INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

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COMPUTER SCIENCE AND ENGINEERING

COURSE PPT

Course Name	**PROBABILITY AND STATISTICS**
Course Code	AHS010
Programme	B.Tech
Semester	II
Course Coordinator	Mr. J Suresh Goud
Course Faculty	Ms. P Srilatha
Lecture Number	38
Topic Covered	Problems on Estimation
Course Learning Outcome's	Understand the concept of estimation for classical inference involving confidence interval.

PROBLEMS ON ESTIMATION

Problems:

1. What is the maximum error can to make with probability 0.95 when using a mean of random sample of size 64 to estimate the mean of population with variance 2.56.

Solution:

Given $n=64,\ \sigma^2=2.56, \sigma=1.6$

$Z_{\alpha/2}=1.96 \ \ at \ \ 95\%$

$$E=Z_{\alpha/2}\cdot\frac{\sigma}{\sqrt{n}}$$

$$=1.96\times\frac{1.6}{8}$$

$$=0.392$$

2. A sample of size 10 is taken from population and S.D of sample is 0.3. Find maximum error at 99% Confidence level.

Solution:

Given $n=10,\ \sigma=0.3$

$t_{\alpha/2}=3.25 \ \ at \ \ 99\%$

$$E=t_{\alpha/2}\cdot\frac{s}{\sqrt{n}}$$

$$=3.25\times\frac{0.3}{\sqrt{10}}$$

$$=0.3$$

3. Assuming that σ=20 how large a random sample to be taken with probability 0.95 that the sample mean will not differ from the population mean by more than 3 points.

Solution:

Given $\sigma = 0.3, E = 3, n = ?$

$$Z_{\alpha/2} = 1.96 \ \ at \ \ 95\%$$

$$n = \left[\frac{Z_{\alpha/2}\,\sigma}{E} \right]^2$$

$$= \left[\frac{1.96 \times 20}{3} \right]^2$$

$$= 171$$

4. The mean and S.D of population are 11795,14054. Find maximum error with 95% confidence level. If $\bar{x}=11795$ and sample size n=50. Construct 95% confidence level interval.

Solution:

Given $n=50$, $\sigma=14054$ and $\bar{x}=11795$

$$Z_{\alpha/2}=1.96 \ \ at \ \ 95\%$$

$$E=Z_{\alpha/2}\cdot\frac{\sigma}{\sqrt{n}}$$

$$=1.96\times\frac{14054}{\sqrt{50}}$$

$$=03895$$

Confidence interval of $(1-\alpha)100\%$ is

$$\left(\bar{x}-E,\bar{x}+E\right)$$
$$=\left(11795-3895,11795+3895\right)$$
$$=\left(7900,15690\right)$$