

Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION-A

Q.1	Questions	A	B	C	D
1.	Support of normal distribution is.	0 to 1	0 to ∞	-1 to +1	-∞ to ∞
2.	Normal distribution is.	Symmetric	Positively skewed	Negatively skewed	All of these
3.	If $X \sim N(\mu, \sigma^2)$, then standard normal variable Z is:	$\frac{X + \mu}{\sigma}$	$\frac{X - \mu}{\sigma}$	χ^2	$\frac{X - \mu}{\sigma}$
4.	Total samples in with -replacement sampling:	N^n	${}^N C_n$	n^N	${}^n C_N$
5.	What is possible in sampling without replacement?	$N = n$	$N > n$	$N < n$	A & B
6.	If P is sample proportion, then for sampling without replacement:	$E(P) = \pi$	$\frac{\pi(1-\pi)}{n} \frac{N-n}{N-1} = \text{Var}(P)$	$\frac{\sqrt{n(N-1)}(\sigma_p)}{\sqrt{\pi(1-\pi)(N-n)}}$	All of these
7.	Point estimate of difference between two population mean ($\mu_2 - \mu_1$) is:	$\bar{X}_1 + \bar{X}_2$	$\bar{X}_1 - \bar{X}_2$	$\bar{X}_2 - \bar{X}_1$	$\bar{X}_1 \bar{X}_2$
8.	For with replacement sampling, $\text{Var}(\bar{X}_1 - \bar{X}_2)$ is:	$\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}$	$\frac{\sigma_1^2}{n_1} - \frac{\sigma_2^2}{n_2}$	$\sigma_1^2 \sigma_2^2 / n_1 n_2$	$n_1 n_2 / \sigma_1^2 \sigma_2^2$
9.	Which of the given is not a proper Null hypothesis?	$H_0: \mu < 7$	$H_0: \mu > 7$	$H_0: \mu \neq 7$	All of these
10.	In $Y = a + bX$:	$-\infty < a < \infty$	$-\infty < b < \infty$	$\sum y = \sum \hat{y}$	All of these
11.	Objective of correlation is to study:	Strength of relationship	Functional relationship	Association of attributes	All of these
12.	Which of the given one is true for regression?	$\sum y = \sum \hat{y}$	$b_{yx} = r \frac{S_y}{S_x}$	$\sum e_i = 0$	All of these
13.	Formula of chi-square (χ^2) is:	$\sum \left(\frac{o-e}{e} \right)^2$	$-\sum (o-e) / e^2$	$\sum \left[\frac{(o-e)^2}{e} \right]$	$\frac{\sum (o-e)^2}{\sum e^2}$
14.	If expected frequencies are equal to corresponding observed frequencies, then value of χ^2 is:	∞	1	0	2
15.	Chronological data is another name for.	Time Series Data	Primary Data	Secondary Data	Qualitative Data
16.	How many components are there in a time series?	2	3	4	5
17.	Windows 10 is an example of:	Operating System	Hardware	Processor	All of these

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Note :- Section B is compulsory. Attempt any Three Questions from Section C.

SECTION - B

2. Write short answers to any Eight parts. (8 x 2 = 16)
- Define standard normal distribution.
 - Give any two properties of normal distribution.
 - In a normal distribution, $Q_1=65$ and $Q_3=75$, find the value of mean.
 - In a normal distribution $\mu_2 = 4$, find μ_4 .
 - Write down equation of the normal curve.
 - What is meant by Estimation?
 - What is unbiased Estimator?
 - Define critical value.
 - Define type-II Error.
 - What is two tailed test?
 - Define input device.
 - What is operating system?
3. Write short answers to any Eight parts. (8 x 2 = 16)
- Given $N=1000$ $n=50$ $\sigma = 9$. If sampling is done without replacement then find $Var(\bar{X})$
 - Define the sampled population.
 - What is sampling?
 - Distinguish between finite and infinite population.
 - All possible samples are drawn from a normal population with $\mu = 50$ and $\sigma = 5$. What is the sample size if the standard error of \bar{X} is 1.0
 - Define sampling distribution.
 - Write the normal equations of straight line Y on X.
 - What is meant by residual in regression model?
 - For the regression lines
- (i) $\hat{y} = 15 - 1.96x$
- (ii) $\hat{x} = 9 - 0.5y$
- Calculate the values of b_{yx} and b_{xy} .
- Define correlation.
 - Given $b_{xy}=-1.4$ and $r_{xy}=-0.8$, find b_{yx} .
 - Write down two properties of correlation coefficient.
4. Write short answers to any Six parts. (6 x 2 = 12)
- Explain class frequency.
 - Differentiate between variable and attribute.
 - If $n=120$, $(A)=82$, $(AB)=90$, find consistence of data.
 - Give two examples of time series data.
 - What are the steps to construct the historigram?
 - Describe seasonal variation in time series.
 - Explain irregular movements in time series.
 - Explain the method of semi-averages.
 - Given $\Sigma x = 0$, $\Sigma y = 245$, $\Sigma x^2 = 28$, $\Sigma xy = 66$ and $n=7$. Fit a linear trend.

SECTION - C

Note: Attempt any Three question. Each question carries 8 marks.

5. (a) If $X \sim N(70, 25)$, find a point that has 87.9% of the distribution below it.
- (b) In a normal distribution, 31% of items are under 45 and 8% are over 64. Find the mean and standard deviation of the normal distribution.
6. (a) Take all possible samples of size 2 without replacement from the population 4, 5, 6, 7, 8. Show that
- (i) $\mu_{\bar{X}} = \mu$ (ii) $\sigma_{\bar{X}}^2 = \frac{\sigma^2}{n} \left(\frac{N-n}{N-1} \right)$
- (b) Given that $n_1 = 2$, $\mu_1 = 6$, $\sigma_1^2 = 2.67$
- $n_2 = 2$, $\mu_2 = 2$, $\sigma_2^2 = 0.67$
- Find $\mu_{\bar{X}_1 - \bar{X}_2}$ and $\sigma_{\bar{X}_1 - \bar{X}_2}$

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7. (a) A random sample of 64 is taken from a certain population with a known standard deviation $\sigma = 16$. If the mean of the sample is 82, compute a 95% confidence interval for population mean. ایف جی اسٹڈی ڈاٹ کام

- (b) A random sample of 10 from a population gave $\bar{X} = 20$ and $\Sigma(X - \bar{X})^2 = 144$. Test $H_0 : \mu = 19.5$ against $H_1 : \mu > 19.5$ at $\alpha = 0.05$

8. (a) Suppose that four randomly chosen plots were treated with various levels of fertilizer, resulting in the following yields of corn.

Fertilizer (x)	100	200	400	500
Production (y)	70	70	80	100

- (i) Estimate the line of regression for Y on X.
- (ii) Estimate the yield when no fertilizer is applied.

- (b) Find the co-efficient of correlation if the two regression co-efficients have the following values:

(i) $b_{yx} = 0.45$, $b_{xy} = 0.8$

(ii) $b_{yx} = -0.1$, $b_{xy} = -0.4$

9. (a) During influenza epidemic 15 boys and 8 girls became ill out of a class of 22 boys and 28 girls.

- (i) Draw up a contingency table.

- (ii) Test the hypothesis of no dependence at 0.05 level of significance.

- (b) Calculate trend values by semi-average for the given data. Also write the equation taking origin at 1980 and find estimate for 1990.

Years	1980	1981	1982	1983	1984	1985	1986	1987	1988
Values	12	14	16	18	17	16	18	10	12