Vidya Prasarak Mandal's

K.G. Joshi College of Arts & N.G. Bedekar College of Commerce, Thane

(Autonomous)

(Affiliated to University of Mumbai)

Program: B.A.

Specific Programme: STATISTICS (JBCUASTATS)

Syllabus for FYB.A.

Year of Establishment: 1969

Year of Upgrading: 2021-2022

Specific Programme: STATISTICS–JBCUASTATS

PREAMBLE

Though God does not play dice, every incident in our life and civilization that is not yet history is unknown. Statistics is a body of numerical methods for making wise decisions in the face of uncertainty. It is the science of developing and studying methods for collecting, analyzing, interpreting and presenting empirical data.

H. G. Wells, the prolific English writer and father of Science Fiction genre who died in 1946,prophecies that "Statistical thinking will one day be as necessary a qualification for efficient citizenship as the ability to read and write."

Statistics is a highly interdisciplinary field that finds applicability in not only all scientific research but also business activities like demand forecasting, consumer behavior, banking, finance and insurance, medicine and health. It is an extremely important subject in the study of Economics and hence has significant impact on politics and government.

Today's cutting-edge computer technologies like Big Data, Artificial Intelligence, Machine Learning etc. use statistics as base. Therefore, the employment opportunities for statisticians are vast. Fortune magazine ranked statistics and biostatistics among the top graduate degrees based on salary, growth and job satisfaction. It is one of the best jobs for women.

The Department of Mathematics and Statistics offers students basic courses in Statistics along with separate courses in Computer Systems & Software....

In the period of three years of degree programme, the Department offers various courses in the sub-disciplines of Statistics like Basic Statistical measures, Probability and probability distributions, Operations Research, Applied Statistics etc. Acquainting the students with these will help them in developing analytical skills but also in appearing various competitive examinations.

Eligibility: A student must have successfully cleared the HSC(12th) examination

Preferable: Liking for mathematics and possess analytical ability

**Duration: Three years (EntireB.A. Course)**

Mode of Delivery: Offline(Online, in case of emergency)

Program Outcome

Bachelor of Arts (BA):

1. To make the learners aware about landmark historical events, political systems, geographical and social aspects of Regional, National and International level
2. To impart linguistic skills and proficiency to the learners about the literature- ancient, Regional, National and International level
3. To sensitize students towards social climate and culture
4. To equip the learners with the skills of citizenship
5. To make the learners aware about Philosophical thoughts - Indian and Western
6. To help the learners develop analytical skills
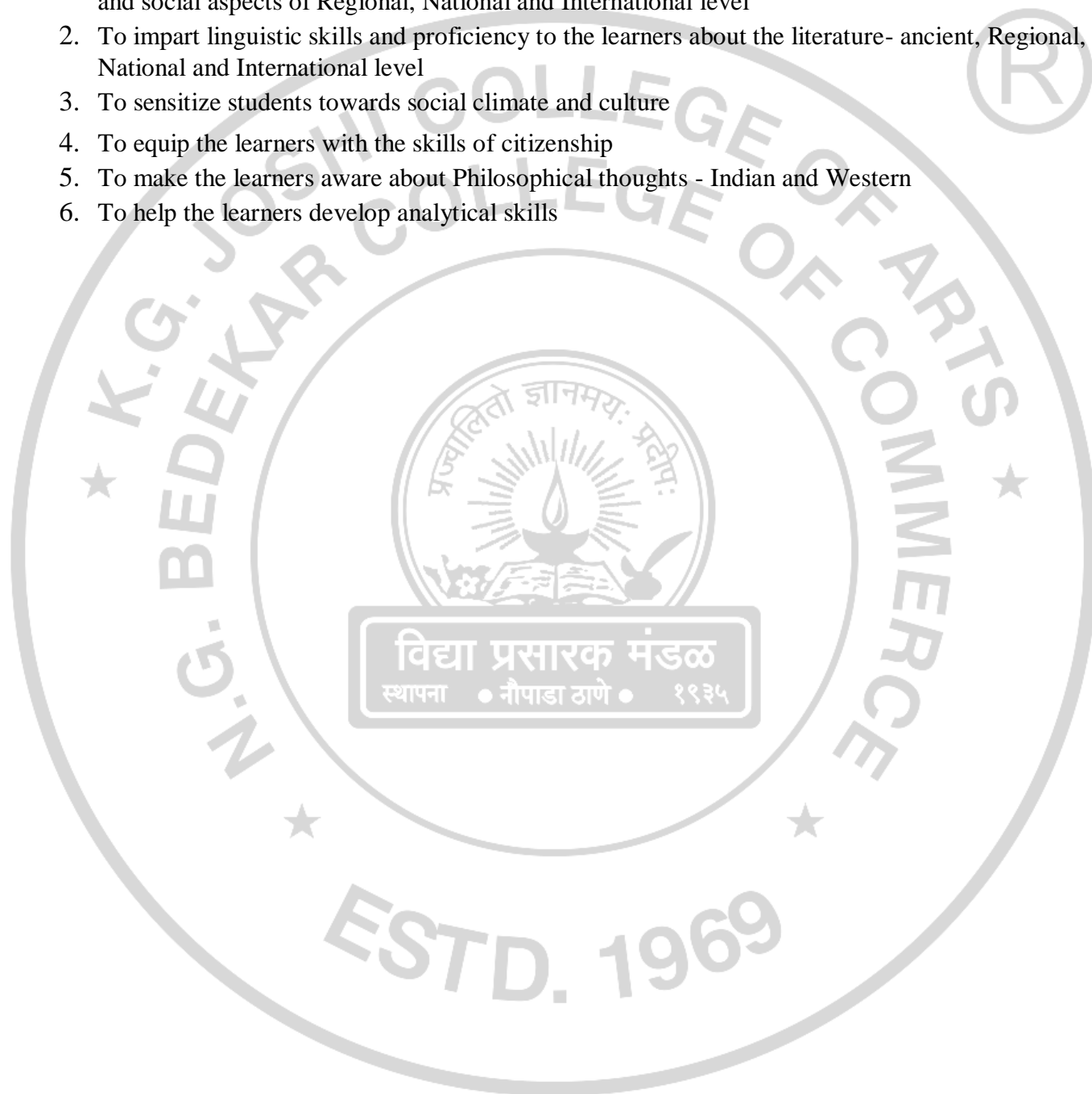
(Credit Based Semester and Grading System with effect from the academic year2021–2022)

Programme-Specific Outcomes: Statistics-JBCUASTATS

PROGRAMME-SPECIFIC OUTCOMES

PSO	PSO Description
PSO1	Students learn to design data collection plans and basic tools of descriptive statistics.
PSO2	Understand,organize, manage and present the data generated in various scenarios of scientific, industrial, or social problems.
PSO3	Perform statistical inference in several circumstances and interpret the results in an applied context
PSO4	Students will be able to learn Project management techniques, transportation and assignment techniques. Concepts will be developed regarding techniques used in industries andApplications of LPP
PSO5	Concept of probability modeling will be developed by studying discrete and continuous probability distributions.
PSO6	Students will be able to know appropriate sampling method with respect to the objective and nature of study and data.
PSO7	Students will be able to understand the Applications of Statistics in Demography and ActurialScience
PSO8	To equip the learners with technical skills which prepare them to become competitive and help them to enter into a promising professional life after graduation.

DISTRIBUTION OF TOPICS AND CREDITS

Course	Coursename	Semester	Course Nomenclature	Course Code	Credits
FYBA	Statistics - I	I	Descriptive Statistics - I	JBCUASTATS101	2
	Practical based on JBCUASTATS101	I		JBCUASTATSP101	1
	Statistics - I	II	Descriptive Statistics - II	JBCUASTATS201	2
	Practical based on JBCUASTATS201	II		JBCUASTATSP201	1

COURSE OUTCOMES

Semester I

Course Nomenclature: Descriptive Statistics – I

Course Code: JBCUASTATS101

1. To understand the concepts and techniques of descriptive statistics.

2. To introduce the technique of data collection and its presentation.

3. Students will be able to understand the concept of Descriptive Statistics of quantitative and qualitative data and its techniques

4. Analyze statistical data using measures of central tendency, dispersion and location.

5. Compute and comprehend the measures of dispersion. Compare Absolute and Relative measures of dispersion

6. Analyze Statistical data using MS-Excel.

SYLLABUS

FYBA

STATISTICS

SEMESTER I
TITLE:STATISTICS - I

SUB-TITLE:DESCRIPTIVE STATISTICS – I

COURSE CODE:	TITLE	Credits: 2
JBCUASTATS101	DESCRIPTIVE STATISTICS – I	No. of lectures: (45)

Unit I	**1.Types of Data and Data Condensation:**
	a.Introduction to Statistics
	  Concept of population and sample. Finite,Infinite population,
	  Concept of sampling, Notionof SRS,SRSWOR and SRSWR
	b. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio.
	c. Collection of Data:
	  Primary data- designing a questionnaire, schedule, distinction
	  between Primary data and Secondary data
	  Problems in collecting data through the questionnaire.
	  Secondary data– its major sources including some government
	  publications
	 d. Types of data: Qualitative and quantitative data; Time series data and cross section data, discrete and continuous data.
	 e. Tabulation- Preparation of tables with two or three
	  factors(variable/attributes) of classification. Requisitesof a good
	  table.
	 f. Dichotomous classification- for two and three attributes,
	  Class frequencies and order of classes, Relationship between class frequencies, consistence of data. Verification for consistency.
	Association of attributes: Yule'scoefficient of association Q. Yule's coefficient of Colligation,relationship between the two coefficients.
		(15)

Unit II	**2. Classification of Data and Measures of central tendency** i)Classification of Data - a. Univariate frequency distribution of discrete and continuous	(15)

	variables. Cumulative frequency distribution. b. Graphical representation of frequency distribution by Histogram, Frequency curve, Frequency polygon, Cumulative frequency curves. Stem and leaf diagram. Diagrammatic representation using Bar diagrams and Pie chart. Bivariate: Frequency distribution, Marginal and Conditional frequency distributions. c.Bivariate frequency distribution. ii) Measures of central tendency a.Concept of central tendency of data. Requirements of good measure b. Locational averages: Median, Mode, and Partition Values: Quartiles, Deciles, and Percentiles. c.Mathematical averages Arithmetic mean (Simple, weighted mean, combined mean), Geometric mean, Harmonic mean, d.Empirical relation between mean, median and mode. e. Concept of trimmed mean f.Merits and demerits of using different measures and their applicability.	
Unit III	**3. Measures of Dispersion, Skewness and Kurtosis** a. Concept of dispersion. Requirements of good measure. b. Absolute and Relative measures of dispersion: Range, Quartile Deviation, Mean absolute deviation, Standard deviation. c. Variance and Combined variance, raw moments and central moments and relations between them. Their properties d. Concept of Skewness and Kurtosis: Measures of Skewness: Karl Pearson's, Bowley's and Coefficient of skewness based on moments. Measure of Kurtosis, Box Plot	**(15)**

COURSE OUTCOMES

Semester II

Course Nomenclature: Descriptive Statistics - II
Course Code: JBCUASTATS201

1. To understand the comparative changes in the price, the quantity consumed and the expenditure about a commodity over a period.
2. To determine the nature and strength of relationship between two variables.
3. Student learn to i) identify the relationship between two variables using scatter plot ii) Interpret a sample correlation.
4. To identify and apply appropriate strategies of quantitative problem solving in theoretical and practical applications
5. Students of this course will be taught to understand and predict the changes in economy

FYBA
STATISTICS

SEMESTER II
TITLE: STATISTICS - I

SUB-TITLE: DESCRIPTIVE STATISTICS – II

COURSE CODE:	TITLE	Credits: 2
JBCUASTATS201	**DESCRIPTIVE STATISTICS – II**	**No. of lectures:** **(45)**
Unit I	**1. Correlation and regression analysis -** a. Scatter Diagram, Product moment correlation coefficient and its properties. b. Spearman's Rank correlation.(With and without ties) c. Concept of linear regression. Principle of least squares. Fitting a straight line by method of least squares. d. Relation between regression coefficients and correlation coefficient. e. Fitting of curves reducible to linear form by transformation. Fitting of linear curve, $y = a + bx$ Fitting of Quadratic curve $y = a + bx + cx^2$ Fitting of Power curve $y = ax^b$ Fitting of Exponential curve $y = ab^x$ and $y = ae^{bx}$ Fitting of Logarithmic curve $y = a + b \log x$ Concept and use of coefficient determination (r^2).	**(15)**
Unit II	**2. Time Series -** a. Definition of time series.Its components. Models of time series. b. Estimation of trend by:i) Freehand curve method ii) Method of semi averages iii)Method of Moving averages iv) Method of least squares(linear trend only) c. Estimation of seasonal component by i) Method of simple average	**(15)**

	ii) Ratio to moving average iii)Ratio to trend method.	
Unit III	**3. Index Numbers -** a. Index numbers as comparative tool. Stages in the construction of Price Index Numbers. b. Measures of Simple and Composite Index Numbers. Laspeyre's, Paasche's, Marshal-Edgeworth's, Dorbisch& Bowley's and Fisher's Index Numbers formula. c. Quantity Index Numbers and Value Index Numbers, Time reversal test, Factor reversal test, Circular test. d. Fixed base Index Numbers, Chain base Index Numbers. Base shifting, splicing and deflating. e. Cost of Living Index Number. Concept of Real Income based on Consumer Price Index Number. f. Applications and interpretation of index numbers	**(15)**

SEMESTER I: Practicals JBCUASTATSP101

Based on JBCUASTATS101
1. Tabulation
2. Attributes
3. Classification of Data
4. Graphical andDiagrammatic representation
5. Measures of Central tendency
6. Measures of dispersion

7. Practicals using Excel –
 Basic Excel
    i) Classification of Data and Diagrammatic representation
    ii) Measures of central tendency
    iii) Measures of dispersion

SEMESTER II : Practicals JBCUASTATSP201

Based on JBCUASTATS201
1.   Correlation analysis
2. Regression analysis
3. Fitting of curve
4. Time series
5. Index number I
6. Index number II
7.Practical using Excel (data analysis tool pack)   i) Correlation analysis   ii) Regression analysis   iii) Fitting of curve

SYLLABUS
FYBA

Paper I: Statistics

Semester I

Title – STATISTICS - I

CourseNomenclature:Descriptive Statistics - I

Course Code: JBCUASTATS101

COURSE CODE:	TITLE	Credits: 2
JBCUASTATS101	**DESCRIPTIVE STATISTICS – I**	No. of lectures: (45)

Unit I	**1.Types of Data and Data Condensation:**
	a.Introduction to Statistics
	  Concept of population and sample. Finite,Infinite population,
	  Concept of sampling, Notion of SRS, SRSWOR and SRSWR
	b. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio.
	c. Collection of Data:
	  Primary data- designing a questionnaire, schedule, distinction
	  between Primary data and Secondary data
	  Problems in collecting data through the questionnaire.
	  Secondary data– its major sources including some government
	  publications
	 d. Types of data: Qualitative and quantitative data; Time series data and
	  cross section data, discrete and continuous data.
	 e. Tabulation- Preparation of tables with two or three factors
	  (variable/attributes) of classification. Requisitesof a good table.
	 g. Dichotomous classification- for two and three attributes,
	  Class frequencies and order of classes, Relationship between class frequencies, consistence of data.Verification for consistency.
	Association of attributes: Yule'scoefficient of association Q. Yule's coefficient of Colligation, relationship between the two coefficients.
		(15)

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Unit II	2. Classification of Data and Measures of central tendency	(15)
	i)Classification of Data -	
	a. Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution.	
	b. Graphical representation of frequency distribution by Histogram, Frequency curve, Frequency polygon, Cumulative frequency curves. Stem and leaf diagram.	
	Diagrammatic representation using Bar diagrams and Pie chart. Bivariate: Frequency distribution, Marginal and Conditional frequency distributions.	
	c.Bivariate frequency distribution.	
	ii) Measures of central tendency	
	a.Concept of central tendency of data. Requirements of good measure	
	b. Locational averages: Median, Mode, and Partition Values: Quartiles, Deciles, and Percentiles.	
	c.Mathematical averages Arithmetic mean (Simple, weighted mean, combined mean), Geometric mean, Harmonic mean,	
	d.Empirical relation between mean, median and mode.	
	e. Concept of trimmed mean	
	f.Merits and demerits of using different measures and their applicability.	
Unit III	3. Measures of Dispersion, Skewness and Kurtosis	(15)
	a. Concept of dispersion. Requirements of good measure.	
	b. Absolute and Relative measures of dispersion: Range, Quartile Deviation, Mean absolute deviation, Standard deviation.	
	c. Variance and Combined variance, raw moments and central moments and relations between them. Their properties	
	d. Concept of Skewness and Kurtosis: Measures of Skewness: Karl Pearson's, Bowley's and Coefficient of skewness based on moments. Measure of Kurtosis, Box Plot	

SYLLABUS

FYBA

Paper I: Statistics
Semester II

TITLE: STATISTICS - I

Course Nomenclature: Descriptive Statistics - II
Course Code : JBCUASTATS201

COURSE CODE:	TITLE	Credits: 2
JBCUASTATS201	**DESCRIPTIVE STATISTICS – II**	No. of lectures: (45)
Unit I	**1. Correlation and regression analysis -** a. Scatter Diagram, Product moment correlation coefficient and its properties. b. Spearman's Rank correlation.(With and without ties) c. Concept of linear regression. Principle of least squares. Fitting a straight line by method of least squares. d. Relation between regression coefficients and correlation coefficient. e. Fitting of curves reducible to linear form by transformation. Fitting of linear curve, $y = a + bx$ Fitting of Quadratic curve $y = a + bx + cx^2$ Fitting of Power curve $y = ax^b$ Fitting of Exponential curve $y = ab^x$ and $y = ae^{bx}$ Fitting of Logarithmic curve $y = a + b \log x$ Conceptand use of coefficient determination (r^2).	(15)
Unit II	**2. Time Series -** a.Definition of time series. Its components. Models of time series. b. Estimation of trend by: i) Freehand curve method ii) Method of semi averages iii)Method of Moving averages iv) Method of least squares(linear trend only) c. Estimation of seasonal component by i) Method of simple average	(15)

	ii) Ratio to moving average iii)Ratio to trend method.	
Unit III	**3. Index Numbers -** a. Index numbers as comparative tool. Stages in the construction of Price Index Numbers. b. Measures of Simple and Composite Index Numbers. Laspeyre's, Paasche's, Marshal-Edgeworth's, Dorbisch& Bowley's and Fisher's Index Numbers formula. c. Quantity Index Numbers and Value Index Numbers, Time reversal test, Factor reversal test, Circular test. d. Fixed base Index Numbers, Chain base Index Numbers. Base shifting, splicing and deflating. e. Cost of Living Index Number. Concept of Real Income based on Consumer Price Index Number. f. Applications and interpretation of index numbers	**(15)**

REFERENCES

1. Goon A.M., Gupta M.K., Dasgupta B. *Fundamentalsof Statistics*,Volume I, The World Press Private Limited, Calcutta. Fifth edition**.**

2. Shah R.J.:*Descriptive Statistics*, Seth Puplications. Eighth edition.

3. Spiegel, M.R.: *Theory and Problems of Statistics*, Schaum's Publishing Series. Tata McGraw-Hill. First edition.

4. Richard. I. Levin, David .S. Rubin: *Statistics for Management* . Fifth edition

5. Agarwal B.L.: *Basic Statistics*, New Age International Ltd.

6. Hoel P.G.: *Introduction to Mathematical Statistics*, Asia Publishing House.

7. Goon A.M.,Gupta M.K., DasguptaB. :*Fundamentals of Statistics*, Volume II : The World Press Private Limited, Calcutta

8. Gupta S.C., Kapoor V.K.: *Fundamentals of Mathematical Statistics*, Sultan Chand &Sons

9. Gupta S.C., Kapoor V.K.:*Fundamentals of Applied Statistics*, Sultan Chand & Sons

10.Allan Bluman (2009) *Introductory Statistics*:*A step by step approach* (7 th edition). McGraw-Hill

11. Milan Gholba, Sudha Phatak, Madhavi Jardosh :*Descriptive Statistics*, Vipul Prakashan

Modality of Assessment

A. Internal Assessment: 40%-40Marks

SerialNo.	EvaluationType	Marks
1	WrittenTest	20
2	Assignment/ case study / Self Learning Exercise	15
3	ClassParticipation	05
	Total:	40

Paper Pattern for Theory(JBCUASTATS101 and JBCUASTATS201)

B. External Examination:60%-60Marks

Semester End Theory Examination   Time: 2

hoursNB.   1.All

questions arecompulsory.

    2. Eachquestionhasinternaloptions.

    3. Use of simple calculator is allowed.

    4. Figurestotherightindicatemarks.

Q.1		**Attempt any Three out of 5**	**15**
	(a)	Unit1	
	(b)	Unit1	
	(c)	Unit1	
	(d)	Unit1	
	(e)	Unit1	
Q.2		**Attempt any Three out of 5**	**15**
	(a)	Unit2	
	(b)	Unit2	
	(c)	Unit2	
	(d)	Unit2	

	(e)	Unit2	
Q.3		**Attempt any Three out of 5**	**15**
	(a)	Unit3	
	(b)	Unit3	
	(c)	Unit3	
	(d)	Unit3	
	(e)	Unit3	
Q.4		**Attempt any Three out of 5** (Concept based)	**15**
	(a)	All units	
	(b)	All units	
	(c)	All units	
	(d)	All units	
	(e)	All units	

Paper Pattern for Practical (JBCUASTATSP101 and JBCUASTATSP201)

Practical Examination Pattern:

A.Internal Examination: 40%- 20 Marks

Particulars	Marks
Journal	5
Assignments/ project using Software	15
Total	20

B .Semester End Practical Examination:

Duration - These examinations shall be of **one and half hour** duration.

Duration :1 hour 30 minutes**Marks:**30

Particulars	Marks
There shall be **Three** COMPULSORY Questions of 10 marks each with internal choice**)**	30
Total	30

Overall Examination & Marks Distribution Pattern

Semester I and Semester II

COURSE	JBCUASTATS101 and JBCUASTATS201		
	Internal	External	Total
Theory	40	60	100
Practical	20	30	50

Workload:

Theory: 3 lectures per week per course.
Practicals: 3 lecture periods per course per week per batch.