

**Sant Gadge Baba Amravati University, Amravati**

**Faculty of Science and Technology**

**Programme : B.Sc. ( Statistics )**

**POs**

At the time of graduation, Students will be able to

- Understand and apply the fundamental principles, concepts and methods in key areas of science and multidisciplinary fields
- Demonstrate problem solving, analytical and logical skills to provide solutions for the scientific requirements.
- Develop the critical thinking with scientific temper.
- Communicate the subject effectively.
- Understand the importance and judicious use of technology for the sustainable growth of mankind in synergy with nature.
- Understand the professional, ethical and social responsibilities.
- Enhance the research culture and uphold the scientific integrity and objectivity.
- Engage in continuous reflective learning in the context of technological and scientific advancement.

**PSOs:**

Upon completion of the programme, students would be able to

1. recall basic facts about statistics and should be able to display knowledge of conventions such as notations, terminology.
2. get adequate exposure to global and local concerns that explore them many aspects of mathematical sciences.
3. Be equipped with statistical modeling ability, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
4. apply their skills and knowledge that is translate information presented verbally into statistical form, select and use appropriate statistical formulae or techniques in order to process the information and draw the relevant conclusion.
5. develop a positive attitude towards statistics as an interesting and valuable subject of study.
6. acquire basic knowledge of diagrammatic & graphical representation of Data with and without software.

**Employability Potential of the programme:**

The programme offers many such scenarios where one

statistician can work. By completing this programme, students

are able to:

- Analyse the things
- Understand patterns in them by asking different questions to it
- Compete with the current demand of field
- To solve a specific problem

This “skill” is a key requirement for many analysis type jobs like,

1. Statisticians
2. Business Analyst
3. Mathematician
4. Professor
5. Risk Analyst
6. Data Analyst
7. Content Analyst
8. Statistic Trainer

Besides all these students can work in various banking sector.

Students can also work in government sector :

- Indian statistical services (ISS)
- Staff selection services(SSC)
- Reserve Bank of India (Junior statistical officer) By taking the course, students are able to:

- Analyse numbers
- Understand patterns in them by asking different questions to it
- Go about it in a systematic fashion
- To solve a specific problem

This “skill” is a key requirement for many analysis type jobs.

### **Career Options::**

**Data Analytics #1:** Students could get into any Analytics firm, and can assist customers in getting patterns out of data.

**Data Analytics #2:** For Data Analytics in banks, there can be algorithms developed for fraud deduction using the digital imprints. This requires analysing large amounts of data. That could a career choice - Digital Forensics.

**Market Research:** For doing a survey for customer expectations and behaviours, the data pours in, from online and offline channels - how students draw meaningful, actionable conclusions? Students need to use the statistical methods learnt. So, Market Research in a MR firm or a corporate entity can be a large area of focus.

**Software Programmer:** With analytical bent of mind, Students could take up a software programming job. It might not leverage learning but will leverage the “bent of mind” cultivated out of the education.

Students could focus on areas like: Visual Representation of Data (Tableau, Quilk, PowerBI), Data Reporting (Crystal Reports) - that are aligned to the core skills.

**Government Statistician:** Our country requires a lot of econometric and statistical data for its running. Acreage, Yields, Health Statistics and the like. Bright young idealistic people are required to run our country too.

Students could be a District Statistical Officer, who are in charge of collecting information from the district, analysing it and sharing with the State Authorities.

**B.A/B.Sc. II Year Semester III ( CBCS )**

**Statistics Syllabus**

**Name of the paper : Statistical Inference and Sampling Distributions**

**No. of theory classes : 6 per week**

**Total credits – 6 credits**

**Unit I**

Statistical inference – Hypothesis, Problem of Hypothesis, Simple hypothesis, Composite hypothesis, Null hypothesis, Alternative hypothesis, One tail and two tail test, Procedure of testing of hypothesis

Estimation theory – Meaning, Estimator and estimate, Characteristics of good estimator, ( 12 Periods )

**Unit II**

Sampling Distribution – Chisquare distribution, Derivation of PDF of chisquare distribution, MGF and CGF, Additive property of Chisquare variates, Students t distribution, Derivation of students t distribution, Confidential limit for  $\mu$ , Constants of the t distribution, limiting form of the t distribution( 12 Periods )

**Unit III**

Chisquare test, Conditions for the validity of chisquare test, Degrees of freedom, Test of significance based on chisquare distribution, Test of significance based on t distribution ( 12 Periods )

**Unit IV**

Sampling distribution – Fisher's t distribution, Derivation of its PDF, Relation between Student's t and Fisher's t distribution, F Statistic, PDF of F distribution, Constants of F distribution, Relation between t and F distribution, Test of significance based on F distribution ( 12 Periods )

**Unit V**

Fisher's Z distribution, Large sample test, Test of significance based on large sample tests, Test for single proportion, difference of proportions, single mean, difference of mean, Bivariate normal probability distribution ( 12 Period )

**Unit VI Skill enhancement Course**

Introduction of R software, Basic commands of R, Addition, Subtraction, Division, Multiplication, Arithmetic Mean, Variance, Standard Deviations, Moments, Central Moments, Absolute Moments ( 12 Periods )

Examination Duration : 3 Hrs.

Theory marks : Theory + MCQ : 80 + Internal : 20 = 100

**Books Recomedoned**

- 1] **Fundamentals of statistics ( Vol. I ) by Goon A. M, Gupta M.K, Dasgupta B, World Press ( Pvt Ltd) Kolkata**
- 2] **Fundamental of Mathematical Statistics- V.K. Kapoor & S.C. Gupta Sultan Chand & Sons New Delhi**
- 3] **New Mathematical Statistics – Sanjay Arora & Bansilal, Satya Prakashan New Delhi**
- 4] **Testing of statistical hypothesis – E.L. Lehmann, J.P. Romano Springer Link**
- 5] **Statistical inference – M. Rajgopalan,P. Dhanavanthan PHI Learning Private Ltd New Delhi**
- 5] **R for beginners – Sandip Rakshit McGraw Hill Education Pvt Ltd.**
- 6] **The book of R: A first course in programming and Statistics Tilman. M. Davies**

**Course Outcome ( CO )**

**Upon completion of this course successfully, students would be able to**

1. Develop inference testing knowledge of the student
2. Develop distribution knowledge of the student.
3. Testing knowledge by using various statistical test is developed.
4. Apply concepts regarding statistical analysis.
5. Elaborative concept of statistical analysis is being developed.
6. CO for skill enhancement Course : Computer knowledge of the students is developed.

**B.Sc. II Semester III Practical Subject : STATISTICS**

**Practical credits : 2.25**

**Cos**

**Upon completion of this course successfully, students would be able to solve/perform/demonstrate the following**

**List of Practicals**

- 1] Chisquare test for population variance
- 2] Chisquare test for goodness of fit
- 3] Chisquare test for independence of attributes
- 4] t test for testing single mean
- 5] t test for testing difference of means.
- 6] Paired t test for testing difference of means
- 7] Large sample test for single proportion
- 8] Large sample test for difference of proportions
- 11] Addition by using R
- 12] Subtraction by using R
- 13] Computation of various statistical constants by using R.

Practical examination duration : 3 Hrs      Practical total marks : Internal : 25 + External : 25 = 50

**B.A/B.Sc. II Year Semester IV ( CBCS )****Statistics Syllabus****Name of the paper : Applied Statistics****No. of theory classes : 6 per week****Total credits – 6 credits****Unit I**

Index Number – Introduction, Construction of Index Number, Simple Aggregate method, Weighted Aggregate method, Laspeyre, Paasche, Marshall Edgeworth, Drobish Bowley, Fishers Index Numbers, Price relative Quantity Relative, Value Relative, Criterion for good index number ( 12 periods )

**Unit II**

Time Series – Introduction, Components of time series, Models used in time series, Measurement of trend – method of semi average, moving average method, method of list squares, Measurement of seasonal variation – Method of simple average, Ratio to trend method, Ratio to moving average method ( 12 Period )

**Unit III**

Vital Statistics – Introduction, Methods of obtaining vital statistics, Measurement of population, Measurement of mortality, Measurement of fertility, Life tables – Assumptions, Discriptions and construction of life table, Uses of life table( 12 period )

**Unit IV**

Statistical Quality Control – Introduction, Definition, Process and product control,  $3\sigma$  control limits, Control chart for variables  $\bar{X}$  and R chart, ( 12 periods )

**Unit V**

Control chart for attributes – p chart, d chart, c chart, Sapling inspection plan for attributes- Definitions of various terms, Single sampling plan, Double sampling plan (12 periods)

**Unit VI Skill Enhancement Course**

Construction of various statistical graphs by using R softwares, Bar diagram, subdivided bar diagram, Histogram, Pie diagram, Box plot, skewness, kurtosis ( 14 Periods )

Examination duration : 3 Hrs

Theory marks : Theory + MCQ : 80 + Internal : 20 = 100

**Books Recommended**

- 1] **Fundamentals of statistics ( Vol. I ) by Goon A. M, Gupta M.K, Dasgupta B, World Press ( Pvt Ltd) Kolkata**
- 2] **Fundamental of Applied Statistics- V.K. Kapoor & S.C. Gupta Sultan Chand & Sons New Delhi**
- 3] **A text book on index numbers and time series – A. K. Sharma Discovery publishing Pvt Ltd New Delhi**
- 4] **A practical introduction of Index Numbers – Jeff Ralph, Rob O'Neill, Joe Winton Wiley India Pvt Ltd New Delhi**
- 5] **Statistics: Theory and Practice – D. Bhattacharya, S. Roychowdhury U. N Dhur and Sons Pvt Ltd**
- 6] **Vital Statistics An introduction to health science statistics – Stephen Mckenzie**
- 7] **R for everyone Advanced analytics and graphics – Jared P. Lander Pearson education Pvt Ltd Bengaluru**

**Course Outcome ( CO )**

Upon completion of this course successfully, students would be able to

1. Knowledge about inflationary and deflationary tendency is developed.
2. Economic and business knowledge of the student is developed.
3. Develops laws of human mortality knowledge of the student.
4. Gaining the knowledge of use of statistical concept in the field of industry.
5. Advance knowledge of use of statistical concept in the field of industry is being developed.
6. CO for skill enhancement Course : Advance computer knowledge of the students is developed.

**B.Sc. II Semester IV Practical Subject : STATISTICS****Practical credits : 2.25****Cos**

Upon completion of this course successfully, students would be able to solve/perform/demonstrate the following

**List of Practicals**

- 1] Construction of various index numbers
- 2] Time and factor reversal test
- 3] Measurement of trend by method of semiaverage
- 4] Measurement of trend by method of moving average
- 5] Measurement of trend by method of least square
- 6] Measurement of seasonal variation by method of simple average
- 7] Measurement of seasonal variation by ratio to trend method
- 8] Measurement of seasonal variation by ratio to moving average method
- 9] Control chart for mean and range.
- 10] Construction of p chart, d chart, c chart

- 12] Construction of Various graphs by using R analytics
- 13] Computation of skewness and kurtosis coefficients by R

Practical examination duration : 3 Hrs      Practical total marks : Internal : 25 + External : 25 = 50

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