103

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ROLL NUMBER						
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STATISTICS HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Candidate Sign. _____

Invigilator Sign. _____

Answer Sheet No. _____

کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Deleting/overwriting is not allowed. *Do not use lead pencil.*

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پر کریں۔

Fill the relevant bubble against each question according to curriculum:

Question سوال	A	B	C	D	A	B	C	D
1. If n coins are tossed, the possible outcomes are:	n	$2n$	2^n	$2+n$	○	○	○	○
2. Two dice are rolled. Probability of getting a total less than 3 is given by:	$\frac{1}{36}$	$\frac{4}{36}$	$\frac{6}{36}$	$\frac{14}{36}$	○	○	○	○
3. A continuous probability distribution may be represented by:	A table	A graph only	A mathematical equation only	A graph and mathematical equation	○	○	○	○
4. If X and Y are independent random variables, then $S.D(X-Y)$ is equal to:	$\sqrt{Var(X)+Var(Y)}$	$SD(X)+SD(Y)$	$SD(X)-SD(Y)$	$\sqrt{Var(X)-Var(Y)}$	○	○	○	○
5. If $E(X)=1.5, Var(X)=0.5$ then $E(X^2)$ is:	0.25	2.25	2.75	2.70	○	○	○	○
6. In a binomial probability distribution, coefficient of skewness =0, it means that the distribution is:	Symmetrical	Skewed to the left	Skewed to the right	Highly skewed	○	○	○	○
7. In hypergeometric probability distribution, the relation between mean and variance is:	Mean < Variance	Mean > Variance	Mean = Variance	Mean = 2 x Variance	○	○	○	○
8. In a $N(\mu,\sigma^2)$, β_2 is equal to:	$\frac{\sigma^4}{2}$	$\frac{3\sigma^4}{4}$	$3\sigma^4$	3	○	○	○	○
9. The shape of the normal distribution is:	Leptokurtic	Platykurtic	Mesokurtic	Skewed	○	○	○	○
10. For making voters list in Pakistan we need:	Sampling error	Standard error	Census	Random values	○	○	○	○
11. Non-random sampling is also called:	Biased sampling	Non-probability sampling	Random sampling	Representative sample	○	○	○	○
12. In case of sampling with replacement, $E(S^2)$ is equal to:	$\left(\frac{n-1}{n}\right)\sigma^2$	$\left(\frac{n}{n-1}\right)\sigma^2$	$\left(\frac{N}{N-1}\right)\sigma^2$	$\frac{\sigma^2}{n}$	○	○	○	○
13. A range of values used to estimate an unknown population parameter is:	A point estimator	An interval estimator	An unbiased estimator	A biased estimator	○	○	○	○
14. In a two sample problem, if samples of sizes n_1 and n_2 $(n_1=n_2=n)$ are independent, then the degree of freedom is:	$n-1$	n	$2n-1$	$2n-2$	○	○	○	○
15. Power of a test is related to:	Type-I error	Type-II error	Type-I error and Type-II error	Neither Type-I error and Types-II error	○	○	○	○
16. If two attributes A and B have perfect positive association, the value of coefficient of association is equal:	-1	0	(r-1)(c-1)	+1	○	○	○	○
17. Brain of computer system is called:	Hard disk	Monitor	Central processing unit	Main memory	○	○	○	○

STATISTICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

SECTION – B (Marks 42)

Q. 2 Write brief answers of any FOURTEEN parts **(14 x 3 = 42)**

(i) A boy has five coins each of different denomination. How many different sums of money can be obtained?

(ii) State the properties of random experiment.

(iii) A box contains 5 white and 7 black balls. If 3 balls are drawn, what is the probability that

a. All are white **b.** 2 are white and 1 is black

(iv) What is meant by probability density function of a continuous random variable?

(v) The probability distribution of a random variable 'X' is given:

X	-2	-1	0	1	2	3
P(X)	0.1	K	0.2	2K	0.3	3K

Rewrite the probability distribution after finding the value of K. Also find P(–2<x<2).

(vi) A continuous random variable x having a function $f(x)=\frac{1}{18}(3+2x)$,where $(2<x<4)$. Show that it is a density function.

(vii) State the properties of hyper geometric distribution.

(viii) If X is a binomial random variable with n=4 and P(X=2)=3P(X=3). Find the value of "P".

(ix) What is meant by standard normal distribution?

(x) In normal distribution, mean is 100, standard deviation is 10. Find

a. Moment ratios β_1 and β_2 **b.** Median and mode

(xi) Let X be normal distribution with mean zero and standard deviation 1. Find $P(X>3)$ and $P(-2<X<2)$

(xii) Differentiate between probability sampling and simple random sampling.

(xiii) What is the value of finite population correction factor (fPC) when n=18 and N=125.

(xiv) Given $n_1=24, \sigma_1=12, n_2=27, \sigma_2=18$ Find $Var(\overline{X}_2-\overline{X}_1)$

(xv) A random sample of size n=25 taken from a normal population with sample mean 80 and $\sigma=5$. Another random sample of size 36 is taken from different normal population with sample mean 75 and $\sigma=3$. Find 95% confidence interval for $\mu_1-\mu_2$. $\left(Z_{\frac{\alpha}{2}}=1.96\right)$.

(xvi) Describe the general procedure for testing of hypothesis.

(xvii) What is meant by statistical inferences? Enlist two main areas of statistical inferences.

(xviii) Briefly describe the terms 'memory' and 'storage'.

(xix) Given $(AB)=145, (A\beta)=155, (\alpha\beta)=145,$ and $n=700$. What kind of association among attributes are likely to occur?

SECTION – C (Marks 26)

Note: **Attempt any TWO questions. All questions carry equal marks.** **(2 x 13 = 26)**

Q. 3 **a.** P can hit the target three times in 5 shots. Q two times in 5 shots, R three times in 4 shots when they fire a volley. Find the probability that: (I) 2 shots hit (II) at least 2 shots hit **(06)**

b. A box contains ten items, seven of which are good and three are defective. Two items are selected (without replacement). Compute the probability distribution for the number of defective items in the sample of two. Also compute the mean and variance of this probability distribution. **(07)**

Q. 4 **a.** Suppose the weights of 2000 male students are normally distributed with mean 155 and standard deviation 20 pounds. Find the number of students with weights:

(I) Greater than 200 Pounds (II) Between 120 and 130 Pounds **(05)**

b. Draw all possible samples of size 3 letters by without replacement from the word "HOUSE". Find the proportion of the vowels in each sample. Construct sampling distribution of proportion and verify:

(I) $\mu_{\hat{p}} = P$ (II) $\sigma_{\hat{p}}^2 = \frac{pq}{n}\left(\frac{N-n}{N-1}\right)$ **(08)**

Q. 5 **a.** Samples of two types of electric light bulbs were tested for length of life and the following data were obtained $n_1 = 5, \overline{X}_1 = 1224, \Sigma\left(X_1 - \overline{X}_1\right)^2 = 6490, n_2 = 7, \overline{X}_2 = 1036, \Sigma\left(X_2 - \overline{X}_2\right)^2 = 11200$. Is the difference in the means significant? Assume that the two samples are drawn from normal populations with identical σ use 2% level of significance. $\left(Z_{\frac{\alpha}{2}} = 0.1879\right)$ **(06)**

b. Given the following contingency table of hair colour and eye colour. **(07)**

Eye Colour	Hair Colour		
	Fair	Brown	Black
Blue	15	5	20
Grey	20	10	20
Brown	25	15	20

Test the hypothesis at 5% level of significance that there is no association between hair and eye colour ($\chi^2 = 9.488$).