|| सा विद्या या विमुक्तये ||

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA
Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'B++' grade

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विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण २०२० नुसार पदवी प्रथम वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२४–२५ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, या विद्यापीठ अंतर्गत येणा–या सर्व संलग्नित महाविद्यालयामध्ये शैक्षणिक वर्ष २०२४–२५ पासून पदवीस्तरावर राष्ट्रीय शैक्षणिक धोरण –२०२० लागू करण्याच्या दृष्टीकोनातून विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत येणा–या अभ्यासमंडळांनी तयार केलेल्या पदवी प्रथम वर्षाचे अभ्यासक्रमांना मा. विद्यापरिषदेने दिनांक १५ मे २०२४ रोजी संपन्न झालेल्या बैठकीतील विषय क्रमांक १५/५९–२०२४ च्या ठरावान्वये मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील खालील बी. एस्सी प्रथम वर्षाचे अभ्यासक्रम (Syllabus) लागू करण्यात येत आहेत.

01 B. Sc. I year - Biotechnolgy
02 B. Sc. I year – Bio-informatics
03 B. Sc. I year – Biotechnology (Vocational)
04 B. Sc. I year- Dyes and Druge
05 B. Sc. I year – Industrial Chemistry
06 B. Sc. I year – Agrochemical and Fertilizers
07 B. Sc. I year – Chemistry (General)
08 B. Sc. I year – Analytical Chemisrty
09 B. Sc. I year – Biochemistry
10 B. Sc. I year – Statistics
11 B. Sc. I year – Zoology
12 B. Sc. I year – Biotechnolgy (NMD College Hingoli)

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.

डॉ. सरिता लोसरवार
सहा.कुलसचिव

जा.क्र.:शै–१/एनइपी/विवत्रंविपदवी/२०२४–२५/१२३

शैक्षणिक (१–अभ्यासमंडळ) विभाग

दिनांक २०.०६.२०२४

प्रत : १) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
३) मा. प्राचार्य, सर्व संबधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) मा. प्राचार्य, न्यू मॉडल डिग्री कॉलेज हिंगोली.
५) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदर परिपत्रक संकेतस्थळावर प्रसिध्द करण्यात यावे.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606 (MS)

(Credit Framework and Structure of Four Year UG Program with Multiple Entry and Exit Option as per NEP-2020)

UNDERGRADUATE PROGRAMME OF

SCIENCE & TECHNOLOGY

Major in **STATISTICS** and Minor in **DSM** (Subject)

Under the Faculty of Science & Technology

(Revised as per the Govt. of Maharashtra circular dt. 13th March 2024)

Preamble:

The education in India, in general is expanding manifolds. It is the challenge to ensure its quality to stakeholders to meet this challenge the issue of quality needs to be addressed and taken forward in systematic manner. For this we statistician tried to modify our subject curriculum according to National Education Policy (NEP) 2020 to explore future brightness of stakeholders.

I,asChairman,BoardofStudiesinStatistics, Swami Ramanand Teerth MarathwadaUniversity, Nanded, happy to state here that we all members made a curriculum and finalized it. The Program Educational Objectives were finalized for undergraduate program in Statistics. I am thankful our Dean of Science and Technology Dr. L. M. Waghmare and Associate Dean Dr. M. K. Patil who has given us this opportunity.

The ProgramEducationalObjectivesfinalizedforundergraduateprograminStatisticsarelistedbelow:

Program Educational Objectives (PEO):

PEO1: Students should able to understand fundamentals of statistical techniques and implement.

PEO2: To develop statistical view for better understanding and analytic ability.

PEO3: The ability to bring together and flexibly apply it to characterize, analyze and solve a wide range of problems with statistical models.

PEO4: The ability to communicate effectively in terms of technical and non-technical audiences.

Program Outcomes (PO):

PO1: Have fundamental knowledge and understanding of statistical theory at an applied level in the subject.

PO2:Acquire the strong foundation of statistical concepts which will benefit them to become good academicians.

PO3: Use acquired statistical tools and techniques to address various real-life problems.

PO4:Gainthe knowledge of software which has the wide range of opportunities in the various sectors viz., IT sector Quality control in industries, Business, Government and private sector etc.

PO5: Qualify various National / State level competitive exams viz. ISS, DSO, GATE, MPSC, UPSC, Banking etc.

Program Specific Outcomes (PSO):

On successful completion of the program students will able to:

PSO1: Understand and implement statistical models.

PSO2: Handle and analyze databases with computer skills.

PSO3: Describe complex statistical ideas to non-statisticians and can make practical suggestions for improvement.

PSO4: Get wide range of statistical skills in problem-solving.

Course Outcomes (for all courses):

The course outcomes are the statement that describes the knowledge & abilities developed in the student by the end of course (subject) teaching. The focus is on development of abilities rather than mere content. There are 4 course outcomes of all courses defined here. These are to be written in the specific terms and not in general. In addition to Program Educational Objectives, for each course of undergraduate program,objectivesandexpectedoutcomesfromlearner'spointofviewarealsoincludedinthecurriculumto support the philosophy of outcome-based education. I believe strongly that small step taken inrightdirectionwilldefinitelyhelpinprovidingqualityeducationtothestakeholders.

Board of Studies of the <u>Statistics</u>
Swami Ramanand Teerth Marathwada University, Nanded

Details of the Board of Studies Members in the subject STATISTICS under the faculty of Science & Technology of S.R.T.M. University, Nanded

Sr. No	Name of the Member	Designation	Address	Contact No.
1.	Vacant	Chairman		
2.	Dr. A. A. Muley	Member	School of Mathematical Sciences, SRTMUN	7276114558
3.	Dr. S. V. Kawale	Member	Dr. B. A. M. Uni., Chhatrapati Sambhajinagar	9421303727
4.	Dr. V.S. Jadhav	Member	Sanjeevanee College,Chapoli	9604421675
5.	Dr. M. R. Fegade	Member	Digambarrao Bindu College, Bhokar	9922675834

B. Sc. First Year Semester I *(Level 4.5)*
Teaching Scheme

	Course Code	CourseName	CreditsAssigned			TeachingScheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional1	SSTACT1101	Descriptive Statistics	02	--	**04**	02	--
	SSTACP1101	Practical-I	-	02			04
Generic Electives *(from other Faculty)*	SSTAGE1101	Statistical Methods**(Basket 2 of respective Faculty)**	02	--	**02**	02	--
Skill Based Course (related to Major)	SSTASC1101	Statistical Analysis Using Excel	--	02	**02**	--	04
Total Credits			**04**	**04**	**08**	**04**	**08**

B. Sc. First Year Semester I *(Level 4.5)*
Examination Scheme

[20% Continuous Assessment (*CA)* and 80% End Semester Assessment (*ESA*)]
(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			
Optional 1	SSTACT1101	Descriptive Statistics	10	10	10	40	--	--	50
	SSTACP1101	Practical-I	--	--	--	--	20	30	50
Generic Electives *(from other Faculty)*	SSTAGE1101	Statistical Methods **(Basket 2 of respective Faculty)**	10	10	10	40	--	--	50
Skill Based Course (related to Major)	SSTASC1101	Statistical Analysis Using Excel	--	--	--	--	20	30	50

B. Sc. First Year Semester II *(Level 4.5)*
Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SSTACT1151	Theory of Variables and Attributes	02	--	**04**	02	--
	SSTACP1151	Practical-II	-	02			04
Generic Electives *(from other Faculty)*	SSTAGE1151	Introduction to Probability and Distributions **(Basket 3)**	02	--	**02**	02	--
Skill Based Course (related to Major)	SSSTA1151	Data Analysis Using R	--	02	**02**	--	04
Total Credits			**04**	**04**	**08**	**04**	**08**

B. Sc. First Year Semester II *(Level 4.5)*
Examination Scheme

[20% Continuous Assessment (*CA)* and 80% End Semester Assessment (*ESA*)]
(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			
Optional 1	SSTACT1151	Theory of Variables and Attributes	10	10	10	40	--	--	50
	SSTACP1151	Practical-II	--	--	--	--	20	30	50
Generic Electives *(from other Faculty)*	SSTAGE1151	Introduction to Probability and Distributions **(Basket 3)**	10	10	10	40	--	--	50
Skill Based Course (related to Major)	SDSCSC1151	Data Analysis Using R	--	--	--	--	20	30	50

B. Sc. First Year Semester I *(Level 4.5)*
Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SSTACT1101	Descriptive Statistics	02	--	**04**	02	--
	SSTACP1101	Practical-I	-	02			04
Generic Electives *(from other Faculty)*	SSTAGE1101	Statistical Methods **(Basket 2 of respective Faculty)**	02	--	**02**	02	--
Skill Based Course (related to Major)	SSTASC1101	Statistical Analysis Using Excel	--	02	**02**	--	04
Total Credits			**04**	**04**	**08**	**04**	**08**

SSTACT1101   **DSC-1: DESCRIPTIVE STATISTICS**
(Maximum no. of periods 30)

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type DSC	Semester: I
Prerequisites: This course does not require any pre-requisite.			

Course Code: SSTACT1101	Course Title: Descriptive Statistics
Course Objectives: • To organize, Manage and present data. • To arrange data in tabular form and to represent it graphically. • To understand the concept of measures of central tendency, Dispersion, Skewness and Kurtosis. • To understand the characteristics of data using method of Moments and their use in real life. • To understand the functioning of Indian Statistical Organization. **Course Outcomes:** After completion of the course students will able to: **CO1:** Organize, Manage and present data. **CO2:** Arrange data in tabular form and to represent it graphically. **CO3:** Understand the concept of measures of central tendency, Dispersion, Skewness and Kurtosis. **CO4:** Understand the characteristics of data using method of Moments and their use in real life.	
Credits: 2	DSC-1
Max. Marks: 50	Min. Passing Marks:20
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 2-0-0	

Module No.	Unit No.	Topic	No. of Lectures
1.0		**Basic Statistics and Data Condensation:**	
	1.1	Meaning of statistics, Importance and scope of Statistician Industry, Medical Science, Social Sciences, Management Science, Agriculture and Insurance, Information Technology, Education & Psychology	**8**
	1.2	Types of data: Primary and secondary data. Scales of measurement of variables: Nominal, Ordinal, Ratio and Interval.	
	1.3	Frequency distributions (continuous and discrete), Presentation of data, Graphical presentation of data by histogram, Frequency curve, Frequency polygon, Ogives, Stem and Leaf Chart.	
	1.4	Diagrammatic presentation of data: Bar chart, Sub-divided, multiple bar charts, pie chart.	

2.0		**Measures of Central Tendency**	
	2.1	Measures of central tendency Arithmetic mean (simple and weighted and Trimmed mean), Combined mean, Geometric Mean, Harmonic Mean, Median, Mode, Derivation of Median formula for frequency distribution.	7
	2.2	Quartiles, Box Plot, Calculating quartiles by analytical and graphical method.	
	2.3	Uses of Mean, Median, Mode, Harmonic Mean, Geometric Mean, Relation between means,	
	2.4	Merits and demerits of measures of central tendency	
3.0		**Measures of Dispersion**	
	3.1	Concepts of measures of dispersion	8
	3.2	Types of measures of dispersion: Range, Quartile Deviation, Mean absolute deviation about mean, median, mode, Standard deviation, Variance, Root mean square deviation	
	3.3	Properties of variance, relation between Root mean square deviation and Standard deviation,	
	3.4	Coefficient of variation.	
4.0		**Moments**	
	4.1	Raw and central moments,	7
	4.2	moments about arbitrary point, Relation between raw moments and central Moments (Upto 4th order), Effect of change of origin and scale on moments,	
	4.3	Sheppard's Correction for central moments, Pearson's coefficients	
	4.4	Measures of skewness and kurtosis.	
		Total	30

TextBooks:

1. Fundamentals of Mathematical Statistics: - S.C. Gupta & V.K. Kapoor,11th ed. (2002) Sultan Chand and sons New Delhi.
2. Descriptive Statistics: P.G. Dixit, Dr. Mrs. V. R. Prayag. D.L. Limaye, 4th ed. (2005),Niralipub.

ReferenceBooks:

1. Fundamentals of statistics volume-I, Goon A.M. Gupta M.K. Dasgupta,The World Press Pvt. Ltd. Kolkatta
2. Modern Elementary Statistics- Freund J.E. Prentice Hall New Jersy (1979)
3. Introductory Statistics- Neil Weiss, Pearson Publications.
4. Programmed statistics - B.L. Agrawal, New Age International PublicationNew Delhi.
5. Research Methodology - Kothari C.R. Wiley Eastern Limited
6. Statistics- A Beginner's Text, Volume I: B.R. Bhat. T. ShirvenkataramanaK.S. MadhavRao.
7. Statistical Methods: S.P. Gupta. Sultan Chand & Sons New Delhi.

SSTACP1101   DSC-3: PRACTICAL -I (Theory Based Practical on DSC-1)

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type DSC	Semester: I
Prerequisites: This course does not require any pre-requisite.			
Course Code: SSTACP1101	Course Title: Practical -I(Theory Based Practical on DSC-1)		

Course objectives:

- To understand frequency distribution.
- To represent the data in graphical and diagrammatical form.
- To compute central tendencies and dispersion.
- To identify the nature of data by computing skewness and kurtosis.

Course outcomes: After completion of the course students will able to:

CO1: Understand frequency distribution of datasets.
CO2: Represent the data graphical and diagrammatic manner.
CO3: Measure and compute central tendencies and dispersion.
CO4: Measure the nature of data by computing skewness and kurtosis

Credits: 2	DSC-3
Max. Marks: 50	Min. Passing Marks:20
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 0-0-4	

Practical-I (Theory Based Practical on DSC-1)		
Sr. No.	**Title of Experiments**	**No. ofExperiments**
1	Construction of Frequency distributions for discrete variables raw data	2
2	Construction of Frequency distributions for continuous variables raw data	2
3	Diagrammatic representation of statistical data-Simple and sub-divided bar diagram	3
4	Diagrammatic representation of statistical multiple bar and pie diagram	2
5	Graphical Representation of Data-Histogram, Frequency polygon, frequency curve, Ogive curve	3
6	Graphical Representation of Ogive curve, Pareto chart	2
7	Measures of Central Tendencies(Also using MS-EXCEL/Spread Sheet)-Ungrouped data	3
8	Measures of Central Tendencies(Also using MS-EXCEL/Spread Sheet)- grouped data	3
9	Compute Measures of Dispersions and Coefficient of Variation (Also using MS-EXCEL/Spread Sheet)-Ungrouped data	3
10	Compute Measures of Dispersions and Coefficient of Variation (Also using MS-	3

		EXCEL/Spread Sheet)- grouped data	
11		Construction of Partition Values	1
12		Computation of Moments, Skewness and Kurtosis	3

B.A. /B.Sc. I (SEMESTER-I)
SSTAGE1101   **GE/OE: STATISTICAL METHODS**

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type GE/OE For Basket 3	Semester: I
Prerequisites: - This course does not require any pre-requisite.			
Course Code: SSTAGE1101	Course Title: Statistical Methods		
Course Objectives: The Learning Objectives of this course are as follows: • To understand the various types collection of data and analyses of data. • It is necessary for students of Statistics are to be familiar with these steps at the very beginning. • Finally different statistical tools and techniques that can be applied on a data set. **Course Outcomes:** After completion of the course students will able to: **CO1:** Represent the data in tabular and diagrammatic representation form. **CO2:** Prepare the frequency distribution for qualitative and quantitative data. **CO3:** Find the summary measures, viz. the measures of central tendency, measure of dispersion, measures of skewness and kurtosis of a univariate data. **CO4:** Find the degree of association/correlation between the two concerned variables in case of a bivariate data.			
Credits: 2	GE/OE		
Max. Marks: 50	Min. Passing Marks:20		
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 2-0-0			

Module No.	Unit No.	Topic	No. of Lectures
1.0		**Type of data and Presentation of data**	
	1.1	Type of data – Primary and secondary data, quantitative and qualitative data, nominal and ordinal data, cross section and time series data, discrete and continuous data.	**8**
	1.2	Presentation of data – Presentation by tables and by diagrams, diagrammatic representations, frequency distributions	
2.0		**Measure of central tendency**	**7**
	2.1	Measure of central tendency: Mean, Median Mode; measures of	

		dispersion: Quartiles, Range, Standard deviation, Coefficient of variation; moments	
	2.2	Measure of skewness and kurtosis for both grouped and ungrouped data.	
3.0		**Correlation and Regression**	**8**
	3.1	Concept of correlation coefficient & its properties, Rank correlation coefficient due to Spearman and Kendall.	
	3.2	Scatter diagram, regression, curve between two variables and concept of error in regression, principles of least squares; fitting of first and second.	
4.0		**Association of attributes**	**7**
	4.1	Fundamental set of frequencies, consistency of data; Measures of association and contingency-table;	
	4.2	Association of attributes and various measurement of association; Analysis of data on two characters and three characters	
		Total	**30**

TextBooks:

1. Goon, Gupta and Dasgupta: Fundamentals of Statistics, World Press (2002)

2. Gupta & Kapoor: Fundamentals of Mathematical Statistics, S Chand (2020)

Reference Books:

1. Kendal and Stuart: Advanced Theory of Statistics, PHI(1994)

2. Gupta S C: Fundamentals of Statistics, Himalaya Publishing House (2018)

3. Spiegel & Stephens, Statistics, Mc Graw Hill International (2017)

4. Kapoor J N & Saxena H C: Mathematical Statistics, S Chand(2010)

B.A. / B.Sc. I (SEMESTER-I)
SSTASC1101   SEC: STATISTICAL ANALYSIS USING EXCEL

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type SEC-I	Semester: I
Prerequisites: --			
Course Code: SSTASC1101	Course Title: Statistical Analysis Using EXCEL		
Courseobjectives: • To create a new worksheet in MS-Excel. • To edit data in MS-Excel. • To format data in MS-Excel. • To use inbuilt MS-Excel functions or formulae. • To use various graphical and diagrammatic techniques and interpretation. **Courseoutcomes:**After completion of the course students will able to:			

- **CO1:** Familiar with MS-Excel.
- **CO2:** Create spreadsheets, enter data, and maintain data.
- **CO3:** Handle data using existing MS-Excel functions.
- **CO4:** Draw appropriate diagrams or graph to the given data.

Credits: 2	SEC-I
Max. Marks: 50	Min. Passing Marks:20
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 1-0-2	

Module No.	Unit No.	Topic	No. of Lectures
1.0		**Getting Acquainted with MS-Excel**	
	1.1	Introduction to MS-Excel, The Excel Environment: Cells, Rows, and Columns, Title Bar, Ribbon, Scroll Bars, Quick Access Toolbar, Formula Bar, Workbook View Buttons, Zoom Slider, Mini Toolbar, Keyboard Shortcuts, Formulas, Sheet Tabs, Page Margins, Page Orientation, Page Breaks and Printing.	**8**
	1.2	Worksheets and Workbooks: Definition of Worksheets and Workbooks, creating and saving new worksheet, Naming of Worksheets, Adding and Deleting Worksheets.	
	1.3	Hiding/ Unhiding Worksheets, Hiding Columns and Rows, Saving Workbooks, Saving an Existing File, Headers and Footers, Inserting, Deleting, copy and Renaming of Worksheets.	
	1.4	Conditional Formatting and cell styles	
2.0		**Entering and Editing Information**	
	2.1	Import external data, Entering Data, create a table, Labels and Values, Copying Cells, Rows and Columns, Pasting Cells, Rows, and Columns, Paste an Item from the Clipboard.	**7**
	2.2	Inserting and Deleting Rows and Columns, Filling and Editing Cell Data, Find and Replace, Go to Cell Data, Locking Rows and Columns, Spell Check, AutoCorrect.	
	2.3	Change Font Styles and Sizes, Adding Borders and Colours to Cells, change Column Width, change Row Height, Merge Cells, Applying Number Formats	
	2.4	Creating Custom Number Formats, Align Cell Contents, Cell Styles, Conditional Formatting, Freeze and Unfreeze Rows and Columns, Adding and Modifying Images	
3.0		**Formatting & Adding Elements to a Worksheet**	
	3.1	Removing A Background, Cropping and Rotating an image, compressing a Picture,	**8**
	3.2	Inserting AutoShapes, Adding WordArt, Clip Art, and a Hyperlink	
	3.3	Logical: IF, AND, NOT, OR, LET, LAMBDA, TRUE, FALSE, SWITCH, etc.	
	3.4	Mathematical: ABS, EXP, CEILING, FLOOR, INT, EVEN,	

		ODD, COMBIN, COMBINA, FACT, FACTDOUBLE, GCD, LCM, LN, LOG, LOG10, MOD, MULTINOMIAL, POWER, PRODUCT, RAND, RANDARRAY, RANDBETWEEN, ROUND, SIGN, SQRT, etc.	
4.0		**Inbuilt MS-Excel Functions**	
	4.1	Lookup: LOOKUP, HLOOKUP, VLOOKUP, XLOOKUP, etc.	
	4.2	Other functions: Date and Time Functions, Text functions, sort, duplicate, Pivot table and Pivot chart	
	4.3	Titles, legend, data labels,creating a New Chart, Formatting the Chat, Types of charts, Using Chart Templates.	**7**
	4.4	Simple bar diagram, subdivided bar diagram, multiple bar diagram, percentage bar diagram, pie diagram, rod or spike plot, histogram, frequency curve and ogive curves, Pareto chart.	
		Total	**30**

TextBooks:

1. Frag Curtis (2013). Step by Step Microsoft Excel 2013, MS Press.
2. Frye Curtis D. (2007). Step by step Microsoft Office Excel 2007, Microsoft Press.
3. John Walkenbach (2013). 101 Excel 2013 Tips, Tricks and Time severs, Wiley.

ReferenceBooks:

1. Kumar Bittu (2013). Microsoft Office 2010, V&S Publishers.
2. Salkind Neil J. and Frey Bruce B. (2021). Statistics for people who (Think They) Hate Statistics, Using MS- Excel, Sage Publications.
3. Sanjay Saxen (2007). MS Office 2000 for everyone, Vikas Publishing House.

B. Sc. First Year Semester II *(Level 4.5)*
Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SSTACT1151	Theory of Variables and Attributes	02	--	**04**	02	--
	SSTACP1151	Practical-II	-	02			04
Generic Electives *(from other Faculty)*	SDSCGE1151	Introduction to Probability and Distributions **(Basket 3)**	02	--	**02**	02	--
Skill Based Course (related to Major)	SSSTA1151	Data Analysis Using R	--	02	**02**	--	04
Total Credits			**04**	**04**	**08**	**04**	**08**

SSTACT1151 DSC: THEORY OF VARIABLES AND ATTRIBUTES
(Maximum no. of periods 30)

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type DSC	Semester: II
Prerequisites: This course does not require any pre-requisite.			
Course Code: SSTACT1151	Course Title: Theory of Variables and Attributes		

Course objectives:
 	
• Foundation of correlation, various correlation coefficients- Pearson's correlation coefficient, Spearman's rank correlation coefficients.
• To calculate correlation between two variables.
• To calculate the simple linear regression equation for a set of data.
• To understand the association between the attributes.
• To understand and fit the curve to the given data.
 	
Courseoutcomes: After completion of the course students will able to:
    CO1: Learn fundamentals of correlation, various correlation coefficients- Pearson's correlation coefficient, Spearman's rank correlation coefficients
    CO2: Compute correlation between two variables.
    CO3: Fit simple linear regression equation for a set of data.
    CO4: Find association between the attributes and to fit the curve to the given data			

Credits: 2	DSC		
Max. Marks: 50	Min. Passing Marks:20		
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 2-0-0			

Module No.	Unit No.	Topic	No. of Lectures
1.0		**Bivariate Data and Correlation**	
	1.1	bivariate data, scatter diagram, Correlation	
	1.2	Karl Pearsons product moment correlation and its properties, independence and uncorelatedness	**8**
	1.3	Spearman rank correlation coefficient and its properties, Kendall rank correlation coefficient	
	1.4	Derivation of rank correlation coefficient	
2.0		**Linear Regression**	
	2.1	Fitting of linear regression lines and their properties	
	2.2	Regression coefficients and its properties	**7**
	2.3	coefficient of determination	
	2.4	Residuals and its properties, residuals plot	
3.0		**Fitting of curves**	**8**

	3.1	Legendre's principle of least squares	
	3.2	fitting of straight line	
	3.3	Second degree curve and Exponential curve, Power curve, Logistic curve, interpretation of Regression coefficients	
	3.4	most plausible solution of system of linear equations	
4.0		**Theory of Attributes**	
	4.1	Concepts of attributes, Notation, Classification using dichotomy, class frequency, order of classes, positive and negative class frequencies, ultimate class frequencies,	
	4.2	Relation between class frequencies, consistency of attributes (up to three attributes)	
	4.3	Independence and association of two attributes	
	4.4	Yule's coefficient of association **Q**. Coefficient of colligation **Y**. Relation between them.	
		Total	30

TextBooks:
1. Fundamentals of Mathematical Statistics: S.C. Gupta V.K. Kapoor, 11 thEdition (2002) Sultan chand and sons New Delhi.
2. Mathematical Statistics: Ray Sharma, 10th edition, Ram Prasad and sons Agra

ReferenceBooks:
1. Statistics: A Beginners: Text volume I B.R. Bhat, T S., K.S. MadhavRao New Age International Publications
2. Descriptive Statistics: Ist (2008) P.G. Dixit, Dr. V.R. Prayag,D.L.Limaya, Nirali Publication, Pune.
3. Descriptive Statistics-II, Ist Ed., (2014) P.G. Dixit, S.J.Alandkar, N.I.Dhanshetti, Nirali Publication Pune.

B.A./ B.Sc. I (SEMESTER-II)

SSTACP1151   **DSC: Practical–II**

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type DSC	Semester: II
Prerequisites: This course does not require any pre-requisite.			

Course Code: SSTACP1151	Course Title: Practical -II

Course objectives:

- To understand correlation between variables and attributes.
- To fit regression equations.
- To fit discrete distributions.
- To computeprobabilities of bivariate distribution

Course outcomes: After completion of the course students will able to:
CO1: Understand correlation between variables.
CO2: Understand nature of data and able to fit the regression equation.
CO3: Understand nature of discrete dataset with its distributions.
CO4: Compute probabilities of bivariate distributions.

Credits: 2	DSC
Max. Marks: 50	Min. Passing Marks:20
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 0-0-4	

Practical-II		
Sr.No.	**Title of Experiments**	**No. of Experiments**
1	Plotting scatter diagram	2
2	Computation of Karl Person's Correlation Coefficient	2
3	Computation of Spearman's Rank Correlation Coefficient(For repeated and unrepeated ranks)	2
4	Fitting of Linear of regression	2
5	Fitting of Line of regression: $Y = a + bX$	1
6	Fitting of Second degree curve	1
7	Fitting of exponential curve(i) $Y=ab^x$,(ii) $Y=aX^b$	4
8	Fitting of Logistic curve	1
4	Attributes	3
5	Computation of probabilities of bivariate distribution	3
6	Most Plausible values of system of linear equations	2
7	consistency of attributes (up to three attributes)	3
8	Yule's coefficient of association **Q**.	2
9	Coefficient of colligation **Y**.	2

SSTAGE1151GE/OE: INTRODUCTORY PROBABILITY AND DISTRIBUTIONS

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type GE(For Basket 3)		Semester: II
Prerequisites: --				
Course Code: SSTAGE1151	Course Title: Introductory Probability and Distributions			

Course Objectives:

- This is a fundamental course on probability theory. Students must have the knowledge of probability theory, random variables and their distributions to make further progress on statistical analysis.
- The firstunits mainly devoted into the basics of probability theory and its applications.
- The students can also get an idea about mathematical expectations and generating functions.
- Students will have a nice idea about several discrete and continuous distributions.

Course Outcomes: After completion of this course, the students will be able to…

CO1: Understand the random experiment, sample space and probability theory.
CO2: Know the one / two dimensional random variables and their properties in discrete /continuous Framework.
CO3: Understand the nature of discrete and continuous random variable.
CO4: Recognize various discrete as well as continuous distributions and their properties.

Credits: 2	GE
Max. Marks: 50	Min. Passing Marks:20
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 2-0-0	

Module No.	Unit No.	Topic	No. of Lectures
1.0		**Introduction of Probability**	
	1.1	Probability: Introduction, random experiments, sample space, events and algebra of events.	**8**
	1.2	Definitions of Probability – classical, statistical, and axiomatic. Laws of addition and multiplication of probability.	
2.0		**Conditional Probability**	
	2.1	Conditional Probability, independent events	**8**
	2.2	Theorem of total probability, Bayes' theorem and its applications.	
3.0		**Random Variables**	
	3.1	Random Variables: Discrete and continuous random variables, p.m.f., p.d.f. ,c.d.f. Illustrations of random variables and its properties.	**7**
	3.2	Expectation, variance, moments and moment generating function.	
4.0		**Standard Probability Distributions**	
	4.1	Standard probability distributions: Binomial, Poisson and their applications	**7**
	4.2	Normal, Exponential and their applications.	
		Total	**30**

TextBooks:
1. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals of Mathematical Statistics, 4thEdition, Sultan Chand &Sons
2. Goon, A.M., Gupta M.K. & Das Gupta, Fundamentals of statistics, Vol. I & II (2005).

Reference Books:

1. Hogg,R.V., Tanis,E.A.andRaoJ.M.(2009):ProbabilityandStatisticalInference, Seventh Ed, Pearson Education, New Delhi.
2. Miller,IrwinandMiller, Marylees(2006):JohnE. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.

B.A. / B.Sc. I (SEMESTER-II)

SSTASC1151   **SEC: DATA ANALYSIS USINGR**

Programme: Certificate Course in Statistics Class: B.A./B.Sc. I	Year: First Level 4.5	Course Type SEC-II	Semester: II
Prerequisites: --			
Course Code: SSTASC1151	Course Title: Data Analysis Using R		

CourseObjectives:
- Students should have elementary information of data and their handling using R software.
- It is useful in IT sector to analyze and to find information of available data

Course Outcomes: After completion of the course students will able to:
- **CO1:** Understand R console for representing data.
- **CO2:** compute and plot distributions.
- **CO3:** perform significance test.
- **CO4:** Evaluate correlation and Regression analysis of the data.

Credits: 2	SEC-II
Max. Marks: 50	Min. Passing Marks:20
Total No. of Lectures – Tutorials – Practical (in hours per week): L-T-P: 1-0-2	

ModuleNo.	Unit No.	Topic	No. of Lectures
1.0		**Introduction to R**	
	1.1	Introduction: History or R Programming, starting and ending R, R commands, Data types, Getting help in R	**8**
	1.2	R use as calculator Descriptive Statistics: Diagrammatic representation of data	
	1.3	Measures of central tendency	
	1.4	Measures of dispersion, measures of skewness and kurtosis	
2.0		**Probability Distribution using R**	
	2.1	Probability and probability distribution: problems on finding basic probabilities,	**7**
	2.2	Some special discrete distribution and continuous probability distribution	
	2.3	probabilities and inverse for various distributions	

	2.4	Sketching graph for various distributions.		
3.0		**Statistical Inference using R**		
	3.1	Statistical inference: Sampling distribution of sample means		8
	3.2	Estimation of parameters		
	3.3	Hypothesis testing		
	3.4	Goodness of fit tests		
4.0		**Correlation and Regression using R**		
	4.1	Correlation, inference procedure for correlation coefficient		7
	4.2	Bivariate correlation, multiple correlations		
	4.3	Linear regression and its inference procedure		
	4.4	Simple optimization method		
		Total		**30**

TextBooks:

1. Normal Maltoff (2009) The art of Rprogramming.
2. Purohit S.G. , Gore S. D. and Deshmukh S. K. (2010) Statistics using R,Narosa.
3. W. John Braun, John Braun,Duncan James Murdoch (2007) First Course in Statistical programming with R, Cambridge UniversityPress.

ReferenceBooks:

1. M.D. Ugarte, A. F. Militino, A.T. Arnholt (2008) Probability and Statistics with R, CRC Press.
2. Peter Dalgard (2008) Introductory Statistics with R,Springer.
3. Michael J. Crawley (2007) The R Book. John Wiley andSons.