அரசினர் ஆடவர் கலைக்கல்லூரி (தன்னாட்சி), நந்தனம், சென்னை – 35.

CODE: **196111** TIME: 2Hrs

NOVEMBER 2020 MAX. MARKS : 50

PART A *(10 x 2=20)*

Answer any ***TEN*** *questions*

1. Define a Binomial distribution.
2. Write down the moment generating function of Geometric distribution.
3. Define a Gamma distribution.
4. Define Cauchy distribution.
5. When do you say a sequence of random variables $\{X_n\}$ converges to a random variable X.
6. Write down the Strong law of large numbers.
7. Define statistic.
8. Define unbiased estimate.
9. Define Type I and Type II error.
10. When do you say a test is Uniformly most powerful test?
11. State Kolmogorov inequality.
12. Write down any two properties of a normal distribution.

PART B *(2 x5=10)*

Answer any ***TWO*** *questions*

13. Find the mean and variance of a Poisson distribution.
14. Find the moment generating function of chi-square distribution.
15. State and prove Borel-Cantelli lemma.
16. Find the probability density function of t-distribution.
17. Let $X \sim b(n, p)$ and apply likelihood ratio test of $H_0: p \leq p_o$ against $H_1 : p > p_o$ to find the level α.
18. Show that, $X_n \overset{a.s.}{\longrightarrow} X$ if and only if $\lim_{n\to\infty} P\{ sup_{m\geq n}|X_m - X| > \epsilon\} = 0$ for all $\epsilon > 0$.
19. Show that, $\hat{\mu}$ is the Maximum Likelihood Estimator of μ if σ^2 is known.
20. Find the probability density function of chi-square distribution

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PART C *(2x10=20)*

Answer any ***TWO*** *questions*

21. Find the moment generating function of Binomial distribution and also find its mean and variance.
22. Find the moment generating function of Normal distribution and find its moments.
23. State and prove Kolmogorov's strong law of large numbers.
24. State and prove Rao-Blackwell theorem.
25. State and prove Neyman-Pearson fundamental lemma.
