॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)
Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

25
1994 - 2019
SILVER JUBILEE YEAR

ACADEMIC (1-BOARD OF STUDIES) SECTION

संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे **CBCS Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४–२०१९ च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्यात येत आहेत.

1.	Agricultural Microbiology	18.	Dyes and Drugs
2.	Agrochemicals & Fertilizers	19.	Electronics
3.	Analytical Chemistry	20.	Environmental Science
4.	B.C.A.	21.	Fishery Science
5.	B.Voc. (Food Processing, Preservation and Storage)	22.	Food Science
6.	B.Voc. (Web Printing Technology)	23.	Geology
7.	Biochemistry	24.	Horticulture
8.	Bioinformatics	25.	Industrial Chemistry
9.	Biophysics	26.	Information Technology (Optional)
10.	Biotechnology (Vocational)	27.	Mathematics
11.	Biotechonology	28.	Microbiology
12.	Botany	29.	Network Technology
13.	Chemistry	30.	Physics
14.	Computer Application (Optional)	31.	Software Engineering
15.	Computer Science (Optional)	32.	Statistics
16.	Computer Science	33.	Zoology
17.	Dairy Science		

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

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–०१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/
२०१९–२०/२९२
दिनांक : ०३.०७.२०१९.

स्वाक्षरित/—
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :

१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

Swami Ramanand Teerth Marathwada University, Nanded

SYLLABUS
Of
STATISTICS

Choice Based Credit System (CBCS) Course Structure
(New Scheme)
B.A / B.Sc. (First) Year
Semester I
CCS- I (section A) Descriptive Statistics and Computing
(Paper-I)
CCS- I (Section B) Elementary Probability Theory
(Paper II)
Semester II
CCS- II (section A) Theory of variables and Attributes
(Paper-III)
CCS- II (section B) Discrete Probability Distributions
(Paper-IV)

Practical Paper: CCSP - I
(Paper-V)
[Annual Practical Based on CCS I & II Section A & B]

w.e.f June 2019

Tentative Distribution of Credits for B.Sc. Statistics (Optional) Under Faulty Science

B.Sc. Syllabus Structure

Semester Pattern Effective From June 2019

STATISTICS

semester	Paper No.	Name of the course	Instruction Hrs/week Marks of Semester	Total Periods	Internal (ESE)	Marks of Semester	Marks of Semester	credits
I	CCS- I Section A	Descriptive Statistics & Computing **(P-I)**	03	45	10	40	50	02
	CCS– I Section B	Elementary Probability Theory **(P-II)**	03	45	10	40	50	02
II	CCS – II Section A	Theory Of variables & Attributes **(P-III)**	03	45	10	40	50	02
	CCS– II Section B	Discrete Probability Distributions **(P-IV)**	03	45	10	40	50	02
	CCSP-I(CCSI& II (Section A & B)	Practical's based on Section A & B of CCS- I &CCS-II Practical-I **(P-V)**	03	23 Practicals	20	80	100	04 (02+02)

Total credits for semester I & II: 12

B.A / B. Sc (First) Year Semester - I
STATISTICS
CCS –I Section (A)
Paper-I Descriptive Statistics and Computing

Credits: 02 (Marks: 50)   **Periods: 45**

Unit I: - Basic Statistics and Data Condensation: 15 periods
Meaning of statistics, Importance and scope of Statistics in Industry, Medical Science, Social Sciences, Management Science, Agriculture and Insurance, Information Technology, education & Psychology, Statistical Organizations in India and their functions Central Statistical Organization (CSO), Indian Statistical Institute (ISI), National Sample Survey Organization (NSSO), Indian Institute of Population Studies (IIPS), Bureau of Economics and Statistics.

       Types of data: Primary and secondary data. Scales of measurement of variables: Nominal, Ordinal, Ratio and Interval. Frequency distributions (continuous and discrete), Presentation of data, Graphical presentation of data by histogram, Frequency curve, Frequency polygon, Ogives, Stem and Leaf Chart. Diagrammatic presentation of data: Bar chart, multiple bar charts, pie chart.

Unit –II:- Measures of Central Tendency: 10 periods
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, Quartiles, Box Plot, Calculating quartiles by analytical and graphical method, Uses of Mean, Median, Mode, Harmonic Mean, Geometric Mean, Relation between means, Merits and demerits of measures of central tendency.

Unit - III Measures of Dispersion: 10 periods
Concepts of measures of dispersion, Types of measures of dispersion, Range, Quartile Deviation, Mean absolute deviation about mean, median, mode, Standard deviation, Variance, Root mean square deviation, Properties of variance, relation between Root mean square deviation and Standard deviation, Coefficient of variation.

Unit IV: - Moments: 05 periods
Raw and central moments, moments about arbitrary point, Relation between raw moments and central Moments (Up to 4th order), Effect of change of origin and scale on moments, Sheppard's Correction for central moments, Pearson's coefficients, Measures of skewness, kurtosis.

Unit V: -Statistical Computing Using Excel:-   05 periods
Graphical & Diagrammatic presentation of data, Computation of various measures of central tendency, dispersion, skewness and kurtosis, moments using ms-excel.

1. **Fundamentals of Mathematical Statistics:** - S.C. Gupta & V.K. Kapoor
11th edition june-2002 (Sultan Chand and sons New Delhi)

Chapter 2:- 2.4, 2.4.1, 2.5, 2.5.1, 2.5.2, 2.5.3, 2.6, 2.6.1, 2.6.2, 2.7, 2.7.1, 2.7.2, 2.8, 2.8.1, 2.8.2, 2.9, 2.9.1, 2.11, 2.11.1., 2.12, 2.12.1, 2.13, 2.13.1, 2.13.2, 2.13.3, 2.13.4, 2.14, 2.14.1, 2.15, 2.15.1, 2.15.2, 2.15.5, 2.16, 2.16.1, 2.17

2. Descriptive Statistics:- P.G. Dixit, Dr. Mrs. V. R. Prayag. D.L. Limaye
 4th edition septmber-2005 (NiraliPrakashan, 41 BudhwarPeth Pune-02)
Chapter1:- 1.1, 1.2, 1.3, 1.4, 1.5
Chapter3:- 3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10
3 Excel 2010 Simple Steps kogent learning Solutions
(Wile India Private Ltd)

Reference Books:-
1.   Fundamentals of statistics volume-(1) 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 Internatinal Publication New Delhi.)
5.   Research Methodology - Kothari C.R. (Wiley Eastern Limited)
6.   Statistics- A Beginner's Text, Volume I : B.R. Bhat. T. Shirvenkataramana K.S. MadhavRao.
7.   Statistical Medhods- S.P. Gupta.(Sultan Chand & Sons New Delhi).

STATISTICS
CCS –I Section (B)
Paper-II Elementary Probability Theory

Credits: 02 (Marks: 50)   **Periods: 45**

Unit- I - Probability: 10 periods
Deterministic and non-deterministic experiments or Random experiment, trial, out come and event, types of events: Simple, composite , mutually exclusive Exhaustive events, Independent events, sample space, classical definition of probability, Empirical definition of probability, Axiomatic approach to probability, Addition theorem of probability, Extension of addition theorem of probability (up to 3events), Conditional probability. Conditional probability and independent events, mutually and pair wise independent events, multiplication theorem of probability for independent finite events, Baye's theorem, Baye's theorem for further events.

Unit-II: - Random Variable (Univariate):- 10 periods
Random Variable, Distribution function and its properties, discrete random variable, Probability mass function, distribution function of discrete random variable, Continuous random variable, Probability density function, distribution function of continuous random variable, properties of distributions (continuous and discrete)

Unit III: Random Variable (Bivariate) 10 periods
Definition, Probability mass function of two dimensional, marginal probability function, conditional probability function, two dimensional distribution function, marginal distribution function joint density function, marginal density function, stochastic independence and related theorems.

Unit IV: Mathematical Expectations: 10 periods
Definition, Expected value of random Variable, Expected value of Function of random variable properties of Expectations, Various measures of Central Tendency,Dispersion, skewness and Kurtosis for Discrete and continuous probabilitydistribution, Basic concepts, Variance, Properties of variance, covariance, Varianceof a Linear combination of Random variable, conditional expectations

Unit -V: Probability Generating function:- 05 periods
Moment Generating Function- Definition, Propertiesof moment generating function, Cumulants, cumulant generating function propertiesof cumulants problems.

Scope of Syllabus:
Fundamentals of Mathematical Statistics - S.C. Gupta & V.K. Kapoor
(11th Edition June 2002) Sultan Chand & Sons New Delhi

Chapter 3:-3.1,3.2, 3.3, 3.4, 3.4.1, 3.5,3.5.1,3.8, 3.8.1, 3.8.2, 3.8.5, 3.9, 3.9.1, 3.9.2, 3.10.3.11, 3.12, 3.13, 3.14, 3.14.1, 3.15, 3.15.1
Theorem: - 3.2, 3.3, 3.4, 3.5, 3.6, Cor.1. Cor. 2, 3, 3.7, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.17, 3.18, 3.19, 3.20, 4.2, 4.2.1

Chapter 4:- 4.2, 4.2.1

Chapter 5:- 5.1, 5.2, 5.2.1, 5.3, 5.3.1, 5.3.2, 5.4, 5.4.1, 5.4.2, 5.4.3
5.5, 5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.5, 5.5.6 Theorem 5.2 (Statement only)

Chapter 6:- 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.6.1,

Chapter 7:- 7.1, 7.1.2,7.1.3,7.2,7.2.1,

Reference Books:-
1. Fundamentals of statistics volume- II- Goon A.M. Gupta M.K, and Dasgupta B (The World press Pvt. Ltd. Kolkatta)
2. Modern Elementary Statistics- Miller and Friends
3. Introductory Statistics by Neil Weiss Pearson Publication.
4. Programmed statistics - B.L. Agrawal(New Age International Publication New Delhi.)
5. Introduction to the theory of Statistics, Mood A.M., Graybill F.A. and Boes F.A
6. Introductory Probability and Statistical applications- Addision Wesley.
7. Statistical Method, S.P. Gupta, (Sultan Chand & Sons New Delhi.)
8. Statistics - A Begineer's Text, Volume II : B.R. Bhat,T. Shrivenkataramana, K.S. Madhav Rao. (New Age International (p) Ltd.)

Paper-III Theory of Variables and Attributes

Credits: 02(Marks: 50)   **Periods: 45**

Unit-I: - Bivaraiate data and Correlation: 10 periods

Graphical method to represents bivariate data, scatter diagram, concept of correlation, Karl persons' product moment correlation and its properties, independence and un co relatedness, Spearman rank correlation coefficient and its properties, derivation of rank correlation coefficient formula.

Unit –II: Linear Regression: -   08 periods

Regression coefficients, coefficient of determination, lines of regression and their properties, properties of regression coefficients, derivation of lines of regression, residuals and their properties, residuals plot.

Unit -III:-Fitting of curves: 10 periods

Legendre's principle of least squares, fitting of straight line, Second degree curve and Exponential curve, Power curve, Logistic curve $y = k/1+Exp(a+ b x)$, interpretation of Regression coefficients, most plausible solution of system of liner equations.

Unit: IV:- Theory of Attributes:-   12 periods

Concepts of attributes, Notation, Classification using dichotomy, class frequency, order ofclasses, positive and negative class frequencies, ultimate class frequencies, relation between class frequencies, consistency of attributes, (up to three attributes) independence and association of two attributes, Yule's coefficient of association **Q**. Coefficient ofcolligation **Y**. Relation between them.

Unit: V: Computation using Excel: 05 periods

Computation of Karl person's correlation coefficient, Spearman rank correlation coefficient, fitting of regression line, curves. Decide the best fit using R^2 with the help of ms-excel.

Scope of Syllabus:-.

(i) **Fundamentals of Mathematical Statistics** : S.C. Gupta V.K. Kapoor (11 th Edition june-2002) Sultan chand and sons New Delhi.
Chapter10:-10.1,10.2,10.3,10.4,10.4.1,10.4.2,10.7,10.7.1,10.7.3, 10.7.4 Theorem 10.1,10.2
Chapter 11:- 11.1, 11.2, 11.2.1, 11.2.2, 11.2.3, 11.3
Chapter13:- 13.1, 13.2, 13.3,13.4,13.4.1,13.4.2,13.4.3, 3.5,13.5.1,13.6,13.6.2 13.7,13.7.1,13.7.2
(ii) **Mathematical Statistics** : Ray Sharma, 10th edition (Ram Prasad and sons Agra)
Chapter 13 :- 13.1,13.2.

Reference Books :
i)   Statistics : A Begineers Text volume I B.R. Bhat, T Shrivenkataramana, K.S. MadhavRao (New Age International Publications)
ii)   Descriptive Statistics : (first edition July – 2008) P.G. Dixit, Dr. V.R. Prayag, D.L. Limaya (Nirali Publication Prakashan Pune).
iii)   Descriptive Statistics-II (first edition February 2014) Prof P.G. Dixit, Prof. S.J.Alandkar, Prof N.I.Dhanshetti(Nirali Publication Prakashan Pune).

B.A/ B. Sc (First) Year Semester - II
STATISTICS
CCS –II Section (B)
Paper-IV Discrete Probability Distributions

Credits: 02(Marks: 50)   **Periods: 45**

Unit I: Uniform and Binomial Distribution: 12 periods

(i)Uniform discrete distribution: - Definition, Mean, Variance and Moment Generating Function, Examples on real life situation.

(ii) Bernoulli distribution: Definition, Mean, Variance and moment generating function, examples on real life situation.

(iii) Binomial Distribution: Definition, Moments, moment generating function, cumulants, additive property of Binomial distribution, recurrence relation for the probabilities of Binomial distribution, Mode, Examples on real life situation.

Unit II: Poisson distribution: -   12 periods

Poisson distribution as a limiting case of Binomial distribution, moments of Poisson distribution, mode of Poisson distribution, recurrence relation for moment of Poisson distribution, moment generating and cumulant generating function, additive property of Poisson distribution, recurrence formula for the probabilities of Poisson distribution.

Unit III: Hyper geometric distribution: -   04 periods

(I)Hyper geometric Distribution: Definition, Mean and variance, relation with Binomial distribution, Recurrence relation for the probabilities of hyper geometric distribution, Examples on real life.

Unit IV: Negative Binomial and Geometric distribution: -   12 periods

(i)Definition, moment generating function, cumulants, moments, Relation between negative binomial and binomial distribution.

(ii) Geometric distribution: definition, lack of memory, moments of geometric distribution, moment generating function, mean, variance, Applications of geometric distribution in the real life situation.

Unit V: Discrete distribution fitting using Excel: 05 periods

Fitting of Binomial distribution, fitting of Poisson distribution, fitting of negative Binomial distribution, Fitting of geometric distribution.

Scope of Syllabus:-

(i) **Fundamental of Mathematical Statistics** S.C. Gupta V.K. Kapoor,
   11th Edition june-2002 (Sultan Chand & Sons New Delhi)
Chapter 8:- 8.1, 8.2, 8.3, 8.3.1, 8.4, 8.4.1, 8.4.2, 8.4.5, 8.4.6, 8.4.7, 8.4.9, 8.4.12, 8.5, 8.5.2, 8.5.3, 8.5.4, 8.5.5,8.5 .7,8.5.8,8.5.10,8.6,8.6.1,8.6.2, 8.7,8.7.1,8.7.2,8.7.3,8.8,8.8.1.

Reference Books:-

(i)   Mathematical Statistics: - H.C. Saxena (Sultan Chand & Sons New Delhi)

(ii)   New Mathematical Statistics (First Edition) Arora Sanjay and Bansilal. Styaprakashan 16/ 7698 New Market New Delhi 5 (1989)

(iii)   Statistics: - a Beginners Text Volume - II B.R. Bhat T. Shivenkataramena K.S. MadhavRao.(New Age International (p) Ltd.iv)Introduction to Discrete Probability and Probability Distributions:-Madhav B. Kulkarni ,Surendra B. Ghatpande. (SIPE Academy, Nasik.)

B.A./ B.Sc. First Year

STATISTICS

Practical - I Paper CCSP – I Paper - V
Annual Practical Based on [CCS I & II (Section A & B)]

Credits: 04 (Marks 100)

Sr. No.	Title of Experiments	No. of Experiments
1	Construction of Frequency distributions	1
2	Diagrammatic representation of data	1
3	Graphical representation of data	1
4	Measures of central tendencies (Also using MS-EXCEL/Spread Sheet)	2
5	Construction of partition values.	1
6	Compute measures of dispersions and coefficient of variation (Also using MSEXCEL/Spread Sheet)	2
7	Computation of Moments, Skewness and kurtosis	2
8	Karl person's correlation coefficient (Also using MSEXCEL/Spread Sheet)	1
9	Spearman's rank correlation coefficient (For repeated and unrepeated ranks)	1
10	Fitting of linear Regression	1
11	Fitting of Binomial distribution	1
12	Fitting of Poisson distribution	1
13	Fitting of Curves (i) $Y=ab^x$ (ii) Second degree curve	2
14	Attributes	3
15	Computation of probabilities of bivariate distribution	2
16	Most Plausible values of system of liner equations	1

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