Department of Statistics

Open Elective/Generic Elective (OE/GE) Course

(Semester-I)

Year	Semester	Course Type	Course Code	Course Title	Theory/ Practical	Credits	No. of Lectures/ Practical	Page No.
1st	I	OE/GE	ST-OE-101T	Basic Statistics-I	Theory	2	30T	**2-3**
			ST-OE-101P	Statistics Practical-I	Practical	2	15P	**4-5**

(Semester-II)

Year	Semester	Course Type	Course Code	Course Title	Theory/ Practical	Credits	No. of Lectures/ Practical	Page No.
1st	II	OE/GE	ST-OE-102T	Basic Statistics-II	Theory	2	30T	**7-8**
			ST-OE-102P	Statistics Practical-II	Practical	2	15P	**9-10**

Semester-I

Generic Elective/Open Elective Course (ST-OE-101T): Basic Statistics-I

Course Code &Title	Credits	Credit Distribution of the Course	
		Theory	Practical
ST-OE-101T- Basic Statistics-I	4	2	2

LEARNING OBJECTIVES:

- To study importance of statistics, scope of statistics, statistical organizations in India.
- To study types of scales, types of data, methods of data collection and sampling methods.
- To study frequency distribution, methods of classification, diagrammatic and graphical representation of data.
- To study various types of measures of central tendencies and measures of dispersion.

COURSE OUTCOMES:

After completion of this course student will be able to:

CO-1: Understand importance of statistics, scope of statistics, statistical organizations in India.

CO-2: Understand the concept of primary data, secondary data, methods of data collection statistical population and sampling methods.

CO-3: Prepare frequency distribution and draw graphs and diagrams.

CO-4: Compute various types of measures of central tendency and measures of dispersion.

SYLLABUS OF ST-OE-101T: Mathematics for Competitive Examination –I

UNIT-I Introduction to statistics **[4 Hours]**

1.1. Meaning of Statistics as a Science.

1.2. Importance of Statistics.

1.3. Scope of Statistics: In the field of Industry, Biological sciences, Medical sciences, Economics, Social Sciences, Management sciences, Agriculture, Insurance, Information technology, Education and Psychology.

1.4. Statistical organizations in India and their functions: CSO, ISI, NSSO, IIPS (Devnar, Mumbai), Bureau of Economics and statistics.

1.5. Statistical Heritage (Indian Perspective: Dr. V. S. Huzurbazar, Dr. P. C. Mahalnobis, Dr. P. V. Sukhatme, Dr. C. R. Rao.

UNIT- II Population and Sample **[6 Hours]**

2.1 Types of characteristics: Attributes: Nominal scale, ordinal scale, Variables: Interval scale, ratio scale, discrete and continuous variables.

2.2 Types of data: Primary data, secondary data, cross-sectional data, time series data, directional data.

2.3 Data collection methods (Survey, laboratory experiments, simulation)

2.4 Population, finite population, infinite population, homogeneous population, heterogeneous population, sample, sampling, census method, simple random sampling with and without replacement.

UNIT-III Presentation of Data **[5 Hours]**

3.1 Classification, frequency distribution (discrete and continuous)

3.2 Methods of classification: Inclusive and Exclusive Methods, class limits, class boundaries, class marks, class width, open end class, cumulative frequencies, relative frequency, guidelines for the choice of classes.

3.3 Diagrammatic Representation of Statistical data: Simple bar diagram, Sub divided bar diagram, Pie chart

3.4 Graphical Representation of Statistical data: Histogram, Frequency curve and frequency polygon, ogive curve.

UNIT- IV Measures of Central Tendency **[8 Hours]**

4.1 Concept of central tendency, characteristics of good averages.

4.2 Arithmetic mean: definition, combined mean of two groups, merits and demerits, numerical examples.

4.3 Mode and Median: definition, formulae (for ungrouped and grouped data), demerits.

4.4 Empirical relation between mean, median and mode, numerical examples.

4.5 Partition values: Quartiles, numerical examples (for ungrouped data and grouped data).

UNIT – V Measures of dispersion **[7 Hours]**

5.1 Concept of dispersion, characteristic of good measure of dispersion.

5.2 Range, Quartile deviation: definition, merits and demerits, coefficient of Range, coefficient of quartile deviation, numerical examples (for ungrouped data and grouped data).

5.3 Variance and Standard deviation: definition, merits and demerits, coefficient of variation, numerical examples (for ungrouped data and grouped data).

ESSENTIAL/RECOMMENDED READINGS:

1) Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.

2) Ghosh, J. K. and Mitra, S. K., Parthsarthi, K. R. (1993). Glimpses of India's Statistics Heritage, Wiley publishing Co.

3) Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition,The World Press Pvt. Ltd.,Calcutta.

4) Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.

Generic Elective/Open Elective Course (ST-OE-101P): Statistics Practical-I

Course Code &Title	Credits	Credit Distribution of the Course	
		Theory	Practical
ST-OE-101P - Statistics Practical-I	4	2	2

LEARNING OBJECTIVES:

- To study introduction to ms-excel, basic excel functions and excel worksheet.
- To study various types graphical and diagrammatic techniques.
- To study tabulation and classification.
- To study various types of measures of central tendency and measures of dispersion.

COURSE OUTCOMES:

After completion of this course student will be able to:

CO-1: Get knowledge about introduction to ms-excel, basic excel functions and excel worksheet.
CO-2: Draw various types of graphs and diagrams.
CO-3: Do tabulation and classification of the given data.
CO-4: Compute various types of measures of central tendency and measures of dispersion.

List of Practicals: ST-OE-101P [60 Hours]

1. Introduction to MS-EXCEL **[1P]**
2. Working with basic Excel functions (Mathematical) **[1P]**
3. Working with basic Excel functions (Statistical) **[1P]**
4. Formatting data in an Excel worksheet **[1P]**
5. Diagrammatic representation of statistical data: simple and subdivided bar diagrams, pie diagram. **[1P]**
6. Graphical representation of statistical data: Histogram, frequency curve and ogive curves. Determination of mode and median graphically. **[1P]**
7. Tabulation **[1P]**
8. Classification of statistical data **[1P]**
9. Computation of measures of central tendency (ungrouped data). **[1P]**
10. Computation of measures of central tendency (grouped data). **[1P]**
11. Computation of measures of dispersion (ungrouped data). **[1P]**
12. Computation of measures of dispersion (grouped data). **[1P]**
13. Diagrammatic representation of statistical data using MS-EXCEL **[1P]**

14. Graphical representation of statistical data using MS-EXCEL **[1P]**
15. Computation of summary statistics using MS-EXCEL **[1P]**

ESSENTIAL/RECOMMENDED READINGS:

1) Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.

2) Ghosh, J. K. and Mitra, S. K., Parthsarthi, K. R. (1993). Glimpses of India's Statistics Heritage, Wiley publishing Co.

3) Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition,The World Press Pvt. Ltd.,Calcutta.

4) Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.

Semester-II

Generic Elective/Open Elective Course (ST-OE-102T): Basic Statistics-II

Course Code &Title	Credits	Credit Distribution of the Course	
		Theory	Practical
ST-OE-102T- Basic Statistics-II	4	2	2

LEARNING OBJECTIVES:

- To study moments, skewness and kurtosis.
- To study correlation, types of correlation, scatter diagram and methods of correlation coefficient.
- To study regression, lines of regression, fitting of regression lines, properties and coefficient of determination.

COURSE OUTCOMES:

After completion of this course student will be able to:

CO-1: Understand moments, skewness and kurtosis.

CO-2: Understand the correlation, types of correlation, scatter diagram and methods of correlation coefficient.

CO-3: Understand regression, lines of regression, fitting of regression lines, properties and coefficient of determination.

CO-4: Compute various types of index numbers.

SYLLABUS OF ST-OE-102T: Mathematics for Competitive Examination–I [30 Hours]

UNIT-I Moment, Skewness and Kurtosis **[8 Hours]**

1.1. Raw moments for ungrouped and grouped data. Central moments for ungrouped and grouped data, Effect of change of origin and scale. Relations between central moments and raw moments, upto 4-th order (without proof).

1.2. Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution. Bowley's coefficient of skewness: Bowley's coefficient of skewness lies between −1 to 1 (with proof), interpretation using Box plot. Karl Pearson's coefficient of skewness. Measures of skewness based on moments.

1.3. Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions. Measures of kurtosis based on moments.

UNIT- II Correlation **[7 Hours]**

2.1 Bivariate data, Scatter diagram and interpretation. Concept of correlation between two variables, positive correlation, negative correlation, no correlation. Covariance between two variables: Definition, effect of change of origin and scale, numerical examples.

2.2 Karl Pearson's coefficient of correlation (r): Definition, computation for ungrouped data and interpretation. Properties of correlation coefficient and numerical examples.

2.3 Spearman's rank correlation coefficient: Concept, definition, formulae for computing rank correlation coefficient between two variables with tie and without tie. Numerical examples.

UNIT-III Regression Analysis [8 Hours]

3.1 Concept of dependent and independent variables. Identification of response and predictor variables and relation between them.

3.2 Meaning of regression, difference between correlation and regression, Connection between correlation and regression.

3.3 Regression lines: y on x and x on y; regression equations without derivation, regression coefficients and numerical examples.

3.4 Explained and unexplained variation, coefficient of determination and standard error of an estimate of line of regression. Interchanging the role of X and Y.

Unit IV: Index Numbers: [7 Hours]

4.1 Introduction and scope of Index Numbers. Various types of Index Numbers like Human Development Index, Happiness Index BSE sensitivity Index.

4.2 Definition and Meaning. Problems in the construction of index numbers.

4.3 Simple and weighted price index numbers based on price relatives. Simple and weighted price index numbers based on aggregates. Laspeyre's, Paasche's and Fisher's Index numbers.

4.4 Consumer price index number: Considerations in its construction. Methods of construction of consumer price index number - (i) family budget method (ii) aggregate expenditure method

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1. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.

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4. Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.

Generic Elective/Open Elective Course (ST-OE-102P): Statistics Practical-II

Course Code &Title	Credits	Credit Distribution of the Course	
		Theory	Practical
ST-OE-102P - Statistics Practical-II	4	2	2

LEARNING OBJECTIVES:

- To study moments, skewness and kurtosis.
- To study correlation, types of correlation, scatter diagram and methods of correlation coefficient.
- To study regression, lines of regression, fitting of regression lines, properties and coefficient of determination.
- To study various types of index numbers.
- To study correlation and regression using MS-Excel.
- To study descriptive statistics and sampling using MS-Excel

COURSE OUTCOMES:

After completion of this course student will be able to:

CO-1: Understand moments, skewness and kurtosis.

CO-2: Understand the correlation, types of correlation, scatter diagram and methods of correlation coefficient.

CO-3: Understand regression, lines of regression, fitting of regression lines, properties and coefficient of determination.

CO-4: Compute various types of index numbers.

CO-5: Compute correlation coefficient and fit regression lines using MS-Excel.

CO-6: Compute descriptive statistics and draw samples using MS-Excel.

List of Practicals: ST-OE-101P [60 Hours]

1. Computations of moments-I (Ungrouped data) **[1P]**
2. Computations of moments-I (Grouped data) **[1P]**
3. Computation measures of skewness, Box plot. (Ungrouped data) **[1P]**
4. Computation of measures of skewness (Grouped data) **[1P]**
5. Computation of measures of kurtosis-I (Ungrouped data) **[1P]**
6. Computation of measures of kurtosis-II (Grouped data) **[1P]**
7. Scatter diagram and correlation coefficient (ungrouped data). **[1P]**
8. Fitting of lines of regression. **[2P]**

9. Index numbers-I **[1P]**
10. Index number-II **[1P]**
11. Scatter diagram and computation of correlation coefficient using MS-Excel **[1P]**
12. Fitting of regression lines using MS-Excel **[1P]**
13. Descriptive statistics using MS-Excel **[1P]**
14. Sampling using MS-Excel **[1P]**

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2. Ghosh, J. K. and Mitra, S. K., Parthsarthi, K. R. (1993). Glimpses of India's Statistics Heritage, Wiley publishing Co.
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