FEDERAL PUBLIC SERVICE COMMISSION

(20)

COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN PBS-17, UNDER THE FEDERAL GOVERNMENT, 2002

STATISTICS

TIME ALLOWED: THREE HOURS **MAXIMUM MARKS: 100**

NOTE: Attempt **FIVE** questions in all, including **QUESTION NO. 8** which is **COMPULSORY**. All questions carry **EQUAL** marks. Statistical Table will be provided.

1. (a) Define: i) Marginal and conditional probabilities
   ii) Distribution function and probability density function
   iii) Stochastic independence.

   (b) The following probability values are given:

   $Pr[A_2 | A_1] = 0.3$ $Pr[A_1] = 0.6$ $Pr[A_2] = 0.4$

   $Pr[A_1 | A_2] = 0.4$ $Pr[A_1 \text{ and } A_2] = 0.3$

   Use the general multiplication law to find

   i) $Pr[A_1 \text{ and } A_1]$ ii) $pr[A_2 \text{ and } A_1]$ iii) $Pr[A_1 \text{ and } A_2 \text{ and } A_3]$

   (10+10)

2. (a) How the Poisson distribution differ form the Binomial and hypergeometric distributions?

   (b) Find the Variance of negative Binomial distribution and Normal distribution. **(8+12)**

3. (a) An examination is given to determine whether veterans of different IQs performed better. The scores obtained are shown in following table. Determine at the 0.05 significance level whether there is a difference in scores due to difference in

   (i) veterans and (ii) IQ.

Table	TEST SCORE		
	High IQ	Medium IQ	Low IQ
Veteran	90	81	74
Nonveteran	85	78	70

   (b) What is the underlying logic for the method of maximum likelihood as an estimating procedure?

   (c) How does a point estimator differ from a confidence interval estimator? **(10+5+5)**

Q.4 a) Find the coefficient of correlation between X and Y, also fit the regression line Y on X.

X	5	7	6	3	4
Y	10	8	3	9	5

   b) For each of the following situations, indicate whether a correlation analysis, a regression analysis, or both would be appropriate. In each case, give the reasons for your choice.

   i) To choose advertising media, an agency account executive is investigating the relationship between a woman's age and her annual expenditures on a client firm's cosmetics.

   ii) A trucker wishes to establish a decision rule that will enable him to determine when to inspect or replace his tires, based on the number of kilometer driven.

https://csshub.com.pk/

iii) A government agency wishes to identify which field offices of various sizes (based on numbers of employees) do not conform to the prevailing pattern of working days lost due to illness.

iv) A research firm conducts attitude surveys in two stages. The first stage identifies coincident factors, such as age and income. The second stage is more detailed and involves a separate study to predict the values of one variable using the known values of other variables associated with it in the initial stage. (10+10)

5 (a) What is systematic sampling? What are its advantages and drawbacks?
(b) Under what conditions can cluster sampling be more efficient than other types of random sampling designs?
(c) How can stratification increase efficiency? (7+7+6)

6 What is the role of statistics in solving the following problems:
(a) Law and crime
(b) Public health
(c) Socio-political inequality.

7. Write short notes on the followings:
(a) Multiple and Partial Correlation.
(b) Testing of hypothesis.
(c) Relationship between T and F distributions.
(d) Importance of normal distribution.

COMPULSORY QUESTION

Q 8 Read the following statements carefully and decide which one is true or false(T/F). Do not reproduce the question.

(1) Sampling error and bias can appear in data at the same time.
(2) Random sampling means that no system is used in the sampling process.
(3) Subjective probabilities of events are those based on observations of past events.
(4) Conditional probability is always subjective probability.
(5) The Poisson distribution is skewed to the right.
(6) In the binomial distribution the probability of success, p , remains the same from trial to trail.
(7) The F distribution is symmetrical
(8) An analysis of variance is a useful tool for proving or disproving a null hypothesis about several means.
(9) There are two main types of chi-square tests- tests of goodness of fit and tests of badness fit.
(10) A regression equation must be computed if a correlation coefficient is to be useful.
(11) The higher the coefficient of correlation the lower the standard error of estimate
(12) If r is negative in a correlation analysis then we know that Y decreases as X increases.
(13) If $b_{12.3}$ is negative then $r_{12.3}$ will be negative
(14) $R_{1.23} = r_{12.3} + r_{13.2}$
(15) The hypergeometric distribution does not require independence between successive trials.
(16) Two sample tests must be two-sided tests as well.
(17) A random variable assumed only numerical values.
(18) A census, if not conducted carefully, may result in sampling bias.
(19) Confidence intervals are not true probability intervals.
(20) Join events are those that are not mutually exclusive.

****

https://csshub.com.pk/