STATISTICS HSSC–II
SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE: Section–A is compulsory. 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) How many possible permutations can be formed form the word COMMITTEE?
A. 45360   B. 9!   C. 6!   D. 4!

(ii) If one event is unaffected by the outcome of an other event, the two events are said to be:
A. Dependent   B. Independent
C. Mutually exclusive   D. Equally likely

(iii) If $P(B / A) = 0.25$ and $P(A \cap B) = 0.20$, then $P(A) = ?$
A. 0.05   B. 0.8   C. 0.95   D. 0.75

(iv) A discrete probability distribution may be represented by:
A. A table   B. A graph
C. A mathematical equation   D. Continuous curve

(v) If 'x' and 'y' are independent random variables then $S.D(x - y)$ is equal to:
A. $\sqrt{\text{var}(x) + \text{var}(y)}$ B. $\sqrt{\text{var}(x) - \text{var}(y)}$
C. $S.D(x) + S.D(y)$ D. $S.D(x) - S.D(y)$

(vi) The Mean, Median and Mode of the binomial distribution $b(x,n,p)$ will be equal when:
A. $p = 0.5$ B. $p < 0.5$ C. $p > 0.5$ D. $p = 1.0$

(vii) In which distribution probability of success changes from trial to trial?
A. Binomial distribution   B. Sampling distribution
C. Hyper Geometric distribution   D. Continuous distribution

(viii) In a normal distribution $N(\mu, \sigma^2)$ what percentage of the area is contained within the limit $\mu \pm 2\sigma$?
A. 99.73%   B. 95.45%   C. 68.27%   D. 95%

(ix) In a $N(\mu, \sigma^2)$, β_2 is equal to:
A. $3\sigma^4$ B. 3   C. $\sigma\frac{1}{2}$ D. $\frac{3\sigma^4}{4}$

(x) A border patrol check point that stops every tenth van is using:
A. Simple random sampling   B. Systematic sampling
C. Stratified sampling   D. Complete enumeration

(xi) If samples of size 'n' are drawn without replacement from a population of size 'N' with mean μ and variance σ^2, then the standard error of the sample mean $\overline{X}$ is:
A. σ^2 / n B. $\sigma / \sqrt{n}$ C. $\sigma / n \left(\frac{N-n}{N-1} \right)$ D. $\sigma / \sqrt{n} \sqrt{\left(\frac{N-n}{N-1} \right)}$

(xii) A statistic used to estimate a population parameter is a:
A. Point estimator   B. Point estimate
C. Interval estimator   D. Interval estimate

(xiii) Confidence co-efficient or level of confidence is denoted by:
A. $1 - \beta$ B. $1 - \alpha$ C. α D. β

(xiv) A judge acquits an innocent person. It is an example of:
A. Type I error   B. Type II error   C. Correct decision   D. Incorrect decision

(xv) If null and alternative hypothesis are respectively $H_0 : \mu = 16$ and $H_1 : \mu < 16$. It is appropriate to use:
A. Right tailed test   B. Left tailed test   C. Two-tailed test   D. None of these

(xvi) If attributes 'A' and 'B' are independent then co-efficient of association is:
A. Zero   B. Negative   C. Positive   D. 1

(xvii) Wall clock is an example of a:
A. Digital computer   B. Analog computer
C. Disk   D. RAM

For Examiner's use only:

Total Marks: | 17 |

Marks Obtained: | |

—— 2HS 1713 ——

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

NOTE: 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. Statistical table will be provided on demand.

SECTION – B (Marks 42)

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

(i)   Differentiate between simple and compound events.

(ii)   Find $P(A \cap B)$ if $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{3}$ and $P(A \cup B) = \frac{1}{2}$

(iii)   If $P(A) = 0.60$, $P(B) = 0.40$, $P\left(\frac{B}{A}\right) = 0.4$ then find $P(A \cap B)$

(iv)   Given $x = 0,1,2$ and $P(x) = \frac{9}{16}$, $\frac{6}{16}$, $\frac{1}{16}$ .Find var(x)

(v)   Distinguish between discreet and continuous random variable.

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

(vii)   If $N = 52, n = 13, k = 12$ find mean and Standard Deviation of Hypermetric distribution.

(viii)   Write down the equation of Standard normal distribution $N(0,1)$ and find the value of Maximum ordinate correct to two decimal places.

(ix)   Find the probability that 400 tosses of a fair coin will result in exactly 200 heads.

(x)   Name the four techniques used in probability sampling and two techniques of non-probability sampling.

(xi)   Given $p_1 = \frac{2}{3}$, $n_1 = 2$, $p_2 = \frac{1}{2}$, $n_2 = 2$. Find $\mu_{p_1-p_2}$ and $\sigma_{p_1-p_2}$

(xii)   Given $n = 64$, $\bar{x} = 42.7$, $\sigma = 8$ and $Z_{\alpha/2} = 1.645$. Find the confidence interval for μ .

(xiii)   Differentiate between estimator and estimate.

(xiv)   What is meant by a critical value?

(xv)   Given the pairs of ranks $(4,2)(1,3)(2,1)(5,6)(6,5)(3,4)$. Find $\sum d_i^2$.

(xvi)   What is difference between correlation and association?

(xvii)   What do you mean if $Q = 0, Q = -1$ and $Q = 1$

(xviii) Differentiate between RAM and ROM.

(xix)   Name various input and output devices.

SECTION – C (Marks 26)

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

Q. 3   a.   The probability is $\frac{2}{3}$ that Mr. A will pass the examination and the probability in $\frac{3}{4}$ that Mr. B will pass the examination. Find the probability that: **(6.5)**
(i)   Both will pass the examination.
(ii)   Only one will pass the examination.

b.   A function is given by $f(x) = \left(\frac{3+2x}{18}\right)$ $2 \leq x \leq 4$,   show that it is a probability density function and find the probability (i) $x \geq 2.5$ (ii) $2 \leq x \leq 3$ **(6.5)**

Q. 4   a.   The mean and Standard Deviation of a normal distribution are 100 and 20 respectively. Find (i) Area between 65 and 85   (ii) Two points containing 98% of area between them.   **(6.5)**

b.   Draw all possible random samples of size 2 with replacement form the population $1,2,3,4,5$. Show that Mean of the sample means is equal to population Mean and variance of sample means is half of the population variance.   **(6.5)**

Q. 5   a.   A random sample of size 36 is taken form a normal population with known variance $\sigma^2 = 25$. If the mean of the sample is $\bar{X} = 42.6$. Test the null hypothesis $\mu = 45$ against the alternative hypothesis $\mu < 45$ at $\alpha = 0.05$ **(6.5)**

b.   Find the χ^2 chi-square to test the hypothesis that there is no association between heights of fathers and heights of sons use $\alpha = 0.05$ **(6.5)**

Father\Sons	Very Tall	Tall	Short
Very Tall	63	49	9
Tall	60	79	28
Short	29	60	23