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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(CSE)-AIML-2024/B.Tech.(CSE)-AIR-2024/B.Tech.(CSE)-CYS-2024

Course Name – Probability and Statistics

Course Code - BBS00014

(Semester IV)

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) 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
- (iii) If all the values of a variable are equal to c, then identify the value of standard deviation
 - a) c
 - b) 0
 - c) 2c
 - d) None of these.
- (iv) 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) $\frac{1}{5}$
 - b) $\frac{1}{8}$
 - c) $\frac{1}{16}$
 - d) $\frac{1}{9}$
- (v) Choose the correct option. A speaks truth in 75% of cases and B in 80% of cases. Calculate the percentage of cases are they likely to contradict each other, narrating the same incident
 - a) 25%
 - b) 35%
 - c) 45%
 - d) 50%
- (vi) Choose the correct option. From a pack of 52 cards, one card is drawn at random. Calculate the probability of a face card drawn
 - a) $\frac{3}{13}$
 - b) $\frac{1}{13}$
 - c) $\frac{1}{52}$
 - d) $\frac{1}{26}$

5. The number of typing errors per page in a document follows a Poisson distribution with mean 1.5. Estimate the probability that a randomly selected page has (i) No errors, and (3)
(ii) At least two errors.
6. Explain BLUE. (3)

OR

- A sample of 600 screws is taken from a large consignment and 75 are found to be defective. Estimate the percentage of defectives in the consignment and find the confidence limit. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. 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)
8. 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)
9. Suppose you start up a company that has developed a drug that is supposed to increase IQ. You know that the standard deviation of IQ in the general population is 15. You test your drug on 36 patients and obtain a mean IQ of 97.65. Using an alpha value of 0.05, evaluate if this IQ significantly different than the population mean of 100. (5)
10. An insurance company issues policies to drivers. The probability that a driver meets with an accident in a year is 0.02. Estimate the probability that out of 10 randomly selected drivers: (5)
(a) None meets with an accident.
(b) At least one meets with an accident.
- Assume that the events are independent.
11. The weights of packets of rice are normally distributed with mean 1 kg and standard deviation 0.05 kg. Estimate the probability that a randomly selected packet weighs (i) between 0.95 kg and 1.05 kg. (ii) Less than 0.95 kg. (5)

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12. Among 157 African-American men, the mean systolic blood pressure was 146 mm Hg (5) 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.

OR

A sample of 50 observations from a normal population yielded a sample mean of 75 and (5) a standard deviation of 10. Test the hypothesis if the population mean is 78 at 5% significance level. Clearly explain the null and alternative hypotheses, the test statistic used, and your conclusion.

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