

Roll No. 

Answer Sheet No. \_\_\_\_\_

Sig. of Candidate. \_\_\_\_\_

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) In how many ways a team of four players can be chosen from 10 players?
- A. 40  
B. 210  
C. 5040  
D. None of these
- (ii) The events A and B are mutually exclusive then \_\_\_\_\_
- A.  $A \cup B = S$   
B.  $A \cap B = A$   
C.  $A \cap B = \phi$   
D. None of these
- (iii) If the random variable "X" denotes the number of heads when three distinct coins are tossed, then "X" assumes the value \_\_\_\_\_.
- A. 1,2,3  
B. 1,3,3,1  
C. 0,1,2,3  
D. None of these
- (iv) If  $E(X) = 1.5$   $Var(X) = 0.5$  then  $E(X^2)$  will be \_\_\_\_\_
- A. 2.75  
B. 2.25  
C. 0.25  
D. 2.7
- (v) In a multiple choice test there are five possible answers to each of 20 questions. If a candidate guesses the correct answer each time, what is the mean number of the correct answer?
- A. 5  
B.  $\frac{1}{5}$   
C. 4  
D. 20
- (vi) Given  $N = 11$   $n = 5$   $K = 6$ , then  $P(x \geq 1)$  equals \_\_\_\_\_
- A. 1  
B.  $\frac{1}{66}$   
C.  $\frac{65}{66}$   
D.  $\frac{461}{462}$
- (vii) Standard deviation of standard normal distribution is \_\_\_\_\_
- A. 1  
B. 0  
C. 1.2  
D. None of these
- (viii) In normal probability distribution  $P(z < -1) = 0.1587$  then  $P(z > 1)$  is \_\_\_\_\_
- A. 0.6587  
B. 0.1587  
C. 0.8413  
D. 0.3413
- (ix) The measure on sample is called \_\_\_\_\_
- A. Statistics  
B. Population  
C. Statistic  
D. Parameter

DO NOT WRITE ANYTHING HERE

- (x) The standard deviation of sampling distribution is called \_\_\_\_\_  
 A. Sampling error                      B. Non-sampling error  
 C. Standard error                      D. Bias
- (xi) A population contains two items and four items are selected at random with replacement , then all possible samples shall be \_\_\_\_\_  
 A. 16                                          B. 8  
 C.  ${}^4C_2$                                       D. 4
- (xii) A statistic  $\hat{\theta}$  is an estimator of parameter  $\theta$ , then it will be unbiased if \_\_\_\_\_  
 A.  $E(\hat{\theta}) > \theta$                               B.  $E(\hat{\theta}) = \theta$   
 C.  $E(\hat{\theta}) < \theta$                               D.  $E(\hat{\theta}) \neq \theta$
- (xiii) For large sample size ( $n > 30$ ) the value of  $Z_{\frac{\alpha}{2}}$  for 90% confidence interval shall be \_\_\_\_\_  
 A.  $\pm 1.96$                                       B.  $\pm 1.645$   
 C.  $\pm 2.33$                                       D.  $\pm 2.58$
- (xiv) In testing hypothesis about difference between population means for small samples and unknown standard deviations, the degree of freedom shall be \_\_\_\_\_  
 A.  $n - 1$                                       B.  $n_1 + n_2 - 2$   
 C.  $n - 2$                                       D.  $2n - 2$
- (xv)  $H_0$  is true and we reject it is called \_\_\_\_\_  
 A. Type II error                              B. Standard error  
 C. Type I error                              D. Sampling error
- (xvi) For  $\alpha = 0.01$  the critical value for  $Z =$  \_\_\_\_\_ for one tailed test are equal to.  
 A.  $-1.96$  or  $1.96$                           B.  $-2.33$  or  $2.33$   
 C.  $-1.645$  or  $1.645$                       D. None of these
- (xvii) A binary digit is commonly called \_\_\_\_\_  
 A. Bit                                              B. Byte  
 C. Kilobyte                                      D. Gigabyte

For Examiner's use only:

Total Marks: 17  
 Marks Obtained:

— 2HA 1213 —



## STATISTICS HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

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) Distinguish between Permutation and Combination.
- (ii) What is the sample space when three distinct coins are tossed? Also specify the event A for exactly two heads.
- (iii) What is Probability density function? What are its properties?
- (iv) Write a set A containing all vowels in the word "PUBLICATION". Then find probability of A. Also find the probability of consonants.
- (v) Given a random variable "X" with  $E(X) = 2.5$  and  $Var(X) = 1.25$   
Find  $E(2x + 3)$   $E(x^2)$  and  $var(2x - 5)$ .
- (vi) What is Binomial distribution and what are its properties?
- (vii) If X is a binomial random variable with mean 2.4 and variance 0.96, find  $P(X = 0)$ .
- (viii) In normal distribution lower and upper quartiles are 15 and 25, respectively.  
Find mean and standard deviation of the distribution. Also find mean deviation.
- (ix) What is Standardized normal variate? Write down the equation of standardized normal distribution.  
Find the value of maximum ordinate.
- (x) Define a Random Sample. How would you obtain it?
- (xi) If  $n = 5$   $N = 25$   $\sigma_{\bar{x}} = 10$  then find  $\sigma^2$ .
- (xii) Differentiate between Point estimation and Interval estimation.
- (xiii) What is an Unbiased estimator?
- (xiv) Given  $(AB) = 150$   $(\alpha B) = 106$   $(A\beta) = 272$   $(\alpha\beta) = 1132$  and  $N = 1660$ .  
Find the coefficient of association.
- (xv) Determine whether the two attributes A and B are independent, positively associated or negatively associated  $(A) = 490$   $(\alpha) = 570$   $(AB) = 294$   $(\alpha B) = 380$ .
- (xvi) Define one tailed and two tailed test.
- (xvii) Describe the procedure for testing hypothesis about mean of a normal population when population standard deviation is known.
- (xviii) Given  $\bar{X}_1 = 26$   $\bar{X}_2 = 18$   $\sigma_{\bar{X}_1 - \bar{X}_2} = 3.41$ ,  $H_o : \mu_1 \leq \mu_2$  and  $\alpha = 0.05$ .  
Find "Z" and make statistical decision.
- (xix) In a binomial distribution with  $n = 5$   $P(x = 0) = P(x = 1)$ . Find the variance.

**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 is  $\frac{3}{4}$  that Mr. B will pass the examination. Find the following probabilities: **04**
- (i) Both will pass the examination
  - (ii) Only one will pass the examination
  - (iii) Somebody will pass the examination

- b.** A continuous random variable "X" that can assume values between  $X = 2$  and  $X = 5$  has a density function given by  $f(x) = K(x + 1)$   
Find : **04**
- (i) K
  - (ii)  $P(x < 4)$
  - (iii)  $P(3 < X < 4)$

- c.** Four coins are tossed. A tail is recorded as 2 and head as 1. The variable of interest is the product of records. Find the probability distribution of this random variable. Also find its mean and variance. **05**

- Q. 4 a.** Five dice are thrown together 243 times. Find the expected frequencies when throwing a three or four is regarded as success. Calculate the mean and variance of this distribution of the number of three's and four's. **08**

- b.** A machine dispenses liquid into bottles in such a way that amount of liquid dispensed on each occasion is normally distributed with mean and standard deviation 266 and 20ml respectively. Bottles that weigh less than 260 ml have to be recycled. What percentage of bottles should be recycled. **05**

- Q. 5 a.** If mean and variance of population are 7 and 3.15. What would be standard error if samples are drawn without replacement of size 6. If number of population unit is 10. **03**

- b.** A random sample of 200 workers was selected from a population and 140 workers were found to be skilled. The factory owner claimed that at least 80% workers were skilled in his factory. Is it possible to reject the claim of factory owner at 5% level of significance? **05**

- c.** A random sample of 200 married men was classified according to education and number of children: **05**

Education	Number of Children		
	0 – 1	2 – 3	Over 3
Elementary	14	37	32
Secondary	19	43	17
College	22	17	10

Test the hypothesis at 5% level of significance that the size of family is independent of the level of education attained by fathers.