UNIVERSITY OF JAMMU
NOTIFICATION
(10/April/ ADP/67)

It is hereby notified for the information of all concerned that the Vice-Chancellor in anticipation approval of the Academic Council, is pleased to authorize adoption of the revised Syllabi and Courses of Study in the subject of Statistics for M.Sc. IV-Semester of Master's Degree Programme for the examination to be held in the year mentioned below alongwith the %age of change:-

M.Sc. -IVth-Semester **For the year May 2010, 2011 & 2012**

Compulsory courses

Course No.	Title	Percent of Change
ST-570	Stochastic Process	Less than 25%
ST-571	Programming in C++	Less than 25%

Optional Courses: (Students may opt any two of the following courses)

Course No.	Title	Percent of Change
ST-572	Econometrics	No Change
ST-577	Operations Research	New Course-100%
ST-578	Non-Parametric Inference	New Course-100%
ST-579	Information Theory	New Course-100%
ST-580	Bio- Statistics	New Course-100%
ST-581	Demography	New Course-100%
ST-582	Actuarial Statistics	New Course-100%
ST-583	Statistical Computing	New Course-100%
Practical		
ST-574	Based on ST-571	No Change
ST-576	Practical on using Statistical Computing	New Course-100%

F.Acd./Statistics/10/ 3287-3311
Dated 08/04/10

Sd/-
(DR. P.S. PATHANIA)
REGISTRAR

Syllabus for the examination to be held in 2010, 2011, 2012.

Compulsory Courses

Course No.	Title
ST-570	Stochastic Process
ST-571	Programming in C++

Optional Courses: (Students may opt any two of the following Courses).

Course No.	Title
ST-572	Econometrics
ST-577	Operations Research
ST-578	Non-Parametric Inference
ST-579	Information Theory
ST-580	Bio-Statistics
ST-581	Demography
ST-582	Actuarial Statistics
ST-583	Statistical Computing

Practical

ST-574	Based on ST-571
ST-576	Practical on using Statistical Software

FOURTH SEMESTER

DETAILED SYLLABUS

Course No. ST-570 Title : Stochastic Processes

Credits: 4 Maximum Marks : 100

a) Semester examination : 80

b) Semester assessment : 20

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012.

OBJECTIVES : The aim of this course is to provide the knowledge of Stochastic Processes to the students.

Unit I

Introduction to stochastic processes (SP's), Classification of SP's 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, Stationary distribution, Classification of states; transient MC, Random walk and gambler's ruin problem.

Unit-II

Discrete state space continuous time MC, Kolomogorav-Feller differential equations, Poission Process, birth and death processes, Applications to queues and storage problems, wiener process as a limit of random walk, first passage time and other problems.

Unit III

Renewal Theory; Elementary renewal theorem and applications, statement and uses of key renewal theorem, study of residual life time process, stationary process, weakly stationary and strongly stationary process.

Unit IV

Branching process, Galton-Watson branching process, probability of ultimate extinction, distribution of populations size, Martingale in discrete time inequality, convergence and smoothing properties, Statistical inference in MC and Markov processes.

NOTE FOR PAPER SETTING:

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

Books Recommended:

1. Adke, S.R and Manjunath, S.M.(1984). An introduction to Finite Markov processes, Wiley Eastern.

2. Bhat, B.R. (2000) Stochastic Models, Analysis and Applications, New Age International India.

3. Karline, S. and Taylor, H.M. (19975): A First course in stochastic Process, Vol. I Academic Press.

4. Medhi, J. (1982) Stochastic Processes Wiley Eastern.

5. Parzen, E (1962): Stochastic Processes.

DETAILED SYLLABUS

Course No. ST-571 Title : Programming in C++

Credits: 4 Maximum Marks : 80

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012.

OBJECTIVES : The aim of this course is to provide the knowledge of programming in C++ to the students.

Unit I

Flowchart, Algorithm and problem solving. General concepts of programming. C++ character set, C++ tokens (identifiers, keywords, constants, and operators), structure of c++ program, cout, cin, Use of I/O operators, Cascading of I/O operators. Data Types: Built-in data types- int , char, float, double, Integer constants, Character Constants, String Constants.Variable: Declaration of variable of built in data types. Operators: Arithmetic operators, Relational Operators. Logical operators. Increment and decrement operator. Conditional operator, Precedence of operators. Type Conversion: Automatic type conversion, type casting. C++ short hands (--, ++, =), Assignment statement, variables initialization.

Unit II

Flow of control: Conditional statements, General form of if-else statement, if else if ladder, Nested if? As an alternative to if, General form of switch, Nested Switch. Simple control statement, for loop statement, while loop, do while loop. Variation in loop statements;Nested Loops, Loop termination: break, continue, go to, exit (), Single character input get char (), single character output (put char ()), gets and puts functions.Structured Data Type: Array, General form of Declaration and Use: one dimensional array, String two dimensional, Array initialization.

Unit III

Functions: General form, Function Prototype, definition of function, accessing a function. Passing arguments to function, Specifying argument Data type, Default argument, Constant argument, Call by value and Call by reference, returning value and their types, Calling function with arrays, Scope rules of function and variables, Local and Global variables, Storage class specifiers: extern, auto, register and static. Standard Header files – string.h, math.h, stdlib.h , iostream.h. Standard library functions-string and char related functions: isalnum(), isalpha(), isdigit(), islower(), isupper(), tolower(), toupper(), strcpy(), strcat(), strlen(), strcmp (). Mathmatical functions: fabs(), frexp() ,fmod (), log(), log10(), pow(), sqrt(), cos(), abs().

Unit IV

Structures: specifying a structure, defining a structure variable, accessing structure members .Functions and structures. arrays of structures, arrays within a structure, Structure within structure Class: Specifying a class, public and private data members and member functions, defining objects , calling member function, constructor and destructor functions.

NOTE FOR PAPER SETTING:

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

Books Recommended:

1. Robert Lafure : C ++ Programming
2. Satish jain : Computer fundamentals and C++ Programming vol. I, Ratna Sagar Pvt. Ltd., Delhi..
3. Al Stevens : Teach Yourself C++, fourth Edition Publications, New Delhi.
4. Ravichandran : Programming C++.
5. Ankit Asthana :Programming in C++.Narosa publication,Delhi

DETAILED SYLLABUS

Course No. ST-572 Title : Econometrics

Credits: 4 Maximum Marks : 100
a) Semester examination : 80
b) Semester assessment : 20

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

OBJECTIVES: The aim of this course is to provide the knowledge of Econometric methods to the students.

Unit I

A review of least squares and maximum likelihood methods of estimation of parameters in classical linear regression model and their properties (BLUE), Generalized Least Square Models, construction of confidence regions and tests of hypothesis, prediction, use of extraneous information in the form of exact and stochastic linear constraints, Restricted regression and mixed regression methods of estimation and their properties. Testing of extraneous information.

Unit II

Multicollinearity, its effects and deletion, Remedial methods including the ridge regression. Specification error analysis, inclusion of irrelevant variables and deletion of dominant variables, their effects on the efficiency of optimization procedure.

Unit III

Hetroscedasticity, consequences and tests for it, estimation procedures under hetroscedastic disturbances. Auto correlated disturbances, Effects on estimation of parameters, Cochran Orcutt and Prais-Winston transformation, Durbin-Watson test. Errors-in-varables model, Inconsistency of least squares procedures, Consistent estimation of Parameters by instrumental variables.

Unit IV

Seemingly unrelated regression equation model, Ordinary least squares and feasible generalized least squares methods and their asymptotic properties.

Simultaneous equation model, problem of indentification, A necessary and sufficient condition for the identifiability of Parameters in a structural equation, Ordinary Least squares, indirect least squares, two stage least squares and limited information maximum likelihood method, K-class estimators, Asymptotic properties of estimators.

NOTE FOR PAPER SETTING :

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

BOOKS RECOMMENDED:

1. Vinod, H.D. and A. Ullah	:	Recent Advances in Regression Methods, (Marcel Dekkar)
2. Jonsten, J.	:	Econometric Methods, (McGraw Hill Book Company.
3. Srivastava, V.K. & D.E Giles		Seemingly unrelated Regression Equations Models: (Marcel Debbar).
4. Maddala, G.S.	:	Econometrics (McGraw Hill Koga Kusha Ltd.)
5. Koutsoyiannis, A	:	Theory of Econometric (Macmillan)
6. Theil, H.	:	Principles of Econometrics (John Wiley).
7. Gujarati, D.	:	Econometric Theory.
8. Madanani	:	Introduction to Econometrics.
9. Baltagi	:	Econometrics (Springer rer log)

DETAILED SYLLABUS

Course No. ST-574

Title : Practical-VII

Credits: 4

Maximum Marks : 100
a) Semester examination : 50
b) Sessional assessment : 50

Duration of Examination: 3 hours

Objectives: To explose students at running programs using C++ language.

SYLLABUS

Based on the Course No. ST-571 during the semester.

Topic	No. of Practicals
Simple Programmes using Operators	3
If else statement	3
Switch Statement	2
Loops	10
Arrays	6
Function	6
Classes & Structure	3
Total	**33**

Note for paper setting:

The paper for practical examination shall be set jointly by the external and internal examiners. Four questions will be set in all and the students will be required to attempt any two questions.

DETAILED SYLLABUS

Course No. ST-576

Title : Practical-VIII

Credits: 4

Maximum Marks : 100
a) Semester examination : 50
b) Sessional assessment : 50

Duration of Examination: 3 hours

Objectives: To expose students to the computation work using standard statistical software.

SYLLABUS

Topic	No. of Practicals
Graphical Representation of data	3
Measures of central tendency &Dispersion	5
Testing of Significance	6
Correlation and regression	5
AVOVA	4
Factor Analysis	2
Total	**25**

Note for paper setting:

The paper for practical examination shall be set jointly by the external and internal examiners. Four questions will be set in all and the students will be required to attempt any two questions.

DETAILED SYLLABUS

Course No. ST-577 Title : OPERATION RESEARCH

Credits: 4 Maximum Marks : 100
a) Semester examination : 80
b) Semester assessment : 20

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

OBJECTIVES: This course introduces the students to various optimization techniques of operations Research and some models of queueing theory.

Unit I

Inventory control, Introduction, Deterministic models, Economic lot size model with and without shortages, Probabilistic models, Single period model with uniform and continuous demand, models with price breaks, news papers boy problems.

Unit II

Introduction of queueing theory, concepts and various definitions, classification of queues and their problems, distribution of arrivals and service time, theorems based on arrival and departure ti es. Different queuing models M/M/1(FCFS, ∞, ∞), Probability distribution of different times and their expected values, Generalized M/M/1 Model, M/M/1 (FCFS, N) and M/M/C (∞, ∞, FCFS)

Unit III

Replacement Problems, Replacement of items that deteriorate, Replacement of items that fail completely, Recruitment and production problems, equipment renewal problems. Simulation, Types of Simulation, limitations of simulation, generation of random numbers and Monte-Carlo Simulation, Applications of Simulation to inventory contrd and Queing problems.

Unit IV

Introduction to decision theory, Types of decision, Decision models, Types of Environment, EMV, EVPI, EOL. Decision making under uncertainly, Conflict and Decision Tree Analysis. Decision making under utilities: utility functions, curves and their construction. Posterior probabilities and Bayesian Analysis.

NOTE FOR PAPER SETTING :

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

BOOKS RECOMMENDED:

1.	Achoff. R.L. and M.W. Sariens	: Fundamentals of Operational Research
2.	S. D. Sharma	: Operations Research
3.	N.U. Prabhu, Wiley	: Queues and Inventions
4.	D. Gross and C.M. Marris	: Fundamentals of Queuing Theory.
5.	Taja, H.A.	: Operations Research- An introduction
6.	N.D.Vohra & Tata Mc Gran hall	: Quantitative Techniques

DETAILED SYLLABUS

Course No. ST-578 Title : Non-Parametric Inference

Credits: 4 Maximum Marks : 100

a) Semester examination : 80

b) Semester assessment : 20

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

OBJECTIVES: To make students familiar with non-parametric concepts.

Unit I

Distribution of F (x), Order Statistics and Their distributions, Coverage probabilities and confidence interrats, empirical distribution function and its properties, asymptotic distributions of order-statistics, bounds on expected values.

Unit II

Single Sample problems, problem of location, Mathisen-Median test, Rosenbaum Statistics I and II, Linear rank statistics, Prediction intervals, Goodness of fit tests, Kolmogrov-Smirnov-one sample Statistic, sign test, Wilcoxon- Signed rank statistics, Walsh averages, general Linear rank statistics, Noether's Conditions, asymptotic distributions of above statistics.

Unit III

Two sample problems, Mann-Whitney-Wilcoxon test, Wilcoxon test, general linear rank statistic, Vander Warden Statistic, Scale problems-Statements and applications of Mood Statistic, freund-Ansari-Bradley-David-Barton statistics, Siegel-Tukey Statistic, Sukhatme test.

Unit IV

Efficiency of tests, asymptotic relative efficiencies Hoffding's, U-Statistics, Asymptotic distribution of U-Statistics, K-Sample problem, Krwskal-wallis test, Kandall's Tau coefficient and its sample estimate, Spearman's rank Correlation Coefficient.

NOTE FOR PAPER SETTING :

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

Books Recommended:

1. J D Gibbons : Non-parametric Statistical Inference.
2. DAS Fraser : Non-parametric Methods in Statistics.
3. Rohatgi : An Introduction to probability Theory & Math statistics
4. H.A. David : Order Statistics
5. S.C. Supta, V.K. Kapoor : Fundamentals of Mathematical Statistics.

Books Recommended:

1. Shannon CE (1948) : The mathematical theory of communication. *Bell Syst. Tech. J, Vol.* 27, *pp.* 379-423 and pp 623-656.

2. VanderLubbe (1996): Information Theory, Cambridge University Press.

3. Thomas T. M. and Cover (2006): Elements of Information Theory. Wiley , New York.

4. Kapur, J.N. and Kesavan, H.K. (1993) Entropy Optimization Principles with Applications, Academic Press, New York.

5. Reza, F.M. (2007): An Introduction to Information Theory, Dover Publications.

6. Robert Ash Information Theory

7

DETAILED SYLLABUS

Course No. ST-579 Title : Information Theory

Credits: 4 Maximum Marks : 100
a) Semester examination : 80
b) Semester assessment : 20

Duration of examination: 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

Objectives: To introduce information theoretic concepts.

Unit-I

Concept of Entropy and information measures, Formal requirements of the average uncertainty, Shanon's measure of information and its properties, Joint and Conditional Entropy, Relative entropy and mutual information, Uniqueness of the entropy function Jensen's Inequality and its consequences, Fano's Inequality, Asymptotic Equipartition Property, Entropy Rate.

Unit-II

Elements of encoding, redundancy and efficiency, binary codes , Shanon Fano Encoding ,Necessary and sufficient condition for noiseless coding, Average length of encoded message Kraft Inequality, McMillan Inequality, Optimal Codes, Huffman Code, Fundamental theorem of discrete noiseless coding.

Unit-III

Differential Entropy, Joint and Conditional Differential Entropy, Properties of Differential and Relative Entropy, Differential Entropy of distribution, Relationship of Differential Entropy to Discrete Entropy, Differential entropy bound on discrete entropy Entropy/ Optimization Principles, Maximum Entropy Principle. MaxEnt Formalism, Maximum Entropy Distribution

Unit-IV

Channel capacity, symmetric channels, Binary symmetric channel, Binary Erasure channel, Properties of channel capacity. Joint AEP theorem, channel coding theorem (statement only), Fano's inequality and converse to the coding theorem, Hamming codes.

NOTE FOR PAPER SETTING:

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

DETAILED SYLLABUS

Course No. ST-580 Title : BIO-STATISTICS

Credits: 4 Maximum Marks : 100
a) Semester examination : 80
b) Semester assessment : 20

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

OBJECTIVES: This course introduces the students to various applications of statistics in biology and medical fields.

UNIT-I

Basic biological concepts in genetics, Mendel's law, Hardy- Weinberg equilibrium, random mating, distribution of allele frequency (dominant/co-dominant cases), Approach to equilibrium for X-linked genes, natural selection, mutation, and genetic drift, equilibrium when both natural selection and mutation are operative.

UNIT-II

Planning and design of clinical trials, Phase I, II, and III trials. Consideration in planning a clinical trial, designs for comparative trials. Sample size determination in fixed sample designs.

UNIT-III

Functions of survival time, survival distributions and their applications viz. exponential, gamma, weibull, Rayleigh, lognormal, death density function for a distribution having bath-tub shape hazard function. Tests of goodness of fit for survival distributions (WE test for exponential distribution, W-test for lognormal distribution, Chi-square test for uncensored observations).

UNIT-IV

Type I, Type II and progressive or random censoring with biological examples, Estimation of mean survival time and variance of the estimator for type I and type II censored data with numerical examples. Idea of Stochastic epidemic models: Simple epidemic models (by use of random variable technique).

NOTE FOR PAPER SETTING:

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

Books recommended:

1. Biswas, S. (1995): Applied Stochastic Processes. A Biostatistical and Population Oriented Approach, Wiley Eastern Ltd.
2. Cox, D.R. and Oakes, D. (1984) : Analysis of Survival Data, Chapman and Hall.
3. Elandt, R.C. and Johnson (1975): Probability Models and Statistical Methods in Genetics, John Wiley & Sons.
4. Ewens, W. J. (1979) : Mathematics of Population Genetics, Springer Verlag.
5. Ewens, W. J. and Grant, G.R. (2001): Statistical methods in Bio informatics.: An Introduction, Springer.
6. Friedman, L.M., Furburg, C. and DeMets, D.L. (1998): Fundamentals of Clinical Trials, Springer Verlag.
7. Gross, A. J. And Clark V.A. (1975) : Survival Distribution; Reliability Applications in Biomedical Sciences, John Wiley & Sons.
8. Lee, Elisa, T. (1992) : Statistical Methods for Survival Data Analysis, John Wiley & Sons.
9. Li, C.C. (1976): First Course of Population Genetics, Boxwood Press.
10. Miller, R.G. (1981): Survival Analysis, John Wiley & Sons.

DETAILED SYLLABUS

Course No. ST-581 Title : DEMOGRAPHY

Credits: 4 Maximum Marks : 100
a) Semester examination : 80
b) Semester assessment : 20

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

OBJECTIVES: To introduce application of statistics in the field of vital statistics demography and population studies.

UNIT-I

Vital statistics: Methods of collection, their merits and demerits, various fertility rates and their computations, factors affecting fertility rates, differential fertilities, graduation of fertility rates, Gross and net reproduction rates.

UNIT-II

Crude mortality rates, infant mortality rates standardized fertility and mortality rates. Life tables: its classification, properties and methods of action with special reference to king, Graville-Reed-Morrel and Chiang methods for construction of abridged life tables.

UNIT-III

Financial calculation, cause deleted tables and multiple detection, Sample variance of life table functions, Probability distribution of life table functions- Probability distribution of the number of survivors and observed expectation of life, joint probability distribution of the number of survivors and the number of distribution.

UNIT-IV

Makeham's and Gompertz curves, Population estimation and projection. Mathematical and component methods of projection. A brief account of other methods of population projection. Migration its concepts and estimation.

NOTE FOR PAPER SETTING:

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

Books Recommended:

1. Spigelman	:	Introduction to Demography.
2. Cox	:	Demography.
3. Keyfitz	:	Applied Mathematical Demography.
4. Chiang	:	Introduction to Bio-Statistics

DETAILED SYLLABUS

Course No. ST-582 Title : Acturial Statistics

Credits: 4 Maximum Marks : 100
a) Semester examination : 80
b) Semester assessment : 20

Duration of examination : 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

Objective: To introduce and expose students to application of statistics in acturial field.

Probability Models and Life Tables

Unit-I

Utility theory, insurance and utility theory, models for individual claims and their sums, survival function, curtate future lifetime, force of mortality.Life table and its relation with survival function, examples, assumptions for fractional ages, some analytical laws of mortality, select and ultimate tables. Multiple life functions, joint life and last survivor status, insurance and annuity benefits through multiple life functions evaluation for special mortality laws.

Unit-II

Multiple decrement models, deterministic and random survivorship groups, associated single decrement tables, central rates of multiple decrement, net single premiums and their numerical evaluations. Distribution of aggregate claims, compound Poisson distribution and its applications.

Insurance and Annuities

Unit-III

Principles of compound interest: Nominal and effective rates of interest and discount, force of interest and discount, compound interest, accumulation factor, continuous compounding.
Life insurance: Insurance payable at the moment of death and at the end of the year of death-level benefit insurance, endowment insurance, deferred insurance and varying benefit insurance, recursions, commutation functions.

Unit-IV

Life annuities: Single payment, continuous life annuities, discrete life annuities, life annuities with monthly payments, commutation functions, varying annuities, recursions, complete annuities-immediate and apportionable annuities-due.

NOTE FOR PAPER SETTING:

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

Books Recommended:

1. Atkinson, M.E. and Dickson, D.C.M. (2000) : An Introduction to Actuarial Studies, Elgar Publishing.

2. Bedford, T. and Cooke, R. (2001): Probabilistic risk analysis,Cambridge.

3. Bowers, N. L., Gerber, H. U., Hickman, J. C., Jones D.A. and Nesbitt, C. J. (1986): 'Actuarial Mathematics', Society of Actuaries, Ithaca, Illinois, U.S.A., Second Edition (1997)

4. Medina, P. K. and Merino, S. (2003): A discrete introduction : Mathematical finance and Probability, Birkhauser.

5. Neill, A. (1977): Life Contingencies, Heineman.

6. Philip, M. et. al (1999): Modern Actuarial Theory and Practice, Chapman and Hall.

7. Rolski, T., Schmidli, H., Schmidt, V. and Teugels, J. (1998): Stochastic Processes for Insurance and Finance, Wiley.

8. Spurgeon, E.T. (1972): Life Contingencies, Cambridge University Press.

9. Relevant Publications of the Actuarial Education Co., 31, Bath Street, Abingdon, Oxfordshire OX143FF (U.K.)

DETAILED SYLLABUS

Course No. ST-583 Title : Statistical Computing

Credits: 4 Maximum Marks : 100
a) Semester examination : 80
b) Semester assessment : 20

Duration of examination: 3 hours.

Syllabus for the examinations to be held in 2010, 2011 and 2012

Objective: To introduce statistical computing.

Unit-I

Random numbers: Pseudo-Random number generation, tests. Generation of non—uniform random deviates-- general methods, generation from specific distributions.

Unit-II

Simulation-Random Walk, Monte-Carlo integration, Applications. Simulating multivariate distributions; simulating stochastic processes.

Unit-III

Variance reduction. Stochastic differential equations: introduction. Numerical solutions. Markov Chain Monte Carlo methods-Gibbs sampling; Simulated annealing, cooling schedule, convergence, application.

Unit-IV

Non-linear regression: Method; Estimation; Intrinsic and Parameter-effects curvature; application. EM algorithm and applications. Smoothing with kernels: density estimation, choice of kernels.

NOTE FOR PAPER SETTING:

Section A will contain 4 compulsory questions of 8 marks each, one question from each unit. Section B will contain 8 questions, 2 from each unit and 4 questions, one from each unit, of 12 marks each to be attempted.

Books Recommended:

1. Bishop, C.M. Neural Networks for pattern Recognition, Oxford University Press.

2. Duda, R.O., Hart, P.E. and Strok, D.G. Pattern Classification, 2nd Edition, John Wiley & Sons.

3. Gentle, J.E., Härdle W. and Mori Y., (2004). Handbook of computational statistics — Concepts and methods, Springer-Verlag.

4. Han, J. and Kamber, M. (2000). Data Mining: Concepts and Techniques, Morgan Kaufmann.

5. Hand, David, Mannila, Heikki, and Smyth, Padhraic, (2001). Principles of Data Mining, MIT Press.

6. Haykin, S. Neural Networks-A Comprehensive Foundation, 2nd Edition, Prentics Hall.

7. McLachlan, G.J. and Krishnan, T. (1997). The EM Algorithms and Extensions, Wiley.

8. Nakhaeizadeh, G. and Taylor G.C., (1997). Machine Learning and Statistics, John Wiley & Sons.

9. Pooch, Udo W. and Wall, James A. (1993). Discrete Event Simulation (A practical approach), CRC Press.

10. Rubinstein, R.Y. (1981). Simulation and the Monte Carlo Method, John Wiley & Sons.

11. Simonoff, J.S. (1996). Smoothing Methods in Statistics, Springer