CHRIST COLLEGE (AUTONOMOUS), IRINJALAKUDA

COMMON COURSE IN STATISTICS

FOR B.VOC IT

(CHOICE BASED CREDIT AND SEMESTER SYSTEM FOR UNDERGRADUATE CURRICULUM)

UNDER THE FACULTY OF VOCATIONAL STUDIES

SYLLABUS

(FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2018 – '19 ONWARDS)

BOARD OF VOCATIONAL STUDIES IN IT (UG)

CHRIST COLLEGE (AUTONOMOUS), IRINJALAKUDA - 680125, KERALA, INDIA

JUNE, 2018

SEMESTER 1

BC3A11: BASIC NUMERICAL SKILLS

Contact Hours per Week: 5

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Objectives

- To enable the students to acquire knowledge of Mathematics and Statistics.
- At the end of this course, the students should have understood set operations, matrix and Mathematics of finance, Statistical tools and their applications.

Course Outline

Module I

Sets and Set Operation – Venn Diagrams – Elements of Co-ordinate system – Matrices – Fundamental ideas about matrices and their operational rules – Matrix multiplication – Inversion of square matrices of not more than 3rd order – Solving system of simultaneous linear equations (15 Hours)

Module II

Theory of Equations: Meaning – types of equations – Simple linear and Simultaneous equations (only two variables) eliminations and substitution method only – Quadratic equation Factorization and formula method ($ax^2 + bx + c = 0$ form only) – Problems on business applications. (10 Hours)

Module III

Progressions: Arithmetic Progressions – Finding the 'n'th term of an AP and also sum to 'n' terms of an AP – Insertion of Arithmetic means in given terms of AP and representation of AP – Geometric Progression – Finding 'n'th term of GP – Insertion of GMs in given GP and also representation of GP – Mathematics of Finance – Simple and compound interest (Simple problems only) (15 Hours)

Module IV

Meaning and Definition of Statistics – Scope and limitations – Statistical enquiries – Scope of the problem – Method to be employed – Types of enquiries – Presentation of data by Diagrammatic and Graphical Method – Formation of Frequency Distribution (15 Hours)

Module V

Measures of Central Tendency – Arithmetic Mean – Median – Mode – Geometric and Harmonic Mean – Measures of Variation and standard, mean and quartile deviations – Skewness and Kurtosis – Lorenz curve. Analysis of Time Series: Methods of measuring – Trend and Seasonal variations – Index number – Unweighted indices – Consumer price and cost of living indices. (20 Hours)

(Theory and problems may be in the ratio of 20% and 80% respectively. An over view of the topics is expected and only simple problems shall be given)

Reference

1. Sundaresan and Jayaseelan – An Introduction to Business Mathematics and Statistical Methods.

2. Dr. A K Arte & R V Prabhakar – A Text Book of Business Mathematics.
3. Sanchethi and Kapoor – Business Mathematics.
4. Gupta S P – Statistical Methods
5. Navaneethan P – Business Mathematics
6. R. S. N, Pillai, Mrs, Bhagavathi – Statistics
7. P. R, Vittal – Business Mathematics and Statistics.

SEMESTER 2

ST1CO1: BASIC STATISTICS & PROBABILITY

Contact Hours per Week: 5

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Course Outline

Module 1

Population, sample, , measures of central tendency-arithmetic mean, weighted arithmetic mean, geometric mean, harmonic mean, median, mode, partition values-quartile, percentile, measures of deviations-variance, standard deviation, mean deviation about mean, quartile deviation, co-efficient of variation (20 hours)

Module 2

Fitting of straight line, parabola, exponential, polynomial, (least square method), correlation, regression, two regression lines, regression coefficients, properties- .rank correlation, partial and multiple correlation (3 variables) (15 hours)

Module 3

Random experiment, Sample space, event, classical definition of probability, statistical regularity, relative frequency definition, field, sigma field, axiomatic definition of probability and simple properties, concept of probability measure, addition theorem (two and three events), conditional probability of two events, multiplication theorem, independence of events(pair wise and mutual), Bayes theorem. –numerical problems (25 hour)

Module 4

Random variable-discrete and continuous, probability mass function (pmf) and probability density function (pdf)-properties and examples, cumulative Distribution function and its properties, change of variable (univariate case) (12 hours)

References

1. V. K. Rohatgi, An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
2. S.C.Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chan and Sons
3. A.M. Mood, F.A. Graybill and D C Bose, Introduction to Theory of Statistics, McGraw Hill
4. John E Freund, Mathematical Statistics (6th edn), Pearson Edn, New Delhi

SEMESTER 3

ST1CO2: PROBABILITY DISTRIBUTIONS

Contact Hours per Week: 5

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Course Outline

Module 1

Mathematical expectations (univariate): Definition, raw and central moments (definition and relationships), moment generating function and properties, characteristic function (definition and use only), Skewness and kurtosis (using moments) (15 hours)

Module 2

Bivariate random variable: joint pmf and joint pdf, marginal and conditional probability, independence of random variables, function of random variable. Bivariate Expectations, conditional mean and variance, covariance, Karl Pearson Correlation coefficient, independence of random variables based on expectation. (15 hours)

Module 3

Standard distributions: Discrete type-Bernoulli, Binomial, Poisson, Geometric, negative binomial (definition, properties and applications), Uniform (mean, variance and mgf), Continuous Type-Uniform, exponential, gamma, Beta, Normal (definition, properties and applications), Lognormal, Pareto and Cauchy (Definition only) (30 hours)

Module 4

Chebyshev's inequality, variables, Convergence in probability weak law of large numbers (iid case), Bernoulli law of large numbers, example only), Central limit theorem (Lindberg Levy-iid case) (12 hours)

References

1. V. K. Rohatgi, An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons
3. A.M. Mood, F.A. Graybill and D C Bose, Introduction to Theory of Statistics, McGraw Hill
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SEMESTER 4

ST1CO3: STATISTICAL INFERENCE

Contact Hours per Week: 5

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Course Outline

Module 1

Sampling distributions: Statistic, Sampling distribution of a statistic, Standard error, Sampling from normal distribution, distribution of sample mean, sample variance; chi-square distribution, t distribution, and F distribution (definition, derivations and relationships only). (25 hours)

Module 2

Theory of Estimation: Point Estimation, desirable properties of a good estimator, unbiasedness, consistency, sufficiency, Fisher Neyman factorization theorem, efficiency. Methods of Estimation:- Method of maximum likelihood, method of moments. (20 hours)

Module 3

Interval Estimation: Interval estimates of mean, difference of means, variance, proportions and difference of proportions. Derivation of exact confidence intervals for means, variance and ratio of variances based on normal, t, chi square and F distributions: (15 hours)

Module 4

Testing of Hypotheses: concept of testing hypotheses, simple and composite hypotheses, null and alternative hypotheses, type I and II errors, critical region, level of significance and power of a test. Neyman Pearson approach: Large sample tsts concerning mean equality of means, proportions , equality of proportions, Small sample tests based on t distribution for mean, equality of means and paired t test. Tests based on Fdistribution for ratio of variances. Tests based on Chi square distribution for variance, goodness of fit and for independence of attributes: (30 hours)

References

1. V. K. Rohatgi, An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
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SEMESTER 5

MCA10 301 NUMERICAL ANALYSIS & OPTIMIZATION TECHNIQUES

Contact Hours per Week: 5

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Objective

This course is indented to familiarize the learners with the various techniques in numerical analysis. The course also aims to introduce the concept of optimization via standards methods for solving linear programming and allied problems. A familiarity with these applications is essential for any specialist in computer applications.

Course Outline

Module 1

Errors in numerical calculations – sources of errors – significant digits – numerical solution of polynomial and transcendental equations – bisection method – regula-falsi method – Newton-Raphson method – fixed point method of iteration – rates of convergence of these methods – solution of system of algebraic equations – exact methods – Crout's triangularization method – iterative methods – Gauss-Seidel and relaxation methods (10 hours)

Module 2

Polynomial interpolation – Lagrange interpolation polynomial – divided differences – Newton's divided difference interpolation polynomial – finite differences – operators Δ, ∇, e, δ – Gregory-Newton forward and backward difference interpolation polynomials – central differences – Stirling's interpolation formulae (10 hours)

Module 3

Numerical differentiation – differentiation formulae in the case of equally spaced points – numerical integration – trapezoidal and Simpson's rules – compounded rules – errors of interpolation and integration – formulae for numerical solution of ordinary differential equations – singe-step methods – Taylor series method – Euler's method – modified Euler's method – Picard's iteration method – Runge-Kutta methods (2nd, 3rd and 4th order formulae – derivations not required) – multistep methods – Milne's predictor and corrector formulae (10 hours)

Module 4

Optimization methods – mathematical formulation of linear programming problem – simplex method – artificial variables – Charne's M-method – two-phase technique – duality in linear programming – dual simplex method (12 hours)

Module 5

Transportation, assignment problems and routing problems (8 hours)

Reference

1. Sastry S. S., Numerical Analysis, Prentice Hall India
2. Froberg, Introduction to Numerical Analysis, Addition Wesley
3. Salvadori & Baron, Numerical Methods in Engineering, Prentice Hall India
4. Gerald, Applied Numerical Analysis, Addison Wesley
5. Grawin W. W., Introduction to Linear Programming, McGraw Hill
6. Gass S. I., Introduction to Linear Programming, Tata McGraw Hill

COMMON COURSE FOR B.VOC FOOD PROCESSING TECHNOLOGY

SEMESTER 3

BC3A11: BASIC NUMERICAL SKILLS

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