### M.Sc Computer Science & Statistics from the admitted batch of 2015-16

<table>
<thead>
<tr>
<th>Semester</th>
<th>Paper</th>
<th>Marks</th>
<th>Credits</th>
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<tbody>
<tr>
<td>I</td>
<td>1.1 Probability &amp; Distribution</td>
<td>80+20</td>
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<td></td>
<td>1.2 Estimation Theory</td>
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<td>1.3 Sampling</td>
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<td></td>
<td>1.4 C Programming</td>
<td>80+20</td>
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<tr>
<td></td>
<td>1.5 Practical Examination (Pract.150+Rec.50)</td>
<td>200</td>
<td>8</td>
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<td></td>
<td>1.6 Viva-Voce</td>
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<tr>
<td>II</td>
<td>2.1 Multivariate Analysis</td>
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<td>2.2 Testing of Hypothesis</td>
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<td>2.3 Stochastic Processes</td>
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<td>2.4 Designs of Experiments</td>
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<td>2.5 Non-Core (To be selected from the List)</td>
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<td>2.6 Practical Examinations (Prac.150+Rec.50)</td>
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<td>2.7 Viva-Voce</td>
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<td>III</td>
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<td>3.2 Data Structures Using C</td>
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<td>3.3 Client Server Technology</td>
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<td>3.4 OOPs in C++ and Unified Modelling</td>
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<td>3.5 Non-Core (To be selected from the List)</td>
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<td>3.7 Viva-Voce</td>
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<td>IV</td>
<td>4.1 Forecasting Methods</td>
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<td>4.2 Visual Application Development</td>
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<td>4.3 Distributed JAVA Objects</td>
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<td>4.4 VB.NET</td>
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<td>4.7 Viva-Voce</td>
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<td><strong>Total</strong></td>
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</table>

The detailed syllabus is enclosed herewith in Appendix-I.

K.Srinivasa Rao  
(Chairman, P.G. B.O.S)
APPENDIX - I

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – I

Paper – 1.1: PROBABILITY AND DISTRIBUTIONS

UNIT-I: Classes of sets, field, Sigma-field, minimal sigma-field, Borel field. Limit of a sequence of sets. Measure on field, extension of measure to sigma field, Lebesgue measure, Lebesgue-Stieltjes measures. Measurable functions, Borel function, induced sigma field.

UNIT-II: Random variable, convergence of sequence of random variables-convergence in probability, almost surely, in the r-th mean and in distribution, and their relationships. Characteristic function, properties, inversion theorem, continuity theorem, Central limit theorem, Lindberg-Levy, Liapunoff forms.

UNIT-III: Mathematical Expectation, Moments of random variable, conditional expectation, problem of moments. Basic Markov’s, Chebycheff’s, Holder’s, Minkowski’s and Jensen’s inequalities. Law of large numbers: Chebyshev’s and Khinchin’s forms of WLLN. Kolmogorov’s SLLN. Convergence theorems relating to $X_n + Y_n$, $X_n Y_n$ and $X_n/Y_n$ where $X_n \rightarrow X$ and $Y_n \rightarrow C$.

UNIT-IV: Weibull and Laplace distributions-their m.g.f and c.f and other properties. Compound distributions-Poisson-Binomial. Sampling distributions: Non-Central chi-square, non central-t and non central F distributions and their properties. Distribution of quadratic forms under normality and related distribution theory.


Text Books:

Reference Books:
SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – 1

Paper – 1.2: ESTIMATION THEORY


UNIT-II: Concept of sufficiency – single parameter and several parameter cases. Fisher-Neyman Factorization theorem, Minimal sufficient statistic, exponential families and Pitman families. Invariance property of sufficiency under 1 – 1 transformation of sample space and parameter space.


UNIT-V: Censored and truncated distributions: Type 1 and Type 2 Censoring for normal and exponential distributions and their MLE’s. Interval estimation: Confidence Intervals, using pivots; shortest expected length confidence intervals.

Text Books:
Reference Books:

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – I

Paper – 1.3: SAMPLING

UNIT-I: Selection with varying probabilities, PPS sampling, Horvitz and Thompson estimator, Yates and Grundy’s estimator, Midzuno -Sen Sampling Scheme.

UNIT-II: Systematic Sampling: Estimation of population mean and its variance, Methods for populations with linear trend: Yates end correction, Modified systematic sampling, balanced systematic sampling, centrally located sampling. Circular systematic sampling.


UNIT-IV: Ratio estimator: Introduction, Bias and Mean square error, Estimation of variance, confidence interval, comparisons with mean per unit estimator, Ratio estimator in stratified random sampling.

Difference estimator and Regression estimator: Introduction, Difference estimator, Difference estimator in stratified sampling. Regression estimator, Comparison of regression estimator with mean per unit estimator and ratio estimator. Regression estimator in stratified sampling.

Text Books:
Murthy, M.N.: Sampling Theory and Methods
Sukhatme, P.V. and Sukhatme, B.V.: Sampling Theory of Surveys with Applications.

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – I

Paper – 1.4: C - PROGRAMMING

UNIT-I: Identifiers and Keywords, Data types, constants, variables and arrays, Declarations, expressions, statements, symbolic constants.

Operations and expressions: Arithmetic operators, Unary operators, relational and logical operators, Assignment operators, conditional operator, and library functions.

UNIT-II: Data Input and Output: getchar, putchar functions, scanf, printf, gets puts functions. Control statements: While, do-while, for, nested loops, if-else, switch, break, continue exit operator, goto statement. Functions: Definition, accessing a function, passing arguments to a function, specifying argument types, function prototypes, and recursion.


UNIT-IV: Pointers: Fundamentals, pointer declarations, passing pointers to a function, pointers and multi-dimensional arrays, operations on pointers, arrays of pointers, passing functions to other functions.

UNIT-V: Structures and Unions: Definition, processing, structures and pointers, passing structures to a function. Data Files: Opening and closing a data file, creating, processing a data file, unformatted data files.

Text Books:
Problem solving with C: M.T.Somasekhara, Prentice Hall India.
SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – II

Paper – 2.1: MULTIVARIATE ANALYSIS

UNIT-I: Definition of Wishart matrix and its properties, Mahalanobis Distance, Null distribution of Hotelling’s $T^2$ statistic. Application in tests on mean vector for one and more multivariate normal populations and also on equality of the components of a mean vector in a multivariate normal population.

UNIT-II: Classification and discrimination procedures for discrimination between two multivariate normal populations, sample discriminant function, tests associated with discriminant functions, probabilities of misclassification and their estimation, classification into more than two multivariate normal populations. K-nearest neighbor classification.

UNIT-III: Principal components, Dimension reduction, Canonical variables and canonical correlation -definition, use, estimation and computation.


Note: Practical exercises must be based on statistical package only.

Text Books:

References Books:

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – II

Paper – 2.2: TESTING OF HYPOTHESIS


UNIT-II: Monotone Likelihood ratio and UMP tests for one-sided hypothesis, Composite hypothesis. Unbiased tests, uniformly most powerful unbiased tests. Type A and Type A1 regions.

UNIT-III: Likelihood ratio criterion, its asymptotic distribution, one sample, two samples and K – sample problems. Linear hypothesis. Wald’s SPRT: Proof that it terminates in a finite number of steps with probability 1. O.C. and A.S.N. functions. Examples of (i) Binomial (ii) Normal cases for testing hypothesis $\mu$ and $\sigma^2$.

UNIT-IV: Notion of Non-Parametric test, Different N-P tests; Run test, Sign test, Wilcoxon and Mann-Whitney test, Median test; Derivation of the mean and variance of the above test statistics when null hypothesis is true.

UNIT-V: $\chi^2$ – test for goodness of fit, its asymptotic distribution, description of Kolmogorov-Smirnov test, Tests involving Rank correlation (Kendall’s Tau and Spearman’s rank Correlation).

Text Books:
Wald (1973) : Sequential Analysis, Dover, Newyork.

References Books:

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – II

Paper – 2.3: STOCHASTIC PROCESSES

UNIT-I: Introduction to Stochastic processes; classification of Stochastic processes according to state space and time domain. Countable state Markov chains (MC’s), Chapman-Kolmogorov equations; calculation of n-step transition probability and its limit. Classification of states, period of a state. Stationary distribution of MC.

UNIT-II: Random walk and gambler’s ruin problem; Random walk in one and two dimensions. Gambler’s ruin problem, probability of ultimate ruin, expected duration of the game.


Text Books:

References Books:

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – II

Paper-2.4: DESIGNS OF EXPERIMENTS

UNIT-I: Principles of designs, analysis of variance and analysis of Co-variance, fixed and random effect models. Contrasts. Model Adequacy checking: Test for Normality, Test for equality of Variances (Bartlett test, Modified Levene method)

UNIT-II: C.R.D., R.B.D., Estimation of parametric functions and tests of hypothesis. Comparison of their efficiencies. Missing plot techniques, testing the equality of subsets of block effects or treatment effects. Multiple comparisons tests: Tukey’s test, The Fisher Least significant Difference (LSD) method, Duncans Multiple range test.


Text Books:

References Books:

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – III
Paper – 3.1: COMPUTER ORGANISATION AND ARCHITECTURE

UNIT-I: Number Systems, Binary, Octal, Hexadecimal systems, binary arithmetic, Character codes,

UNIT-II: Error detection, correction logic gates, simplification of Boolean expressions, half and full adders,

UNIT-II: Multiplexer, decoder, encoder, flip flops, counters CPU organization, Instruction formats, addressing modes, Fetch, indirect execution cycles.

UNIT-IV: IO architecture, programs controlled, interrupts DMA transfers. Priority interrupts.

UNIT-V: Memory organization, Hierarchy, cache, associative, Virtual Memory, Demand paging concepts.

Reference Books:

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – III

Paper – 3.2: DATA STRUCTURES USING “C”


UNIT-II: Introduction to data structures, classification, linear arrays, One way, Two way linked lists, circular linked lists. Operations such as traversal, insertion, deletion, searching. Algorithms for binary search, merging of sorted arrays.

UNIT-III: Linear and linked representations of stacks and queues, circular queues, Queues and priority queues. Applications such as Conversion of infix to postfix expression, evaluation of expressions. Conversion of recursion to non recursion, etc. Garbage collection. Hashing and collision resolution methods.

UNIT-IV: Trees, Traversal algorithms, binary search tree, Heap, conversion of a general tree to binary tree, Thread tree, Btree applications, tories.
Graphs and applications, linear, linked Representation, power matrices, Graph traversals such as BFS, DFS, Prim’s, Kruskal algorithms for Minimum Spanning tree construction. Warshal algorithm and Floyd algorithms.

UNIT-V: Programming the sorting problems such as Bubble, insertion, selection, Quick sort, Merge sort.

Time complexity of sorting, searching algorithms.

Reference Books:
Horowitz and Sahni: Data Structures, Galgotia Pub.
Tanenbaum et.al.: Data Structures Using C, Prentice Hall India, Ltd.

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.S.C. COMPUTER SCIENCE & STATISTICS
SEMESTER – III

Paper – 3.3: CLIENT SERVER TECHNOLOGY AND APPLICATIONS

UNIT-I: Evolution of corporate computing models, Mainframe, mini, personal network, file server models.

Benefits of client server model and its scalability.

UNIT-II: The server in client server, Data base servers, Oracle Database, Tables, Views, Table spaces, Data integrity, Encoding the data integrity, Managing the data concurrency, ensuring the data security.

UNIT-III: The client in client server, User interlaces, CUI, GUI interfaces, OOPS concepts. Between client and server the networking issues, Middle ware, types of middleware such as DCE, RPC, MOM object oriented development with client server, DML, DDL, DCL statements of SQL, constraints such as primary and foreign key, SQL functions, nested queries, role of a DBA.


PL/SQL programming, Loops, control structures, Cursors, database triggers, procedures, functions and packages. Security considerations in database management systems.

UNIT-V: Oracle Forms, Features, Designing a form from a single table, Designing a Master detail form, GUI elements such as text box, Button, radio, check box and Event triggers.
Oracle reports, preparation of a report from a single table, Master detail report, adding title, page No. to reports, Summary reports, formulae tool.

**Reference Books:**
Oracle, 8.0, Oracle Press, 1998.

**SYLLABUS**
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – III

**Paper – 3.4: OBJECT ORIENTED PROGRAMMING IN C++ AND UNIFIED MODELLING LANGUAGE**

**UNIT-I:** Object oriented programming principles, Declaration of classes, array of classes, Pointer to classes, constructors such as void constructor, copy constructor, Destructor, friend functions, inline functions, static class members, this pointer.

**UNIT-II:** Single, Multiple inheritance, Types of derivation such as public, private, protected inheritance and member access controls, ambiguity in inheritance, Virtual base class, container classes. Function Overloading, Operator Overloading, Overloading of assignment, binary, unary operators.

**UNIT-III:** Polymorphism, Early binding, virtual functions, Late binding, pure virtual functions, abstract base classes, constructor under inheritance, destructor under inheritance, virtual destructors. Templates and Exception Handling. Data File operations, structures and file operations, classes and file operations.

**UNIT-IV:** Introduction to UML, Use case Diagrams, State diagrams, Sequence diagrams, collaboration diagrams, activity diagrams, component and deployment diagrams, understanding aggregations, composites and interfaces, realizations. Modeling tools for UML.

**UNIT-V:** Performing domain analysis, gathering system requirement, understanding design patterns.

**Reference Books:**
Deital & Deital: C++, Prentice-Hall Inc.
Sinan Si Alhir, Oreilly: UML
UNIT-I: Smoothing Methods: Averaging methods, exponential smoothing methods, other smoothing methods, a comparison of methods, general aspects of smoothing methods.

UNIT-II: Decomposition Methods: Trend fitting, the ratio-to-moving averages, classical decomposition method, different types of moving averages.


UNIT-IV: Box-Jenkins Models: Identification, Estimation and diagnostic checking for the models. Simulation and Monte-Carlo methods.

UNIT-V: Application of Time-Series analysis: Determining randomness of data, examining stationarity of a time series, removing non-stationarity in a time series, Recognizing seasonality in a time-series.

References Books:
Makridakis, S., Wheel Wright S.C., and McGee V.E.: Forecasting Methods and Applications.
Chatifield: Time-Series Analysis, Chapman & Hall.
Montgomery, Johnson & Gardiner: Forecasting and Time Series Analysis, McGraw Hill.

UNIT-I: Visual programming advantages, Event driven code, Data types, arrays, user defined data types, passing variables to procedures, understanding the scope and life of variables.
UNIT-II: Creating forms, form properties, visual basic tools and customizing the tool box, Displaying the text, button, list, dropdown, check box, radio, frame controls. Control arrays, handling mouse events, keyboard events, visual basic debugging tools.

UNIT-III: Understanding the COM, COM component software architecture, benefit of COM interfaces, Component object library, Component object servers.

Reading, writing the text files, creation, deletion, copying the files. Crystal reports, Report creation, changing the properties at runtime.

UNIT-IV: Object linking and Embedding, OLE Storage, Creating active document server, OL Drag and Drop.

Data control, Navigating the data control, Creating Queries in visual basic, Jet DAC, using the record set ODBC, RDO creating applications, working with data bound control.

UNIT-V: Creating intranet applications, understanding the client side, server side scripting, creation of ASP pages.

References Books:
Peter Norton and Michael Groh; Peter Norton’s Guide to Visual Basic 6, Tech Media

SYLLABUS
WITH EFFECT FROM 2015-2016 ADMITTED BATCH OF STUDENTS
M.SC. COMPUTER SCIENCE & STATISTICS
SEMESTER – IV

Paper – 4.3: DISTRIBUTED JAVA OBJECTS

UNIT-I: Distributed object computing, TCP/IP concepts, Object oriented analysis and design, Design architectures, client server and distributed architectures, Design patterns, factory, observer, callback patterns.

UNIT-II: Java overview, Standalone, Applets, AWT and Swing based GUI, Multithreading, Interfaces, Delegation event modelling, IO Streams.

UNIT-III: Java Networking, Sockets, Datagrams, security, JDBC.

UNIT-IV: Connectivity, Java help, Java mail, skeletons, Remote reference layer, RMI based software agents.

UNIT-V: Introduction to CORBA, COM, DCOM approaches to distribute computing.

References Books:
UNIT-I: Data bases: Access databases: Database file, tables, queries, SQL server databases: Data files, log files; Oracle databases: Data files, redo log files, control files, temp files, password files; Relational databases design: Normalization.

UNIT-II: Introduction ADO.NET: Overview: Architecture, components; connection class: Common constructors, opening a connection, closing a connection, command class, Data Adapter class, Data reader class.


References Books:
VB.NET Professional Black Book, NY
Beginning VB.NET: Thearon Willis, Wiley, India.
Microsoft ADO.NET: Riordon, Microsoft Press
Introducing Microsoft ASP.NET, Prentice Hall of India.