BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-2023
Course Name – Probability & Statistics
Course Code - BSCG301
(Semester III)

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) Identify the measure of central tendency which is the most likely to be influenced by extreme values in the data set

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

(ii) Enumerate the value of correlation coefficient between X and Y:

X	-2	-1	0	1	2
Y	4	1	0	1	4

a) 0 b) 1
c) -1 d) None of these

(iii) If the third moment about mean is zero then the distribution is _____. Identify the correct option

a) Positively skewed b) Negatively Skewed
c) Symmetrical d) None of these

(iv) Examine if A and B are mutually exclusive events , then

a) $P(A \cap B) = P(A).P(B)$ b) $P(A \cap B) = P(A)+P(B)$
c) $P(A \cap B) = 0$ d) None of these

(v) A number is chosen at random among the first 120 natural numbers. Choose the correct option for the probability of the number chosen being a multiple of 5 or 15

a) 1/5 b) 1/8
c) 1/16 d) 1/9

(vi) In a deck of 52 cards, calculate the probability of drawing a red card or a face card

a) 13/26 b) 13/52
c) 16/52 d) 8/13

(vii) 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.

(viii) Identify the shape of a binomial distribution with parameters 5 and 1/3.

a) leptokurtic b) Platykurtic
c) Mesokurtic d) None of these

(ix) The variance of exponential(λ) distribution is _____, select the correct option

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

(x) In case of Poisson Distribution with parameter λ, Identify the sufficient estimator of parameter

a) $\lambda(1-\lambda)$ b) $\bar{x}/n$
c) λ d) λ/n

(xi) Identify the correct statement from the following.

a) Sampling error increases as we increase the sampling size
b) Sampling error remains constant as we increase the sampling size.
c) Sampling error decreases as we increase the sampling size
d) None of these

(xii) The difference between a statistic and the parameter is called _____. Select the correct answer

a) Random Error b) Sampling error
c) Probabilistic Error d) Non-random

(xiii) In a large population of adults, 45% have a post secondary degree.If people are selected at random from this population, enumerate the probability that the third person selected is the first one that has a post secondary degree.

a) 0.1361 b) 0.1254
c) 0.1567 d) None of these

(xiv) If SSE=200 and df(Error)=10, enumerate the value of mean square error.

a) 20 b) 2000
c) 200 d) 100

(xv) If we are conducting an ANOVA, F-DATA will always fall within the range _____. Select the correct answer

a) Between negative infinity and infinity b) Between 0 and 1
c) Between 0 and infinity d) Between 1 and infinity

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Show that mean of Bin(n,p) distribution is np. (3)

3. The first three moments of distribution about the value 2 are 1, 16 and 40 respectively. Identify the skewness of the distribution (3)

4. Define correlation coefficient. (3)

5. A fair coin is tossed twice such that E: event of having both head and tail, and F: event of having atmost one tail. Calculate P(E), P(F) and P(E|F) (3)

6. Explain population and sample with example. (3)

Explain MVUE. **OR** (3)

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

7. The following frequency table is given below: (5)

Class	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	35	35	11	28	15	22

Enumerate the standard deviation of the frequency distribution.

8. The two regression lines are 3X+2Y=26 and 6X+3Y=31. Identify the correlation coefficient. Also find the mean of X and Y. (5)

9. Show that the variance of Binomial(n,p) distribution is npq. (5)

10. Explain probabilistic and non-probabilistic sampling. (5)

11. A random sample of 400 is taken from a large number of coins. The mean weight of the coins in the sample is 28.57 gms and s.d is 1.25 gms. Estimate the limits that have a 95% chance of including the mean weight of all the coins (5)

12. The purpose of a study by Luglie was to investigate the oral status of a group of patients diagnosed with thalassemia major (TM). One of the outcome measure s was the decayed, missing, filled teeth index (DMFT). In a sample of 18 patients, the mean DMFT index value was 10.3 with standard deviation of 7.3. Evaluate if this sufficient evidence to allow us to conclude that the mean DMFT index is greater than 9 in a population of similar subjects.Let $\alpha = 0.1$ (5)

OR

Among 157 African-American men, the mean systolic blood pressure was 146 mm Hg with a standard deviation of 27. We wish to know if on the basis of these data, we may conclude that the mean systolic blood pressure for a population of African-American is greater than 140. Use $\alpha=0.01$. Evaluate the hypothesis. (5)