UNIT-I: Introduction To Statistics

1. Definition and Scope
- Statistics as a science of data collection, organization, analysis, and interpretation
- Role in decision making and research
- Historical development of statistics

2. Basic Objectives
- Description of data
- Statistical inference
- Prediction and forecasting
- Decision making under uncertainty
- Quality control and improvement

3. Applications in Science
3.1 Physical Sciences
- Data analysis in physics experiments
- Chemical process control
- Environmental monitoring
- Astronomical data analysis

3.2 Biological Sciences
- Clinical trials
- Genetic research
- Population studies
- Ecological surveys

3.3 Social Sciences
- Economic indicators
- Demographic studies
- Psychological research
- Market research

4. Data Collection Methods
4.1 Internal Data
- Organization's own records
- Management information systems
- Transaction data
- Performance metrics

4.2 External Data
- Government publications
- Industry reports
- Market research
- Academic publications

4.3 Primary Data Collection
- Surveys and questionnaires
- Interviews (structured/unstructured)
- Observations
- Experimental data
- Field studies

4.4 Secondary Data
- Sources and reliability
- Advantages and limitations

- Evaluation criteria
- Documentation methods

5. Population and Sampling
5.1 Population Concepts
- Target population
- Accessible population
- Parameters of interest
- Census vs sampling

5.2 Sample Selection
- Random sampling methods
- Systematic sampling
- Stratified sampling
- Cluster sampling
- Multi-stage sampling

5.3 Representative Sample
- Characteristics and requirements
- Sample size determination
- Sampling error
- Confidence levels
- Margin of error

5.4 Common Sampling Issues
- Selection bias
- Non-response bias
- Coverage error
- Sampling frame issues
- Response rate