Roll No												

PRESIDENCY UNIVERSITY
BENGALURU

SET - B

SCHOOL OF ENGINEERING
END TERM EXAMINATION - FEB 2023

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

Date : 23-FEB-2023
Time : 9.30AM - 12.30PM
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. Give the formula for Arithmetic mean for unclassified data. (CO1) [Knowledge]

2. Find the position of upper quartile Q_3 for the following data set: 25, 27, 199, 29, 432,100, 87, 76, 86, 34, 123. (CO1) [Knowledge]

3. Write the variance formula for the population. (CO1) [Knowledge]

4. If the coefficient of correlation is *r = 1, then the correlation is called ?* (CO1) [Knowledge]

5. If a certain linear regression equation is found to be 2x+3=5y, calculate the regression coefficient of x on y. (CO1) [Knowledge]

6. Two dice are thrown simultaneously. Find the probability of getting the same number on both dice? (CO2) [Knowledge]

7. What are the simple events for the given set H={1, 2, 3, 4}? (CO2) [Knowledge]

8. While considering the conditional probability $P(B|A)$, which event has occurred first, A or B? (CO2) [Knowledge]

9. If the random variable X follows the Poisson distribution with λ=4, then find the value of P(X=6) (CO3) [Knowledge]

10. State the probability mass function for a Binomial distribution. (CO3) [Knowledge]

PART B

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

11. Following are the marks obtained by a student B in 10 tests of 100 marks each

$Test$	1	2	3	4	5	6	7	8	9	10
$Marks\ obtained\ by\ B$	48	75	54	60	63	69	72	51	57	66

Determine the standard deviation of marks. (CO1) [Comprehension]

12. Police plan to enforce speed limits by using radar traps at 3 different locations within the city limits. The radar traps at each of the locations P, Q and R are operated 40%, 30% and 20% of the time. A person who is speeding on her way to work has probabilities of 0.2, 0.1 and 0.5 respectively, of passing through these locations. If the person received a speeding ticket on her way to work, what is the probability that she passed through the radar trap located at (i) location P (ii) location R?

(CO2) [Comprehension]

13. Compute Karl Pearson's coefficient of correlation between capital employed and profit obtained from the following data

Capital Employed (Rs. In Crore)	10	20	30	40	50	60	70	80	90	100
Profit (Rs in Crore)	2	4	8	5	10	15	14	20	22	50

Also determine the nature of correlation of the observation.

(CO1) [Comprehension]

14. It has been observed that 10 drops of water trickle every 5 minutes from a leaking pipe. What is the probability that in 5 minutes (a) at least 2 drops of water trickle (b) at most 2 drops of water trickle (c) exactly 6 drops of water trickle?

(CO3) [Comprehension]

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

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS **(2 X 15 = 30M)**

16. Consider the following data set:

Marks in Subject P	10	13	14	16	11	18	10	12	20	18
Marks in Subject Q	13	12	18	15	17	15	11	14	10	16

Construct suitable mathematical models to estimate:

a. Marks in Subject P when marks in Subject Q is known

b. Marks in Subject Q when marks in Subject P is known

(CO1) [Application]

17. It has been observed that 1 out of 8 bulbs manufactured by a factory are defective.
a. Construct a suitable mathematical model, which represents the number of defective bulbs manufactured by the factory out of a total of *n* bulbs.
b. If a box of 10 bulbs is selected, what is the probability that at most 2 are defective?
c. If a box containing 9 bulbs is selected, what is the probability that more than 8 are defective?
d. If 50 bulbs are picked up, what is the mean number of defective bulbs?

(CO3) [Application]

*****