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Version No.				
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ROLL NUMBER						

STATISTICS HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed.

Do not use lead pencil.

حصہ اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نگرانِ مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پُر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	If events A and B are mutually exclusive then:	$A \cap B = \phi$	$A \cap B = A$	$A \cup B = S$	$A \cap B = B$	○	○	○	○
2.	Set is always denoted by:	Small letter	Capital letter	Greek letter	Italic letter	○	○	○	○
3.	A coin is tossed three times; the total number of possible outcomes will be:	1^3	3^2	2^3	3^3	○	○	○	○
4.	The probability of an event cannot be:	$=0$	>0	$=1$	<0	○	○	○	○
5.	A random variable is also known as:	Chance variable	Kurtosis	Null Hypothesis	Event	○	○	○	○
6.	If X and Y are random variables, then $E(X-Y)$ is equal to:	$E(X)+E(Y)$	$E(X)-E(Y)$	$X-E(X)$	$E(X)-Y$	○	○	○	○
7.	Variance of $(q+p)^4$ is:	$\sqrt{4pq}$	$4p$	$4pq$	$\sqrt{4p}$	○	○	○	○
8.	If $Z-N(0,1)$, then coefficient of variation is equal to:	0.50	1	0	∞	○	○	○	○
9.	Total area under the normal curve is:	1	0.5	0	2	○	○	○	○
10.	For a normal distribution with $\mu=1, \sigma=0.5$, the area to the right of 1 is equal to:	1	0.5	−0.5	0.75	○	○	○	○
11.	For making voters list in Pakistan we need:	Standard error	Sampling error	Census	Simple random sampling	○	○	○	○
12.	A population contains two items, and four items are selected at random with replacement, then possible samples are:	4	2^2	${}^4C_2$	2^4	○	○	○	○
13.	Interval estimate is associated with:	Range of values	Probability	Non-probability	Number of parameters	○	○	○	○
14.	In a Z-test degree of freedom is:	$n-1$	$n-2$	n_1+n_2-2	Not Possible	○	○	○	○
15.	If two attributes A and B are independent then the coefficient of association is:	+1	0	−1	0.5	○	○	○	○
16.	The most common output devices are:	Mouse	Keyboard	Monitor and Printer	CPU	○	○	○	○
17.	LAN stands for:	Limited Area Network	Local Area Network	Large Area Network	Logical Area Network	○	○	○	○

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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) Evaluate **a.** ${}^5P_3$ **b.** ${}^{10}P_6$

(ii) State the addition law of probabilities for not mutually exclusive events.

(iii) Two cards are drawn at random from a well-shuffled pack of 52 cards. Find the probability that:

a. Both are of same colors. **b.** Both are of different colors.

(iv) A pair of dice are rolled. Find the probability that the sum of the uppermost dots is either 8 or 9.

(v) A random variable X has the following probability distribution.

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

Determine: **(a)** k **(b)** $P(-2 < X < 2)$ **(c)** $P(X \leq 1)$

(vi) Given $E(X^2) = 400$ and $SD(X) = 12$. Find $E(X)$

(vii) Given $n = 6$, $P(X = 1) = 6/64$ and $P(X = 2) = 15/64$. Find $P(X = 0)$.

(viii) Write down the equation of hypergeometric distribution. Also write its mean and variance.

(ix) The MD of a normal distribution is 16. Find the value of its σ.

(x) Write down any three properties of normal distribution.

(xi) In normal distribution $\mu = 100$ and $\sigma = 10$. Find Q_1, Q_3 and the values of points off inflection.

(xii) If $\sigma = 0.7$ and $\sigma^2_{\bar{X}} = 0.245$. Find n if sampling is with replacement.

(xiii) Differentiate between probability and non-Probability sampling.

(xiv) A population consists of values 0 and 4. Draw all possible samples of size 3 with replacement.

(xv) Given $\overline{X} = 140, \sigma = 8, n = 20$ and $Z_{\frac{\alpha}{2}} = 2.33$ (Table value). Construct the 98% confidence interval for population mean μ.

(xvi) Given $\overline{X} = 120, \mu = 100, \mu = 25, s = 34.75$. Find the value of t.

(xvii) Given $\overline{X} = 43260, H_o : \mu \leq 42000, H_1 : \mu > 42000, \sigma = 5230, \alpha = 0.05$ and $n = 30$. Find Z and make the statistical decision (Table value $Z_\alpha = 1.65$).

(xviii) Given the following information $N = 1000, (A) = 946, (B) = 490, (AB) = 452$. Show that attributes A and B are negatively associated.

(xix) Differentiate between RAM and ROM.

SECTION – C (Marks 26)

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

Q. 3 **a.** An integer is chosen at random from the first 100 positive integers. Find the probability that the chosen digit is divisible by 8 or by 12. **(05)**

b. Draw all possible samples of two letters each, with replacement from the letter of the word "HEN". **(08)**

(i) Find proportion of letter "E" in each sample.

(ii) Make sampling distribution of proportions obtained in part (i).

(iii) Find mean and variance of the distribution.

(iv) Verify that: **(a)** $\mu_{\hat{p}} = p$ **(b)** $\sigma^2_{\hat{p}} = \frac{pq}{n}$

Q. 4 **a.** In a normal distribution, the mean and standard deviation are 0 and 1 respectively. Write down its equation and find the value of the maximum ordinate correct to four decimal places. **(04)**

b. Given the following information. What is your conclusion in testing each of the indicated null and alternative hypotheses? **(09)**

Sr. No.	n	$\bar{x}$	s^2	α	H_o	H_1	**Table value**
(i)	25	8	64	0.05	$\mu \geq 10$	$\mu < 10$	-1.711
(ii)	9	12	36	0.01	$\mu \leq 10$	$\mu > 10$	2.896
(iii)	16	13	64	0.05	$\mu = 10$	$\mu \neq 10$	± 2.131

Q. 5 **a.** The IQ's of the college students are known to be normally distributed with a mean of 123. A random sample of 49 students showed an average IQ of $\bar{x} = 120.67$ and $S = 8.44$. Test the hypothesis that $\mu \geq 123$ against the alternative that it is less. Let $\alpha = 0.05$. $(\text{Table value } Z_\alpha = -1.65)$ **(05)**

b. Four hundred and ninety-two candidates for scientific posts gave particulars of their college degrees and their hobbies. The degrees were in either mathematics, statistics or economics, and the hobbies could be classified roughly as music, craftwork, reading or drama. The data are presented concisely in the following contingency table. **(08)**

Categories	Mathematics	Statistics	Economics
Music	24	83	17
Craftwork	11	62	28
Reading	42	147	78

Discuss the association between the two criteria of classification; i.e. the degree and the hobbies. Use $\alpha = 0.05$ $(\text{Table value } \chi^2 = 9.49)$.

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