FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION-2018
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) **Part-II** is to be attempted on the separate **Answer Book.**
(ii) Attempt **ONLY FOUR** questions from **PART-II** by selecting **TWO** questions from **EACH SECTION. 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) Candidate must 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 attempted question will not be considered.
(vii) **Use of Calculator is allowed.**
(viii) **Use of statistical table is allowed.**

PART-II
SECTION – A

Q. 2. **(a)** The mean and standard deviation of a sample of 20 observations were found to be 75 and 2.5 respectively. On checking the original figures, it was discovered that one observation which was actually 68, was copied down as 86. Find the correct mean and standard deviation. (5)

(b) Given below is the distribution of monthly income (to the nearest rupee) of 100 employees working in each of two banks A and B. Compare the variations in salaries of employees by calculating coefficient of variation in each case? (9)

Income Rs. 000	35 – 49	50 – 64	65 – 79	80 – 94	95 – 109	110 – 124
f_A	10	15	35	20	10	10
f_B	15	20	40	15	7	3

(c) What can you say of the skewness in each of the following cases? (6) **(20)**
(i) Mean = Rs. 39000 and Mode = Rs. 45000
(ii) The median is 79.39, which the two quartiles are 50.25 and 95.00.
(iii) Mean = Rs. 39000 and Median = Rs. 38500

Q. 3. **(a)** A box contains 12 red and 20 white rose flowers. Flowers are picked up at random one by one without replacement. What is the probability that: (6)
(i) The third one is red given that the first 2 are white?
(ii) There are 3 red and 2 white flowers in the first five picked up?

(b) Two hundred and fifty passengers have made reservations for an airplane flight. If the probability that a passenger who has a reservation will not show up is 0.005, what is the probability that exactly five will not show up? (8)

(c) A soft drink machine is regulated so that it discharges an average of 250 milliliters per glass. If the amount of drink is normally distributed with a standard deviation equal to 15 millimeters, then: (6) **(20)**
(i) What fraction of the glasses will contain more than 280 milliliters?
(ii) What is the probability that a glass contains between 240 milliliters to 260 milliliters.

Q. 4. **(a)** What is a multiple regression? Explain the basic differences between simple regression and multiple regression. (5)

(b) Differentiate between multiple correlation and partial correlation. (5)

(c) Find the coefficient of correlation between persons employed and cloth manufactured in a textile mill. Interpret the result (10) **(20)**

Persons employed	139	219	140	213	180	215	249	280
Cloth Manufactured (000 meters)	28	55	26	49	42	54	51	60

SECTION-B

Q. 5. **(a)** What is meant by an experimental design? Describe in brief the basic principles of experimental designs. (8)

(b) A consumer agency wanted to find out if the mean time it takes for each of three brands of medicines to provide relief from a headache is the same. The 1st drug was administrated to six randomly selected patients, the 2nd to four randomly selected patients and the 3rd to five randomly selected patients. The following table gives the time (in minutes) taken by each patient to get relief from a headache after taking the medicine. (12) **(20)**

Drug 1	Drug 2	Drug 3
25	15	44
38	21	39
42	19	54
65	25	58
47		73
52		

At 5% significance level, will you conclude that mean time taken to provide relief from a headache is the same for each of the three drugs?

Q. 6. **(a)** The management of a super market wanted to investigate if the percentages of men and women who prefer to buy local brand products over the imported products are different. A sample of 900 men shoppers at the company's super markets showed 400 of them prefer to buy local brand products over imported brand. Another sample of 1200 women shoppers showed that 420 of them prefer to buy local brand products over the imported brand. (6)

(i) Construct a 99% confidence interval for the difference between the two proportions.
(ii) At 5% significance level, can you conclude that the difference between all male customers at this market is less than that by all female customers?

(b) An auto manufacturing company wants to estimate the variance of kilometers per litre for its one of the auto model. A random sample of 25 cars of this model showed that the variance of kilometres per litre for all such cars are approximately normal. Test at the 5% significance level whether the sample result indicates that the population variance is different from 1.05. (7)

(c) A researcher wanted to study the relationship between gender and owning expensive cell phones. A sample of 1000 young people were taken and information given are in the following table. (7) **(20)**

Status cell phones	Male	Female	Total
Own	300	400	700
Do not own	200	100	300
Total	500	500	1000

At the 5% level of significance, can we conclude that gender and owning an expensive cell phone are related for all young people?

Q. 7. **(a)** Define and distinguish between: (6)

(i) Target and Sampled Populations
(ii) Simple Random Sampling and Stratified Random Sampling
(iii) Sample Distribution and Sampling Distribution

(b) Explain with examples the properties of a good point estimator. (6)

(c) The heights of a large number of shrubs of the same kind produced for sale by a horticultural nursery are normally distributed with mean 1.14 m and standard deviation 0.25 m. Fifty samples, each consisting of 100 shrubs are selected. In how many of these samples would you expect to have the mean sample being to be (i) greater than 1.16 m; (ii) between 1.13 m and 1.18 m? (8) **(20)**

Q. 8. **(a)** What are the various statistical organizations in Pakistan? Discuss the main functions of Statistics Division and NADRA. (10)

(b) Calculate age-specific fertility rates, total fertility rate, gross-reproduction rate and net reproduction rate from the following data, assuming sex-ratio at birth to be 106.18 per cent (10) **(20)**

Age-group (years)	Female Population (000)	Registered Births	Probability of Survival
15 – 19	1,424	27,639	0.9645
20 – 24	1,531	226,817	0.9607
25 – 29	1,653	280,506	0.9554
30 – 34	1,658	194,526	0.9489
35 – 39	1,741	113,966	0.9416
40 – 44	1,669	32,363	0.9324
45 – 49	1,561	2,215	0.9201

****

https://csshub.com.pk/