FEDERAL PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATION – 2025

FOR RECRUITMENT TO POSTS IN BS-17

UNDER THE FEDERAL GOVERNMENT

Roll Number

Statistics

TIME ALLOWED: THREE HOURS	**PART-I (MCQS) MAXIMUM MARKS = 20**
PART-I(MCQS): MAXIMUM 30 MINUTES	**PART-II MAXIMUM MARKS = 80**

NOTE:

(i) First attempted **Part-I (MCQS)** on the separate **OMR Answer Book** which shall be taken back after 30 minutes**.**

(ii) Overwriting/cutting of the **options/answers** will not be given credit.

(iii) There is no **negative marking**. All **MCQs** must be attempted.

PART-I (MCQs) (COMPULSORY)

Q.1. **(i)** Select the best option/answer and fill in the appropriate Box on the **OMR Answer Sheet. (20 × 1 = 20)**
(ii) Answers given anywhere else, other than the OMR Answer Sheet, will not be considered.

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1. Statistics deals with:
(A) Individuals
(B) Particular facts
(C) Isolated Items
(D) Aggregative facts

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2. The branch of Statistics that deals with procedure and methodology for obtaining valid conclusion is called:
(A) Descriptive
(B) Advance
(C) Inferential
(D) All of these

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3. Sum of the absolute deviation is least when deviation is taken from:
(A) Mean
(B) Median
(C) Mode
(D) Geometric Mean

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4. In t-distribution, which one is true?
(A) Mean = Median = Mode
(B) Mean > Median > Mode
(C) Mean < Median < Mode
(D) All of these

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5. What is the probability of a sure event?
(A) 1
(B) 0
(C) 0.5
(D) 0.2

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6. Which formula represents the probability of the complement of event A?
(A) 1 + P(A)
(B) 1 - P(A)
(C) P(A)
(D) P(A) - 1

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7. In regression analysis, the variable that is being predicted is:
(A) Dependent variable
(B) Independent variable
(C) Intervening variable
(D) None of these

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8. Paired t-test is applicable when the observations in the two samples are:
(A) Equal in number
(B) Paired
(C) Correlation
(D) All of these

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9. The degree to which numerical data tend to spread about an average is called:
(A) The Dispersion
(B) Regression
(C) Correlation
(D) None of these

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10. The types of estimates are:
(A) Point estimate
(B) Interval estimates
(C) Estimation of confidence region
(D) All of these

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11. Ranking scale also includes the properties of _____ scale.
(A) Nominal
(B) Interval
(C) Ratio
(D) All of these

12. The difference between a statistic and the parameter is called:
(A) Sampling error
(B) Random error
(C) Non-random error
(D) Probability

13. The standard deviation of any sampling distribution is called:
(A) Standard error
(B) Non-sampling error
(C) Type-I error
(D) Type-II error

14. A survey conducted by a sampling design is called:
(A) Sample survey
(B) Population survey
(C) Systematic survey
(D) None of these

15. The sum of the frequencies of the frequency distribution of a statistic is equal to:
(A) Sample size
(B) Population size
(C) Possible samples
(D) Sum of X values

16. Sampling error can be reduced by:
(A) Non-probability sampling
(B) Increasing the population
(C) Decreasing the sample size
(D) Increasing the sample size

17. The range of test statistic *t* is:
(A) 0 to ∞
(B) 0 to 1

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(C) $-\infty$ to $+\infty$
(D) -1 to +1

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18. The probability associated with committing a Type-I error is:
(A) β
(B) α
(C) $1 - \beta$
(D) $1 - \alpha$

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19. The degree of freedom for paired t-test based on *n* pairs of observations is:
(A) $2n - 1$
(B) $n - 2$
(C) $2(n - 1)$
(D) $n - 1$

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20. Experimental error is due to:
(A) Experimenter's mistakes
(B) Extraneous factors
(C) Variation in treatment effects
(D) None of these

PART-II

NOTE:

(i) Part-II is to be attempted on the separate **Answer Book.**
(ii) Attempt **ONLY FOUR** questions from **PART-II. ALL** questions carry **EQUAL** marks.
(iii) All the parts (if any) of each Question must be attempted at one place instead of at different places.
(iv) Write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.
(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
(vi) Extra attempt of any question or any part of the question will not be considered.
(vii) Use of calculator is allowed.

SECTION-A

Q. No.2. (a) What is the purpose of frequency distribution and what are its desirable qualities? For a certain frequency distribution, the mean was 40.5 and the median 36. Find the mode approximately using the formula connecting the three. **(10)**

(b) Define Statistics. Discuss the importance of study of statistics by giving examples. How it can help the extension of scientific knowledge? **(10) (20)**

Q. No.3. (a) Explain what is meant by the skewness of the distribution, and define a suitable measure (10)

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of Skewness. For given p.d.f.

$$f(x) = k(x-x^2),\ 0 \le x \le 1$$

Find the Skewness and discuss.

(b) Define the normal distribution and obtain its mean and variance. Show that for the normal distribution, the mean, mode and median are the same. **(10) (20)**

Q. No.4. (a) If X has a binomial distribution, then show that E(X) = np, Var(X) = npq. Derive the m.g.f of the binomial distribution and explain its uses? **(10)**

(b) What are the main characteristics of the Poisson distribution? Explain with the help of examples. Also give its properties, applications and relationship with other distributions. **(10) (20)**

Q. No. 5.(a) From the following set of values: **(10)**

Y	6.5	5.3	8.6	1.2	4.2	2.9	1.1	3.0
X	3.2	2.7	4.5	1.0	2.0	1.7	0.6	1.9

1) Compute the residuals and verify that they add to zero and draw the conclusion about the results.

2) Compute the standard error of estimate, Sy.x

(b) Under what conditions the correlation among the random variables exists. Also describe the properties of correlation coefficient. Calculate the correlation co-efficient for a sample of 20 pairs of observations, given that **(10) (20)**

Mean of X = 2, Mean of Y = 8, $\Sigma X^2 = 180$, $\Sigma Y^2 = 1424$ and $\Sigma XY = 404$

Also interpret its results.

SECTION-B

Q. No.6. (a) What is finite-correction factor? When is it appropriately used in sampling applications and when can it, without the great undesirable consequences, be ignored? **(10) (10) (20)**

(b) Given the population 2, 4, 8, 8, 10, 10.

1) How many samples of size n = 2 can be drawn without replacement from this population?

2) Compute and tabulate the sampling distribution of the mean for samples of size n = 2.

Q. No.7. (a) Explain what is meant by: **(10)**

(i) a statistical hypothesis, **(ii)** test-statistic, **(iii)** test of significance, **(iv)** level of significance, **(v)** type-I error and type-II error

(b) The weights of 4 persons before they stopped smoking and 5 weeks after they stopped smoking are as follows: **(10) (20)**

Person	1	2	3	4
Before	148	176	153	116
After	154	176	151	121

Use the t-test for paired observations to test the hypothesis at the 0.05 level of significance, that giving up smoking has no effect on a person's weight.

Q. No.8. (a) Explain the procedure of randomization in a completely randomized design where we have 3 varieties of wheat and 18 experimental plots available. Also explain what is explained by significant F value in an experiment. **(10)**

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(b) Four varieties of wheat were tried in a randomized complete block design in four replications. Yield in kilogram per plot is shown in the table given below. Test the hypothesis that there is no difference in the means of four varieties. $\alpha = 0.05$. **(10) (20)**

Replicates	Varieties			
	V_1	V_2	V_3	V_4
I	2	5	4	1
II	2	3	3	1
III	4	6	6	2
IV	1	4	2	3

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