UNIVERSITY OF MUMBAI
No.UG/70 of 2009

CIRCULAR:-

A reference is invited to the Ordinances Regulations and syllabi relating to the B.A.degree course **vide** this office Circular No.UG/415 of 2007 dated 15th October, 2007 and the Principals of the affiliated colleges in Arts and the Professor-cum-Director, Institute of Distance Education are herby informed that recommendation made by the Board of Studies in Statistics at its meeting held on 6th October, 2008 has been accepted by the Academic Council at its meeting held on 15th December, 2008 **vide** item No. 4.24 and that in accordance therewith, the revised syllabus of Paper II and III in Statistics at the S.Y.B.A. examination is modified as per **Appendix** and that the same has been brought into force with effect from the academic year 2009-2010.

MUMBAI-400 032
26th February, 2009

PRIN.K.VENKATARAMANI
REGISTRAR

To,

The Principals of the affiliated colleges in Arts and Professor cum-Director, Institute of Distance Education.

AC/4.24/15/12/2008

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No. UG/70-A of 2009, MUMBAI-400 032 26th February, 2009

Copy forwarded with compliments for information to :-

1. The Dean Faculty of Arts
2. The Chairman, Board of Studies in Statistics.
3. The Controller of Examination,
4. The Co-Ordinator, University Computerization Centre,

(D.H.KATE)
DEPUTY REGISTRAR
U.G./P.G.Section

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro- Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Central Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum- Director, Institute of Distance Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar (2 copies) and the

Enclosure to Item No 4.24
15.12.2008

UNIVERSITY OF MUMBAI

Modified Syllabus

For

Paper-II & III

in the Subject of

Statistics

at the S.Y.B.A.

(With effect from the academic year 2009-2010)

S.Y.B.A.
PAPER – II
STATISTICAL METHODS

Unit -1 Elementary Probability theory :
Trial, random experiment, sample point and sample space. Definition of an event.
Operation of events, mutually exclusive and exhaustive events, complementary events.
Classical and Empirical definitions of Probability and their limitations.
Theorems on Addition and Multiplication of probabilities (with proofs),
Independence of events, Conditional probability. Bayes' theorem and its applications.

Unit -2 Discrete random variable and its probability distribution :
Concept of Discrete random variable.
Definition and properties of probability distribution and cumulative distribution function of discrete random variable.
Raw and Central moments (definition only) and their relationship. (upto order four without proof).
Concepts of Skewness and Kurtosis and their uses.
Expectation of a random variable. Theorems on Expectation and Variance.
Probability mass function and Cumulative distribution function of discrete random variable.
Joint probability mass function of two discrete random variables. Marginal and Conditional distributions. Theorems on Expectation, Variance (with proof), Covariance and Coefficient of Correlation.
Independence of two random variables.

Unit-3 Standard Discrete Distributions :
Discrete Uniform, Binomial and Poisson distributions; their probability mass functions,
obtaining their cumulative distribution function. Derivation of mean and variance.
Poisson approximation to Binomial distribution (statement only).

Unit-4 Continuous random variable and its probability distribution :
Definition and properties of probability density function and cumulative distribution function of Continuous random variable. Their representative curves. Expectation, Variance and Standard deviation of continuous random variable and their properties.
Median, Raw and central moments.

Unit-5 Standard Continuous Distributions :
Rectangular i.e. Continuous Uniform, Exponential and Normal distributions.
Frequency Curves of Uniform, Exponential and Normal distributions.
Derivations of mean, variance and median for Uniform and Exponential distributions.
Properties of Normal distribution (without proof) and properties of Normal curve.
Use of Normal tables.

Unit-6

Concept of a Parameter, statistic, estimator and its sampling distribution. Standard error of the estimator and concept of bias in an estimator.
Central Limit Theorem (statement only)
Sampling distribution of sample means and sample fractions (proportions) (For large samples only).
Standard errors of sample mean and sample fractions.
Point and Interval estimate of single mean, single proportion from sample of large size.
Statistical tests :
Concept of Hypothesis
Null and Alternate hypotheses, Simple and Composite hypotheses
Types of errors, Critical region, Level of significance.
Large Sample Tests
for testing specified value of population mean
for testing specified value in difference of two means
for testing specified value of population proportion
for testing specified value in difference of population fractions,

TOPICS FOR PRACTICALS:

1. Probability
2. Discrete Random Variable
3. Bivariate Probability Distributions (Discrete case only)
4. Binomial and Poisson distribution
5. Continuous Random Variables
6. Rectangular and Exponential Distributions
7. Normal Distributions
8. Testing of hypothesis
9. Estimation
10. Large Sample Tests

Students are required to do at least two practicals using Computerized Statistical Software.

References :

1. Medhi J : Statistical Methods : An Introductory Text, 2nd Edition, New Age International Ltd.
2. David S : Elementary Probability, Cambridge University Press.
3. Hoel P.G. : Introduction to Mathematical Statistics. Asia Publishing House..
4. Hogg R.V. and Tannis E.P. : Probability and Statistical Inference, McMillan Pub.Co.Inc.
5. Kothari C.R.: Quantitative Techniques, Wiley Eastern Limited
6. Pitan Jim : Probability, Narosa Publishing House.
7. Spiegel M.R.: Theory and Problems of Statistics, Schaum's Publishing Series, Tata McGraw-Hill
8. Goon A.M., Gupta M.K. and Dasgupta B: Fundamentals of Statistics, Volume II, The World Press Private Limited, Calcutta

S.Y.B.A.
PAPER-III
OPERATIONS RESEARCH AND INDUSTRIAL STATISTICS

Unit-I

Sampling :

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Concepts of population, population unit, sample, sample size, parameter, statistic, estimator, unbiasedness, bias, mean square error (M.S.E.) and standard error.

Census and Sample Surveys.

Steps in conducting sample survey with illustrations of designing Questionnaire.

Concepts of Sampling errors and Non-Sampling errors.

Concepts of Non-probability sampling and probability sampling.

Sampling with replacement, without replacement

Simple random sample (SRS)

Drawing Simple random sample (SRS) by

(a) Lottery Method and
(b) Use of Random Numbers

Mean of a simple random sample is an unbiased estimator of population mean.

Introduction (only) : Stratified sampling, Systematic sampling, Cluster sampling, Two stage sampling

Application to Market Research in variety of fields. (Psychology, Economics)

NSSO, CSO and their functions.

Unit-2 Forecasting Methods :

Least Square technique (15L

Fitting of Curves of the form $Y = a\,b^X$, $Y = a\,x^b$ and $Y = a\,e^{bx}$ using Log

Simple Linear Regression

Relevance of coefficient of determination (r^2)

Application of β coefficient in Regression Analysis

Application of Exponential smoothing using Time Series Data

Unit-3 CPM and PERT : (15L)

Concept of project with illustrations as an organized effort with time management

Objective and Outline of the techniques

Diagrammatic representation of activities in a project :

Bar Diagram and Network Diagram

Slack time and Float time. Determination of Critical path.

Probability consideration in project scheduling.

Unit-4 Transportation Model : (15L)

Concept, Mathematical Formulation, Concepts of Solution, Feasible Solution, Unbalanced Problem.

Initial Basic Feasible Solution by

i) North-West Corner rule,

ii) Matrix Minima Method

iii) Vogel's Approximation Method

Optimum Solution by MODI Method for the following cases

i) Maximisation

ii) Minimisation

iii) Degenerate feasible solution.

Assignment Model :

Concept of assignment model as a particular case. Solution by Hungarian Method, include unbalanced type problems too.

Adjustments when problem is of Maximization type

Unit-5 Linear Programming Problem (L.P.P.): (15L)
Mathematical Formulation, Concepts of Solution, Feasible Solution, Basic Feasible Solution.
Graphical Solution for Problem with two variables.

i) Alternative Optima

ii) Unbounded Solutions

iii) Infeasible Solutions

Standard Linear Programming form using Slack variable, Surplus variable and Artificial variable

Solution of L.P.P. using :

Simplex Method, Big M Method

Special cases of Simplex Method : Degeneracy

Concept of Duality. Its use in solving LPP. Relationship between optimal solutions to Primal and Dual.

Economic Interpretation of Dual.

Unit-6 Application of chi-square distribution and measures of association :

Definition of Chi-square distribution.

Fitting of specified distribution; Binomial, Poisson Distribution and testing Goodness of Fit

Independence of Attributes :

Data given by 2 x 2 contingency table. (With Derivation of Test statistic)

Data given by r x s contingency table (Without Derivation of Test statistic)

Measures of association

i) Yule's coefficient
ii) Coefficient of Colligation
iii) Phi-coefficient
iv) Odds ratio

TOPICS FOR PRACTICALS:

1) Sampling Techniques

2) Forecasting Methods

3) Transportation and Assignment Problems

4) L.P.P. : Formulation and Mathematical Model

5) Linear Programming (Graphical or Simplex)

6) Fitting and Testing 'Goodness of Fit' of specified distribution; Binomial; Poisson

7) Distribution distributions mentioned under Chi-Square.

8) Measures of association.

References :

1) Gupta and Kapoor : Applied Statistics S. Chand Publications

2) Coobran : Sampling Techniques. Wiley publications

3) Naresh Malhotra : Market Research

4) Kothari C.R. : Quantitative Techniques Wiley Eastern limited

5) PERT and CPM, Principles and Applications : Srinath

6) Operations Research : Kantiswaroop and Mamohan Gupta

7) Operations Research : Sharma

8) Operations Research : Taha

9) Damodar Gujrati : Basic Econometrics

Work-load :

Theory : 3 Lectures per week per paper

Practicals : 3 Lecture periods per paper per week per batch of 20 students

Students are required to do at least two practicals i.e. Six Lecture periods using Computerized Statist Software

ALL THESE THREE LECTURE PERIODS OF PRACTICALS SHOULD BE CONDUCTE SUCCESSION TOGETHER ON A SINGLE DAY