



Vidya Prasarak Mandal's

K.G. Joshi College of Arts & N.G. Bedekar College of

Commerce

(Autonomous College)

(Affiliated to University of Mumbai)

Syllabus for SYBA

Program: B.A.

Specific Programme: STATISTICS-JBCUASTA

Year of Establishment: 1969

Year of Upgrading: 2022-2023

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.

PERI SALATA

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

Programme Duration: Three years (Entire B.A. Course)

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

Paper No	Paper Name	Semester	Course Nomenclature	Course Code	Credits
	_	ш	STATISTICAL METHODS- I	JBCUASTA301	2
п	STATISTICAL	COL	PRACTICALS Based on JBCUASTA301	JBCUASTP301	R
10	METHODS	IV	STATISTICAL METHODS- II	JBCUASTA401	2
12	E D F	6	PRACTICALS Based on JBCUASTA401	JBCUASTP401	
		STI	D. 1969	EROS	

DISTRIBUTION OF TOPICS AND CREDITS

(Credit Based Semester and Grading System with effect from the academic year 2022–2023)

Ge .

Programme-Specific Outcomes: Statistics-JBCUASTATS

6

PROGRAMME - SPECIFIC OUTCOMES

1 ...

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 and Applications 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 Acturial Science.
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.

(Credit Based Semester and Grading System with effect from the academic year 2022–2023)

Specific Programme: STATISTICS- JBCUASTATS

COURSE OUTCOMES

Semester III

Course Nomenclature: STATISTICALMETHODS-1

Course Code: JBCUASTA301

- 1. To make them aware how theory of probability increased the scope of statistical applications.
- 2. To understand how the large data can be approximated by certain probability distribution
- 3. To introduce the result of probability distribution and how it can be used in analyzing statistical data
- 4. To make them aware how probability can be used to test the reliability of statistical inferences

STD 1

EXISTING SYLLABUS AND PROPOSED SYLLABUS

<u>SYBA</u>

STATISTICS PAPER II SEMESTER III STATISTICALMETHODS-I

COURSE CODE:	IIILE	Credits: 2
JBCUASTA301	STATISTICALMETHODS-I	No. of lectures:-(45)
Unit I	Elementary Probability Theory:	15
/	Trial, random experiment, sample point and sample space.	~
	Definition of an event. Operation of events, mutually exclusive and	
	exhaustive events.	
1 (4	Classical (Mathematical) and Empirical definitions of Probability and	<u> </u>
1 ~	their properties. Axiomatic definition of probability.	1
1.1	Theorems on Addition and Multiplication of probabilities, pair wise.	1
1 - 1	(With proof)	- N
	Independence of events and mutual independence for three-events.	1
	Conditional probability, Bayes' theorem (with proof) and its	
- C	applications.	
I wit II	Concept of Discrete worden veriable and properties of its	15
Unit II	concept of Discrete random variable and properties of its	15
1	probability distribution.	1
· · · ·	Random variable. Definition and properties of probability	1
	distribution and cumulative distribution function of	1
N 1	discrete random variable.	f
	Raw and Central moments (definition only) and their relationship.	
	(up to order four with proof).	
	Concepts of Skewness and Kurtosis and their uses.	
	Expectation of a random variable. Theorems on Expectation and	
	Variance (with proof) Joint probability mass function of two discrete random variables.	
	Marginal and conditional distributions.	
	Covariance and Coefficient of Correlation. Independence of two random	
	variables.	
	Concept of Generating function, Moment Generating function, Cumulant	
	generating function, Probability generating function	

Unit III	Some Standard Discrete Distributions:	15
	Discrete Uniform, Binomial and Poisson distributions and derivation of	
	their mean and variance.	
	Recurrence relationship for probabilities of Binomial and Poisson	
	distributions and its applications (with derivations).	
	Poisson approximation to Binomial distribution (statement only).	
	Hyper geometric distribution, Derivation of its mean and variance.	
	Binomial approximation to hyper geometric distribution (statement only)	
	Fitting of Binomial and Poisson Distribution	(p)
	GS ALLEA A	-957

Practical:

COURSE CODE: TITLE Credit : 1 JBCUASTP301 No. of Lectures Per ц÷. week:3 Unit I 1.Probability I 2.Prabability II Unit II 1.Discrete Random Variable 2. Bivariate Probability Distribution 1.Binomial distribution Unit III 2. Poisson Distribution 3. Hyper geometric distribution 4. Fitting of Binomial and Poisson Distribution. 5. Practical using R **Basics of R** Binomial Poisson and Hyper geometric distribution Computation of probabilities using R Probability plots using R

Course Code: JBCUASTP301

<u>SYBA</u>

Semester IV

Course Nomenclature: STATISTICALMETHODS-II

Course Code: JBCUASTA401

- 1. How to apply continuous probability distribution to various field
- To make them understand the concept of testing of hypothesis and confidence interval
 To make them understand the concept of computing and interpreting result of inference statistics

4. To make them aware how statistical methods are used in various field.

STD. 19

EXISTING SYLLABUS AND PROPOSED SYLLABUS

6-0

<u>SYBA</u>

STATISTICS PAPER III

SEMESTER IV STATISTICALMETHODS-II

COURSE CODE:	TITLE	Credits: 2
JBCUASTA401	STATISTICALMETHODS-II	No. of
		lectures:-(45)
Unit I	Continuous random variable:	15
1 .	Concept of Continuous random variable and properties of its	
1 (4	probability distribution	N
1 4		1
1.2	Probability density function and cumulative distribution function.	1
1 - 1	Their graphical representation.	- N
	Expectation and variance of a random variable and its properties (with	· · · · ·
	proof). Measures of location, dispersion, skewness and kurtosis.	
	Raw and central moments (simple illustrations).	
	Concept of M.G.F. and C.G.F. and its properties.	
	- 11	
Unit II	Some Standard Continuous Distributions:	15
· · · ·	Uniform Exponential distribution (location and scale	1
	narameter) memory less property of Exponential distribution (without	1
\	proof)	1
<u> </u>	Cumulative distribution function derivations of mean median and	r i i i i i i i i i i i i i i i i i i i
	variance for Uniform and Exponential distributions	
	Normal distribution	
	Properties of Normal distribution/curve (without proof).	
	Use of Normal tables	
	Normal approximation to Binomial and Poisson distribution (statement	
	only)	
	Fitting of Normal distribution	
Unit III	Elementary theory of Estimation and Testing of hypothesis:	15
	Sample from a distribution	
	Concept of a statistic, estimate and its sampling distribution, Parameter	

and its estimator. Unbiasedness: Concept of bias and standard error of an estimator. Central Limit theorem (Statement only- without proof). Sampling distribution of sample means and sample proportion. (For large sample only) Standard errors of sample mean and sample proportion. Point estimate and interval estimate of single mean, single proportion from sample of large size. Statistical tests: Concept of hypothesis Null and alternative hypothesis, Types of errors, Critical region, Level of significance. Power of the test Large sample tests (using central limit theorem, if necessary) For testing specified value of population mean For testing specified value in difference of two means For testing specified value of population proportion For testing specified value of difference of population proportion Concept of p value

TD 19

PRACTICAL

Course Code: JBCUASTP401

COURSE CODE:	TITLE	Credit 1
JBCUASTP401		No. of lectures
		Per week :3
Unit I	Continuous Random Variable	
	COLLEGA	. 0
Unit II 🛛 🥒	1. Uniform, Exponential Distribution	
	2.Normal Distribution	\sim
/	3. Application of central limit theorem and normal	
	approximation	1 2
/ ~	4. Fitting of Normal Distribution	Y N
1 65 6		2
Unit III	1.Testing of Hypothesis	121
- 1 <i>U</i> .	2.Large sample test	
1 2 2	3. Practical using R	
1 - 0	Uniform and Exponential distribution	E. Y 1
	Normal Distribution	4
4	Testing of Hypothesis	
	Sampling Distribution	~
	Large sample tests	

REFERENCES:

- 1. Medhi J.: Statistical Methods, An Introductory Text, Second Edition, New Age International Ltd.
- 2. Agarwal B.L.: Basic Statistics, New Age International Ltd.
- 3. Spiegel M.R.: Theory and Problems of Statistics, Schaum's Publications series. Tata McGraw-Hill.
- 4. DavidS.: Elementary Probability, Cambridge University Press.
- 5. Hoel P.G.: Introduction to Mathematical Statistics, Asia Publishing House.
- 6. Hogg R.V. and Tannis E.P. : Probability and Statistical inference. McMillan Publishing Co.Inc.
- 7. Pitan Jim: Probability, Narosa Publishing House.
- 8. Goon A.M., Gupta M.K., Das gupta B.: Fundamentals of Statistics, Volume II : The World Press Private Limited, Calcutta.
- 9. A M Mood, F.A. Graybill, D C Boyes: Introduction to the theory of statistics
- 10. S.C. Gupta, V.K. Kapoor: Fundamentals of Mathematical Statistics: Eighth Edition; Sultan Chand &Sons.
- 11. J.N. Kapur, H.C. Saxena: Mathematical Statistics; Fifteenth Edition; S. Chand & Company Ltd.

Modality of Assessment

A. Internal Assessment : 40% - 40 Marks

Serial No.	Evaluation Type	Marks	
1	Written Test	20	
2	Assignment/Project/ SLE/ Case Study	15	
3	Class Participation	05	R
10	D' - OTotal: EGA	40	0
S			

B. External Examination: 60%- 60 Marks

Semester End Theory Examination

Time: 2 hours

- NB. 1. All questions are compulsory.
 - 2. Each question has internal options.
 - 3. Figures to the right indicate marks.

1	Attempt any three out of four / five questions. (Unit I)	15
	a)	1
Ν.	b)	1
1	c)	
\sim	d)	
	e)	
2	Attempt any three out of four / five questions. (Unit II)	15
	a) 5577 1967	
	b)	
	c)	
	d)	
	e)	
3	Attempt any three out of four / five questions. (Unit III)	15

	a)	
	b)	
	c)	
	d)	
	e)	
4	Attempt any three out of four / five questions. (All three Units)	15
	a) b) c)	(R)
	d)i e)	
	MM (()) B	
	ESTD. 1969	

Paper Pattern for Practical (JBCUASTP301 and JBCUASTP401)

Practical Examination Pattern:

A. Internal Examination: 40%-20 Wrarks				
Particulars	Marks			
Journal	5			
Assignments using Software R	15			
Total	20			
an anterca	1. 1. 1.			

A. Internal Examination: 40%-20 Marks

B. Semester End Practical Examination:

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

Duration : 1 hour 30 minutes	larks:30
Particulars	Marks
There shall be Three COMPULSORY Questions of	30
10 marks each with internal choice)	\leq
Total	30

Overall Examination & Marks Distribution Pattern Semester III and Semester IV

COURSE	INTERNAL	EXTERNAL	TOTAL
THEORY JBCUASTA301 JBCUASTA401	40	60	100
PRACTICAL JBCUASTP301 JBCUASTP401	20	30	50
- C.C.	Th 40	63 /	

Workload:

Theory: 3 lectures per week per course.

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

**_*_*_

I.U.