SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc. CS with DS - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - IV
22UDSAT4004 - Allied Statistics

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. State and prove multiplication theorem on probability.
2. Define normal distribution and write its properties.
3. Write a short note on Students t-distribution and point out its uses.
4. A Company wants to test that the average life time of batteries lasts more than 40 hours.For this sample of 15 batteries have been selected and the mean life time is focused to be 49.9 hrs with standard deviation of 8.9 hrs. Test the claim at 5% level.
5. Find the variance of Poisson distribution.
6. X follows normal distribution with mean 16 and standard deviation 3.
   Compute (i) P(X $\geq$ 19) (ii) P(12.5 $<$ X $<$ 19).
7. Show that the maximum likelihood estimate for the parameter λ of a Poisson distribution on the basis of a sample of size n is $\overline{x}$.
8. One card is drawn from a deck of 52 cards, well shuffled. Calculate the probability that the card will be
   (i) be an ace. (ii) not be an ace.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. (i) State and prove addition theorem of probability.
   (ii) A, B and C try to hit a target. A can hit the target 3 times in 5 shots, B 2 times in 5 shots, C 3 times in 4 shots. Find the probabilities of the following event: (i) two of them hit (ii) two at least hit.
10. Derive the mean and variance of Binomial Distribution.

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11. A random variable has the following cdf
$$F(x) = \begin{cases} 1-(1+x)\,e^{-x} & for\ x \geq 0 \\ 0 & for\ x < 0 \end{cases}$$
Find the probability that it assumes the value less than 1. Also find mean and variance of f(x).

12. Find the mean and variance of Chi-Square distribution.

13. In 120 throws of a single die, the following distribution of faces were obtained.

Faces	1	2	3	4	5	6	Total
Frequency	30	25	18	10	22	15	120

Compute the statistic you would use to test whether the results constituted reputations of equal probability.

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