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HSSC-II

Statistics Guess paper 1

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FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION

ISLAMABAD

GUESS PAPER
CLASS 12 | STATISTICS (PART-II)

Time Allowed: 3 Hours | **Total Marks: 100**

Name: _____ Roll No: _____

SECTION A — MULTIPLE CHOICE QUESTIONS (20 × 1 = 20 Marks)

Attempt ALL questions. Each question carries one mark. Encircle the correct option.

1. In how many ways can 5 books be arranged on a shelf?

(a) 20 (b) 60 (c) 120 (d) 24

2. If ${}^{n}P_{2} = 42$, then n = ?

(a) 6 (b) 7 (c) 8 (d) 9

3. The number of combinations of n objects taken r at a time is denoted by:

(a) ${}^{n}P_{r}$ (b) ${}^{n}C_{r}$ (c) n! (d) r!

4. If two events A and B are mutually exclusive, then $P(A \cap B) = ?$

(a) 1 (b) 0 (c) P(A)P(B) (d) P(A)+P(B)

5. If P(A) = 0.4, P(B) = 0.3, and A, B are independent, then $P(A \cap B) = ?$

(a) 0.7 (b) 0.12 (c) 0.1 (d) 1.2

6. A random variable that can take only a countable number of values is called:

(a) Continuous (b) Discrete (c) Constant (d) Independent

7. For a discrete probability distribution, $\Sigma P(x) = ?$

(a) 0 (b) 0.5 (c) 1 (d) depends on n

8. The mean of a Binomial distribution is:

(a) npq (b) np (c) nq (d) pq

9. In a Hypergeometric distribution, sampling is done:

(a) With replacement (b) Without replacement (c) Infinite population (d) None

10. The variance of Binomial distribution is:

(a) np (b) npq (c) nq (d) n^2p

11. The Normal distribution curve is:

(a) Skewed (b) Symmetric (c) J-shaped (d) U-shaped

12. Total area under the Normal curve is:

(a) 0 (b) 0.5 (c) 1 (d) ∞

13. The standard normal variable Z is defined as:

(a) $Z = (x+\mu)/\sigma$ (b) $Z = (x-\mu)/\sigma$ (c) $Z = \sigma/(x-\mu)$ (d) $Z = \mu/\sigma$

14. A sample selected such that every member of population has equal chance is called:

(a) Biased sample (b) Random sample (c) Judgment sample (d) Quota sample

15. The standard error of sample mean is given by:

(a) σ/n (b) $\sigma/\sqrt{n}$ (c) σ^2/n (d) $\sqrt{\sigma}/n$

16. A single value used to estimate a population parameter is called:

(a) Interval estimate (b) Point estimate (c) Hypothesis (d) Parameter

17. The confidence interval becomes wider when:

(a) Sample size increases (b) Confidence level increases (c) σ decreases (d) None

18. Rejecting a true null hypothesis is called:

(a) Type-II error (b) Type-I error (c) Correct decision (d) Level of significance

19. Association of attributes is measured using:

(a) Correlation coefficient (b) Coefficient of Association (c) Regression (d) Standard deviation

20. RAM stands for:

(a) Random Access Memory (b) Read Access Memory (c) Random Application Memory (d) Read Application Memory

SECTION B — SHORT QUESTIONS (Total: 56 Marks)

Attempt ALL questions. Each question carries 4 marks.

Q.1 State and explain the Fundamental Principle of Counting with an example. *(4)*

Q.2 In how many ways can the letters of the word "STATISTICS" be arranged? *(4)*

Q.3 Define mutually exclusive and independent events. Give one example of each. *(4)*

Q.4 A box contains 5 red and 3 blue balls. Two balls are drawn without replacement. Find the probability that both are red. *(4)*

Q.5 Define random variable. Distinguish between discrete and continuous random variables. *(4)*

Q.6 The probability distribution of a random variable X is given below. Find E(X). *(4)*

X	0	1	2	3
P(X)	0.1	0.3	0.4	0.2

Q.7 State the conditions under which a Binomial experiment is applicable. Write the Binomial probability formula. *(4)*

Q.8 A fair coin is tossed 6 times. Find the probability of getting exactly 4 heads. *(4)*

Q.9 Differentiate between Binomial and Hypergeometric distributions with an example of each. *(4)*

Q.10 Write the properties of the Normal distribution curve. *(4)*

Q.11 If X is normally distributed with $\mu = 50$ and $\sigma = 5$, find $P(X < 55)$. *(4)*

Q.12 Define sampling distribution of the sample mean. State the Central Limit Theorem. *(4)*

Q.13 Distinguish between a parameter and a statistic with examples. *(4)*

Q.14 Explain the terms Type-I error and Type-II error with a suitable example. *(4)*

Q.15 Construct a 2×2 contingency table and explain the concept of association of attributes. *(4)*

Q.16 What is meant by point estimation and interval estimation? Give one example of each. *(4)*

SECTION C — LONG QUESTIONS (Total: 24 Marks)

Attempt any TWO questions. Each question carries 12 marks.

Q.1

(a) A committee of 5 members is to be selected from 7 men and 4 women. In how many ways can this be done if the committee must include exactly 3 men? *(6)*

(b) Explain the Addition and Multiplication Laws of Probability with suitable examples. *(6)*

Q.2

(a) The probability that a machine produces a defective item is 0.1. If 10 items are selected at random, find the probability that exactly 2 items are defective using the Binomial distribution. *(6)*

(b) In a lot of 20 items, 5 are defective. If 4 items are selected at random without replacement, find the probability that exactly 2 are defective using the Hypergeometric distribution. *(6)*

Q.3

(a) The weights of students in a college are normally distributed with mean 60 kg and standard deviation 8 kg. Find the probability that a randomly selected student weighs between 52 kg and 68 kg. *(6)*

(b) A random sample of 36 items is drawn from a population with mean 100 and standard deviation 12. Construct a 95% confidence interval for the population mean, and test the hypothesis $H_0: \mu = 100$ against $H_1: \mu \neq 100$ at $\alpha = 0.05$. *(6)*

— END OF PAPER —

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Statistics Guess paper 2

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FEDERAL BOARD OF INTERMEDIATE & SECONDARY EDUCATION (FBISE)

HSSC-II (2nd Year) — STATISTICS

HARD GUESS PAPER 2026 | Based on FBISE Model Paper & Past Annual Exam Pattern

(Saleem Akhtar Book — ICS / FA / HSSC-II Group)

Time Allowed: 3:00 Hours	Total Marks: 85	Year: 2026

SECTION – A (Marks: 19)

Q.1 Choose the correct answer. Each part carries **one (1) mark**. Section-A is compulsory. Deleting / overwriting is NOT allowed.

Sr.	Question	A	B	C	D
i	If two events A and B are mutually exclusive, then P(A ∩ B) is:	P(A)+P(B)	P(A)·P(B)	0	1
ii	The number of ways to arrange the letters of the word 'STATISTICS' is:	10! / 3!3!2!	10! / 3!3!	10!	10! / 2!3!
iii	If nP2 = 20, then n =	4	5	6	10
iv	For a binomial distribution with n = 10 and p = 0.3, the variance is:	3	2.1	0.21	7
v	The mean of a hypergeometric distribution (N=20, n=5, K=8) is:	1.6	2.0	3.0	2.5
vi	If E(X) = 3 and E(X²) = 13, then Var(X) =	4	3	13	10
vii	For a continuous random variable X with pdf f(x), P(X = c) equals:	f(c)	1	0	0.5
viii	In a standard normal distribution, the area between z = -1 and z = +1 is approximately:	0.9544	0.6827	0.9974	0.5000
ix	The sampling distribution of X■ has mean equal to:	σ/√n	μ	μ/n	σ²
x	A 95% confidence interval uses Z-value:	1.282	1.645	1.960	2.576
xi	Type-I error is defined as:	Accepting H■ when it is false	Rejecting H■ when it is true	Accepting H■ when it is true	Rejecting H■ when it is false
xii	The coefficient of association Q = +1 indicates:	No association	Complete negative association	Complete positive association	Partial association
xiii	A parameter is a numerical value computed from:	Sample	Population	Estimator	Statistic
xiv	If p = 0.5 in binomial distribution, the distribution is:	Positively skewed	Negatively skewed	Symmetric	Bimodal
xv	The finite population correction factor (fpc) when n = 25, N = 100 is:	√(75/99)	√(75/100)	75/99	25/100
xvi	Which of the following is NOT a property of normal distribution?	Mean = Median = Mode	Bell-shaped curve	Total area = 1	It is discrete

xvii	A point estimate provides:	A range of values	A single value for the parameter	Confidence level	Level of significance
xviii	If Q.D. = 4 in a normal distribution, then σ =	4	6	8	2
xix	Output devices of a computer include:	Keyboard and Scanner	Monitor and Printer	Mouse and Joystick	CPU and RAM

SECTION – B (Marks: 42)

Q.2 Attempt **ALL** parts. Each part carries **3 marks**. Answer on E-Sheet. An OR option is given for each part.

Sr.	Question (3 Marks)		OR Alternative (3 Marks)
i	In how many ways can a committee of 3 men and 2 women be selected from a group of 7 men and 5 women?	**OR**	Define: (a) Sample space (b) Event (c) Mutually exclusive events. Give one example of each.
ii	A bag contains 5 red, 4 green and 3 blue balls. One ball is drawn at random. Find P(red or blue). Also verify: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.	**OR**	Two cards are drawn successively without replacement from a pack of 52 cards. Find the probability that (a) both are aces (b) first is king and second is queen.
iii	A fair coin is tossed 4 times. Using binomial distribution find P(exactly 2 heads) and P(at least 3 heads).	**OR**	10% items in a lot are defective. If 5 items are randomly selected find: (a) P(no defective) (b) P(at most 2 defective).
iv	A discrete random variable X has the probability distribution: X: 0 1 2 3 4 P: 0.1 0.2 k 0.3 0.1 Find: (a) value of k (b) E(X) (c) Var(X)	**OR**	A continuous random variable X has pdf: $f(x) = (3/16)(4x - x^2)$, $0 \le x \le 4$ Verify that f(x) is a valid pdf. [Hint: $\int f(x)dx = 1$]
v	In hypergeometric distribution: N = 40, K = 16, n = 8. Find mean, variance and standard deviation.	**OR**	State and prove the additive law of expectation: E(X + Y) = E(X) + E(Y) for independent X, Y.
vi	If N = 60, K = 20, n = 12, find the mean and variance of the hypergeometric distribution. Also compare with binomial approximation using p = K/N.	**OR**	Mean and variance of a binomial distribution are 6 and 4.2 respectively. Find n, p and q.
vii	In a normal distribution μ = 50 and σ = 10. Find: (a) P(45 < X < 65) (b) P(X > 70) (c) D■ [Z-table: z=0.5→0.1915, z=1.5→0.4332, z=2→0.4772]	**OR**	Write SIX properties of the normal distribution and sketch the normal curve labeling mean, median, mode, and inflection points.
viii	In a normal distribution the lower quartile Q■ = 40 and upper quartile Q■ = 60. Find mean (μ) and standard deviation (σ).	**OR**	What is finite population correction (fpc)? When is it applied? Compute fpc when n = 36 and N = 200.
ix	A population of 4 values: 2, 4, 6, 8. Draw ALL possible samples of size 2 WITHOUT replacement. Construct sampling distribution of X■. Verify μ_x■ = μ.	**OR**	Out of 500 people surveyed, 280 were smokers; of smokers 140 had lung disease; of non-smokers 60 had lung disease. Calculate chi-square statistic.
x	A random sample of n = 64 gives X■ = 75. If σ = 8, find: (a) 90% CI (b) 95% CI for population mean μ. [Z■.■■ = 1.645, Z■.■■■ = 1.960]	**OR**	Differentiate: (a) parameter vs statistic (b) point estimate vs interval estimate (c) sampling with vs without replacement.
xi	Test H■: μ = 100 vs H■: μ ≠ 100 at α = 0.05 given n = 36, X■ = 96, σ = 12. [Critical value: Z■.■■■ = ±1.960]	**OR**	A politician claims 60% voters support him. In a sample of 200 voters, 110 support him. Test the claim at 5% level. [Z■.■■ = 1.645]
xii	A student scores 85 in a test where μ = 70, σ = 10. Find: (a) z-score (b) percentile rank of the student (c) P(X > 85). [Z-table: z=1.5→0.4332]	**OR**	Define: (a) null hypothesis (b) alternative hypothesis (c) level of significance (d) critical region. Give one example of each.

xiii	In a study of 200 people: (A) = 120, (B) = 90, (AB) = 54. Check whether attributes A and B are independent, positively or negatively associated. Find Q.	**OR**	Describe the properties and conditions of chi-square (χ^2) test of association.
xiv	Define RAM and ROM. Differentiate between primary and secondary memory of a computer with examples.	**OR**	What is the difference between correlation and association? When do we use Yule's coefficient Q vs Pearson's r?

SECTION – C (Marks: 24)

Q.3 – Q.6 Attempt **ALL** questions. Each question carries **6 marks**. An OR option is given for each question.

Q. 3	A bag contains 6 red, 4 white and 2 blue balls. Three balls are drawn at random without replacement. Find the probability that: (a) all three are red (b) exactly two are white (c) at least one is blue (d) none is red Show all steps clearly.	**OR**	In a normal distribution, mean = 40 and standard deviation = 8. Find: (a) P(X < 50) (b) P(30 < X < 52) (c) P(X > 56) (d) The 90th percentile (P■■) [Z-table values: z=1.25→0.3944, z=1.5→0.4332, z=2→0.4772, z=1.28→0.3997]
Q. 4	For a binomial distribution with n = 5 and p = 0.4: (a) Construct the complete probability distribution table P(X = x) for x = 0,1,2,3,4,5 (b) Find mean (μ) and variance (σ^2) (c) Find P(X ≥ 3) (d) Verify: mean = np and variance = npq	**OR**	A box contains 12 items of which 4 are defective. A sample of 5 items is drawn without replacement (hypergeometric). Find: (a) Probability that exactly 2 are defective (b) Probability that at most 1 is defective (c) Mean and variance of the distribution Show all combinations used.
Q. 5	A population consists of values: 4, 8, 12, 16 Draw all possible samples of size 2 WITH replacement. (a) List all 16 possible samples and their means (b) Construct the sampling distribution of X■ (c) Calculate μ_x■ and σ^2_x■ (d) Verify: μ_x■ = μ and σ^2_x■ = σ^2/n	**OR**	A random sample of 10 measurements: 18, 21, 19, 24, 17, 22, 20, 23, 19, 21 Construct: (a) 95% confidence interval for μ when σ = 2 (known) (b) 90% confidence interval for μ when σ is unknown First compute X■ and s. [Z■.■■■ = 1.960, t■.■■(9) = 1.833]
Q. 6	A factory claims average life of its bulbs is 1500 hours. A sample of 25 bulbs gives X■ = 1480 hours and s = 60 hours. Test at: (a) 5% level of significance (H■: μ < 1500) (b) 1% level of significance (H■: μ < 1500) State H■, H■, test statistic, critical region and conclusion. [t-critical values: t■.■■(24) = 1.711, t■.■■(24) = 2.492]	**OR**	A survey of 300 students is conducted on study habits and exam performance: | Pass | Fail | Total Regular Study | 120 | 30 | 150 Irregular | 80 | 70 | 150 Total | 200 | 100 | 300 Test at 5% level whether study habit and exam result are associated. Compute χ^2, find Yule's Q, and state conclusion. [χ^2 critical for 1 df at α=0.05 is 3.841]

Chapter 1: Probability

- Counting: permutations of words with repetitions (e.g. STATISTICS, MISSISSIPPI)
- Combination problems: selecting teams/committees
- Addition law: P(A∪B) with/without mutually exclusive events
- Conditional probability: P(A|B) and multiplication law
- Bayes' theorem (basic)
- Independence: P(A∩B) = P(A)·P(B)

Chapter 2–3: Random Variables & Distributions

- Finding k in discrete probability distribution; E(X), Var(X)
- Verifying continuous pdf [∫f(x)dx = 1]
- Binomial: P(X=x), mean, variance, complete distribution table
- Hypergeometric: mean, variance, individual probabilities
- Normal distribution: finding areas using Z-table; Q1, Q3, D9, P90
- Finding μ and σ from given Q1 and Q3 in normal distribution

Chapter 4: Sampling & Estimation

- Drawing all samples (with/without replacement), sampling distribution of X■
- Verifying: μ_x■ = μ and σ²_x■ = σ²/n
- Standard error (with and without fpc)
- Confidence interval for μ: Z-test (known σ) and t-test (unknown σ)
- CI for population proportion p

Chapter 5: Hypothesis Testing

- Z-test for population mean (one-tailed and two-tailed)
- t-test for mean with unknown σ (small sample)
- Z-test for proportion
- Chi-square (χ^2) test for association in 2×2 contingency table
- Yule's coefficient of association Q

Standard Normal Distribution — Z-Table (Area from 0 to z)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

t-Distribution Critical Values (Two-tailed)

df	α=0.10 (t■.■■)	α=0.05 (t■.■■■)	α=0.02 (t■.■■)	α=0.01 (t■.■■■)
5	2.015	2.571	3.365	4.032
7	1.895	2.365	2.998	3.499
8	1.860	2.306	2.896	3.355
9	1.833	2.262	2.821	3.250

10	1.812	2.228	2.764	3.169
14	1.761	2.145	2.624	2.977
15	1.753	2.131	2.602	2.947
19	1.729	2.093	2.539	2.861
24	1.711	2.064	2.492	2.797
29	1.699	2.045	2.462	2.756
40	1.684	2.021	2.423	2.704
60	1.671	2.000	2.390	2.660

Chi-Square Critical Values

df	α = 0.10	α = 0.05	α = 0.01
1	2.706	3.841	6.635
2	4.605	5.991	9.210
3	6.251	7.815	11.345
4	7.779	9.488	13.277

KEY FORMULAS — Quick Reference

Formula	Expression
Permutation	nPr = n! / (n–r)! | Repeated: n! / (n■! n■! … nk!)
Combination	nCr = n! / [r!(n–r)!]
Addition Law	P(A∪B) = P(A) + P(B) – P(A∩B) [If mutually exclusive: P(A∩B)=0]
Conditional P	P(A|B) = P(A∩B) / P(B)
Binomial	P(X=x) = nCx · p■ · q^(n–x); μ = np; σ² = npq
Hypergeometric	P(X=x) = KCx · (N–K)C(n–x) / NCn; μ = nK/N; σ² = n·K(N–K)(N–n) / [N²(N–1)]
Normal Z-score	Z = (X – μ) / σ
Sampling Dist.	μ_x■ = μ; σ_x■ = σ/√n (with replacement); σ_x■ = (σ/√n)·√[(N–n)/(N–1)] (without)
CI for μ (Z)	X■ ± Z_{α/2} · (σ/√n)
CI for μ (t)	X■ ± t_{α/2,n–1} · (s/√n)
Z-test (mean)	Z = (X■ – μ■) / (σ/√n)
t-test (mean)	t = (X■ – μ■) / (s/√n), df = n–1
Z-test (prop)	Z = (p■ – p■) / √[p■q■/n]
Chi-square	χ² = Σ (O–E)² / E; E = (Row Total × Col Total) / Grand Total
Yule's Q	Q = (AD – BC) / (AD + BC); |Q|=1 complete assoc.; Q=0 independent
Normal Dist.	Q.D. = 0.6745σ; M.D. = 0.7979σ; β■=0, β■=3

Best of luck! — Focus on NUMERICALS. Practice past papers. Attempt ALL of Section-A and Section-B. In Section-C, choose the OR wisely based on your stronger topic.