PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF INFORMATION SCIENCE
MID TERM EXAMINATION - OCT 2023

Semester : Semester III - 2022
Course Code : MAT1008
Course Name : Sem III - MAT1008 - Probabilty and Inferential Statistics
Program : BSD

Date : 30-OCT-2023
Time : 11:30AM - 1:00PM
Max Marks : 50
Weightage : 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   (5 X 2 = 10M)

1. Distinguish between discrete and continuous random variables.

    (CO1) [Knowledge]

2. Suppose the time it takes a nine-year old child to eat a donut follows a continuous uniform distribution between 0.5 and 4 minutes. Find the probability that a randomly selected nine-year old child eats a donut in at least 2 minutes.

    (CO1) [Knowledge]

3. The weights of 1500 ball bearings are normally distributed with the mean of 635 gms and a standard deviation of 1.36 gms. If 300 samples of size 36 are drawn, find the mean and variance of the sampling distribution of means if the sampling is done without replacement.

    (CO2) [Knowledge]

4. Distinguish between type I and type II errors in the context of sampling.

    (CO2) [Knowledge]

5. Write the formula of the test statistic concerning the binomial experiment in the context of sampling.

    (CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS   (4 X 5 = 20M)

6. Assuming that it is true that 3 of 10 industrial accidents are due to fatigue, find the probability that (a) exactly 3 of 7 industrial accidents are due to fatigue (b) at least 3 of 7 industrial accidents are due to fatigue (c) at most 3 of 7 industrial accidents are due to fatigue.

    (CO1) [Comprehension]

7. While proofreading a book, 5 misprints are found in every 3 pages. What is the probability that any given 3 pages would have (a) exactly 5 misprints (b) at most 2 misprints (c) at least 2 misprints?

(CO1) [Comprehension]

8. The life of mobile batteries is exponentially distributed with a mean of 1000 days. What is the probability that a battery will last more than 1200 days?

(CO1) [Comprehension]

9. The average monthly sales of 'Reliable Computers' are 2500 units with a standard deviation of 100 units. The sales are found to be normally distributed over months. Find the probability that the sales during a particular month would be between 2450 to 2550 units (given that $P(Z \leq 0.5) = 0.6915$ and $P(Z \leq 1) = 0.8413$).

(CO1) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION   (1 X 20 = 20M)

10. (a) A population consists of the 4 numbers 3, 7, 11 and 15. Consider all possible samples of size 2 that are drawn from this population with and without replacement. Find the mean and variance of the population, and the mean and variance of the sampling distribution of the means.
    (b) In a sample of 1000 people in Karnataka, 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat eaters are equally popular in the state at 1% level of significance? (table value of Z is 2.58 for two-tailed test and 2.33 for one-tailed test).

(CO2) [Application]