Course Title: Introduction to Information Technology
Course no: CSC-101 **Full Marks** 60+20+20
Credit hours: 3 **Pass Marks** 24+8+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Fundamental concept of Information technology. Computer systems, Computer software, DBMS, and application of computer science.

Goal: This course introduces fundamental concepts of Information Technology and computer science.

Course Contents:

Unit 1. Introduction to Computer Systems **10 Hrs.**

Introduction to computers, Classification of digital computer systems, Anatomy of a digital Computer, Computer Architecture, Memory system, Memory Units, Auxiliary Storage devices, Inputs devices, Output Devices.

Unit 2. Computer Software and Software Development **6 Hrs.**

Introduction to Computer Software, Operating Systems, Programming Languages, General Software Features and Trends.

Unit 3. Database Management Systems **6 Hrs.**

Data processing, Introduction to Database Management systems, Database design

Unit 4. Telecommunications **8 Hrs.**

Introduction to Telecommunications, Computer Networks, Communication Systems, Distributed systems

Unit 5. Internet and New Technologies in Information Technology **10 Hrs.**

Internet, Multimedia tools and system, Intranets, Electronic Commerce, Hypermedia, Data Warehouses and Data Marts, Data Mining, Geographical Information System

Unit 6. Applications of Information Technology **5 Hrs.**

Computers in Business and Industry, Computers in education, training, Computers in Entertainment, science, medicine and Engineering

Laboratory works: The main objective is familiarizing students with operating system and desktop applications using current version of windows.

Text / Reference books: Alexis Leon, Mathews Leon, **Fundamentals of Information Technology**, Leon TechWorld

Course Title: Fundamentals of Computer Programming
Course no: CSC-102 **Full Marks**: 60+20+20
Credit hours: 3 **Pass Marks** 24+8+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course contains the concepts of programming methodology using C.

Goal: This course is designed to familiarize students to the techniques of programming in C.

Course Contents:

Unit 1. Problem Solving with Computer **2 Hrs.**

Problem analysis, Algorithms and Flowchart, Coding, Compilation and Execution, History of C, Structure of C program, Debugging, Testing and Documentation

Unit 2. Elements of C **4 Hrs.**

C Tokens, Escape sequence, Delimiters, Variables, Data types, Constants/ Literals, Expressions, Statements and Comments

Unit 3. Input and Output **2 Hrs.**

Conversion specification, I/O operation, Formatted I/O

Unit 4. Operators and Expression **4 Hrs.**

Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bitwise operator, Increment or Decrement operator, Comma operator.

Unit 5. Control Statement **4 Hrs.**

Branching, Looping, Conditional Statement, Exit function, Difference between break and exit

Unit 6. Arrays **6 Hrs.**

Introduction, Declaration of array, Initialization of array, Sorting, Multidimensional array

Unit 7. Functions **5 Hrs.**

Library Functions, User defined functions, Recursion, Function declaration, Local and global variables, Use of array in function, Passing by Value, Passing by Address

Unit 8. Pointers **6 Hrs.**

Introduction, The & and * operator, Declaration of pointer, Pointer to pointer, Pointer arithmetic, Array and Pointer, Pointer and array, Pointer with multidimensional array, Pointer and strings, Array of pointer with string, Dynamic memory allocation

Unit 9. Structure and Union **5 Hrs.**

Introduction, Array of structure, Passing structure to function, Passing array of structure to function, Structure within structure (Nested Structure), Union, Pointer to structure

Unit 10. Files and file handling in C **4 Hrs.**

Concept of file, Opening and closing of file, Modes, Input/ output function, Random access in file, Printing a file

Unit 11. Introduction to Graphics **3 Hrs.**

Modes, Initialization, Graphics Function

Laboratory works: This course requires a lot of programming practices. Each topic must be followed by a practical session. Some practical sessions include programming to:

- Create, compile and run simple C programs, handle different data types available in C, perform arithmetic operations in C, perform formatted input and out put operations, perform character input and output operations.
- Perform logical operations, create decision making programs, create loops to repeat task, sue different looping method.
- Create user-defined factions, create recursive functions, work with automatic, global and static variables, create manipulate arrays and matrices (single and multi-dimensional), work with pointes, dynamically allocate de-allocate storage space during runtime, manipulate strings (character arrays) using various string handling functions.
- create and use structures an files to keep record of students, employees etc

References:

- Deitel, C.: **How to Program**, 2/e (With CD), Pearson Education.
- Al Kelley, Ira Pohl: "**A Book on C**", Pearson Education.

- Brian W. Keringhan & Dennis M. Ritchie: "**The C programming Language**", PHI
- Bryons S. Gotterfried: "**Programming with C**," TMH
- Stephen G. Kochan: "**Programming in C**", CBS publishers & distributors.
- Yashavant Kanetkar: "**Let us C**", BPB Publications

Course Title: Probability and Statistics
Course no: STA-103 **Full Marks**: 60+20+20
Credit hours: 3 **Pass Marks**: 24+8+8
Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Concept of descriptive statistics, probability, probability distributions, inferential statistics and their applications.

Goal: This course enhances the ability of students in computing and understanding summary statistics; understanding the concept of probability and probability distributions with their applications in statistics. Finally, students will develop their ability of using inferential statistics in decision-making processes.

Course Contents:

Unit 1. Introduction **2 Hrs.**

Scopes and limitations of statistics in empirical research; Role of probability theory in statistics; Role of computer technology in statistics

Unit 2. Descriptive Statistics **6 Hrs.**

Measures of location: mean, median, mode, partition values and their properties; Measures of dispersion: absolute and relative measure of variation; range, quartile deviation, standard deviation; Other measures: Coefficient of variation; Measures of skewness and kurtosis.

Unit 3. Probability **5 Hrs.**

Introduction of probability: Basic terminology in probability: sample space, events, random experiment, trial, mutually exclusive events, equally likely events, independent events; Definitions of probability: Classical, statistical, axiomatic definitions; Basic principles of counting; Laws of probability: Additive and multiplicative; Conditional probability; Bayes' Theorem.

Unit 4. Random Variable and Expectation **2 Hrs.**

Random Variables: Discrete and continuous random Variables; Probability distribution of random variables; Expected value of discrete & continuous random Variable.

Unit 5. Jointly Distributed Random Variables and Probability Distributions **4 Hrs.**

Joint Probability Distribution of two random variables: Joint probability mass functions and density functions; Marginal probability mass and density functions; Mean, variance, covariance and correlation of random variables; Independent random variables; Illustrative numerical problems.

Unit 6. Discrete Probability Distributions **5 Hrs.**

Bernoulli and binomial random variable and their distributions and moments; Computing binomial probabilities; Fitting of binomial distribution; Poisson random variable and its distribution and moments; Computing Poisson probabilities; Fitting of Poisson distribution.

Unit 7. Continuous Probability Distributions **6 Hrs.**

Normal distribution and its moments; Standardization of normally distributed random variable; Measurement of areas under the normal curve; Negative exponential distribution and its moments; Concept of hazard rate function.

Unit 8. Chi-square, t and F Distribution **4 Hrs.**

Characteristics function of normal random variable; Distribution of sum and mean of n independent normal random variables; Canonical definitions of chi-square, t and F random variables and their distributions; Joint distribution of $\overline{X}$ and S^2 in case of normal distribution.

Unit 9. Inferential Statistics **7 Hrs.**

Simple random sampling method and random sample; Sampling distribution and standard error; Distinction between descriptive and inferential statistics; General concept of point and interval estimation; Criteria for good estimator; Maximum likelihood method of estimation; Estimation of mean and variance in normal distribution; Estimation of proportion in binomial distribution; Confidential interval of mean in normal distribution; Concept of hypothesis testing; Level of significance and power of a test; Tests concerning the mean of a normal distribution case – when variance is known (*Z*-test) and unknown (t-test)

Unit 10. Correlation and Linear Regression **4 Hrs.**

Simple Correlation: Scatter diagram; Karl Pearson's correlation coefficient and its properties, Simple Linear Regression: Model and assumptions of simple linear regression; Least square estimators of regression coefficients; Tests of significance of regression coefficients; Coefficient of determination

Text Books: Sheldon M. Ross, **Introduction to Probability and Statistics for Engineers and Scientists**, 3rd Edition, India: Academic Press, 2005.

References:
- Richard A. Johnson, **Miller and Freund's probability and Statistics for Engineers**, 6th Edition, Indian reprint: Pearson Education, 2001.

• Ronald E. Walpole, R.H. Myers, S.L. Myers, and K. Ye, **Probability and Statistics for Engineers and Scientists**, 7th Edition, Indian reprint: Pearson Education, 2005.

Note:

1. Theory and practice should go side by side.
2. It is recommended **45** hours for lectures and **15** additional hours for tutorial class for completion of the course in the semester.
3. SPSS software should be used for data analysis.
4. Students should have intermediate knowledge of Mathematics.
5. Home works and assignments covering the lecture materials will be given throughout the semester.

Course Title: Calculus and Analytical Geometry
Course no: MTH-104 Full Marks: 80+20
Credit hours: 3 P.M: 32+8
Nature of Course: Theory

Course Synopsis: Preliminaries revision of differentiation and integration; Techniques of integration infinite series; Vectors and analytical geometry in space (differential geometry). Vector valued functions. Multivariable functions and partial derivatives. Multiple integrals and integration in vector fields. Partial derivatives; Equations of First Partial Derivatives.

Goal: This course aims at providing students with some advanced topics in undergraduate calculus and fundamental concepts of partial differentiation and P.D.E of second order. It is assured that a student who has done Certificate Level papers in mathematics will be able to study this course.

Course Contents:

Unit 1. Topics in Differential Calculus and Integral Calculus 8 Hrs.

1.1 Functions and Graphs
1.2 Extreme values of functions; graphing of derivatives
1.3 Mean value integers
1.4 Definite integers, Properties and application, Mean value theory for definite integers
1.5 Fundamental theory of Integral Calculus and application, Improper integrals

Unit 2. Infinite Series 5 Hrs.

2.1 Infinite sequence and sequence of convergence and divergence
2.2 Integral test, comparison test, ratio and root test
2.3 Absolute and conditional convergence
1.4 Power series, Taylor and Maclaurin series, convergence of Taylor series

Unit 3. Conic Section 3 Hrs.

3.1 Classifying conic sections by eccentricity
3.2 Plane curves, parametric and polar equations, integration in polar coordinates

Unit 4. Vectors and Vectors Valued Functions 6 Hrs.

4.1 Vectors in the space
4.2 Lines and planes in space
4.3 Cylinders and Quadric surfaces
4.4 Cylindrical and Spherical Coordinates
4.5 Vector valued functions and space curves

4.6 Unit tangent vector, curvature and torsion and TNB system

Unit 5. Multiple Integrals **5 Hrs.**

5.1 Double integrals in rectangular polar coordinates
5.2 Finding areas, moments and centre of mass
5.3 Triple integrals in rectangular coordinates and application
5.4 Substitutes in multiple integrals

Unit 6. Multivariate Calculus **9 Hrs.**

6.1 Functions, limits and continuity of two or more variables
6.2 Partial derivatives
6.3 Differentiability, Differentials, Total Differential Coefficients
6.4 Directional derivatives and gradient vectors
6.5 Extreme values
6.6 Lagrange Multiplies

Unit 7. Partial Differential Equations **9 Hrs.**

7.1 Review of Ordinary Differential Equations
7.2 Analysis of P.D.E of 1^{st} and 2^{nd} order
7.3 Linear equations of the 1^{st} order and the general solutions
7.4 P.D.E of 2^{nd} order, its derivation and basic concepts
7.5 Solution of general P.D.E with constant coefficients, complimentary solution and integral solution
7.6 Wave equations and heat equations and their solutions (Chapter II, Section 11.1, 11.2, 11.4, 11.5). Erwin and Kreyszig. 8^{th} edition, John-Wiley Publications.

Text Books

Thomas and Fenns: **Calculus and Analytical Geometry**, 9^{th} Edition, 2004. (Thomas, Jr. G. B., and Finney, Ross L. Publisher: Pearson Education Pvt. Ltd.
Kreyszig, Erwin**, Advanced Engineering Mathematics**, John- Wiley & Sons (1991). 5^{th} Edition.

References

E.W. Swokowski, **Calculus with Analytical Geometry,** Second Alter Edition.
Sneddan Ian- Elements of Partial Differential Equations.

Course Title: Physics I
Course no: PHY-105 **Full Marks**: 60+20+20
Credit hours: 3 **Pass Marks**: 24+8+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: The course deals with related topics in Mechanics and Electrodynamics. **Mechanics:** Non Relativistic Particle dynamics, conservation laws, harmonic Oscillator, dynamics of rigid body, strength of materials, hydrodynamics. **Electrodynamics:** Electrostatics, dielectrics, Electrostatic and magnetic energy, Maxwell's equation, propagation of electromagnetic wave. Laboratory works are designed to complement and supplement the theory course.

Goal: The course aims at introducing the concepts and methods of physics needed for application in various branch of modern science and technology.

Course Content:

Mechanics

Unit 1. Newton's Law of Motion and Galilean Invariance **4 Hrs.**

1.1 Newton's laws of motion
1.2 Reference frame, Galilean transformation, Galilean Invariance
1.3 Transformation equations
1.4 Non inertial frames of reference fictious forces
- Centrifugal and coriolis forces

Unit 2. Non Relativistic Particle Dynamics **4 Hrs.**

2.1 Equation of motion of uncharged and charged particles, Charged particles in constant and alternating electric field
2.2 Charged particles in a fields, magnetic field- cyclotron, magnetic focusing
2.3 Charge particles in combined electric and magnetic field

Unit 3. Conservation Laws **7 Hrs.**

3.1 Laws of conservation of momentum and energy.
3.2 Conservative forces, potential energy,
3.3 Potential energy in electric and gravitational fields.
3.4 Non conservative forces, General laws of conservation of energy.
3.5 Collision in three dimensions, lab and cm. frames of reference, final velocities after collision, scattering angle,
3.6 Law of conservation of angular momentum - rotational invariance of potential energy
3.7 Example - motion of a planet, Kepler's laws

Unit 4. Harmonic Oscillator **6 Hrs.**

4.1 Harmonic oscillator, energy, example: diatomic molecule.
4.2 An harmonic oscillator - pendulum with large oscillation
4.3 Damped oscillations, power factor, Q - factor
4.4 Driven oscillations, resonance, phase and half width
4.5 LCR and parallel resonance circuits.

Unit 5. Viscosity **2 Hrs.**

5.1 Viscosity, Newton's law of viscous force, analogy between current flow and viscous flow
5.2 Motion of a body in a viscous medium.

Electrodynamics

Unit 6. Electrostatics **7 Hrs.**

6.1 Electric field and electric potential
6.2 Divergence of E and Gauss's law, applications
6.3 Solution of electrostatic problems, Poisson's and Lap lace's equations
6.4 Solution of Lap laces equations in spherical cylindrical coordinates and rectangular coordinates
6.5 Examples conducting sphere in a uniform E field, method of images, point charge and a conducting sphere, line charge and line images, systems of conductors.
6.6 Solution of Poisson's equation

Unit 7. Dielectrics **4 Hrs.**

7.1 Electric field in a dielectric media
- Polarization, field inside and outside a dielectric gauss's law in a dielectric medium-displacement vector, electric susceptibility and dielectric constant
- Boundary conditions on field vectors, boundary value problems in a dielectric medium, dielectric sphere in a uniform el. field.

7.2 Molecular theory of dielectrics, induced dipoles

Unit 8. Electrostatic Energy **1 Hr.**

8.1 Potential energy of a group of charges and charge distributions, energy density.
8.2 energy of a system of charged conductors

Unit 9. Magnetic Field Energy **1 Hr.**

9.1 Vector potential, and magnetic field
9.2 Energy density in the magnetic field, magnetic energy of coupled circuits.

Unit 10. Slowly Varying Current **3 Hrs.**

10.1 Transient and steady state behavior
10.2 Series and parallel connection of impedances
10.3 Power, power factor, Resonance.

Unit 11. Maxwell's Equation **6 Hrs.**

11.1 Maxwell's equations - displacement current
11.2 Electromagnetic energy
11.3 Wave equations without and with source, boundary conditions

Laboratory Works:

- To draw I-V characteristics of Ohmic and non Ohmic resisters and find voltage current ration.
- To study the junction diode and LED characteristics.
- To study the temperature dependence of resistance of a given semiconductors
- To determine the moment of inertia of a fly wheel.
- To determine the modulus of rigidity for the material of a rod by using the horizontal pattern of the twisting apparatus.
- To determine the terminal velocity and find coefficient of viscosity by Stoke's method.
- To determine the surface tension of work with a capillary tube.
- To determine the impedance of a given LCR circuit.
- To study characteristics of NPN transistor.
- To determine dielectric constant by using Lissagous pattern.
- To construct CE amplifier for the determination of the voltage gain of the amplifier.
- To study the characteristic of a Zener a diode (Switches) and use it to regulate power supply.
- To construct and study the working of NOT-AND-OR, NAND and NOR gates.
- To construct and study the working of OR, NAN and NOR gates.

Text books:

(1) D.S. Mathur, **Mechanics**, S. Chand and Company Ltd
(2) John R. Ritz, Frederick J. Milford and Robert W. Christy, **Foundations of Electromagnetic Theory,** Narosa Publishing House

References:

(1) David J Griffith, **Introduction to Electrodynamics**, 2nd Edition, Prentice Hall of India, 1994.

Prerequisite: Calculus based introductory physics
Note: Home work assignments: Several numerical problems to be given every week.

Course Title: Biology I
Course no: BIO-106 **Full Marks**: 60+20+20
Credit hours: 3 **Pass Marks**: 24+8+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Living System and their properties, major biological molecules, basic physiological processes, introduction of genetics, basic concepts of diversity and evolution.

Goal: The course is aimed at providing the introduction of biological system with respect to nature, behavior and functioning of the cell.

Course Contents:

Unit 1. **5 Hrs.**

1.1 Introduction: Brief introduction to all aspects of Biology
1.2 Bio-molecular: Carbohydrates, Lipids, Proteins and Nucleic acid

Unit 2. **19 Hrs.**

2.1 Cell structure and functions: Cell theory, cell membrane, transport system across the membrane, organelles composed of membranes, nonmenbranous organelles, nuclear components and major cell types
2.2 Enzymes: Nomenclature, biocatalysis, action of enzymes, environmental factors, co-enzymes, enzyme activation and inhibition.
2.3 Biochemical Pathways: Introduction, cellular respiration, glycolysis, TCA Cycle, ETC, ATP calculation, fermentation, protein and fat metabolism, photosynthesis-C_3 and C_4 pathways, photorespiration, chemosynthesis, transpiration.

Unit 3. **7 Hrs.**

3.1 Genetics: Laws of inheritance, linkage and crossing over
3.2 Diversity within species: Gene pool concept, genetic variety, role of natural selection in evolution, factors influencing natural selection, Hardy-Weinberg equilibrium concept and application

Unit 4. **6 Hrs.**

4.1 Material exchange in the body: Basic principle, blood circulation, pulmonary and systemic, nature of blood and role of heart, gas exchange, respiratory anatomy, lung function, digestive system, kidney structure and function

Unit 5. 8 Hrs.

5.1 Body's control mechanism: Nerve impulse, synapse, CNS organization, endocrine system, sensory input and output coordination

5.2 Immune system: Defense mechanism, humeral and cell mediated immune responses, vaccines and monoclonal antibody.

Laboratory Works:

1. Identification of biomolecules: cellulose, Lignin, Lipid, Protein.
2. Analysis of amino acids in protein by paper chromatography and paper electrophoresis.
3. Separation of photo synthetic pigments by paper chromatography.
4. Determination of value of RQ of different respiratory substrates.
5. Study of different types of plant and anima cells in temporary preparation.

Text Books:

E.D. Enger & F.C. Ross, **Concepts in Biology**, 9th Edition, Tata McGraw Hill

Reference Book:

P.H. Reven et.al, **Biology**, 5th Ed. WBC McGraw Hill.

Course Title: Geology I
Course no: GEO-107
Credit hours: 3

Full Marks: 60+20+20
Pass Marks 24+8+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Fundamental concepts of contemporary earth and environmental science and engineering with increasing computer application.

Goal: This course aims at providing general understanding of Earth and environmental science and engineering

Course Contents:

Unit 1. **10 Hrs.**

1.1 New Global Tectonic framework of the earth: Continental margins, earthquakes, volcanoes and mountain ranges.
1.2 Crystal, minerals and rocks: rock types and rock systematic

Unit 2. **10 Hrs.**

2.1 Mineral deposits and mineral mining: technologies, reserves, economics and environment
2.2 Engineering geology: construction and stability of structures and natural and artificial face stability

Unit 3. **10 Hrs.**

3.1 Climate changes and natural disasters: Landslides, Floods and Desertification.
3.2 Natural resources depletion: Hydrocarbons, metals and new sources of energy and materials.

Unit 4. **10 Hrs.**

4.1 Geographic Information system (GIS): Vectors and raster and remote sensing database management.
4.2 Computer aided data management: remote sensing data acquisition, storage, processing and interpretation.
4.3 GIS and RS packages: ERDAS, ER Mapper, ArcView and other operating systems and capabilities

Laboratory works: Mineral / Rock identification, Soil types, Reserve calculation, Slope stability calculation, Rock Mass Ratings, ER Mapper, ArcView, ILWIS tour, RS data analysis, Digitization, practice and Geographic locking, GIS Layers shows and illustrations, GIS assignment with digital RS data.

Practical:

- To identify elements of symmetry of a cube.
- To identify 5 oxides and 5 sulphide minerals.
- To calculate reserve of a ore deposit.
- To calculate cost - benefit analysis of a mining enterprise
- To calculate the stability of natural slope
- To calculate and interpret precipitation data
- To calculate rock mass rating form data
- To perform digitization and geographic locking in computer
- GIS assignment with RS data.

Text Books: No specific text book covering all materials but a working manual could be easily prepared.

Reference:

Homework: Homework assignments covering lecture materials and primary numerical exercises.

Assignments: Given throughout the semester.

Computer Usage: MS-WINDOWS (WINDOWS 98/XP) base PC of workstation

Prerequisites: Basic IT literacy

Category contents: Science Aspect: 50%
Engineering Aspect: 50%

Course Title: Statistics I
Course no: STA-108
Credit hours: 3

Full Marks: 60+20+20
Pass Marks: 24+8+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Concept of Applied Statistical Techniques and its Applications

Goal: This course makes students able to understand Applied Statistical Techniques and their applications in the allied areas.

Course Contents:

Unit 1: Sampling Techniques **10 Hrs.**

Types of Sampling; Simple Random Sampling with and without Replacement; Stratified Random Sampling; Ratio and Regression Method of Estimation under Simple and Stratified Random Sampling; Systematic Sampling; Multistage Sampling; Estimation of population total and its Variance.

Unit 2: Non Parametric Test **16 Hrs.**

Chi-square test: Test of goodness of fit; Test for independence (Categorical Data). Definition of Order Statistics; Run Test; Sign Test; Wilcoxon Matched Pairs Signed Ranks Test; Mann-Whitney U Test; Median Test; Kolmogorov Smirnov Test (One Sample Case); Cochran Q Test; Kruskl Wallis One way ANOVA Test; Friedman Two way ANOVA Test.

Unit 3: Correlation and Regression Analysis **19 Hrs.**

Partial and Multiple Correlations; Multiple Linear Regressions: Assumptions; Coefficient Estimation, and Significance Test; Coefficient of Determination; Cobb-Dauglas Production Function; Growth Model; Logistic Regression; Autoregressive Model of order One, and Appraisal of Linear Models (Heteroscedasticity, Multicolinearity, Autocorrelation).

Note:

1. Theory and practice should go side by side.
2. It is recommended **45** hours for lectures and **15** additional hours for tutorial class for completion of the course in the semester.
3. SPSS Software should be used for data analysis.
4. Home works and assignments covering the lecture materials will be given throughout the semester.

Text Books:

- Draper, N. and H. Smith, *Applied Regression Analysis*, 2nd edition, New York: John Wiley & Sons, 1981.
- Hogg & Tanis, *Probability & Statistical Inference*, 6th edition, First Indian Reprint, 2002.
- Gujaratii, D. *Basic Econometrics*, International edition, 1995.
- Gibbons, J.D. *Nonparametric Statistical Inference*. International Student Edition.
- Siegel, S. *Nonparametric Statistics for the Behavioural Sciences*. McGraw-Hill, New York.

References:

- Hollander, M. & Wolfe, *Nonparametric Statistical Methods*. Johns Wiley & Sons, New York.