

**Department of Statistics**  
**Gauhati University**  
**B.Sc. General Syllabus: Statistics**  
**(Semester System)**

**Semester – I      Credit - 6**

One theory paper consisting of 75 marks.

Total marks: - 75

**Paper E 101 or 102 or 103 : 75 Marks (Internal 20%)**  
**Descriptive Statistics and Finite Difference**

Unit 1 : 30 marks

Descriptive Statistics: Concept of a statistical population and sample from a population; qualitative and quantitative data.

Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications.

Presentation of Data: Construction of tables with one or more factors of classification. Diagrammatic and Graphical representation of non-frequency data. Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, frequency polygon and Ogive.

Analysis of Quantitative Data: Univariate data: Concepts of Central tendency or location, dispersion and relative dispersion, moments, Skewness, Kurtosis, Sheppard's correction for moments for grouped data (without derivation).

**Unit 2: 30 marks**

Finite Difference: Definition, Operators  $\Delta$  &  $E$ , their properties, Difference table, Missing terms,

Interpolation: Definition, Newton's Forward and Backward interpolation formula.

Divided Difference(DD): Definition, DD table, Newton's DD formula.

Lagrange's interpolation formula.

Numerical Integration: Introduction, General quadrature formula, Trapezoidal, Simpson's  $1/3^{\text{rd}}$  &  $3/8^{\text{th}}$  rules [All theorems, formulae, rules with derivation]

Newton-Raphson method.

**Unit 3: 15 Marks – Index Number**

Definition, Construction of wholesale price index number, different formulae, tests of index number, Chain base index number, Cost of Living Index Number – definition, data collection, construction and uses . Index Number of Industrial Production.

### References for semester 1

1. H C Saxena. Calculus of Finite Difference
2. A M Goon , M K Gupta, B Dasgupta . Fundamental of Statistics, Vol 1 & 2 World Press
3. F E Croxton, D J Cowden, S Klein. Applied General Statistics, Prentice Hall
4. A M Goon , M K Gupta, B Dasgupta . Basic Statistics, World Press
5. J. Medhi. Statistical Methods: An Introductory Text. New Age International (P) Ltd.
6. M. K. Jain and S. R. Iyenger and R. K. Jain. Numerical Methods : Problems & Solutions; New Age International (P) Ltd.
7. Introduction to Statistics, Vol 1 & 2, L Choudhury, Kitap Ghar, Guwahati.
8. Fundamental of Statistics , Kapoor & Gupta,

**Total Marks – 75 Credit - 6**

### Semester – 2

One theory paper consisting of 75 marks.

Total marks: - 75

**E 201 or 202 or 203 : 75 Marks (Internal 20%) Credit - 6**  
**Probability and Distribution**

#### (Unit 1: 35 marks: Probability)

Random Experiment: Sample point and sample space, event, operation of events, concepts of mutually exclusive and exhaustive events.

Classical and relative frequency approach, properties of probability, Independence of events, conditional probability, total and compound probability rules, Bayes theorem and its application.

#### (Unit 2: 40 marks : Distribution)

Univariate Random Variables: p.m.f and p.d.f. Expectation of a r.v , Related theorems, Moments, measures of location and dispersion of r.v.'s, Chebyshev's inequality, WLLN (without proof), Bernoulli, Binomial, Poisson, Normal distribution (Normal Distribution without derivation) distribution, Central limit theorem (without proof).

### References for semester II

1. A M Goon , M K Gupta, B Dasgupta . Fundamental of Statistics, Vol 1 & 2 World Press
2. A M Goon , M K Gupta, B Dasgupta . Basic Statistics, World Press
3. J. Medhi. Statistical Methods: An Introductory Text. New Age International (P) Ltd.
4. Introduction to Statistics, Vol 1 & 2, L Choudhury, Kitap Ghar, Guwahati.
5. Fundamental of Statistics , Kapoor & Gupta,

**Total Marks – 75 Credit – 6**

## SEMESTER – 3

One theory paper consisting of 75 marks and one practical paper of 50 marks.

Total marks: - 50 + 50 = 100      Credit - 4

### **Paper E 301 or 303 or 306 : Applied Statistics I & Correlation Regression**

**50 Marks**

**(Internal 20%)**

- 1) Unit 1 : Vital Statistics: **15 marks**  
Introduction, data, Definition of rates, Mortality Rates, Crude Death Rate(CDR), Age Specific Death Rate(ASDR), Standardized Death Rates (Direct method only), life Tables-Idea, different columns of a complete life table, Crude Birth Rate(CBR), General Fertility Rate, Age Specific Fertility Rates(ASFR) , Total Fertility Rate(TFR), GRR and NRR.
  
- 2) Unit 2: Sampling Distribution : 15  
**marks**  
Idea of Population and Sample, Estimate, Parameter and Statistic, Sampling Distribution, Standard Error; Idea of hypothesis, Type I and Type II error, level of significance. Statement and applications of  $\chi^2$ , t, and F distribution, large sample tests, and confidence interval of sample mean and proportion. Measures of Association & Contingency.
  
- 3) Unit 3: Correlation & Regression: **20**  
**marks**  
Product moment correlation coefficient and its properties; Principle of least Squares; Scatter diagram; linear regression; regression lines, regression Coefficients, angle between two lines of regression (with derivation). Partial and multiple correlation and multiple linear regression (upto three variables) ordinary least square (OLS) Estimation.

### **Paper E 302 or 304 or 307 : Practical paper 50 marks (Internal 20%)**

**Credit - 4**

Practical from theory paper of 3<sup>rd</sup> semester & Unit 1 of theory paper of 1<sup>st</sup> semester

#### References for Semester 3

1. P Mukhopadhyay. Applied Statistics, New Central Book Agency
2. F E Croxton, D J Cowden, S Klein. Applied General Statistics, Prentice Hall. F E Croxton, D J Cowden, S Klein. Applied General Statistics, Prentice Hall.
3. Fundamental of Statistics, Vol 2, Goon, Gupta and Dasgupta, World Press, Kolkata.
4. Fundamentals of Applied Statistics , Kapoor and Gupta.
5. J. Medhi: Statistical Methods
6. L. Choudhury – Introduction to Statistics Vol 1 & 2.

**Total Marks – 100**

**Total Credit - 8**

## **SEMESTER 4**

One theory paper consisting of 50 marks and one practical paper of 50 marks.  
Total marks: - 50 + 50 = 100

### **Paper E 401 or 403 or 406: Sample Survey and Design of Experiments:**

**Credit – 4      50 marks**  
**(Internal 20%)**

- 1) Unit 1 : Sample Survey: 25 marks  
Idea, Basic Principles, biases, steps involved in a large scale sample survey, judgment sampling, simple random sampling (with and without replacement) in detail, Stratified random sampling - idea and advantages, Neyman's and proportional allocations, systematic sampling.
  
- 2) Unit 2: Design of experiments: 25 marks  
Assumptions, Analysis of Variance(AOV) with one way and two way classified data, Basic principles of Design of experiments, Completely Randomized Design (CRD), Randomized Block Design(RBD), Latin square Design, factorial experiment- $2^2$  and  $2^3$  experiment. (without confounding).

### **Paper E 402 or 404 or 407: Practical Paper    50 marks (Internal 20%) Credit - 4** **Practical from theory paper of 4<sup>th</sup> semester**

#### **References for Semester 4**

1. P Mukhopadhyay. Applied Statistics, New Central Book Agency
2. Fundamental of Statistics, Vol 2, Goon, Gupta and Dasgupta, World Press, Kolkata.
3. Fundamentals of Applied Statistics , Kapoor and Gupta.
4. J. Medhi: Statistical Methods
5. L. Choudhury – Introduction to Statistics Vol 1 & 2.

**Total Marks – 100**

**Total Credit - 8**

## SEMESTER - 5

One theory paper of 100 marks and one practical paper of 100 marks.  
Total marks: -  $100 \times 2 = 200$

Paper 5.1 : Distribution Theory and Applied Statistics      **Credit - 8**  
100 marks (Internal 20%)

Unit 1 : Some Distributions:

Beta and Gamma distributions, Exponential distribution, Uniform distribution, Hypergeometric, Geometric and Negative Binomial Distribution.

### UNIT 2 : 20 Marks

Time series: Components of time series. Determination of trend by different methods, Determination of seasonal variation by ratio to trend, ratio to MA and link relative method.

### UNIT 3 : 20 Marks

Demand Analysis: Theory of consumption and demand, demand function, elasticity of demand, determination of elasticity of demand by family budget method, Lorentz curve and Gini's coefficient, Engel's law and Engel's curve, Pareto's law of income distribution.

### UNIT 4 : 20 Marks

1. LPP: LP problem formulation and solution by graphical method only

**Paper E 502 or 503 Practical Paper : Practical from topics in theory paper of semester 5      100 Marks(Internal 20%) Credit 8**

### **Reference for Semester 5**

1. J E Freund. Mathematical Statistics, Prentice Hall
2. A M Mood, F A Graybill, D C Boes. Introduction to the Theory of Statistics, McGraw Hill
3. A M Goon , M K Gupta, B Dasgupta . An outline of Statistics, Vol II World Press.
4. A M Goon , M K Gupta, B Dasgupta . Fundamental of Statistics, Vol II World Press.
5. Kapoor and Gupta, Fundamentals of Statistics.

**Total Marks – 200**

**Total Credit - 16**

## SEMESTER – 6

One theory paper of 100 mark and one practical paper of 100 marks.

Total marks: -  $100 \times 2 = 200$

**Credit - 8**

### **Paper E 601 or 604 Estimation**

**100 Marks (Internal 20%)**

Unit 1. Estimation:

20 marks

Unbiasedness, Consistency, Efficiency and Sufficiency.

### UNIT 2 : 20 Marks

Statistical Quality control: Theoretical basis of SQC, different kinds of control charts  $\bar{X}$  bar, R, p and c charts.

### UNIT 3 : 20 Marks

Econometrics: Definition and scope. Relation between variables. Linear model (two variables only), Estimation of regression parameters.

Unit 4. Introduction to Computers and Computer Programming in FORTRAN: 40 marks  
Basic idea of different parts of a computer, brief idea of software and hardware; Different types of numeric variables used in FORTRAN language and their uses, use of Do Loop, writing small programmes for determining commonly used statistical measures .

**Paper E 602 or 605 Practical Paper 100 Marks (Internal 20%) Credit - 8**

**Practical from theory paper of semester 6**

**Reference for Semester 6**

1. J E Freund. Mathematical Statistics, Prentice Hall
2. A M Mood, F A Graybill, D C Boes. Introduction to the Theory of Statistics, McGraw Hill
3. A M Goon , M K Gupta, B Dasgupta . An outline of Statistics, Vol II World Press.
4. A M Goon , M K Gupta, B Dasgupta . Fundamental of Statistics, Vol II World Press.
5. Kapoor and Gupta, Fundamentals of Statistics.

**Total Marks – 200**

**Total Credit - 16**

