BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – B.Tech.(CSE)-AIML-2021
Course Name – Probability and Statistics
Course Code - BSCM201
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) The variance of Geometric Distribution is , choose the correct option

a) q/p^2 b) q^2/p
c) $p(1-p)/q^2$ d) $q(1-q)/p^2$

(ii) Choose the correct option. The variance of Uniform distribution is

a) $(b-a)/12$ b) $(b-a)^2/12$
c) $(a+b)/2$ d) None of these

(iii) Select the formula of residual variance:

a) $S_Y^2(1-r^2)$ b) $S_Y(1-r^2)$
c) $r(1-s_y^2)$ d) $r(1-s_y^2)$

(iv) Identify the measure of location which is the most likely to be influenced by extreme values in the data set.

a) Mode b) Median
c) Mean d) Geometric mean

(v) The normal distribution is a limiting form of Binomial distribution, choose the correct option:

a) $n \to \infty$ and $p \to 0$ b) $n \to 0$ and $p \to \infty$
c) $n \to \infty$ and $p \to n$ d) $n \to \infty$ and neither p nor q is small

(vi) Choose which of the following is not a property of a binomial experiment?

a) The experiment consists of a sequence of n identical trials b) Each outcome can be referred to as a success or a failure
c) the probabilities of the two outcomes can change from one trial to the next d) The trials are independent

(vii) The two lines of regression are given as X+2Y-5=0 and 2X+3Y=8.Then the mean values of X and Y , respectively are, identify the correct answer

a) 2,1 b) 1,2
c) 2,5 d) 2,3

(viii) The sum of relative frequency is, select the correct option

a) 0 b) -1
c) 1 d) 2

(ix) A coin is tossed 5 times. Compute the probability that at least 2 tosses show heads.

a) 0.7811 b) 0.8125
c) 0.9999 d) None of these

(x) For one sample mean test with unknown variance we should use _____. select the test.

a) Z-test b) Chi-square test
c) F-test d) t-test

(xi) Identify which of the following formulas is used to calculate the F statistic for a one-way ANOVA experiment?

a) SSB/SSW b) MSW/MSB

c) SSW/SSB
d) MSB/MSW

(xii) If E(X)=3, E[X(X-1)]=22,then estimate the value of Var(7-2x)

a) 16
b) 64
c) 32
d) None of These

(xiii) If population standard deviation is known and $n>30$ then estimate the appropriate test statistics mean comparison.

a) t-test
b) Z-test
c) F-test
d) Chi-square test

(xiv) The value that separates a rejection region from an acceptance region is called a _____. Select the correct option.

a) Parameter
b) Critical Value
c) Significance level
d) Significance level

(xv) The variance of exponential(λ) distribution is, identify the correct option

a) $1/\lambda$
b) $1/\lambda^2$
c) $1/\lambda(1-\lambda)$
d) $(1-\lambda)/\lambda$

Group-B
(Short Answer Type Questions) 3 x 5=15

2. Discuss correlation coefficient. (3)

3. The average number of misprints per page of a book is 2.Calculate the probability that a particular page is free from misprints. (3)

4. A government association claims that 44% of adults in the United States do volunteer work. You work for a volunteer organization and are asked to test this claim. You find that in a random sample of 1165 adults, 556 do volunteer work. At alpha = 0.05, do you infer that you have enough evidence to reject the association's claim? (3)

5. Distinguish between type I error and type II error. (3)

6. Explain conditional probability. (3)

OR

E(X)=8, E(Y)=6 Var(X)=16, Var(Y)=36 and p_{xy}=0.5, then Calculate, E(XY) and cov(X,X+Y) (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Illustrate the mean and variance of Uniform distribution. (5)

8. Explain the steps of hypothesis testing briefly. (5)

9. Discuss the difference between the p-value approach and the critical value approach in hypothesis testing. (5)

10. Explain the concept of simple linear regression. (5)

11. Show that the numerical value of correlation coefficient lies between (-1,1) (5)

12. Establish that the variance of Binomial(n,p) distribution is npq. (5)

OR

Establish that the mean deviation about mean for Normal distribution is $\sigma\sqrt{\frac{2}{\Pi}}$. (5)