SANT GADGE BABA AMRAVATI UNIVERSITY , AMRAVATI
CURRICULUM AS PER NEP-2020
FACULTY OF SCIENCE AND TECHNOLOGY
Three Years Degree Course
SUBJECT Major: STATISTICS
B.Sc. FIRST YEAR
SEMESTER-I

Program outcomes

PO1:DisciplinaryKnowledge:
Demonstrate comprehensive knowledge of the disciplines that form a part of agraduate programme. Execute strong theoretical and practical understanding generated from the specific graduate programme in the area of work.

PO2 :Critical Thinking and Problem solving:
Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.

PO3: Social competence:
Display the understanding, behavioural skills needed for successful social adaptation, workin groups,exhibits thoughts and ideas effectively in writing and orally.

PO4 :Research-related skills and Scientific temper:
Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research

PO5: Personal and professional competence:
Performing dependently and also collaboratively as a part of team to meet definedobjectives and carry out work across interdisciplinary fields. Execute inter personal relationships, self-motivation and adaptability skills and commit to professional ethics

PO6 :Effective Citizenship and Ethics:
Demonstrate empathetic social concern and equity centred national development ,and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.

PO7 Environment and Sustainability:
Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development

PO8: Self-directed and Life-long learning:
Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

Program Specific Outcomes:

At the end of the program, students are able to:

1. Understand the elementary techniques of data analysis such as, graphical andnumerical.

2. Get the knowledge of different concepts, principles, methodologies and

 tools (skills) of Statistics.

3. Collect, represent graphically, analyze and interpret data /information by using appropriate Statistical tools.

4. Identify and solve a wide range of problems in real life /industry related to Statistics.

5. Apply various measures of central tendency and dispersion and hence enable them to infer about the nature and characteristics of a particular data set.

6. Understand the basic concepts of probability.

7. Understand the concept of random variable, univariate probability distribution, expectation and moments of probability distribution.

8. Understand bivariate probability distributions and their applications in real life.

9. Summarize, analyze and interpret data through various techniques learnt by manual calculations as well as by using MS-Excel.

B.Sc. First Year Semester I
Major / Minor - Statistics

Vertical No.	Vertical Name	Typeof Corse	Course Code	Course name	Credits	Workload Perweek	Max Marks
a	Major / Minor	Theory-1	1320101	Descriptive Statistics	2	2	30

Course Objectives	1.To know the importance of Statistics in various field 2.To learn the basic statistical methods 3.To understand meaning of data and their types
Course Outcomes	Students will be able to- 1. Identify the appropriate Scale of measurement for a particular characteristic under study. 2. Get the knowledge of various statistical organizations working in India. 3. Calculate and describe data through measures of central tendency and dispersion. 4. Interpret the utilization of measures of central tendency and dispersion to compare group results.

Units	Contents	Workload Allotted
I	Meaning of statistics as Science, its importance and limitations. Scope of Statistics : In the field of Industry, Biological Sciences,Medical Sciences, Agricultural Sciences, Management Sciences,Educationand Psychology. Statistical Organizations in India and their functions :CSO, NSSO, IIPS, ISI.	8 hrs
II	Types of Data : Qualitative and Quantitative data, nominal and ordinal data, discrete and continuous data, frequency and non-frequency data. Primary and Secondary Data and its major sources. Types of Scales : Nominal, ordinal, ratio and interval. Classification: Rules of Classification and its types.	7 hrs
III	Frequency Distribution: Discrete and continuous frequency distribution, cumulative frequency distribution, ogive curves. Central Tendency : It's concept and its measures (A.M., weightedA.M., median, mode) with its merits and demerits. Properties of A.M., relation between mean, mode and median, Partition values :Quartiles, deciles and percentiles	8 hrs
IV	Measures of dispersion: Range, Quartile deviation, mean deviation and its coefficients. Standard deviation, root mean square deviation, variance and various formulae for calculating variance, C.V. Moments : Raw moments and central moments with its relationship, effect of change of origin and scale on moments	7 hrs

References

1. Brase C.H., Brace C.P (2016). Understandable Statistics, Concepts and Methods, 12th Edition, Cengage Learning.

2. Freedman D., Pisani R., Purves R. (2007). Statistics, 4[th]Edition, W.W. Nortonand Company.

3. Freund J.E. (1977) .Modern Elementary Statistics .4th Edition, Prentice Hall of India Private Limited, NewDelhi.

4. Goon A.M., Gupta,M.K .and Dasgupta,B .(1983). Fundamentals of Statistics, Vol.1. 6th Revised Edition, The World Press Pvt. Ltd.,Calcutta.

5. Gupta S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics. 8th Edition, Sultan Chand and Sons Publishers,NewDelhi.

6. Gupta S. C. and Kapoor, V. K. (1997) .Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand and Sons Publishers, New Delhi.

7. Heumann C., Schomaker, M., Shalabh (2016). Introduction to Statistics and Data Analysis. 1st Edition, Springer, Germany.

8. Moore D. S., Notz W .I. ,Fligner M. A. (2013).TheBasicPracticeofStatistics,6[th]Edition, Ruth Baruth.

9. Utts J.M., Heckard R. F. (2010). Mind On Statistics, 4th Edition, Richard Stratton Publisher.

10. Zealure C. H. (1998).Fundamentals of DescriptiveStatistics.1stEdition,Routledge, U.K.(TaylorandFrancisGroup).

Vertical No.	Vertical Name	Type of Corse	Course Code	Course Name	Credits	Work load Per week	Max Marks
a	Major / Minor	Practical-1	13201P1	Practicals based on 1320101	02	04	25

Course Outcomes	At the end of the course students are able to
	    1. Use various graphical and diagrammatic techniques to represent statistical data and interpret.
	    2. Prepare the frequency distribution and present it graphically.
	    3. Analyze data pertaining to discrete variables and to interpret the results.
	    4. Compute various measures of central tendency , dispersion.	

Units	Contents	Workload Allotted
	1. Presentation of data by frequency table. 2. Calculation of arithmetic mean, median and mode for ungrouped frequency distributions. 3. Calculation of arithmetic mean, median and mode for grouped frequency distributions. 4. Calculations of partition values as quartiles deciles and percentiles for ungrouped data 5. Calculations of partition values as quartiles, deciles and percentiles for grouped data 6. Calculation of range, mean deviation and quartile deviation with its coefficients. 7. Calculation of standard deviation and coefficient of variation for grouped data. 8. Calculation of standard deviation and co efficient of variation for ungrouped data. 9. Problems on calculations of moments (up to third order) 10. Computation of covariance between two variables	4 hrs per week

Vertical No.	Vertical Name	Type of Corse	Course Code	Coursename	Credits	Workload Perweek	Max Marks
c	Generic/ open elective	Theory-1	13201G1	Statistics in social and behavioral Sciences (Useful for competitive examination)	02	02	30

Course Objectives	The objective of this course is to understand basic knowledge of statistics that will be useful to apply in competitive Exams.
Course Outcomes	At the end of the course, students are able to… 1. Identify the appropriate scale of measurement for a particular characteristic under study. 2. Represent data using appropriate diagram/graph. 3. Calculate and describe data through various frequency distribution 4. After completing of the course student are prepared for basic knowledge of competitive examination.

Units	Contents	Workload Allotted
I	Meaning of statistics as Science, its importance and limitations.Scope of Statistics : In the field of Industry, Biological Sciences,Medical Sciences, Agricultural Sciences, Management Sciences, Education and Psychology.	8 hrs
II	Statistical Organizations in India and their functions :CSO, NSSO, IIPS, ISI. Types of Data: Qualitative and Quantitative data, nominal and ordinal data, discrete and continuous data, frequency and non-Frequency data.	7 hrs
III	Primary and Secondary Data and its major sources, Time series data, cross sectional data, Classification: Rules Of Classification and its types. Tabulation: Meaning of Tabulation & its types, construction of tables with one or more factors	8 hrs
IV	Frequency Distribution: Discrete and continuous frequency distribution, cumulative frequency distribution, Ogive curves. Central Tendancy : It's concept and its measures (A.M., weighted A.M., median, mode, G.M., H.M.) with its merits and demerits.	7 hrs

Reference

1.Goon A.M., Gupta,M.K .and Dasgupta,B .(1983). Fundamentals of Statistics, Vol.1. 6th Revised Edition, The World Press Pvt. Ltd.,Calcutta.

2. Gupta S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics. 8th Edition, Sultan Chand and Sons Publishers,NewDelhi.

3. Gupta S. C. and Kapoor, V. K. (1997) .Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand and Sons Publishers, New Delhi.

4. Heumann C., Schomaker, M., Shalabh (2016). Introduction to Statistics and Data Analysis. 1st Edition, Springer, Germany.

Vertical No.	Vertical Name	Type of Corse	Course Code	Course name	Credits	Workload Perweek	Max Marks
c	Generic/ Open elective	Theory-2	13201G2	Statistics for competitive examination	02	02	30

Course Objectives	The objective of this course is to make aware the students basic measures of central tendencies and dispersion and to understand basic concept of probability which will be useful for Staff Selection Commission Combined Graduate level examination
Course Outcomes	At the end of the course students are able to ….. 1. Calculate and describe data through measures of central tendency and dispersion. 2. Compute the variability between series through their measures. 3. Understand basic concept of probability 4. At the end of the course student will able to acquire basic knowledge of the staff selection commission combined graduate level exam.

Units	Contents	Workload Allotted
I	Properties of A.M (only formula and numerical problems)., relation between mean, mode and median, relation between A.M., H.M., G.M. Partition values : Quartiles, deciles and percentiles. Simple numerical problems	8 hrs
II	Range, Quartile deviation, mean deviation and its coefficients. Standard deviation, root mean square deviation, variance and various formulae for calculating variance, C.V. Simple numerical problems	7 hrs
III	Permutation and combination theory, Binomial theorem. Algebra of Events. Simple problems. Concept of probability, Definitions of – Random experiment, Trial and Events, Exhaustive, Favourable, Equally likely event, Mutually exclusive event, Independent event & complementary events.. simple numerical problems	8 hrs
IV	Classical and Statistical Probability with its limits, simple numerical problems on probability, Sample space, discrete sample space. Axiomatic probability, simple theorems on probability with additive and multiplicative law of probability. Conditional probability, Independent events. Simple numerical problems.	7 hrs

Reference

1.Goon A.M., Gupta,M.K .and Dasgupta,B .(1983). Fundamentals of Statistics, Vol.1. 6th Revised Edition, The World Press Pvt. Ltd.,Calcutta.

2. Gupta S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics. 8th Edition, Sultan Chand and Sons Publishers,NewDelhi.

3. Gupta S. C. and Kapoor, V. K. (1997) .Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand and Sons Publishers, New Delhi.

4. Heumann C., Schomaker, M., Shalabh (2016). Introduction to Statistics and Data Analysis. 1st Edition, Springer, Germany.

Vertical No.	Vertical Name	TypeofCorse	Course Code	Course name	Credits	Workload Perweek	Max Marks
d	SEC	Lab/Practical-3	13201P3	Skill based Practicals through MS Excel	02	04	25

Course Outcomes	At the end of the course students are able to ….. 1. Calculate and describe data through measures of central tendency and dispersion. 2. Compute the variability between series through their measures. 3. Understand basic concept of probability 4. Interpret the utilization of measures of central tendency and dispersion to compare group results.

Units	Contents	Workload Allotted
I	Advanced problems to be performed through MS Excel 1. Calculation of arithmetic mean, median and mode for grouped and ungrouped frequency distributions. 2. Establish the relation between various measures through graphs 3. Calculations of partition values as quartiles , deciles and percentiles. 4. Calculation of range, mean deviation and quartile deviation with its coefficients. 5. Calculation of standard deviation and coefficient of variation for grouped and ungrouped data. 6. Problems on calculations of moments (up to third order) 7. Computation of Standard Deviation and coefficient of Variation.	4 hrs/week

References

1. Frag Curtis (2013). Step by Step Microsoft Excel 2013, MSPress.

2. Frye Curtis D. (2007). Step by step Microsoft Office Excel 2007, Microsoft Press.

3. John Walkenbach (2013). 101 Excel 2013 Tips, Tricks and Times evers,Wiley.

4. Kumar Bittu (2013). Microsoft Office 2010, V & S Publishers.

5. Salkind Neil J. and Frey Bruce B. (2021). Statistics for people who (Think They) Hate Statistics, Using MS-Excel, Sage Publications.

6. Sanjay Saxena (2007).M S Office 2000 for everyone, Vikas Publishing House.

Vertical No.	Vertical Name	Typeof Corse	Course Code	Course name	Credits	Workload Perweek	Max Marks
e	IKS Generic	Theory-	13201IKS	IKS Generic Statistics	2	2	30

Units	Contents	Workload Allotted
Course Objectives	1. To understand the brief history of statistics 2. To know the importance of statistics in government organizations 3. To understand the basic knowledge of statistics which will be useful for the competitive examination 4. To improve the statistical reasoning of ability	
Course Outcomes	Students will be able to- 1. Student will able to understand the brief history of statistics of India pre independence and after independence 2. Student improve their knowledge about application of statistics in different government organization 3. Student will able to understand the knowledge of vedic mathematics 4. Statistical reasoning of student will get improved through the understanding.	
Units	Contents	Workload Allotted
I	**Evolution of statistics in India** : Importance of Statistics in ancient India, Brief history statistical system in ancient India, Statistical system in pre independence period, Statistical system after independence, Present statistical system in India, Central statistical Organization (CSO), National Sample Survey Organization, Indian Institute of Population Science, International Institute of Population Science	8 hrs

II	**Statistics in Government Organizations** : Use of Statistics in central and state government i.e In five year plan, agricultural development, health program, socio economic development of India, Industrial development, family welfare. Statistics in Indian Research Institute	7 Hrs
III	**Indian Logic :** Role of statistics in understanding Artificial Intelligence, Knowledge of data evaluation, Relevance of statistical methodology in the context of AI development, AI concerning methodological development , planning and designing of study, Assessment of data quality and data collection, Integration of statistical aspect in to AI teaching	8 Hrs
IV	**Statistical reasoning** : Analytical evidence and empirical evidence, Designing research, Develop an understanding of data using graph in statistics, Statistical tools used in the scientific methods, Statistical reasoning process in data	7 Hrs

References
1] J. K. Ghosh, P Maiti, T. J. Rao, B. K. Sinha(1999) : Evolutionary statistics in India
International Statistical Review , 67, 1, 13-34.
2] Karr A. F, Sanil A. P, Banks D. L (2006) : Data Quality : A Statistical Perspective Stat methodol 3(2),137 – 173.
3] Miller T (2019) : Explanation in Artificial Intelligence : In sight from the social sciences Artif Intell 267, 1-38
4] Ganeri, J. (2003). Ancient Indian Logic As A Theory Of Case-Based Reasoning , Journal of Indian Philosophy, 31(1), 33–45.
5] Joan Garfield (2017) : The challenge of developing statistical reasoning Journal of statistical education volume 10 issue 3.

Vertical No.	Vertical Name	Typeof Corse	Course Code	Cours ename	Credits	Workload Perweek	Max Marks
b	Minor/ Major	Theory-2	1320202	Probability Theory	02	02	30

Course Objectives	1. The objective of the course is to understand the concept of probability. 2. Understand the concept of random variables in the real life situation 3. The concepts of bivariate probability distributions with its applications in statistics can be easily understood.
Course Outcomes	At the end of the course students are able to understand 1. Understand the basic concepts of random experiment, random variable, probability. 2. Use concept of probability in real life situations. 3. Compute probability of real-life events. 4. Identify the nature of data using moments. 5. Check the dependency of events using probability or conditional probability.

Units	Contents	Workload Allotted
I	Permutation and combination theory, Binomial theorem. Algebra of Events. Concept of probability, Definitions of– Random experiment, Trial and Events, Exhaustive, Favorable, Equally likely event, Mutually exclusive event, Independent event & complementary events. Classical and Statistical Probability with its limits, simple numerical problems on probability. Sample space, discrete sample space. Axiomatic probability, simple theorems on probability with additive and multiplicative law nof probability.Conditional probability,Independentevents.	8 hrs
II	Concept of random variable & its illustration by examples. Discrete and Continuous random variables. Probability distribution of a r.v., discrete and continuous distribution function, properties of distribution functions, simple numerical Problems on probability distribution.	7 hrs
III	Mathematics expectations and its properties. Numerical problems on expectations. Expectation of discrete and continuous r.v., expectation of a linear combination of r.v., Addition and multiplication theorem of expectation variance of a r.v. covariance and its properties. Cumulant generating function, moment generating function, relation between c.g.f and m.g.f., properties of m.g.f. Properties of Cumulant generating function.	8 hrs
IV	Bivariate probability distributions (discrete and continuous), joint, marginal and conditional probability mass functions. Marginal distribution functions, joint density function, marginal and conditional density functions. Stochastic Independence, Numerical problems on bivariate, marginal and conditional functions.	7 hrs

References

1. Agarwal B.L. (2003). Programmed Statistics, 2nd edition ,New Age International Publishers, NewDelhi.

2. Brase C.H., Brace C.P (2016). Understandable Statistics, Concepts and Methods, 12thEdition, Cengage Learning.

3. Freedman D., Pisani R. ,Purves R. (2007). Statistics, 4th Edition, W. W. Norton and Company.

4. Gupta S. C. and Kapoor, V .K. (1983). Fundamentals of Mathematical Statistics, 8thEdition, Sultan Chand and Sons Publishers, NewDelhi.

5. Hoel P .G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, NewYork.

6. Hogg R. V. and Craig R. G. (1989). Introduction to Mathematical Statistics, Mac Millan Publishing Co., NewYork.

7. Mayer P. (1972). Introductory Probability and Statistical Applications, Addison Wesley Publishing Co., London.

8. Mood A. M. ,Graybill ,F .A. and Boes D. C. (1974). Introductiont the Theory of Statistics, 3rd Edition, Mc Graw Hill Book Company.

9. Moore D. S .,Notz W. I. ,Fligner M. A .(2013). The Basic Practice of Statistics, 6th Edition, RuthBaruth.

10. Rao B L S Prakasa (2008). First Course in Probability and Statistics, New Age International Publishers, NewDelhi

11. Rohatgi V. K. and Saleh, A. K. Md. E. (2015). An Introductiont o Probability and Statistics, John Wiley & Sons, Inc., Canada.

12. Ross S. (2002). A First Course in Probability, 6th Edition, Pearson Education, Inc. & Dorling Kindersley Publishing,Inc.

13. Utts J. M. , Heckard R. F. (2010). Mind On Statistics, 4thEdition, Richard Stratton Publisher.

14. Freund J. E. (1977). Modern Elementary Statistics. 4th Edition, Prentice Hall of India Private Limited, New Delhi.

15. Goon A. M. ,Gupta ,M .K .and Dasgupta ,B. (1983). Fundamentals of Statistics, Vol.1, 6th Revised Edition, The World Press Pvt. Ltd., Calcutta.

16. Gupta S. C. and Kapoor ,V. K. (1983). Fundamentals of Mathematical Statistics, 8th Edition, Sultan Chand and Sons Publishers ,New Delhi.

17. Gupta S. P. (2014) Statistical Methods, 43rd Edition, Sultan Chandand Sons,

23, Daryaganj, New Delhi 110002.

18. Montgomery D. C, Peck, E. A. ,Vining, G. G. (2006) .Introduction to Linear
    Regression Analysis, John Wiley and Sons

19. Moore D. S., Notz W. I., Fligner M. A. (2013).The Basic Practice of Statistics, 6th
    Edition, Ruth Baruth.

Vertical No.	Vertical Name	Type of Corse	Course Code	Course Name	Credits	Workload Perweek	Max Marks
a	Major / Minor	Practical-2	13202P2	Practical based on 1320202	02	04	25

Course Outcomes	At the end of the course students are able to 1. Use various types of probabilities 2. Prepare the probability distribution. 3. Analyze data pertaining to discrete variables and to interpret the results. 4. Compute various probability distribution.

Units	Contents	Workload Allotted
	1. Evaluation of simple probabilities 2. Evaluation of probabilities using addition theorem-1 3. Evaluation of probabilities using addition theorem- 2 4.Evaluation of probabilities using multiplication theorem.-1 5. Evaluation of probabilities using multiplication theorem.-2 6. Problems on conditional probability. 7.Determination of probability distribution of discrete random variables. 8. Determination of mathematical expectation and variance for discrete r.v. 9. Determination of mathematical expectation and variance for continuous r.v. 10. Computation of Marginal , Joint and conditional probability functions for descrete random variable 11. Computation of Marginal , Joint and conditional probability functions for continuous random variable	4 hrs per week

Vertical No.	Vertical Name	Type of Corse	Course Code	Course name	Credits	Workload Perweek	Max Marks
c	Generic/ Open elective	Theory-3	13202G3	Business Analytics I (Useful for marketing strategies)	02	02	30

Course Objectives	This course is designed to understand the basic knowledge used in business analytics. Concepts used in measuring the relationship between two variables.	
Course Outcomes	At the end of syllabus the student is able to do….. 1.Understand the concept of relationships between two variables. 2.Understand the concept used in the business analytics 3.Testing of association between two variables	
Units	Contents	Workload Allotted
I	Concept of correlation, scatter diagram and positive and negative correlation. Karl Pearson's coefficient of correlation, properties of Correlation coefficient, coefficient of determination. Simple problems	8 hrs
II	Rank correlation– Spearman's rank correlation coefficient. Intraclass Correlation coefficient. Simple problems based on Spearman rank correlation coefficient.	7 hrs
III	Index numbers: Introduction of Index Numbers, Definition and meaning, Problems in the construction of index numbers, Simple and weighted price index numbers, Lapeyres price index numbers, Paasches price index numbers, Consumer price index number	8 hrs
IV	Definition of attribute, notations, classes and class frequencies, order of class and class frequencies. Consistency of data, conditions for consistency of data, simple numerical problems. Independence of attributes, criteria for independence. Association of attributes, Yule's coefficient of association, coefficient of colligation, simple problems	7 hrs

References
1. Brase C. H., Brace C.P (2016). Understandable Statistics, Concepts and Methods, 12th Edition, Cengage Learning.

2.Freund J. E. (1977).Modern Elementary Statistics. 4th Edition, Prentice Hall of India Private Limited, NewDelhi.

3.Goon A. M. ,Gupta , M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol.1, 6th Revised Edition, The World Press Pvt. Ltd. ,Calcutta.

4.Gupta S. C. and Kapoor, V. K. (1983) .Fundamentals of Mathematical Statistics ,8th Edition, Sultan Chand and Sons Publishers, New Delhi.

5.Gupta S. P. (2014) Statistical Methods, 43rd Edition, Sultan Chandand Sons, 23, Daryaganj, New Delhi 110002

Vertical No.	Vertical Name	Type of Corse	Course Code	Course name	Credits	Workload Perweek	Max Marks
c	Generic/ Open elective	Theory-4	13202G4	Business Analytics II (Useful for marketing strategies and forecasting)	02	02	30

Course Objectives	This course is designed to familiar with the concept of structured and unstructured sample surveys. Also understanding the concept used in business analytics which will be useful for marketing strategies understanding of the student.
Course Outcomes	At the end of this course, students are able to… 1. Identify the most suited sampling method for an intended survey. 2. Understand the concept used in the projection of data. 3. Create structured and organized survey forms. 4. Acquiring the knowledge regarding market forecasting and strategies.

Units	Contents	Workload Allotted
I	Questionnaire: Characteristics of a good questionnaire, Designing questionnaires for surveys (i.e. survey forms) Processing Survey Data, Types of questionnaires	8 hrs
II	Concept of Statistical Population, Concept of population surveys, sample surveys, scope of the surveys, limitations of survey. Concept of Sampling.	7 hrs
III	Design of sample surveys : Sample Design, sampling and non sampling errors, sample survey VS Census Survey, Types of sampling Design: Non probability sampling, Probability sampling, Simple random Sampling with and without replacement (only concept)	8 hrs

IV	Time series analysis : Meaning of Time Series, Various components of a time series, Examples of time series in real life Additive and Multiplicative methods for analysis of a time series
	Methods of estimating trend:
	    (i) Freehand or Graphical method
	    (ii) Method of semi-averages
	    (iii) Method of moving averages
		7 hrs

References

1. Brase C. H. ,Brace C. P (2016). Understandable Statistics, Concepts and Methods, 12th Edition, Cengage Learning.

2. Goon A. M. ,Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol.2, 6th Revised Edition, The World Press Pvt. Ltd., Calcutta.

3. Gupta S . C .and Kapoor, V. K. (1983). Fundamentals of applied Statistics, 8th Edition, Sultan Chand and Sons Publishers,NewDelhi.

4. Gupta S. P. (2014) Statistical Methods, 43rd Edition, Sultan Chand and Sons, 23, Daryaganj, New Delhi 110002

Vertical No.	Vertical Name	TypeofCorse	Course Code	Coursename	Credits	WorkloadPerweek	Max Marks
d	VSC	Lab/Practical-6	13202P6	Basic analysis skill through MS Excel	02	04	50 Int.

Course Outcomes	At the end of the course student is able to do…. 1. Understanding with some fundamental concepts, which play a critical role in understanding and visualizing real world data. 2. Get familiar with the spread sheets of MS Excel 3. Understand the basic function of analytics through MS Excel	
Units	Contents	Workload Allotted
	Following practicals to be performed through MS Excel 1. Problems on simple Correlation Coefficient. 2. Problems on Rank Correlation by Spearman's and Kendall's formulae. 3. Fitting of straight line 4. Fitting of second degree parabola by least square method. 5. Fitting of exponential curve. 6. Problems on regression of two variables. 7. Testing association of attributes by all four methods. 8. Measurement of trend by semi average method 9. Measurement of trend by moving average method	4 hrs per week

Vertical No.	Vertical Name	TypeofCorse	Course Code	Coursename	Credits	Workload Perweek	Max Marks
d	SEC	Lab/Practical-7	13202P7	Descriptive statistics Through R	02	04	50 Int.

Course Outcomes	At the end of the course student is able to do…… 1. Get acquainted with the concept of R software 2. Understanding various analysis skill through the use of R 3. Understanding fitting of discrete distributions	
Units	Contents	Workload Allotted
	Following practical to be performed through R programming and MS Excel 1. Calculation of mean, variance, coefficient of Skewness and Kurtosis for Binomial distribution. 2. Calculation of mean, variance, coefficient of Skewness and Kurtosis for Poisson distribution. 3. Calculation of mean, variance, coefficient of Skewness and Kurtosis for Geometric distribution. 4. Fitting of Binomial distribution. 5. Fitting of Poisson distribution. 6. Fitting of Normal Distribution. 7. Problems on Area property of normal distribution 8. Basic tools for creating power point presentation.	4 hrs per week