model, then the parameter is classified as:
A	Nuisance parameter
B	Constrained parameter
C	Free parameter
D	Non-Centrality parameter
Answer	B

Id	**42**
Question	The Shewhart control charts are meant:
A	To detect whether the process is under statistical quality control.
B	To find the assignable causes
C	To reflect the selection of samples.
D	All the above
Answer	D

Id	**43**
Question	Hotellings T^2 - test is a generalization of
A	Chi-square test
B	F- test
C	T- test
D	Likelihood ratio test
Answer	C

Id	**44**
Question	Let $\underline{X}$ be a p-component random vector with $E[\underline{X}]=\underline{0}$ and variance-covariance matrix Σ , positive definite. If $\underline{X}$ is partitioned into $\underline{X}^{(1)}$ of p_1 components and $\underline{X}^{(2)}$ of p_2 components such that $p_1+p_2=p$ and $p_1\leq p_2$. Then, the square of canonical correlation are the characteristic roots of the matrix:
A	Σ
B	$\sum_{11}^{-1}\sum_{12}$
C	$\sum_{22}^{-1}\sum_{21}$
D	$\sum_{11}^{-1}\sum_{12}\sum_{22}^{-1}\sum_{21}$
Answer	D

Id	**45**
Question	The simplest linear regression modal is $Y=\alpha+\beta X+\varepsilon$ where $\varepsilon\sim N(0,\sigma^2)$. Let x* denote a particular value of the independent variable X. Which of the following statement is true regarding positive variance of Y where X=x* ?
A	$\sigma_{y\|x^*}^2=\sigma^2$
B	$\sigma_{y\|x^*}^2=\alpha+\beta x^*+\sigma_\epsilon^2$
C	$\sigma_{y\|x^*}^2=\beta x^*+\sigma^2$
D	$\sigma_{y\|x^*}^2=\beta^2\sigma^2$
Answer	A

Id	**46**
Question	Consider the simple linear regression model: $Y_i=\theta_0+\theta_1 x_i+\varepsilon_i,\ i=1,2$ where $\varepsilon_i \sim NZD(0,\sigma^2)$, $x_1=-1$, $x_2=1$. The BLUE of θ_0 & θ_1 respectively are
A	$[\bar{Y}, \frac{Y_2-Y_1}{2}]$
B	$[\frac{Y_2-Y_1}{2}, \bar{Y}]$
C	$[Y_1-\bar{Y}, Y_2-\bar{Y}]$
D	$[\bar{Y}, \bar{Y}]$
Answer	B

Id	**47**
Question	Let $X_t = Z_t + \theta Z_{t-1}$ and $Y_t = Z_t + \frac{1}{\theta} Z_{t-1}$ where $Z_t \sim iid\ Normal(0,1)$. Which of the following statements is true?
A	ACF of $\{X_t\}$ process is same as that of $\{Y_t\}$
B	ACF of $\{X_t\}$ process is different as that of $\{Y_t\}$
C	Both the processes $\{X_t\}$ and { $\{Y_t\}$ } are invertible for a given value of θ
D	Both $\{X_t\}$ and $\{Y_t\}$ are non-stationary
Answer	A

Id	**48**
Question	Polynomial trend generally follows:
A	T-shaped
B	U-shape
C	Linear
D	V-shape
Answer	B

Id	**49**
Question	In the following regression equation: $Y_t = \alpha + \beta t + \varepsilon$ where, t-time index, Y_t - number of motorcycle riders at time t, and t= 1,2,3,...... which of the following component from above regression equation leads to trend?
A	t
B	ε
C	α
D	β
Answer	D

Id	50
Question	Consider a stationary time series Y_t given by $Y_t - \phi Y_{t-1} = \mu + Z_t - \theta Z_{t-1}$ Where Z_t is a unit noise process $(0, \sigma^2)$. Which of the following statement(s) is (are) true? 1. $E(Y_t) = \mu, V(Y_t) = \frac{\sigma^2}{(1-\phi^2)}$ 2. $E(Y_t) = \frac{\mu}{1-\theta}, V(Y_t) = \frac{\sigma^2}{(1-\phi^2)}$ 3. $E(Y_t) = \frac{\mu}{1-\theta}, V(Y_t) = \frac{1-2\phi\theta+\theta^2}{(1-\theta^2)}\sigma^2$ 4. $E(Y_t) = \frac{\mu}{1-\phi}, V(Y_t) = \frac{1-2\phi\theta+\theta^2}{(1-\theta^2)}\sigma^2$ Codes:
A	(1), (2), (3) and (4)
B	(2) & (4) only
C	(4) only
D	(1), (2), (3)
Answer	C