Roll No. [ ] [ ] [ ] [ ] [ ] [ ]

Sig. of Candidate._____

Answer Sheet No._____

Sig. of Invigilator._____

STATISTICS HSSC–II
SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE: Section–A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Neither tail nor head comes up on the upper side of the coin, is an example of _____ set.

    A. Finite   B. Infinite

    C. Null   D. None of these

(ii) If three six-faced dice are rolled, the possible outcomes are_____

    A. 2^3 B. 216

    C. 36   D. 18

(iii) If $P(A) = \dfrac{2}{3}$, $P(B) = \dfrac{1}{3}$, B is a complementary event of event A.

    A. Yes   B. No

    C. Irrelevant   D. None of these

(iv) If E(X)=10, a=2 and b=5 then E(ax − b)=_____

    A. 20   B. 15

    C. 25   D. None of these

(v) Median of the Binomial distribution $\left(\dfrac{1}{2} + \dfrac{1}{2}\right)^{20}$ will be_____

    A. $\dfrac{1}{2}$ B. $\dfrac{1}{4}$

    C. 5   D. 10

(vi) For a symmetrical binomial distribution p and q are_____

    A. Equal   B. Unequal

    C. Irrelevant   D. None of these

(vii) In normal distribution the 4th mean moment about mean is equal to_____
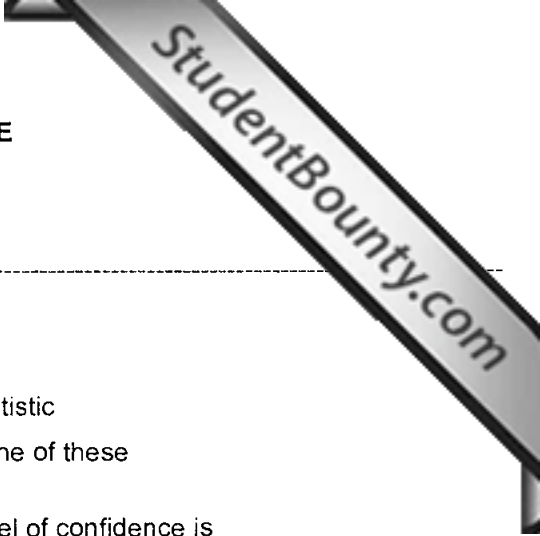
    A. $13\sigma^4$ B. $3\sigma^1$

    C. $3\sigma^3$ D. None of these

(viii) If a normal distribution $\sigma = 10$, then M.D. will approximately be_____

    A. 8   B. 10

    C. 12   D. 14

(ix) S.E. of $\overline{X}$ for without replacement sampling is_____

    A. $\dfrac{\sigma}{n}$ B. $\dfrac{\sigma}{\sqrt{n}}$

    C. $\dfrac{\sigma}{\sqrt{n}} \cdot \sqrt{\dfrac{N-n}{N-1}}$ D. None of these

(x) Population proportion is a_____

    A.   Variable   B.   Statistic

    C.   Parameter   D.   None of these

(xi) $\left[\bar{x} \pm 1.96 \dfrac{\sigma}{\sqrt{n}}\right]$ is the confidence interval for μ ;when the level of confidence is_____

    A.   80%   B.   90%

    C.   95%   D.   99%

(xii) Rejecting H_0, when H_0 is actually false is a _____

    A.   Type-I error   B.   Type-II error

    C.   Wrong decision   D.   Correct decision

(xiii) For $\alpha = 0.05$, the critical value of Z for two tailed test is_____

    A. ± 2.33 B. ± 1.96

    C. ± 2.58 D.   None of these

(xiv) Which test-statistic should be preferred to test the population mean when the population variance is known?

    A.   t-statistic   B.   z-statistic

    C. $x^2 - $ statistic   D.   None of these

(xv) The calculated value of the Chi-square could **NOT** be_____.

    A.   Positive   B.   Negative

    C.   Zero   D.   None of these

(xvi) If a contingency table consists of four rows and three columns, the d.f will be_____

    A.   6   B.   7

    C.   9   D.   12

(xvii) Chi-square distribution is a_____ distribution.

    A.   Symmetrical   B.   Negatively skewed

    C.   Positively skewed   D.   None of these

For Examiner's use only:

Total Marks: 17

Marks Obtained:

—— 2HA 1313 ——

STATISTICS HSSC–II

Time allowed: 2:35 Hours   **Total Marks Sections B and C: 6**

NOTE: Sections 'B' and 'C' comprise pages 1–2 and questions therein are to be answered on the separately provided answer book. Answer any fourteen parts from Section 'B' and any two questions from Section 'C'. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2   **Attempt any FOURTEEN parts. All parts carry equal marks.**   **(14 x 3 = 42)**

(i)   Show that in a single throw with two dice, the probability of throwing more than 7 is equal to that of throwing less than 7.

(ii)   Find the probability that on a single draw from a pack of playing cards, we draw a Diamond card or Picture card Or Both.

(iii)   Write down the properties of Mathematical Expectation.

(iv)   If for $f(x) \dfrac{6 \, |7-x|}{36}$ for x 2,3,4,5,6 ------12, find the variance of the random variable "X"

(v)   What is Binomial Distribution and what are its properties?

(vi)   A random variable x is binomially distributed with mean 3 and variance 2. Compute $P(x=6)$.

(vii)   If X is a binomial random-variable with n=5 and P=0.6 then find $E(2X-3)$ and $Var(2X-3)$.

(viii)   Write down the properties of the Normal distribution.

(ix)   The two quartiles of the normal distribution are 9 and 18, respectively. Find the Mean and Standard deviation of the distribution.

(x)   Define Standardized Normal Variate. Also write equation of the normal curve for standardized normal variate

(xi)   Differentiate between Probability and Non-probability Sampling.

(xii)   What is the value of the finite population correction factor (f.p c), when n=18 and N=125?

(xiii)   Differentiate between Point-estimate and Interval-estimate.

(xiv)   Given n=500, $\hat{P}=0.08$, $Z_{0.005}=2.58$ Find the 99% Confidence Interval for the population proportion

(xv)   Describe the difference between One-sided and Two-sided tests.

(xvi)   Given:

$$H_0 : \mu_1 - \mu_2 = 0 \quad vs \quad H_1 : \mu_1 - \mu_2 \neq 0$$

When

$$n_1 = 11 \; , \quad n_2 = 14 \; , \quad \bar{x}_1 = 75 \; , \quad \bar{x}_2 = 60$$

$$(n_1 - 1)s_1^2 = 372.1 \; , \quad (n_2 - 1)s_2^2 = 365.34$$

Find the value of "t" – Statistic.

(xvii)   What is the difference between Simple and Composite Hypothesis?

(xviii)   Given the following information $(a) = 54$, $(a\beta) = 16$, $(\beta) = 490$ and N=1000

Show whether attributes A and B are positively-associated, negatively-associated or independent

(xix)   What is meant by Association of attributes?

SECTION – C (Marks 26)

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

Q. 3 **a.** A random variable X has the following probability distribution: 03

X	−3	−2	−1	0	1
P(X=x)	$\dfrac{1}{16}$	$\dfrac{1}{4}$	K	$\dfrac{1}{4}$	$\dfrac{1}{16}$

Find:

(i) The value of K.

(ii) $P(X<0)$ and $P(X>-1)$.

b. A finite population consists of numbers 2,2,4,6 and 5, written on 5 tags of different colours. 10
Draw all possible random samples of size 2 without replacement from this population and find
their means. Construct the sampling distribution of the sample mean and verify that:

(i) $\mu_{\bar{x}} = \mu$

(ii) $\sigma_{\bar{x}}^2 = \dfrac{\sigma^2}{n}\left(\dfrac{N-n}{N-1}\right)$

Q. 4 **a.** If $X \sim N(30, 31.36)$, then find : 03

(i) $P(X > 20)$

(ii) $P(X \leq 25)$

b. In a test given to two groups of students, the marks obtained are given below: 10

G-I	9	11	13	11	15	9	12	14
G-II	10	12	10	14	9	8	10	

Test the hypothesis that $\mu_1 = \mu_2$ at 5% level of significance, assuming that $\sigma_1^2 = \sigma_2^2$.

Q. 5 **a.** A sample of 120 observations from a population known to be non-normal yielded the Sample 03
Values, $\overline{X} = 576$, $S^2 = 2475$

Find an approximate 90% Confidence Interval for mean of the population.

b. The following table shows the distribution of 200 school children according to their
Physical defect and Speech defect. Use $\alpha = 0.01$ 10

Speech Defect	Physical Defect		
	P_1	P_2	P_3
S_1	34	22	24
S_2	25	14	21
S_3	21	24	15

Do the data suggest any association between Physical defect and Speech defect?

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