



# STATISTICS HSSC-II

## SECTION – A (Marks 17)

42

Time allowed: 25 Minutes

Version Number 9 9 9 9

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

- 1) The number of ways in which four books can be arranged on a shelf is:  
A. 4                      B. 6                      C. 24                      D. 12
- 2) For two mutually exclusive events A and B,  $P(A) = 0.2$  and  $P(B) = 0.4$ . Then  $P(A \cup B) =$   
A. 0.8                      B. 0.2                      C. 0.6                      D. 0.5
- 3) The probability of drawing two Aces from a pack of 52 cards with replacement is:  
A.  $\frac{1}{4}$                       B.  $\frac{1}{16}$                       C.  $\frac{1}{169}$                       D.  $\frac{1}{256}$
- 4) The distribution function  $f(x)$  is equal to:  
A.  $P(x=x)$                       B.  $P(x \leq x)$                       C.  $P(x \geq x)$                       D.  $P(x > x)$
- 5) If  $E(x) = 1.5$ ,  $\text{var}(x) = 0.5$ , then  $E(x^2)$  will be:  
A. 2.75                      B. 2.25                      C. 0.25                      D. 2.70
- 6) Which of the following is true for the binomial distribution  $b(x, n, p)$ ?  
A. Mean > variance                      B. Mean < variance  
C. Mean = variance                      D. Mean = standard deviation
- 7) Given  $N = 11$ ,  $n = 5$ ,  $k = 6$ , then  $P(x \geq 1)$  equals to:  
A. 1                      B.  $\frac{1}{66}$                       C.  $\frac{65}{66}$                       D.  $\frac{461}{462}$
- 8) In a normal distribution  $N(\mu, \sigma^2)$ , 95% of the area lies between the limits:  
A.  $\mu \pm 2\sigma$                       B.  $\mu \pm 1.96\sigma$                       C.  $\mu \pm 1.645\sigma$                       D.  $\mu \pm 2.58\sigma$
- 9) In a standard normal distribution  $Q_1$  is equal to:  
A. 0.7979                      B. 0.6745                      C. -0.6745                      D. -0.7979
- 10) The standard deviation of the sampling distribution is called:  
A. Sampling error                      B. Non-sampling error  
C. Standard error                      D. Bias
- 11) A value calculated from the sample is called:  
A. Parameter                      B. Statistic                      C. Mean                      D. Proportion
- 12) A range of values used to estimate an unknown population parameter is:  
A. A point estimator                      B. An interval estimator  
C. An unbiased estimator                      D. A biased estimator
- 13) If  $E(\hat{\theta}) = \theta$  then  $\hat{\theta}$  is:  
A. Biased                      B. Unbiased  
C. Positively biased                      D. Negatively biased
- 14) A failing student is passed by an examiner; it is an example of:  
A. Type I error                      B. Type II error  
C. Correct decision                      D. None of these
- 15) For a particular hypothesis test  $\alpha = 0.05$  and  $\beta = 0.10$  the power of the test is equal to:  
A. 0.14                      B. 0.90                      C. 0.95                      D. 0.25
- 16) If the attributes 'A' and 'B' are completely associated then the Co-efficient of association is equal to:  
A. 1                      B. 0                      C. -1                      D. None of these
- 17) Programs in general are referred to as:  
A. Software                      B. Hardware                      C. Floppy disk                      D. Hard disk



# STATISTICS HSSC-II

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)

(14 x 3 = 42)

**Q. 2** Attempt any FOURTEEN parts. All parts carry equal marks.

- What is a random experiment?
- Write a set 'A' containing all vowels in the word. "PUBLICATION" and then find the probability of 'A'. Using the probability of A find the probability of consonants.
- Given  $P(A) = \frac{5}{9}$ ,  $P(B) = \frac{4}{9}$ ,  $P(B/A) = \frac{2}{5}$ . Find  $P(A/B)$
- Describe the properties of a discrete probability distribution.
- A continuous random variable has P.d.f  $f(x) = 2x$   $0 \leq x \leq 1$  find  $P(x > \frac{1}{4})$ .
- Given  $E(x) = 0.55$ ,  $\text{var}(x) = 1.55$ . If  $y = 2x + 1$  find  $E(y)$  and  $\text{var}(y)$ .
- Given  $N = 10$ ,  $n = 4$ ,  $k = 3$  find the Mean and variance of hypergeometric distribution.
- If  $x$  is a binomial random variable with mean 2.4 and variance 0.96. Find its parameters.
- The standard deviation of a normal distribution is 4. Find its first four moments about the mean.
- In a normal distribution Mean  $\mu = 80$  and standard deviation  $\sigma = 36$ . Find its Median, Mode  $Q_1$  and  $Q_3$ .
- Distinguish between probability sample and non-probability sample.
- If  $n = 15$ ,  $N = 25$ ,  $\sigma_{\bar{x}} = 10$  then find  $\sigma^2$
- Differentiate between point estimation and interval estimation.
- In a random sample of 500 items 40 are defective. Compute 99% confidence interval for the proportion of defectives in the population.
- Define  $\alpha$  and  $\beta$ .
- Given  $\bar{x} = 120$ ,  $u = 100$ ,  $n = 25$ ,  $s = 34.75$  find the value of  $t$ .
- If  $(A) = 240$ ,  $(B) = 270$ ,  $N = 600$  what would be the number of  $(AB)$  if 'A' and 'B' are independent.
- Using the binomial distribution find the probability of 4 successes in 6 trials when  $P = 0.2$ .
- Given  $s_1^2 = 1.43$ ,  $s_2^2 = 5.21$ ,  $n_1 = 10$ ,  $n_2 = 10$  then find the value of  $s_p$ .

## SECTION – C (Marks 26)

**Note:** Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

- Q. 3** a. The probability that a brother and sister will pass an entry examination is 0.8 and 0.7 respectively find the probability that: (2+2+2.5)
- Both will pass
  - Only one will pass
  - At least one will pass
- b. Three balls are drawn from a bag containing 5 white and 3 black balls. if  $x$  denotes the number of white balls drawn from the bag, then find the probability distribution of  $x$ . Also find  $E(x)$ . (6.5)
- Q. 4** a. If the heights of 300 students are normally distributed with mean 68.0 inches and standard deviation 3.0 inches. How many students have heights: (3+3.5)
- Greater than 72 inches
  - Between 65 and 71 inches inclusive
- b. A population consists of values 1, 3, 5, 7, 9. Draw all possible samples of size 2 with replacement and find mean of each sample. Make a sampling distribution of  $\bar{x}$  and verify that: (6.5)
- $\mu_{\bar{x}} = \mu$
  - $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$
- Q. 5** a. The heights of male students of college are known to be normally distributed with a mean of 67.39 inches and  $\sigma = 1.30$  inches. A random sample of 400 students showed a mean height of 67.47 inches. Using 0.05 level of significance, test the hypothesis  $H_0: u = 67.39$  against the alternative  $u > 67.39$ . (6.5)
- b. The following table gives the distribution of 200 school children according to physical defect [ $P_1, P_2, P_3$ ] and speech defect [ $S_1, S_2, S_3$ ]. (6.5)

Speech Defect	Physical Defect			Total
	$P_1$	$P_2$	$P_3$	
$S_1$	34	22	19	75
$S_2$	25	14	11	50
$S_3$	21	28	26	75
Totals	80	64	56	200

Do the data suggest association between physical defect and speech defect? Use  $\alpha = 0.05$