PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023

Semester : Semester II - 2022
Course Code : MAT1003
Course Name : Sem II - MAT1003 - Applied Statistics
Program : B.Tech - All Programs

Date : 7-JUN-2023
Time : 1.00PM - 4.00PM
Max Marks : 100
Weightage : 50%

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 **(10 X 2 = 20M)**

1. Identify the arithmetic mean of the first 7 natural numbers.

   (CO1) [Knowledge]

2. The probability that the Indian industry will locate in London,United Kingdom is 0.6, the probability that it will locate in Birmingham ,United Kingdom is 0.3, and the probability that it will locate in either London or Birmingham is 0.7. List the probability that the industry will locate in both cities?

   (CO2) [Knowledge]

3. For a singing competition 10 participants were given marks by 2 judges. The correlation co-efficient r_{xy} was found to be 0.113. Recognize the nature of correlation and describe the same.

   (CO1) [Knowledge]

4. Define the shape of the normal curve.

   (CO3) [Knowledge]

5. If variance of an unclassified data set is found to be 10.21, then identify the standard deviation of that dataset.

   (CO1) [Knowledge]

6. If the random variable X follows the Poisson distribution with mean 2. Identify the value of P(X=3).

   (CO3) [Knowledge]

7. Label the probability of getting a prime number when a die is rolled once.

   (CO2) [Knowledge]

8. List the probability distribution for the random variable X= number of tails, when three coins are tossed together.

(CO3) [Knowledge]

9. List the upper quartile for the following set of numbers:
10,50,30,20,10,20,70,30.

(CO1) [Knowledge]

10. State the conditional probability $P(A|B)$ when A and B are independent events.

(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS (5 X 10 = 50M)

11. It is estimated that 50% of emails are spam emails. Some software has been applied to filter these spam emails before they reach your inbox. A certain brand of software claims that it can detect 99% of spam emails, and the probability of a false positive (a non-spam email detected as spam) is 5%. Now if an email is detected as spam, then predict the probability that
(a) it is in fact a non-spam email?
(b) it is in fact spam email?

(CO2) [Comprehension]

12. Consider the run scored by 2 players X and Y in 10 consecutive overs when facing spin bowling on a scale of 0-10

Overs	1	2	3	4	5	6	7	8	9	10
Player X	8	9	8	7	6	10	0	2	9	4
Player Y	7	7	9	6	8	2	6	8	3	1

Identify the nature of the correlation prevalent between the scores of the players while facing a spinner.

(CO1) [Comprehension]

13. Suppose a card is drawn randomly from a standard deck of 52 playing cards. Predict the probability that
a) the card is a club, knowing that the card is a king?
b) the card is a spade, knowing that the card is black?

(CO2) [Comprehension]

14. Consider the following two data sets.
Data Set I: 12, 25, 37, 8, 41.
Data Set II: 19, 32, 44, 15, 48.
Estimate the standard deviation for each of these two data sets and find which set is more consistent.

(CO1) [Comprehension]

15. Salaries of employees of a certain organization are normally distributed with a mean of 7 LPA and a standard deviation of 3 LPA. Predict the probability for a randomly selected employee of this organization, the salary would be
    (a) at least 5 LPA
    (b) between 6 and 8 LPA
    (c) at most 5 LPA.
(Given that $P(Z \leq 0.33) = 0.62930$, $P(Z \leq 0.67) = 0.74857$).

(CO3) [Comprehension]

PART C

16. The following data gives the age of husband (x) and the age of wife (y) in years. Compute the two regrssion lines and calculate the age of husband corresponding to 16 years age of wife.

x	36	23	27	28	28	29	30	31	33	35
y	29	18	20	22	27	21	29	27	29	28

(CO1) [Application]

17. If 2 out of 10 industrial accidents are due to fatigue, compute the probability that (a) exactly 2 out of 8 industrial accidents are due to fatigue (b) at least 2 out of 8 industrial accidents are due to fatigue (c) at most 2 out of 8 industrial accidents are due to fatigue (d) none of the 8 accidents is due to fatigue (e) all the 8 accidents are due to fatigue.

(CO3) [Application]