डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./विज्ञान/अभ्यासक्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधीतांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वितीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

..2..

[31]	B.Sc. Geology	Semester-III & IV,
[32]	B.A. Statistics with minor changes	Semester-I & II,
[33]	B.A. Statistics	Semester-III & IV,
[34]	B.Sc. Statistics with minor changes	Semester-I & II,
[35]	B.Sc. Statistics	Semester-III & IV,
[36]	B.Sc. Industrial Chemistry	Semester-III & IV,
[37]	B.Sc. Horticultural	Semester-I & II,
[38]	B.Sc. Dry land Agriculture	Semester-I & II,
[39]	B.Sc. Microbiology	Semester-III & IV,
[40]	M.Sc. Computer Science	Semester-I to IV,
[41]	M.Sc. Information Technology	Semester-I to IV.

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,
औरंगाबाद-४३१ ००४.
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/ ६५९९-७०२
दिनांक :- २७-०५-२०१४.

संचालक,
महाविद्यालये व विद्यापीठ विकास मंडळ.

****

या परिपत्रकाची एक प्रत :-

१) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
२) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थंळावर उपलब्ध करुण देण्यात यावेत.
४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

-=**=-

Syllabus of

B.Sc. First Year

Statistics [Optional]

Sem. I & II

effect for the academic year 2014-2015

SYLLABUS OF F.Y.B.Sc.

STATISTICS

2014-15

Semester	Theory Paper No.	Title Of The Paper	No. of Lectures per week	Marks Univ.
I	101	Descriptive Statistics-I	03	50
	102	Probability Theory	03	50
II	103	Descriptive Statistics-II	03	50
	104	Probability Distributions	03	50
Annual Practical	105 Practical I	Practicals Based On 101, 102, 103 & 104	04	100

Theory: 45 Lectures per paper
Practical: 60 Lectures per paper

First Year B.Sc. (Statistics)

Semester- I

Descriptive Statistics-I

Paper-101

Unit-I **(15 Lectures)**

Introduction of some basic concepts

1.1 Introduction to statistics.

1.2 Scope and importance of Statistics.

1.3 Various definitions of Statistics.

1.4 Statistical Organisations
(ISI, NSSO, CSO,)

1.5 Statisticians and their contributions.
(R.A Fisher, Mahalonobis, C.R. Rao)

1.6 Primary and Secondary data, Types of data : qualitative, quantitative, discrete, continuous, cross-section, time series, failure, industrial, directional data.

1.7 Presentation of data.

a. Graphical presentation: Histogram, frequency polygon, frequency curves, ogive curves, stem and leaf charts, check sheet.

b. Diagrammatic presentation: Bar diagrams, Pie diagram, Parato diagram, scatter diagram.

1.8 Different types of scales:

Qualitative data (Attributes): Nominal and ordinal scales

Quantitative data (Variables): Interval and ratio scales, linear and circular scales.

1.9 Classification of data: Discrete and continuous frequency distributions, inclusive and exclusive methods of classification, relative and cumulative frequency distributions.

. **Unit II** **(15 Lectures)**

Measures of Central Tendency

2.1 Concept of central tendency. Prerequisites of ideal measure of central tendency.

2.2 Arithmetic mean (A.M.) for frequency and non frequency data (simple and weighted) trimmed mean, mean of pooled data.

2.3 Effect of change of origin and scale of A.M., properties of A.M. merits and demerits of A.M.

2.4 Mode: Computation for frequency and non-frequency data. Derivation of formula for mode. Computation of mode by graphical method. merits and demerits of mode.

2.5 Median: Computation for frequency and non-frequency data, computation by graphical method, merits & demerits of median. Empirical relation between mean, median and mode.

2.6 Geometric mean (G.M.) computation for G M for pooled data (for two groups.) G M for ratio of two variables. merits demerits and applications

2.7 Harmonic Mean (H M) computation for frequency, non-frequency data, merits, demerits,

2.8 Order relation between AM, GM, HM (with proof for n=2)

2.9 Selection of an average.

Unit-III **(15 Lectures)**

Partition values & Measures of Dispersion

3.1 Concept of Dispersion and characteristics of good measure of dispersion.

3.2 Range and coefficient of range: merits, demerits and applications.

3.3 Partition values: Computation by formulae, computation by graphical method and Box plot. Quartile deviation (QD), coefficient of quartile deviation

3.4 Mean deviation (MD) about mean, mode, and median, coefficient of MD minimality property (with proof)

3.5 Variance, standard deviation (S.D.) effect of change of origin and scale on variance
Variance for pooled data (Proof for two groups)

S.D. ≤ MD about mean

Merits, demerits & uses of S.D.

3.6 Coefficient of variation (C.V.) uses of C.V., merits & demerits

3.7 Covariance: for frequency & non frequency data. Effect of change origin and scale & properties

3.8 Variance of linear combination

Probability Theory

Paper-102

Unit I **(15 Lectures)**

Basic concepts in probability theory

1.1 Concepts of experiments and random experiments

1.2 Definitions: Sample Space, Discrete sample space (finite and countably infinite) Event, Elementary event, complement of an event.

1.3 Algebra of events (Union, Intersection and Complementation)

1.4 Definitions: Exhaustive events, Favourable events, Mutually Exclusive events, Equally Likely events, Independent events, Impossible events and certain events.

1.5 Power Set P (Ω) (sample space consisting at least three sample points.)

1.6 Symbolic representation of given evens and description of events in symbolic forms.

1.7 Examples, based on 1.1 to 1.6

1.8 Apriori (Classical) definition of probability of an event. Equiprobable sample space, simple examples of computation of probability of the events based on Permutations & Combinations

1.9 Axiomatic definition of Probability (with reference to finite and countably infinite sample space)

1.10 Proof of the results

i $P(Q) = 0$

ii $P(A') = 1 - P(A)$

iii $P(AUB) = P(A) + (B) - P(A \cap B)$ (with proof)

and its generalization (statement only)

iv if $A \subset B$, $P(A) \leq P(B)$

v $0 \leq P(A \cap B) \leq P(A) \leq P(AUB) \leq P(A) + P(B)$

1.11 Examples based on 1.10

Unit II **(15 Lectures)**

Conditional Probability

2.1 Definition of conditional Probability

2.2 Multiplication theorem P (A∩ B) = P (A). P (B/A)

2.3 Partition of sample space.

2.4 Posteriori Probability

2.5 Statement and proof of Baye's Theorem

2.6 Elementary examples based on 2.1 to 2.5

2.7 Independence of events

2.8 Proof of the results that if A & B are independent then
i) A& B' ii) A'& B iii) A' & B' are independent

2.9 Pair wise & mutual independence of three events

2.10 Examples based on 2.7 to 2.9

Unit III **(15 Lectures)**

Prerequisites of distribution functions

3.1 Definition of Discrete and continuous random variables.

3.2 Probability mass function (p.m.f.) and Probability density function.
(p.d.f.) cumulative distribution functions (discrete and continuous) their properties (Statements only)

3.3 Probability distribution function of a random variable

3.4 Median and Mode of univariate discrete & continuous Probability Distribution.

3.5 Examples based on 3.1 to 3.4

3.6 Expectation of a random variable and expectation of function of a random variable.

3.7 Properties of expectation.

3.8 Mean and variance of univariate distribution and effect of change of origin and scale on mean and variance.

3.9 Raw and Central moments of univariate distribution their relationship, skewness and kurtosis.

3.10 Probability generating function (p.g.f) of a random variable and computation of means and variance using p.g.f.

3.11 Examples based on 3.6 to 3.10

Semester II

Descriptive Statistics- II

Paper-103

Unit-I **(15 Lectures)**

Moments & different measures

1.1 Moments about x = a : definition, computation for raw and grouped data.

1.2 Raw moments: Definition, computation for raw and grouped data.

1.3 Central moments: Definition, computation for raw and grouped data.

Effect of change of origin and scale.

Sheppard's corrections

1.4 Relation between raw and central moments up to 4^{th} order

(with proof)

1.5 Skewness : Concept, types of skewness, measures of skewness

i Karl Pearson's

ii Bowley's, show that it lies between -1 and +

iii Pearsonian Coefficient of skewness (β_1, γ_1)

1.6 Kurtosis : Concept, types of Kurtosis, Pearsonian coefficients β_2, γ_2

1.7 The results

i $\beta_2 \geq 1$

ii $\beta_2 \geq \beta_1 + 1$ (with proof)

Unit-II **(15 Lectures)**

Correlation & regression

2.1 Bivariate data, its frequency distribution

2.2 Correlation: Concepts, positive, negative correlation, interpretation of scatter diagram

2.3 Karl Pearson's Coefficient of correlation, computation for grouped, ungrouped data

2.4 Properties of Karl Pearson's Coefficient of correlation

i Effect of change of origin & scale

ii Limits (-1, +1)

iii $r_{xy} = r_{yx}$

2.5 Merits, demits, interpretation, applications, of correlation

2.6 Spearman's rank correlation : Derivation of formula (without repetition), for non repeated and repeated ranks computation- comparison of Karl Pearson's and Spearman's Correlation coefficient.

2.7 Regression : Concept, Independent and response variables, fitting of lines of regression by using principle of least squares (with derivation) Properties of lines of regression, Determination of angle between lines

2.8 Regression coefficient: Properties,
Difference between correlation and regression.

Unit-III **1Credit (15 lectures)**

a) Theory of attributes

3.1 Attributes: Notations and definitions of dichotomy, class frequency, positive & negative classes, ultimate class frequency, fundamental set, relationship among different class frequencies (up to three attributes)

3.2 Concept of consistency and conditions of consistency (up to three attributes.)

3.3 Independence and association of attributes.

3.4 Yule's coefficient of association, (Q), coefficient of colligation (y) and relation between Q & y.

b) Vital Statistics

3.5 Introduction and Uses of Vital Statistics

3.6 Methods of Obtaining Vital Statistics

3.7 Death Rates: i. Crude Death Rate

ii. Specific Death Rate

iii. Standardized Death Rate

3.8 Fertility Rates: i. Crude Birth Rate

ii. General Fertility Rate

iii. Specific Fertility Rate

3.9 Introduction to Life Tables and their Uses.

Probability Distributions

Paper-104

Unit I **(15 lecturers)**

Bivariate probability distribution

1.1 Concept of Bivariate probability distribution (on finite sample space)

1.2 Definition of two dimensional discrete random variable, its joint probability mass function, distribution function and their properties.

1.3 Computation of probabilities of events in Bivariate probability distribution

1.4 Marginal and conditional probability distributions

1.5 Independence of two discrete random variables.

1.6 Mathematical expectation of jointly distributed random variables.

1.7 Conditional expectation, Conditional mean and variance

1.8 Raw and Central moments

1.9 Covariance, Coefficient of correlation, variance of linear combination

1.10 M.G.F :- Definition, Properties, theorems on MGF ,CGF :- Definition, Properties

Unit II **(15 lecturers)**

Some standard discrete probability distributions

2.1 Definition of Bernoulli distribution and moments of the distribution

2.2 Additive property of Bernoulli distribution (Two variables)

2.3 Definition of Binomial distribution and applications of Binomial distribution

2.4 Mode of Binomial distribution

Moments and recurrence relation in moments of Binomial distribution.

2.5 Additive property of Binomial distribution

Fitting of Binomial distribution

2.6 Examples based on 2.1 to 2.5

2.7 Definition of Poisson distribution and applications.

2.8 Mode of Poisson distribution

Moments of Poisson distribution.

(Poisson distribution as a limiting form of Binomial distribution.)

2.9 Additive property and its generalization for Poisson distribution and fitting of Poisson distribution

2.10 Examples based on 2.7 to 2.9

Unit III **(15 lecturers)**

Discrete probability distributions continued

3.1Geometric Distribution :-Definition ,mean, variance,

3.2 MGF, Distribution function,

3.3 Lack lof memory property,

3.4 Distribution of x+y when x & y are independent Distribution of min (x,y)

3.5 Negative Binomial Distribution :- Definition, mean, variance,

3.6 MGF,CGF, Skewness, kurtoris (recursive relation not expected)

3.7 Relation between geometric & -ve binomial.

3.8 Poisson approximation to –ve binomial.

Annual Practical Based on Theory Papers- 101,102,103& 104

Paper-105

List of Practicals

1. Representation by frequency distribution & Analysis of real life data collected by students.
2. Graphical Representation of data
3. Diagrammatic Representation of data
4. Computation of Arithmetic Mean
5. Computation of arithmetic mean by change of origin and scale.
6. Computation of Median for ungrouped and grouped data and graphical location.
7. Computation of Mode for ungrouped and grouped data and graphical location.
8. Computation of Quartiles, Deciles and Percentiles and their graphical location.
9. Computation of Quartile deviation and Mean deviation.
10. Computation of Variance, S.D. and coefficient of variation (C.V.)
11. Computation of raw moments for ungrouped and grouped data and computation of measures of skewness and kurtosis.
12. Computation of central moments using raw moments for ungrouped and grouped data and
13. computation of measures of skewness and kurtosis..
14. Computation of Karl Pearson's coefficient of correlation.
15. Computation of Spearman's Rank correlation
16. Fitting lines of regression and Verification of properties of regression coefficients
17. Attributes: Testing consistency of data
18. Computation of Coefficient of Association.
19. Computation of CDR, SFR and Standardized Death Rates.
20. Computation of CBR, SFR and GFR.
21 Problems based on Probabilities
22 Problems based on various results in Probability (1.10 of theory paper-II)
23 Problems based on addition and multiplication theorems of probability.

24 Problems based on conditional probability.

25 Problems based on Baye's theorem.

26Problems based on mathematical expectation and its properties.

27Problems based on mathematical expectation.

28 Computation of measures of central tendency using mathematical expectations – I

29 Computation of measures of dispersion using mathematical expectation.

30 Computation of measures of skewness and Kurtosis..

31 Problems based on uninvariate random variables.

32 Problems based on Binomial distribution.

33 Fitting of Binomial distribution

34 Problems based on Poisson distribution

35 Fitting of Poisson distribution

36 Computation of marginal, conditional probability distributions from bivariate probability distribution

37 Independence of two discrete random variables from a Bivariate Probability distribution.

.

--=*=--

BVS*130514/-