

St. Xavier's College (Autonomous),  
Mumbai



Syllabus of the courses offered by the  
Department of Information Technology  
(2019-20)

**Contents:**

SITS0101	PROFESSIONAL COMMUNICATION SKILLS
SITS0102	APPLIED MATHEMATICS-1
SITS0103	DIGITAL ELECTRONICS
SITS0104	THE ART OF PROGRAMMING
SITS0105	DATA COMMUNICATION AND NETWORK STANDARDS
SITS01PR	THE ART OF PROGRAMMING & DIGITAL ELECTRONICS

**F.Y.B.Sc.I.T.**

**COURSE: SITS0101**

**TITLE: PROFESSIONAL COMMUNICATION SKILLS**

**LEARNING OBJECTIVE:**

To equip the students with communication skills required in the Information Technology Industry.

**Number of lectures: 60**

<b><u>UNIT 1</u></b>	<b>The Seven Cs of Effective Communication</b> Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness <b>Communication: Its interpretation</b> Basics, Nonverbal Communication, Barriers to Communication	<b>15</b>
<b><u>UNIT 2</u></b>	<b>Business Communication at Work Place</b> Letter Components and Layout, Planning a Letter, Process of Letter Writing, E-mail Communication, Memo and Memo Reports, Employment Communication, Notice Agenda and Minutes of Meeting, Brochures <b>Report Writing</b> Effective Writing, Types of Business Reports, Structure Of Reports, Gathering Information, Organization Of Material, Writing Abstracts and Summaries, Writing Definitions, Visual Aids, User Instruction Manual	<b>15</b>
<b><u>UNIT 3</u></b>	<b>Required Skills</b> Reading Skills, Listening Skills, Note Making, Precise Writing, Audiovisual Aids, Oral Communication	<b>15</b>
<b><u>UNIT 4</u></b>	<b>Mechanics of Writing</b> Transitions, Spelling Rules, Hyphenation, Transcribing Numbers, Abbreviating Technical and Non-Technical Terms, Proof Reading	<b>15</b>

**Continuous Internal Assessment**

Industrial Visits, Group Discussions, Presentations / Seminars Mid-Term Test

**List of Text Books**

1. ArunaKoneru, McGrawHill – Professional Communication.
2. Herta A Murphy, Herbert W Hildebrandt, Jane P Thomas, McGrawHill – Effective Business Communication.
3. Lesikar and Petit, McGrawHill – Business Communication

4. Summers Wiley, India – Communication Skills Handbook
5. Rai and Rai, Himalaya Publishing House – Business Communication (Revised Edition)
6. R.C. Sharma and Krishna Mohan, TMH – Business Correspondence and Report Writing

**LEARNING OBJECTIVE:** To study basic mathematics required for developing algorithms for systems and application software

**Number of Lectures: 60**

<b><u>UNIT 1</u></b>	<b>Matrices, Eigen Values and Eigen Vectors</b> Rank of a Matrix, System of Homogeneous and Non-Homogeneous Linear Equations, Linearly Independent and Linearly Dependent Vectors, Characteristic Equation of a Square Matrix, Derogatory and Non-Derogatory Matrices, Eigen Values and Eigen Vectors of a Square Matrix, Diagonalization of a Square Matrix, Cayley-Hamilton Theorem, Adjoint of a Matrix.	<b>15</b>
<b><u>UNIT 2</u></b>	<b>Real Valued Functions of One Variable</b> Intermediate Value Theorem, Successive Differentiation, Higher Order Derivatives and Leibnitz Rule, Mean Value Theorems, Increasing and Decreasing Functions, Finding Extreme Values by first and second Derivative Test, Concavity, Points of Inflection, Asymptotes, Tracing of Curves using first and second derivatives, Graphs of some standard function, Taylor's Series and Taylor's Polynomials.	<b>15</b>
<b><u>UNIT 3</u></b>	<b>Real Valued Functions of Two or Three Variables</b> Limit(Two path test) and Continuity of Functions in 2 or 3 variables, Level Curves to draw Quadric Surfaces, Partial Differentiation, Implicit Differentiation, Chain Rule, Euler's Theorem, Directional Derivatives and Gradients, Extreme Values of a Function of two variables by second derivative test and by the method of Lagrange's Multiplier.	<b>15</b>
<b><u>UNIT 4</u></b>	<b>Differential Equation</b> Exact Differential Equations of first order and first degree and Integrating Factors, Linear Differential Equations and Bernoulli's Differential Equation, Linear Differential Equations with Constant Coefficient	<b>15</b>

**List of Recommended / Reference Books**

- 1.B.S. Grewal, Khanna Publications – Higher Engineering Mathematics
- 2.B.V. Ramana, McGrawHill – Higher Engineering Mathematics
- 3.David C. Lay, Pearson – Linear Algebra and its Applications
- 4.Shanti Narayan. S. Chand – Differential Calculus
- 5.Thomus and Finney, Pearson – Calculus

\*\*Use of software like Maple.

## TITLE: DIGITAL ELECTRONICS

Number Of Lectures : 60

<b><u>UNIT 1</u></b>	<p><b>Number System</b> Analog System, Digital System, Numbering System, Binary Number System, Octal Number System, Hexadecimal Number System, Conversion form One Number System to Another, Floating Point Numbers, Weighted Codes Binary Code Decimal, Non-Weighted Codes Excess – 3 Code, Gray Hollerith Code, Morse Code, Teletypewriter (TTY), Error Detection And Correction, Universal Product Code, Code Conversion</p> <p><b>Binary Arithmetic</b> Binary Addition, Binary Subtraction, Negative Number Representation, Subtraction Using 1's Complement and 2's Complement, Binary Multiplication and Division, Arithmetic in Octal Number System, Arithmetic in Hexadecimal Number System, BCD and Excess – 3 Arithmetic</p> <p><b>Boolean Algebra</b> Introduction, Logic (AND,OR,NOT), Boolean Theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic Expression using Boolean Algebra, Deriving Boolean Expression from given Circuit</p>	<b>15</b>
<b><u>UNIT 2</u></b>	<p><b>Logics Gates</b> Exclusive OR and Exclusive NOR gates, Universal Logic Gates, Implementation Of Other gates using Universal gates, Input Bubbled Logic, Assertion Level.</p> <p><b>Minterm, Maxterm and Karnaugh Maps</b> Introduction, Minterms and sum of minterm form, maxterm and Product of Maxterm form, Reduction Technique using Karnaugh Maps – 2/3/4/5/6 variable K – Maps, K – Maps for Product of Sum Form, Minimize Boolean Expression using K – Map and obtain K – Map from Boolean Expression, Quine Mc Cluskey Method.</p> <p><b>Combinational Logic Circuits</b> Introduction, Multi-input, multi-output Combinational Circuits, Code Converters Design and Implementations</p>	<b>15</b>
<b><u>UNIT 3</u></b>	<p><b>Arithmetic Circuits</b> Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator</p> <p><b>Multiplexer, Demultiplexer, ALU, Encoder and Decoder</b> Introduction, Multiplexer, Demultiplexer, Decoder, ALU, Encoders</p> <p><b>Sequential Circuits:Flip-Flop</b> Introduction, Terminologies used, S–R Flip–Flop, D Flip-Flop, JK Flip-Flop, Race-Around Condition, Master-Slave JK Flip-Flop, T Flip-Flop Conversion from one type of Flip-Flop to another, Applications of Flip-Flops</p>	<b>15</b>
<b><u>UNIT 4</u></b>	<p><b>Counters</b> Intorduction, Asynchronous Counter, Terms related to Counters, IC7493 (4-bit Binary Counter) , Synchronous Counter, Bushing, Type T Design, Type JK Design, Presetable Counter, IC7490, IC7492, Synchronous Counter ICs Analysis of Counter Circuits.</p> <p><b>Shift Register</b> Introduction, Parallel and Shift Registers, Serial Shifting, Serial-In Serial-Out, Serial-In Parallel-Out, Parallel-In Parallel-Out, Ring Counter, Johnson Counter, Applications of Shift Registers, Pseudo-Random Binary Sequence Generator, IC</p>	<b>15</b>

**Reference Books**

1. Anil K. Maini Wiley – Digital Electronics: Principles, Devices and Applications
  2. Charles Platt, O'Reilly – Make Electronics
  3. Malvino and Leach, TataMcGrawHill – Digital Principles and Applications
  4. N.G. Palan, Technova – Digital Electronics and Logic Designs
- R.P.Jain, TataMcGrawHill – Modern Digital Electronics

**TITLE: ART OF PROGRAMMING**

**OBJECTIVE:** To ignite the logical ability in order to develop algorithms, for real world problems, independent of computer type, language or application.

**Number Of Lectures : 60**

<b>UNIT-I</b>	<p><b>Algorithm Design, Program Structure</b>  Meaning of Algorithm, Control Structure, Pseudo Code, and Flowchart.  Understanding need of: if and for statements.  Understanding when and why multiple for statements required.  Algorithm, Flowchart and Control Structure construction for area of triangle.  Algorithm, Flowchart and Control Structure construction for finding gross pay for employee.  Algorithm, Flowchart and Control Structure construction for date validation of a calendar date.  Algorithm Construction for 5 more examples.  Program Structure: Understanding Problem definition, input, processing, output.  Case study of Program structure with Motor Vehicle Enquiries.  Writing proper documentation for program/algorithm.</p>	<b>15</b>
<b>UNIT-II</b>	<p><b>Module Design and Abstract Data Structure</b>  Concept of module design, How to divide a given problem to modules, Inter module communication, module coupling, local and global data.  Understanding Stack and its operation pop, push, peek and write corresponding Methods/pseudo code for it.  Understanding Queue and its operation enqueue dequeue and write corresponding Pseudo code for it.</p>	<b>15</b>
<b>UNIT-III</b>	<p><b>Programming fundamentals in C</b>  Understanding while Loop, for loop in C through examples.  The break Statement and continue Statement.  Logical operators in C with single and multiple conditions.  Understanding Arrays 1D, 2D, 3D in C through examples.  Understanding if and Case statement in C.  Writing program involving both arrays and loop.</p>	<b>15</b>
<b>UNIT-IV</b>	<p><b>Functions and Pointers in C</b>  What is a Function? Why Use Functions?  Passing Values between Functions, Scope Rule of Functions, Calling Convention, Advanced Features of Functions, Return Type of Function Call by Value and Call by Reference,  An Introduction to Pointers, Pointer Notation and corresponding memory diagram. Recursion and examples of it.</p>	<b>15</b>

**Continuous Internal Assessments**

Assignments / Project / Presentation / Case Study / Mid Term Test

**REFERENCE BOOKS:**

Peter Juliff –Interface Publication- The Art of Structured Programming

Yashwant Kanetkar—BPB Publication.- Let us C

Yashwant Kanetkar—BPB Publication- Exploring C

**F.Y. B.Sc.IT****Course: SITS0105****Title: Data Communication and network standards****Total Number of lectures: 60**

<b>UNIT 1</b>	<b>Introduction to data communication and networking, Network models</b>  Components of data communication, data flow, topology-bus, ring, star, hybrid, protocols and standards, The OSI reference model, Layers in OSI reference model, TCP/IP protocol suite	[15]
<b>UNIT 2</b>	<b>Media and Transmission modes</b>  Data and signals, Periodic analog signals, Digital signals , Transmission impairment , Digital to digital, Analog to digital conversion, Transmission modes, Digital to analog conversion, Analog to analog conversion, Guided media and Unguided media	[15]
<b>UNIT 3</b>	<b>Switching and routing algorithms</b>  Switching basics, circuit switching, packet switching and Message switching. datagram networks and virtual circuit networks, routing algorithms- distance vector routing and link state routing  <b>Information Encoding, Error Detection and Correction</b>  Introduction, representing different symbols, Minimizing errors, Error classification, types of errors, redundancy, detection versus correction, hamming distance, cyclic redundancy check, checksum	[15]
<b>UNIT 4</b>	<b>IP</b>  IPV4 addressing, IPv6 addresses, IP v 6 header formats, IPv6 extension headers, IPv6 auto configuration, configuration via DHCP v6 , IPv6 transition strategies	[15]



### **List of Recommended Reference Books**

1. Achyut Godbole - Data communications and Networks, TMH
2. Behrouz A Forouzan, Mc-Graw Hill – Data communications and Networking (Fourth Edition)
3. Dr.SidnieFeit - TCP/IP (Second Edition) TMH
4. W.Stallings, Pearson Education - Data and Computer Communications (Eighth Edition)

### **ASSESSMENT:**

#### **THEORY:**

CIA I: Written test **for 15 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 25 marks**

**F.Y. B.Sc.IT**

**Course: SITS01PR**

#### **Practical:**

### **The Art of Programming**

- 1) Write C program to find the Fibonacci series
- 2) Write C program for matrix addition.
- 3) Write C program for matrix multiplication.
- 4) Write C program to check for leap year. Accept the date from user.
- 5) Write C program to find sum of squares of natural numbers. Take the end number from user.
- 6) Write C program to generate the multiplication table.
- 7) Write C program to display simple calculator using switch case.

- 8) Write C program to convert decimal system to binary, octal and hexadecimal.
- 9) C program to count the number of vowels, consonants and so on.
- 10) C Program to Read a Line From a File and Display it.
- 11) Write a C program to create a pyramid pattern.
- 12) C Program to Store Information (name, roll and marks) of a Student Using Structure.
- 13) C Program to remove all Characters in a String except Alphabet.
- 14) C Program to Calculate Difference between Two Time Periods.

**Digital Electronics Practical**

**SITS01PR**

### **List of Practical**

- 1. Study of Logic gates and their ICs and universal gates:**
  - a. Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates
  - b. IC 7400, 7402, 7404, 7408, 7432, 7486, 74266
  - c. Implement AND, OR, NOT, XOR, XNOR using NAND gates.
- 2. Implement the given Boolean expressions using minimum number of gates.**
  - a. Verifying De Morgan's laws.
  - b. Implement other given expressions using minimum number of gates.
- 3. Implement combinational circuits.**
  - a. Design and implement combinational circuit based on the problem given and minimizing using K-maps.

**4. Implement code converters.**

- a. Design and implement Gray – to – Binary code converter.
- b. Design and implement Binary – to – BCD code converter
- c. Design and implement Binary – to – XS-3 code converter

**5. Implement Adder and Subtractor Arithmetic circuits.**

- a. Design and implement Half adder and Full adder.
- b. Design and implement BCD adder.
- c. Design and implement XS – 3 adder.
- d. Design and implement binary subtractor.

**6. Implement Arithmetic circuits.**

- a. Design and implement a 2-bit by 2-bit multiplier.
- b. Design and implement a 2-bit comparator.

**7. Implement Encode and Decoder and Multiplexer and Demultiplexers.**

- a. Design and implement 8:3 encoder.
- b. Design and implement 3:8 decoder.
- c. Design and implement 4:1 multiplexer. Study of IC 74153/74157
- d. Design and implement 1:4 demultiplexer. Study of IC 74139

**8. Study of flip-flops and counters.**

- a. Study of IC 7473.
- b. Study of IC 7474.
- c. Study of IC 7476.
- d. Conversion of Flip-flops.
- e. Design of 3-bit ripple counter using IC 7473.

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**9. Study of counter ICs and designing Mod-N counters.**

- a. Study of IC 7490/ 7492/7493 and designing mod-n counters using these.

**10. Design of shift registers and shift register counters.**

- a. Design serial – in serial – out, serial – in parallel – out, parallel – in serial – out, parallel – in parallel – out and bidirectional shift registers using IC 7474.
- b. Implementation of digits using seven segment displays.

**Books and References:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year</b>
1.	Digital Electronics and Logic Design	N. G. Palan	Technova		
2.	Digital Principles and Applications	Malvino and Leach	Tata McGraw Hill		

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**Contents:**

<b>SITS0201</b>	<b>COMPUTER GRAPHICS</b>
<b>SITS0202</b>	<b>APPLIED MATHEMATICS-II</b>
<b>SITS0203</b>	<b>MICROPROCESSOR AND MICROCONTROLLERS</b>
<b>SITS0204</b>	<b>DESCRIPTIVE STATISTICS</b>
<b>SITS0205</b>	<b>INTRODUCTION TO C++ PROGRAMMING</b>

<b>SITS02PR</b>	<b>C++ PROGRAMMING &amp; COMPUTER GRAPHICS &amp; MICROPROCESSOR AND MICROCONTROLLERS</b>
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**F.Y.B.Sc (IT)**

**COURSE: SITS0201**

**TITLE: COMPUTER GRAPHICS**

**OBJECTIVES:** TO understand the logic used in drawing graphs and to implement it through the use of a programming language.

**Number Of Lectures : 60**

<b><u>UNIT1</u></b>	<b>Introduction. Application and Algorithmic Implementation</b> <b>Introduction and Application</b> Areas of Computer graphics, Video Display Devices, Raster-Scan Systems, Random-Scan System, Input Devices, Hard-Copy Devices <b>Algorithms</b> Line Drawing Algorithms-DDA Algorithm, Bresenham's Line Algorithm, Circle-Generating Algorithms, Ellipse Generating Algorithms, Filled Area Perimitives	<b>15</b>
<b><u>UNIT2</u></b>	<b>Modeling Attributes and 2D Transformation</b> <b>Modeling and Approaches to System Requirements</b> Line Attributes, Curve Attributes, Color and Grayscale levels, Area-Fill Attributes, Character Attributes, Aliasing <b>Two Dimensional Geometric Transformation and Viewing</b> Basic Transformation, Matrix Representation, Composite Transformation, Other Transformation- Reflection, Shear, Viewing Pipeline, Window-two-ViewPort, Co-ordinate Transformation, Clipping Operation, Point-Clipping, Line-Clipping, Polygon Clipping, Curve Clipping, Text Clipping	<b>15</b>
<b><u>UNIT 3</u></b>	<b>Three-Dimensional Concept</b> <b>Display Methods</b> Three-Dimensional Display Methods-Parallel Projection, Perspective Projection, Depth Cueing, Visible Line and Surface Identification, Surface Rendering <b>Curves</b> Three-Dimensional Object Representation-Bezier Curves and Surfaces, B-Spline Curves and Surfaces	<b>15</b>
<b><u>UNIT 4</u></b>	<b>Hidden Surface Removal Technique</b> <b>Visible-Surface Detection Method</b> Classification of visible-surface detection algorithms, back-face detection, painter's algorithm, scan-line algorithm, depth-sorting method, area-subdivision method, image and object precision, z-buffer algorithm, floating horizons	<b>15</b>

**List of Reference Books and URL:**

1. A.P. Godse, Technical Publications Pune – Computer Graphics
2. Donald Hearn and M.Pauline Baker, Pearson Education – Computer Graphics

3. Hill Jr – Computer Graphics
4. J.D.Foley, A.Van Dan, S.K.Feiner and R.L.Phillips, Addison Wesley – Computer Graphics Principles and Practise
5. J.D.Foley, A.Van Dan, S.K.Feiner and R.L.Phillips, Addison Wesley – Introduction to Computer Graphics
6. Rogers – Computer Graphics
7. Steven Harrington, McGrawHill – Computer Graphics
8. William M.Newman, Robert F.Sproull, McGrawHill – Principles of Interactive Computer Graphics

**F.Y.B.Sc (IT)**

**COURSE: SITS0202**

**TITLE: Applied Mathematics - II**

**OBJECTIVES:** To study basic mathematics required for developing algorithms for system and application software.

**Number of Lectures: 60**

<b><u>UNIT 1</u></b>	<b>Complex Variables</b> De Moivre's Theorem and its Applications, Circular and Hyperbolic Functions, Inverse Hyperbolic Functions, Limit and Continuity of $f(z)$ , Differentiable and analytic functions, Cauchy-Riemann Equations (In Cartesian And Polar Form), Harmonic Functions. Conformal Mapping, Cross Ratio, Bilinear Transformation, Fixed (Invariant) Points. Complex Integration, Cauchy's Theorem and its Consequences, Cauchy's Integral formula, Types of Singularities, Taylor and Laurent Series, Residues, Cauchy's Residue Theorem and its Applications.	<b>15</b>
<b><u>UNIT 2</u></b>	<b>Laplace Transform</b> Definition, Properties of Laplace Transform, Laplace Transform of Standard Functions. Inverse Laplace Transform, Inverse Laplace Transform of Standard Functions, Properties of Inverse Laplace Transform, Applications to Solve Differential Equations.	<b>15</b>
<b><u>UNIT 3</u></b>	<b>Special Integrals</b> Differentiation under Integral Sign, Error Function, Gamma Function, Beta Function.	<b>15</b>

<b><u>UNIT 4</u></b>	<b>Series</b> Series of Real Numbers, Sequence Of Partial Sums and Convergence of Series, Convergent and Divergent Series, Geometric Series, Cauchy Criterion of Convergence of Series, Comparison Test, Limit Form Of Comparison Test, Condensation Test, Alternating Series, Leibnitz Theorem (Alternating Series Test), Absolute Convergence, Conditional Convergence, Ratio Test, Root Test, Tests for Absolute Convergence.	<b>15</b>
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**List of recommended / Reference Books**

1. A.R Vasishta, Dr. R.K. Gupta, Krishna Prakash Mandir – Integral Transforms
2. B.V. Ramana, McGrawHill – Higher Engineering Mathematics
3. B.S. Grewal, Khanna Publications - Higher Engineering Mathematics
4. R.K. Jain, S.R.K. Iyengar, Narosa Publishing House – Advanced Engineering Mathematics
5. Thomus and Finney. Pearson - Calculus

**F.Y.B.Sc (IT)**

**COURSE: SITS0203**

**TITLE: MICROPROCESSOR AND MICROCONTROLLERS**

**OBJECTIVES:** To understand the architecture and functioning of a microprocessor and microcontroller, which happen to be the prototypes of the modern large computers.

**Number of Lectures: 60**

<b><u>UNIT 1</u></b>	<b>Logic Devices</b>  Tristate Devices, Buffers, Encoder, Decoder, Latches, Types of Memories, Concept of Control lines Such as Read/Write Chip Enable  <b>Introduction to 8085 Microprocessor</b>  Organization of Microprocessor based System, 8085 $\mu$ p architecture, Concept of Address Line and Memory Interfacing, Address Decoding and Memory Interfacing	
<b><u>UNIT 2</u></b>	<b>8085 Programming Model</b>  Instruction Classification, Instruction Format, 8085 Instruction Set  <b>Introduction to Modern Day Computer Systems</b>  Organizations and Architecture, Structure and Function.  <b>System Bus</b>	



	<p>Computer Components, Computer Functions</p> <p><b>PCI</b></p> <p>Features of PCI bus, Why PCI bus is needed?, Concept of PCI Arbitration</p> <p><b>Internal Memory</b></p> <p>Concept of Cache Memory, Methods of Cache Mapping, Concept and Need for Cache Coherency</p> <p><b>External Memory</b></p> <p>RAID</p>	
<b><u>UNIT 3</u></b>	<p><b>The 8051 Microcontroller</b></p> <p>Introduction And Overview of 8051 family, 8051 Assembly Language Programming, Jumps</p>	
<b><u>UNIT 4</u></b>	<p><b>Interfacing the 8051 Microcontroller</b></p> <p>8051 I/O Port Programming, Addressing Modes, Arithmetic and Logical Instructions</p>	

### **Continuous Internal Assessment**

Assignments / Projects / Mid Term Test

### **List of Recommended Books**

1. Andrew C. Tanenbaum ,PHI – Structured Computer Organization (3<sup>rd</sup> Edition)
2. John P Hayes,McGrawHill,1998 – Computer Architecture and Organization
3. M. Morris Memo, PHI, 1998 – Computer System Architecture
4. M.A Mazidi, J.G. Mazidi & R.D – The 8051 Microcontroller and Embedded Systems
5. McKinlay, Pearson Education
6. Malvino – Digital Computer Fundamentals
7. R.S. Gaonkar, PRI (3<sup>rd</sup> Edition) – Microprocessor Architecture and Programming and Applications with the 8085.
8. Thomas C Barte, TMG – Digital Computer Fundamentals

9. William Stallings , PHI,1998 – Computer Organization and Architecture (4<sup>th</sup> Edition)

**F.Y.I.T**

**Course Code: SITS0204**

**Title: Descriptive Statistics**

**Learning Objectives:**

1. To introduce the technique of data collection and its presentation.
2. To emphasize the need for numerical summary measures for data analysis.

**Total Number of lectures: 60**

Unit I	Types of data from a population : Qualitative and Quantitative data; Geographical, Time series data; Discrete and Continuous data. Different types of scales: Nominal, Ordinal, Ratio and Interval. Collection of Data : Concepts of statistical population and sample. Primary data- designing a questionnaire , distinction between them, Problems when collecting data through the questionnaire. Secondary data– its major sources including s o m e government publications. Elementary Categorical Data Analysis Preparation of tables with two or three factors (variable /attributes) Of classification. Requisites of a good table.	12
Unit II	Univariate : Frequency distribution of discrete and continuous variables. Cumulative frequency distribution. Graphical representation of frequency distribution by Histogram, Frequency polygon, Frequency curve and Ogives. Diagrammatic representation using Bar diagrams and Pie chart.	12

	Exploratory data analysis: Stem and Leaf diagram, Dot plot. Bivariate : Frequency distribution, Marginal and Conditional frequency distributions.	
Unit III	Measures of central tendency Arithmetic mean and its properties (simple and weighted), Combined mean. Geometric mean and Harmonic mean. Quartiles (Median, Quartiles, Deciles, Percentiles.) Mode. (Grouping Method not expected). Empirical relationship between mean, Median and Mode. Merits, Demerits and Uses of Mean, Median, Mode, G.M. and H.M. Requisites of a good average Choice of scale of measurement for each measure of central tendency.	13
Unit IV	Measures of Dispersion Definition of dispersion, objectives of measuring dispersion, absolute and relative measures, range, coefficient of range, inter quartile range ,mean deviation, standard deviation, coefficient of variation, graphic method of dispersion Skewness Skewness introduction, objectives of Skewness , Measures of Skewness, Karl Pearson's coefficient of Skewness. Moments and Kurtosis	17

### **List of Recommended Reference Books**

1. Statistics [Theory ,Methods & Application] - D.C Sancheti , V.K.Kapoor , Sultan Chand & Sons
2. Fundamentals of Statistics, Volume I -Goon A.M., Gupta M.K., Dasgupta B. The World Press Private Limited, Calcutta. Fifth edition.
2. Research Methodology, Methods and Techniques -Kothari, C.R.: Wiley Eastern Limited. First Edition.
3. Descriptive Statistics -Shah R.J, Seth Publications, Eighth edition.

### **ASSESSMENT:**

### **THEORY:**

**CIA I: Written test for 20 marks**

**CIA II: Assignments / Project / Presentation / Case Study/ Written Test for 20 marks**

**F.Y.B.Sc (IT)**

**COURSE: SITS0205**

**TITLE: INTRODUCTION TO C++ PROGRAMMING**

**OBJECTIVES:** To learn a Programming Language and to learn structured and procedural programming concepts

Unit 1	<p>C++ concepts</p> <p>Variables and Assignments</p> <ul style="list-style-type: none"><li>Variables</li><li>Identifiers</li><li>Variable declarations</li><li>Assignment Statements</li><li>Reference variable</li><li>Symbolic constant</li></ul> <p>Input and Output</p> <ul style="list-style-type: none"><li>cin, cout</li><li>Escape sequences</li><li>include directives and Namespaces</li><li>Indenting and Comments</li><li>Operator precedence</li></ul> <p>Data types and expressions</p> <ul style="list-style-type: none"><li>Arithmetic operators</li><li>Type compatibilities</li></ul>	(15 Lectures)
Unit 2	<p><b>Flow of Control and Functions</b></p> <p>Compound statements</p> <p>Loops</p> <ul style="list-style-type: none"><li>while</li><li>for</li><li>do while</li><li>Nested loops.</li></ul> <p>Decision making</p> <ul style="list-style-type: none"><li>if – else</li><li>nested if else</li><li>switch</li><li>break and continue</li></ul> <p>Manipulators</p>	(15 Lectures)

	<p>endl</p> <p>setw</p> <p>sizeof</p> <p>Increment and decrement operators</p> <p>Type Cast Operators</p> <p>Scope resolution operators</p> <p>Function Prototypes</p> <p>    Built in functions and user defined functions</p> <p>    Function overloading</p> <p>    Call by reference</p> <p>    Call by value</p> <p>    const member functions</p> <p>Inline Functions and recursive functions</p> <p>Math Library Functions</p> <p>Virtual Functions</p>	
Unit 3	<p><b>Arrays, Pointers, Strings, Vectors</b></p> <p>String functions</p> <p>    strcmp</p> <p>    strcat</p> <p>    strlen</p> <p>    strcpy</p> <p>Vector Basics</p> <p>Arrays</p> <p>    Introduction to arrays</p> <p>    Arrays in functions</p> <p>    2-D arrays</p> <p>    Multidimensional arrays</p>	(15 Lectures)

	<p>Pointers and Functions</p> <ul style="list-style-type: none"> <li>Introduction to pointers</li> <li>void pointers</li> <li>Pointers in function</li> <li>Pointer to constant and constant pointer</li> <li>Generic pointer</li> </ul>	
Unit 4	<p><b>Object Oriented Feature</b></p> <p>Classes and Objects</p> <ul style="list-style-type: none"> <li>-Class Specification</li> <li>- Constructors and types</li> <li>-Accessing class members</li> <li>-Structures and classes</li> <li>- Passing Objects as Arguments</li> <li>- Returning Objects from functions</li> <li>-Data Hiding</li> <li>- Friend Function and Friend Class</li> </ul> <p>Inheritance</p> <ul style="list-style-type: none"> <li>-Inheritance and member accessibility</li> <li>-Multiple Inheritance</li> <li>- Constructors in derived class</li> <li>-Object Composition</li> </ul> <p>Polymorphism</p> <p>Generic programming with Templates</p> <ul style="list-style-type: none"> <li>-Function Templates</li> <li>- Class Templates</li> <li>- Overloading Function Templates</li> </ul>	(15 Lectures)

## **Continuous Internal Assessment**

Assignments / Project

Mid Term test.

## **List of Recommended Reference Books**

1. Y.P.Kanetkar, "Let us C++", seventh edition, BPB publication
2. Problem Solving with C++, Walter Savitch, Sixth Edition, Pearson Education.
3. J. R. Hubbard, Schaum's outlines "Programming with C++", Second Edition, Tata McGrawHill
4. Mastering C++ KR Venugopal
5. Object oriented programming with C++, E Balagurusamy, Third Edition, and Tata McGraw Hill.
6. Object oriented programming with C++ PoonamchandraSarang, PHI Second Edition.
7. Pure C++ programming, Amir Afzal, Pearson Education.

## **Introduction to C++ Programming**

**SITS02PR**

### **Learning Objective:**

To help students learn to write an algorithm, convert it to program logic and execute the same on a Computer, thus instilling the foundations of basic programming principles in them.

- I. Write a C++ program for Formatting the following statement using setw and endl:  
" Nothing is difficult than beginning"  
"So Let's start the voyage of technology"
- II. Write a C++ program to Calculate simple and compound interest.
- III. Write C++ programs to perform the following:
  - a. Calculate sum of the digits of a number.
  - b. Find the reverse of a number, entered by the user.



- IV. Write a C++ program for:
  - a. solving the quadratic equation
  - b. printing all the prime numbers in a given range (ask user input for lower bound and upper bound of the range)
  - c. Write a C++ program for displaying the Fibonacci series.
- VI) Write a C++ program for converting number to words. (switch, break, continue)
  
- V. Write a C++ function for:
  - a. Swapping two numbers with the use of a third variable
  - b. Swapping two numbers without using third variable.
- VI. Write a recursive C++ function for calculating the factorial of a given number
- VII. Write a C++ program for (1D arrays):
  - a. sorting an array of numbers in ascending and descending order
  - b. Finding the max in the array
- VIII. Write a C++ program for the following(2D arrays):
  - a. Matrix Transpose
  - b. Matrix Addition.
  - c. Matrix Multiplication.
  - d. Inverse of a matrix.
- IX. Write your own function for string reverse, string palindrome, string comparison
- X. Write a program for implementing the concept of structures
- XI. Write a C++ program for finding the greatest and smallest number using vector
- XII. Write a C++ program for:
  - a. Implementing the concept of call by value and call by reference.
  - b. Programs on use of pointers

## COMPUTER GRAPHICS

**Learning Objective:** To develop a program to implement following algorithms

- I) Write a program to implement the DDA Algorithm.
- II) Write a program to implement the Bresenham's Algorithm.
- III) Write a program to implement the Mid-point Circle Algorithm.
- IV) Write a program to implement the Ellipse Algorithm.
  
- V) Write a program to implement the Pie-Algorithm.
- VI) Write a program to design any given pattern.
  
- VII) Write a program to implement the 2D Translation Concept.
- VIII) Write a program to implement Translation Concept.
- IX) Write a program to implement Scaling Concept.
- X) Write a program to implement Reflection Concept.
- XI) Write a program to implement the Cohen-Sutherland Line Clipping Concept.
- XII) Write a program to implement the Bezier Curve

## **MICROPROCESSOR AND MICROCONTROLLERS**

### **Learning Objective:**

To be able to develop and execute assembly language programs for microprocessors and microcontrollers.

### **8085 programs:**

- I) Simple 8-bit and 16-bit addition and subtraction
- II) Transfer a block of data from one location to another.
- III) Find the largest/smallest of the numbers stored at one location. IV) Addition of 10 numbers.
- V) Multiplication of 8-bit and 16-bit numbers. VI) BCD addition

### **8051 programs:**

- I) To search a number from a given set of numbers. The end of the data is indicated by 00. II) Finding the average of signed numbers.
- III) Multiplication of signed numbers.
- IV) Convert the BCD 0111 0101 number to two binary numbers and transfer this number to registers.

**Contents:**

<b>ITS.3.01</b>	<b>LOGIC AND DISCRETE MATHEMATICS</b>
<b>ITS.3.02</b>	<b>WEB DESIGNING AND PROGRAMMING</b>
<b>ITS.3.03</b>	<b>DATABASE SYSTEMS AND CONCEPTS</b>
<b>ITS.3.04</b>	<b>OBJECT ORIENTED PROGRAMMING USING JAVA</b>
<b>ITS.3.05</b>	<b>EMBEDDED SYSTEM</b>
<b>ITS.3.PR1</b>	<b>DATABASE SYSTEMS AND ES</b>
<b>ITS.3.PR2</b>	<b>WEB DESIGNING AND OOPS</b>

**CLASS: S.Y. B.Sc.IT**

**COURSE CODE: ITS.3.01**

**TITLE: Logic and Discrete Mathematical Structures (LDMS)**

**LEARNING OBJECTIVES:**

To develop logical reasoning and analytic mind

**Total Number of lectures: 60**

<b>UNIT I</b>	<b>Basics of set theory and logic</b>	<b>15</b>
	Sets and subsets Operations on sets Sequences mathematical structures The inclusion exclusion principle Mathematical induction Logic – propositions and logical operations Methods of proof	
	<b>Counting principles:</b>	
	Permutations Combinations The pigeon hole principles Recurrence relation Basics of probability	
<b>UNIT II</b>	<b>Relations and Digraphs</b>	<b>15</b>
	Relations and digraphs Paths in relation and digraphs Properties of relation Equivalence relations Computer representation of relation and digraphs Transitive closure and Warshalls algorithm	
	<b>Graph</b>	
	Eulers paths and circuits Hamiltonion paths and circuits <b>Trees</b> Labeled trees Tree searching Minimal spanning trees	
<b>UNIT III</b>	<b>Order relations and Structures</b>	<b>15</b>
	Partially ordered sets Lattices Finite Boolean Algebra Functions on Boolean Algebra	
	<b>Semi Groups</b>	
	Groups Coding of Binary Information and error detection Decoding and error correction	
<b>UNIT IV</b>	<b>Languages and finite state machines</b>	<b>15</b>
	Languages Representation of special languages and grammars	

	Finite state machines Machines and regular languages	
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## **Continuous Internal Assessment**

Problem Solving / MCQ

Midterm test

## **List of Recommended Reference books**

1. B Kolman, RC Busby, S Ross Pvt. Ltd- Discrete Structures
2. Liu - Discrete Structures
3. Joe L Mott – Discrete Mathematics For computer scientists and mathematicians
4. Seymour Lipschutz, Marc Lipson – Discrete Mathematics, Schaum’s outline series

**CLASS: S.Y. B.Sc.IT**

**COURSE CODE: ITS.3.02**

**TITLE: Web Designing and Programming**

**LEARNING OBJECTIVES:**

1. To learn web page designing using HTML, CSS for the WWW.
2. To learn web page designing using JavaScript, jQuery, XML, PHP, mysql technologies.

**Total Number of lectures: 60**

UNIT I	Components of the internet and web page designing	15
	<p>Internet and WWW</p> <p>What is Internet? Introduction to internet and its application, E-mail, telnet, FTP, ecommerce, e-business, internet service providers, Domain name Server, Internet address, World Wide Web(WWW)</p> <p>World Wide Web and its evolution, Exploring the Uniform resource locator(URL) and its components</p> <p>Browsers: Google Chrome, Mozilla Firefox, Opera, Apple Safari, Internet Explorer, Search engine,</p> <p>Web server: Apache , IIS, proxy server, xampp, HTTP protocol method</p>	
	<p>HTML &amp; CSS</p> <p>HTML Tags: Formatting Tags, Understanding the difference between a tag, Element and attributes in HTML, DIV Element, SPAN Element, Creating Lists, Imagemaps, hyperlink tags, Tables, Frames, iframes. Tables, Forms, Canvas for 2D drawing, video, audio, content specific element: Article , footer, header, nav, section, wbr, datalist, output Form controls, Calendar, date, time, email, url, search.</p> <p>Style Sheets using CSS: Evolution of CSS, Understanding the CSS syntax, Exploring CSS Selectors (universal, type, class, id , child, descendent, adjacent Sibling), Inserting CSS in an HTML document: The Internal Style Sheet, The External Style Sheet , The Inline Style Sheet, Defining Inheritance in CSS, Background and Color Gradients, Fonts and Text Styles, Creating Boxes and Columns, Displaying, Positioning, Floating an Element, List Styles, Table Layouts Pseudo-classes and Pseudo -elements</p>	

UNIT II	Javascript	15
	<p>Fundamentals of JavaScript Client-Side JavaScript, Server-Side JavaScript</p> <p><b>Operator:</b> Assignment operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, (Conditional operator), (Comma operator), delete, new, this, void.</p> <p><b>Statements:</b> Break, comment, continue, delete, function, return, switch, var</p> <p><b>Core JavaScript</b>(Properties and Methods of Each): Array, Boolean, Date, Function, Math, Number, Object, String, RegExp</p> <p><b>Events and Event Handlers</b></p> <p>General Information about events, defining event handlers, Event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload</p>	
UNIT III	jQuery and XML	15
	<p><b>jQuery</b> Fundamentals of jQuery, Loading and using jQuery, jQuery Syntax, jQuery Selectors, Element Properties and attributes, Methods to access HTML Attributes, Methods For Traversing, jQuery Events, CSS using jQuery</p> <p><b>XML</b> Introduction to XML, Anatomy of an XML Document, creating XML Documents, creating XML DTDs, XML schemas, XSL</p>	
UNIT IV	PHP & Mysql	15
	<p>PHP Why PHP and Mysql? Server-side web scripting, installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors/problems Advanced PHP and Mysql PHP/Mysql Functions, displaying Queries in tables, building forms from queries, PHP /Mysql Efficiency, PHP/Mysql Problems</p>	

	Advanced array Functions , String and Regular Expressions , file system and system Functions , sessions , cookies and HTTP, type and type conversion , PHP mathematics , E-mail, Steps to deploy a website	
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**LIST OF RECOMMENDED REFERENCE BOOKS and URL:**

1. HTML5 covers CSS3, JavaScript, XML, PHP, jQuery Black book, dreamtech press
2. John Pullock, Tata McGraw Hill – JavaScript: A beginners guide
3. Bear Bibeault and Yehuda Katz , dreamtech press- jQuery in Action Second Edition
4. Williamson , Tata McGraw hill – XML the complete reference
5. <http://www.w3schools.com>



**CLASS: S.Y. B.Sc.IT**

**COURSE CODE: ITS.3.03**

**TITLE: DATABASE SYSTEMS AND CONCEPTS**

**LEARNING OBJECTIVES:**

To learn the concept of database systems and PL/SQL for manipulating and maintaining databases.

**Total Number of lectures: 60**

<b>UNIT 1</b>	<b>Introduction to Databases and Relational database model</b>	<b>15</b>
	<p>What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management</p> <p><b>Data Models</b></p> <p><b>Database Design, ER Diagram, ERD Issues, weak entity sets,</b></p> <p><b>Codd's rules, Relational Schemas, Introduction to UML</b></p> <p>Creating a Database, Alter Database , Integrity constraints, Types of constrains</p> <p>DML statements, Summary functions, aggregate function, Single table queries</p>	
<b>UNIT 2</b>	<b>Normalization and Subqueries</b>	<b>15</b>
	<p><b>Relational Database design:</b> features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).</p> <p>What is a subquery, subqueries in WHERE clause, Subquery search conditions,</p> <p><b>Views:</b> Introduction to views, data independence, security, updates on views, comparison between tables and views</p> <p><b>Joins</b></p>	
<b>UNIT 3</b>	<b>Transaction management and Concurrency, Basics of PL/SQL</b>	<b>15</b>
	<p>ACID properties, serializability and concurrency control</p> <p>Lock based concurrency control (2PL, Deadlocks),</p> <p>Time stamping methods, optimistic methods,</p> <p>Database recovery management</p>	

	<p><b>Beginning with PL / SQL</b>, Identifiers and Keywords, Operators, Expressions,</p> <p>The %TYPE Attribute, PL/SQL Block Syntax</p> <p><b>Control Structures</b> : Conditional processing using IF Statements and CASE Statements, Loop Statement, While Loop Statement, For Loop Statement,</p>	
<b>UNIT 4</b>	<b>Advanced PL/SQL</b>	<b>15</b>
	<p><b>Stored Procedures and Functions:</b> Syntax of creating procedure, Creating procedure with parameters, IN parameter, OUT parameter, Basic concept of functions , different types of functions , advantages of using stored functions The steps to create a stored function ,</p> <p><b>Triggers:</b> Definition, CREATE TRIGGER Statement, Statement Level Triggers and Row Level Triggers</p> <p>DDL and Event Database Triggers, instead of trigger</p> <p>Comparison of database Triggers and Stored Procedures</p>	

#### **LIST OF RECOMMENDED REFERENCE BOOKS :**

1. A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts”, fifth Edition McGraw-Hill,
2. Rob, Coronel, “Database Systems”, Seventh Edition, Cengage Learning
3. Steven Feuerstein , Bill Pribyl -Oracle PL/SQL Programming 5th edition
4. Oracle 11g:SQL Reference Oracle press
5. Joel Murach , Murach and associates- Murach’s Oracle SQL and PLSQL
6. Michael Mc- Oracle Database 11g PL/SQL Programming workbook

#### **Term work:**

Assignments /test

**CLASS: S.Y. B.Sc.IT**

**COURSE CODE: ITS.3.04**

**TITLE: Object Oriented Programming with Java**

**LEARNING OBJECTIVES:**

To learn a core Java fundamentals, to understand how Java is used in object oriented programming. To develop strong foundation for building project in Java. To understand how Java differs from other programming languages.

Design patterns skill is useful in designing projects.

**Total Number of lectures: 60**

UNIT I	Overview of Java, OOPS fundamentals, Interface and Package  Overview of Java Difference between C++ and Java. History of Java. Installation of JDK, Features JDK. Difference between JDK and JRE. Architecture of Java—portability Features of Java, datatypes in Java Variables in Java, scope and lifetime of variables Arrays in Java-1D,2D,different ways to declare an array Arithmetic operators, Boolean operators, assignment operators, operator Control statements- while,do-while,for, if-else, switch, string, string buffer, string Tokenizer in details  OOPS fundamentals What is class and objects, Meaning of Object oriented and its Features? Assigning Object Reference Variables,Methods, Passing different parameter to method with different return type, Constructors, this and super keyword, garbage collection, Inheritance, Polymorphism,	15
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	<p>Wrapper Classes, Access Control, Modifiers, Anonymous Classes</p> <p>Interface and Packages</p> <p>Packages, Access Protection,</p> <p>Importing Packages, Interfaces, Defining an Interface</p> <p>Implementing Interfaces, Nested Interfaces,</p> <p>Applying Interfaces, Variables in Interfaces,</p> <p>Interfaces can be extended</p>	
UNIT II	<p>Exceptional Handling, JDBC and Thread</p> <p>Exception Handling</p> <p>Exception Hierarchy</p> <p>Exceptional Handling fundamentals,</p> <p>Exception Types Uncaught Exceptions,</p> <p>Try and catch, multiple catch clauses,</p> <p>Nested try statements, throw, throws</p> <p>Finally, java built in exception,</p> <p>Creating your own exception subclasses</p> <p>JDBC</p> <p>Understanding type I driver of JDBC, examples using JDBC,</p> <p>Understanding ResultSetMetaData, Prepared statement, callable statement</p> <p>Thread</p> <p>Java thread model, main thread, creating a thread, creating multiple threads,</p> <p>Using isAlive(), join(), Thread priorities,</p> <p>Synchronization, interthread communication</p>	15
UNIT III	<p>Collection framework and design pattern</p> <p><i>Collection framework</i></p> <p>Collection overview , collection hierarchy, the collection interface- list interface, set interface</p> <p>Collection classes-ArrayList class , linked list class,</p>	15

	<p>Vectors and Hashtable</p> <p>Map</p> <p><i>Design pattern</i></p> <p>What is design pattern ? singleton pattern , adapter pattern , façade pattern , Factory pattern , Proxy Pattern</p>	
UNIT IV	<p>i/o, Applets and Swing</p> <p>I/O basics, Reading console inputs, writing console o/p, print writer class, reading and writing files.</p> <p>Applet fundamentals, Life Cycle of Applet, Programs using applets, introduction to swing. Difference between swing and applet.</p> <p>JLabel and ImageIcon, JTextField, JButton, JToggleButton</p> <p>Check boxes, radio buttons, JTabbedPane, JScrollPane , JList</p> <p>JcomboBox , trees , JTable and event handling</p>	15

### Continuous Internal Assessment

Assignments /Projects

Mid term test.

### LIST OF RECOMMENDED REFERENCE BOOKS:

- 1 .Herbert Schildt.—TMH Publications – Java 2 complete reference books
2. Steven John Metsker—Pearson publication- design pattern in java
1. Kathy Sierra-OCJP
2. Ivan Bayross –bpb publication-Java2
3. Balaguruswamy—TMH-Java2

**Title: Embedded System****LEARNING OBJECTIVE:**

To learn the importance of Embedded Systems. Write programs for embedded system

**[Total Lectures 60]**

<b>UNIT 1</b>	<b>Introduction to embedded systems</b>	<b>15</b>
	<p>Embedded Systems and general purpose computer systems, classifications, applications and purpose of embedded systems, characteristics , components of Embedded system hardware, design metrics used in embedded systems</p> <p>Microprocessors and Microcontrollers,RISC and CISC controllers</p> <p><b>The 8051 Microcontrollers :</b> Overview of 8051 family, instruction set, 8051 Microcontroller hardware, Input/output pins, Ports, Circuits, external memory, Counters and Timers</p> <p><b>Programming embedded systems:</b> structure of embedded program, build process, compiling, linking and locating</p>	
<b>UNIT 2</b>	<b>Memory and peripherals</b>	<b>15</b>
	<p>Types of memory – RAM , ROM, types of RAM and ROM,DMA, memory testing-common memory problems, Data bus test, Address Bus Test and Device Test, validating memory contents- Checksum and CRC ,Flash memory, NVRAM</p> <p>Peripherals: Control and Status Registers, Device Driver, developing a device driver, Timer - Watchdog Timers</p>	
<b>UNIT 3</b>	<b>Interprocess Communication and Real Time Operating System (RTOS)</b>	<b>15</b>
	<p>Shared Data Problem, Use of Semaphores, Mutex</p> <p>Priority Inversion Problem</p> <p>Inter Process Communications using Signals , Queue and Mailbox functions</p> <p>Operating system basics, Goals of operating systems, RTOS services, Interrupt routines in RTOS environment</p>	

	RTOS task scheduling models	
<b>UNIT 4</b>	<b>Design and Development</b>	<b>15</b>
	Embedded system development environment-IDE, types of file generated on cross compilation ,disassemble / decompiler , simulator, emulator and debugging, embedded product development life cycle, software modules and tools for implementation of embedded systems	

### **Continuous Internal Assessment:**

Assignment/ presentation / Project / Written Test

### **List of Recommended Reference Book**

1. Rajkamal —Embedded Systems Architecture, Programming and Design, Tata McGraw Hill.
2. Shibu K., Introduction to Embedded Systems
3. Programming Embedded systems in C and C++, O.reilly
4. M.A Mazidi, J.G. Mazidi& R.D – The 8051 Microcontroller and Embedded Systems

**S.Y. B.Sc.IT**

**ITS.3.PR1**

## **DATABASE SYSTEMS**

### **EMBEDDED SYSTEM**

**Number of lectures: 45**

### **SQL & PL/SQL**

Objective: To develop the skill of database programming:

### **LIST OF PRACTICALS**

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER,UPDATE and DELETE
4. Write the query for implementing the following functions:  
MAX(),MIN(),AVG(),COUNT()

5. Write the query to implement the concept of Integrity constraints
6. Write the query to create the views
7. Write the queries to implement the joins
8. Querying single and multiple tables using sub queries.
  - a. Manipulating data (Insert, update and delete)
  - b. Multiple column sub queries, sub queries in from clause,
  - c. Scalar sub queries and correlated sub queries
9. Basic PL/SQL
  - a. Creating anonymous PL/SQL blocks.
  - b. manipulating data using PL SQL
10. Functions and Stored Procedures
  - a. Creating and invoking functions from SQL statements.
  - b. Creating and invoking stored procedures.
11. Working with triggers
  - a. Create a trigger to update a table only during office timing.
  - b. Create row triggers for updating values.
  - c. Create procedures that will be invoked from the triggers.
12. Working with INSTEAD OF triggers, business rules and recompiling procedures, functions, packages and views.
  - a. Create instead of triggers for views.
  - b. Implement business rules.

## **EMBEDDED SYSTEM**

### **Learning Objective:**

To learn to program using assembly language / embedded C, Arduino and Microcontroller Kits.

Any three from the each of the following categories should be implemented

Using Simulator



1. Write a program to flash single LED at P1 from right-to-left and left-to-right.
2. Write a program to search a number from given set of numbers
3. Add two numbers stored in R0 and R1. If the sum is greater than FF, Port p1.0 will be —ON.
4. Add four numbers stored in RAM location 40 to 43 display the result in binary at port0(MSB) and port1 (LSB).
5. Write a program to toggle all the bits of P1 continuously after every 1s. Use Timer0, mode 1 (16 bit timer/counter) to create the delay.
  - Using polling method
  - Using interrupt driven method

#### Using Arduino Kit

1. Programming using LED.
2. Programming using LDR
3. Programming using LCD
4. Programming using REMOTE CONTROL
5. Programming using the serial command prompt as display and the remote control.

#### Using Microcontroller Kit do the following:

1. Configure timer control registers of 8051 and develop a program to generate given time delay.
2. Port I/O: Use one of the four ports of 8051 for O/P interface to eight LED's.

Simulate binary counter (8-bit) on LED's.

3. 8051 with D/A converter and generate square wave of given frequency using an oscilloscope.
4. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clockwise or counter clock wise direction.

5. Generate traffic signal

**A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

### **Continuous Internal Assessment**

MCQ / Viva test during practicals

Mid Term practical test.

**S.Y. B.Sc.IT**

**Course: ITS.3.PR2**

**Practical – II:**

### **OOP with JAVA**

### **WEB DESIGNING AND PROGRAMMING**

### **OOP with JAVA**

**Learning Objective:** To apply the concepts learnt in object oriented programming using java.

I) Design a program to implement concept of class, constructor and inheritance  
Design a class to represent a bank account to display name and balance using

Members:

b. Account name

- c. Depositor name
- d. Type of account
- e. Balance amount in account

Methods:

1. to assign initial value
2. to deposit an amount
3. to withdraw an amount after checking balance

II. Write a program to Calculate sum of the digits of a number

III. Create a login screen and authenticate the user by matching username and password through database

IV) Write java code to design four radio buttons and whenever user clicks on a particular button the selected button should be known by text message. Implement the Listener

V. Design the screen using swing to accept the roll number and marks in three subjects and on click of the button it shows the average of marks on the text

VI) Write a program for exception handling. Implement user-defined exception. Create, throw and catch user – defined exception and handle runtime exception

VII) Write java program to find whether the string is a palindrome or not

VIII) Write java program for arranging the strings in alphabetical order

IX) Write java program to arrange the numbers in decreasing order but the numbers should be stored using Vector

X) Write a java program to read data from a file and copy it to another file.

**A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

# WEB DESIGNING AND PROGRAMMING

## Learning Objective:

To be able to design and develop a dynamic website.

Number of lectures: 45

**For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

- I. Design a web page using a text editor with different text formatting tags and save it as *aboutme .html* extension in a folder called *Prac\_1* in the D - drive.

## II. Lists, Links & Images:

Design a HOME page called *index.html* with links to different pages and allow navigation between pages. **Elements:** your page must use some lists (numbered and/or un-numbered and/or description), as well as a table, and a variety of headings. The page must also include some images and some links to other websites like [ww.xaviers.edu](http://ww.xaviers.edu). The web page title must reflect what the page is: example —John White's Home Page

Make the top level heading of the web page the same as the title. **Content:** the page should comprise of your personal information like

Academic/Employment status: I am a student Courses that you are studying (make use of table tag)

Write about your interests (nice place for some lists or perhaps an image as well?)  
Write about where you come from (perhaps you could find some images, and use them as links?)

## III. Design a web page with image maps.

**Journal entry:** The World Wide Web Consortium (W3C) has an HTML validation service. Give the steps on How does one validate an HTML page and the purpose behind this validation?

IV) **Tables:** Design a web page with different tables. Design a web page using tables so that the content appears well placed.

V. **Form & CSS:** Create the Registration form using all types of controls. Create the CSS file and Implement the CSS with HTML.

VI) **Frames & CSS:** Design a web site using a frameset and open different pages in the frames. Make use of an external/linked style sheet so that the pages have uniform style.

VII) **Javascript:**

- Create an HTML form that accepts an integer value from the user and then using JavaScript, prints its factorial.
- Design an HTML form for the canteen coffee counter that accepts the item, quantity and using JavaScript calculates the total along with taxes and displays back to the user. (make use of list box/check box/radio button/text box etc)
- Design a form with a text box and a command button. Using JavaScript, write a program to check whether the number entered in the text box is a prime number or not.

VIII) Design a form and validate all the controls placed on the Registration form using JavaScript and regular expressions.

IX) **jQuery introduction:**

- a. hello world example
- b. calling a function in jQuery and JavaScript
- c. Loading jQuery from Google **Journal entry:** why is it better to load the library using Google code?
- d. Applying styles to a table using jQuery CSS
- e. Design a web page to create the sliding effect using the slideup(), slidedown() and slidetoggle() methods

- f. Make use of the **toggleClass( class )** method that adds the specified class styling when clicked upon and removes the specified class styling when clicked for the second time.

#### X. XML:

- a. Design a DTD, corresponding XML document and display it in browser using CSS.
- b. Design an XML document and display it in browser using XSL.
- c. Design XML schema and corresponding XML document.

#### XI) PHP:

- a. Design a php page to process a form.
- b. Design a php page for authenticating a user.

XII) Design a complete dynamic website with all validations.

**#Note:** Keeping the SYBsc.IT students in mind, although care has been taken to cover the significant areas of Web designing and Programming, but being a vast subject, one semester is not sufficient to cover all the sub-topics during lectures and practical sessions. Hence students are encouraged to do research and practicals on their own in their leisure time, through various books, online sites as advised by the course instructor at the end of every session, in order to gain an in-depth knowledge of this paper.

### **Continuous Internal Assessment**

MCQ / Viva test during practicals

Mid Term practical test.

**Contents:**

<b>ITS.4.01</b>	<b>SOFTWARE ENGINEERING</b>
<b>ITS.4.02</b>	<b>MODERN OPERATING SYSTEMS</b>
<b>ITS.4.03</b>	<b>MOBILE APPLICATION DEVELOPMENT</b>
<b>ITS.4.04</b>	<b>DATA STRUCTURES USING JAVA</b>
<b>ITS.4.05</b>	<b>STATISTICAL TECHNIQUES AND OPERATION RESEARCH</b>
<b>ITS.4.PR1</b>	<b>STATISTICS AND DATA STRUCTURES</b>
<b>ITS.4.PR2</b>	<b>MOS and MOBILE APPLICATION DEVELOPMENT</b>

**CLASS: S.Y. B.Sc.IT****COURSE CODE: ITS.4.01****TITLE: Software Engineering****LEARNING OBJECTIVES:**

To develop an understanding of the systematic approach required for software development.

**Total Number of lectures: 60**

<b>UNIT I</b>	<b>Introduction and Principles</b> (15 lectures)
	<b>Process Models</b>
	What is software engineering? Phases in the development of software, Prescriptive Models, Waterfall Model, Incremental Process Model, Evolutionary Process Models, Specialized Process Models.
	<b>Software Engineering Practice</b>
	Software Engineering Practice, Communication Practices, Planning Practices, Modeling Principles,

	Construction Practice, Deployment.
<b>UNIT II</b>	<b>Modeling and the UI aspects</b> (15 lectures)
	<b>Modeling and Approaches to System Requirements</b>
	Events and system requirements, Things and system requirements, Data entities and Objects, Entity-Relationship diagram, Traditional Approach, Object oriented approach
	<b>Performing User Interface Design</b>
	The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.
<b>UNIT III</b>	<b>Software Testing Concepts</b> (15 lectures)
	<b>Testing Strategies and Tactics</b>
	A Strategic Approach to Software Testing, Test Strategies for Conventional Software, Object Oriented Software, Validation Testing, System Testing, Software Testing Fundamentals, Black Box Testing, White Box Testing
<b>UNIT IV</b>	<b>Project Management</b> (15 lectures)
	<b>Software Project Management</b>
	Cost Estimation, Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring, Risk Management.



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**LIST OF RECOMMENDED REFERENCE BOOKS and URL:**

1. Software Engineering, Principles and Practice II, Hans van Vliet, Wiley.
2. Software Engineering, A Practitioner's Approach II, Roger S. Pressman, TMH
3. System Analysis and Design, by Satzinger
4. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa.
5. Software Engineering, S. L. Pfleeger, Macman.

**ASSESSMENT:**

Presentation / Developing Documentation for Project Undertaken.

Mid Term test.

**MODERN OPERATING SYSTEM**

**COURSE: ITS.4.02**

**LEARNING OBJECTIVE:**

Operating System forms the heart of all computer system which is required for running any kind of application program. This subject focuses on the mechanism involved in building an Operating System and understanding the fundamentals of modern operating system. Distributed Operating System is also focussed.

**[Total Lectures 60]**

Unit 1	<b>Introduction To Operating System, Process and DeadLock</b> Introduction to Operating System History of Operating System, General Architecture of Computer, Parts of Computer System, Functions of Operating System. Types of Operating System Batch, Multiprogramming, Multitasking, Real-Time Operating System Structure	15 lectures
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	<p>Layered, Monolithic, Microkernel</p> <p>Process and Thread</p> <p>Process Management Creation, Termination, States Thread Model and Implementation,</p> <p>Interprocess Communication &amp; Synchronization Race Condition</p> <p>Critical Region, Dekker Algorithm, Mutual Exclusion, Semaphores, Monitors Classical IPC</p> <p>Problems Dining Philosophers Problem, Readers and Writers Problem Process</p> <p>Scheduling(Preemptive and Nonpreemptive)</p> <p>Deadlock</p> <p>Condition of deadlock,Resource Allocation Graph, Deadlock Detection And</p> <p>Recovery, Banker's Algorithm.</p>	
Unit 2	<p><b>Linux Commands and Shell Scripts</b></p> <p>Basic Commands(ls,pwd,bc,cat cp, mv, rm, echo, date, cal,chmod etc.), vi</p> <p>Editor(Basic Concepts, Commands, Programming in vi),</p> <p>Shell Programming Concepts (Types of Shell, Environment Variables, Programming</p> <p>Construct: loops, conditions, logical operators).</p> <p>At least 10 shell scripts.</p> <p>Simple filters—head, tail, cut, paste, sort.</p> <p>Searching through awk, grep, sed command in details.</p> <p>Inode structure in Linux.</p>	15 lectures
Unit 3	<p><b>Memory Management:</b></p> <p>Static Allocation, Dynamic Allocation, Segmentation, Paging, paged segmentation and segmented paging. Virtual Memory, Page Replacement Algorithm (Optimal Page Replacement</p>	15 lectures

	Algorithm, First-In First-Out)	
Unit 4	<p><b>File System and Distributed Operating System</b></p> <p>File System</p> <p>Files(Naming, Structure, Types, Access, Attribute), Directories(Single Level, Hierarchical Level, Path Name, Operations), File System Implementation(Layout, Implementation, Shared Files)</p> <p>Distributed Operating System</p> <p>Introduction to Distributed Operating System (Goals, Hardware Concepts, Software Concepts, Design Issues), Multiprocessor System (Motivation And Classification, Multiprocessor Interconnection, Types of Multiprocessor). Transparency in Distributed system, Challenges in distributed system. Types of Distributed System.</p>	15 lectures

Continuous Internal Assessment

Assignments / Project / Presentation / Case Study

Mid Term test.

Text Books:

Reference Books:

1. Linux and Unix – Sumitbha Das -Tata McGraw Hill
2. Operating System Concepts by Silbershatz, Peterson, Galvin – Addison Wesley.
3. Mordern Operating Systems by Andrew S. Tnenbaum - Pearson Education.
4. Distributed Operating Systems by Andrew S. Tnenbaum, Pearson Education.
5. The Design of UNIX Operating System by Maurice J. Bach – Prentice Hall.
6. Working with Unix by Kaushal Thakker, Kiran Dattani – BPB Publication
7. Operating System Design and Implementation by Andrew S. Tanenbaum.

**CLASS: S.Y. B.Sc.IT**

**COURSE CODE: ITS.4.03**

**TITLE: Mobile Application Development**

**LEARNING OBJECTIVES:**

To help students gain a strong foundation in developing mobile apps for the android operating system.

**Total Number of lectures: 60**

<b>UNIT I</b>	<b>User Interface</b>	<b>15</b>
	<b>Android Foundation and basic user interface</b>	
	<b>Introduction:</b> Android history, Android architecture, Android versions, Building blocks	
	<b>User Interface:</b> Layouts, Button, TextView and EditText, Dialog, Lists, Notifications, Radiogroup, CheckBox	
	<b>Advanced User Interface:</b>	
	SeekBar, ProgressBar, ToggleButton, ListView, Spinner, CustomControls Date and Time Pickers, Sliding drawer Tabs, Tabs with swipe, Custom title bar	
<b>UNIT II</b>	<b>Android Programming and Data Persistence</b>	<b>15</b>
	Activities, Lifecycle, Preferences, Menu – Context and Options menu Activities and intents	
	<b>Data Persistence –(internal memory and SD Card)</b>	
	Data Storage & Permissions: Process & application context, Permission systems, Internal storage, External storage, Cache management, Preferences	
<b>UNIT III</b>	<b>Databases, Content Providers &amp; Contacts</b>	<b>15</b>
	<b>Databases</b>	
	SQL review, DB helper, Database operations, Cursors, Databases, SQL review, DB helper, Database operations, Cursors	
	<b>Content Providers &amp; Contacts</b>	

	Content providers & URIs, Accessing contacts, Insertion, deletion, updating, Managed cursors	
<b>UNIT IV</b>	<b>Services and Web Services</b>	<b>15</b>
	<b>Services:</b> Lifecycle, Bound services, Notifications, Running in foreground	
	<b>Web Services:</b> Bluetooth, Wifi, Maps, Telephone manager, CSV reader and writer, Call and SMS	

**LIST OF RECOMMENDED REFERENCE BOOKS and URL:**

1. Android programming for beginners, John Horton, Open Source
2. Head First Android Development, Griffiths & Griffiths, Oreilly
3. Beginning Android Application development, Wei-Meng lee, Wrox, Wiley India

**ASSESSMENT:**

**THEORY:**

CIA I: Written test **for 20 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

**SEMESTER IV**

**COURSE: ITS.4.02**

**MODERN OPERATING SYSTEM**

**LEARNING OBJECTIVE:** Operating System forms the heart of all computer system which is required for running any kind of application program. This subject focuses on the mechanism involved in building an Operating System and understanding the fundamentals of modern operating system. Distributed Operating System is also focused

[Total Lectures 60]

Unit 1	<b>Introduction To Operating System, Process and DeadLock</b>  Introduction to Operating System History of Operating System,	15 lectures
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	<p>General Architecture of Computer, Parts of Computer System, Functions of Operating System. Types of Operating System Batch, Multiprogramming, Multitasking, Real-Time Operating System Structure Layered, Monolithic, Microkernel Process and Thread Process Management Creation, Termination, States Thread Model and Implementation, Interprocess Communication &amp; Synchronization Race Condition Critical Region, Dekker Algorithm, Mutual Exclusion, Semaphores, Monitors Classical IPC Problems Dining Philosophers Problem, Readers and Writers Problem Process Scheduling(Preemptive and Nonpreemptive) Deadlock Condition of deadlock,Resource Allocation Graph, Deadlock Detection And Recovery, Banker's Algorithm.</p>	
Unit 2	<p><b>Linux Commands and Shell Scripts</b></p> <p>Basic Commands (ls, pwd, bc, cat cp, mv, rm, echo, date, cal, chmod etc.), vi Editor (Basic Concepts, Commands, Programming in vi), Shell Programming Concepts (Types of Shell, Environment Variables, and Programming Construct: loops, conditions, logical operators). At least 10 shell scripts. Simple filters—head, tail, cut, paste, sort. Searching through awk, grep, sed command in details. inode structure in Linux</p>	15 lectures
Unit 3	<p><b>Memory Management:</b></p> <p>Static Allocation, Dynamic Allocation, Segmentation, Paging, paged segmentation and segmented paging. Virtual Memory, Page Replacement Algorithm (Optimal Page Replacement Algorithm, First-In First-Out)</p>	15 lectures
Unit 4	<p><b>File System and Distributed Operating System</b></p> <p>File System Files(Naming, Structure, Types, Access, Attribute), Directories(Single Level, Hierarchical Level, Path Name, Operations), File System Implementation(Layout, Implementation, Shared Files) Distributed Operating System Introduction to Distributed Operating System (Goals, Hardware Concepts, Software Concepts, Design Issues), Multiprocessor System (Motivation And Classification, Multiprocessor Interconnection, Types of Multiprocessor). Transparency in Distributed system, Challenges in distributed system. Types of</p>	15 lectures

	Distributed System.	
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### Continuous Internal Assessment

Assignments / Project / Presentation / Case Study

Mid Term test.

#### Reference Books:

- 1) Distributed Operating Systems by Andrew S. Tanenbaum, Pearson Education.
- 2) Linux and Unix – Sumitbha Das -Tata McGraw Hill
- 3) Operating System Concepts by Silbershatz, Peterson, Galvin – Addison Wesley.
- 4) Modern Operating Systems by Andrew S. Tanenbaum - Pearson Education
- 5) The Design of UNIX Operating System by Maurice J. Bach – Prentice Hall.
- 6) Working with Unix by Kaushal Thakker, Kiran Dattani – BPB Publication
- 7) Operating System Design and Implementation by Andrew S. Tanenbaum.

## DATA STRUCTURES USING JAVA

**COURSE: ITS.4.04**

### LEARNING OBJECTIVE:

Data Structure is required in almost all programming design. Performance of a

Program mainly depends on the data structure and algorithms used. This subject forms the basis for selecting the appropriate data structure as needed by the program to improve the efficiency of a program. Knowledge of Data Structure and complexity helps in improving analytical skill.

[Total Lectures 60]

Unit 1	<b>Introduction to Data Structure, Stacks, Queues and Recursion</b>  Introduction and Complexity Data Types, Data Structure, Abstract Data Types, What is an algorithm, Rate of growth and its graph with analysis. Time Complexity(Big Oh and Big Omega, Theta Notation,), Master Theorem for divide and conquer, Problems on complexity for divide and conquer, Master Theorem for subtract and conquer and problems on it.	15 lectures
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	<p><b>Stacks</b></p> <p>Introduction to Stack, Array Representation of Stack, Notations (infix, prefix and post fix notation), understanding stack operations push, pop, peek , algorithm for converting infix to postfix and infix to prefix, algorithm to separate operator and operand from given string ,</p> <p>Queue concept of queue, inserting deleting data in queue, concept of circular queue, inserting deleting data in circular queue</p> <p>recursion</p> <p>What is recursion? Format of recursive function, recursion and memory visualization,</p> <p>Examples on recursion, Tower of Hanoi and its complexity.</p>	
Unit 2	<p><b>Linked List</b></p> <p>What is a Linked List, Comparing Linked List with Arrays, advantage and disadvantage of Linked List? Singly Linked List, traversing, insertion node at beginning, ending and at middle, deleting node from beginning, ending and at middle for singly linked list, Doubly Linked List, Insertion node at beginning, ending and at middle for doubly linked list, deleting node from beginning, ending and at middle for doubly linked list, circular linked list, printing content of circular linked list, inserting node at front, end and middle of circular linked list, deleting node from front, end and middle of circular linked list, searching elements from singly, doubly, circular linked list.</p>	15 lectres
Unit 3	<p><b>Trees</b></p> <p>What is a Tree, Binary Tree and Binary search Tree, properties of Binary Tree,</p> <p>Structure of Binary Tree, Types of Binary Trees (Strict Binary Tree, Full Binary Tree, complete Binary Tree, Almost complete Binary Tree), inorder, preorder and post order traversal with recursion and without recursion, searching element in Binary Search Tree, Finding maximum and minimum element from Binary Search Tree, deleting an element from Binary Search</p>	15 lectures



	Tree, Threaded Trees, traversal using right thread, AVL Tree, single and double rotation, Expression Trees , concept of N-ary Tree(Generic Tree), Huffman's coding	
Unit 4	<p><b>Sorting and Graph</b></p> <p>Sorting</p> <p>Bubble Sort, Selection Sort, Insertion Sort, Radix sort and its complexity</p> <p>Heap property, Heapify, Building Heap, Heapsort algorithm and complexity</p> <p>Merge sort and its complexity.</p> <p>Quick sort and its complexity.</p> <p>Graphs</p> <p>Definition of Graph, difference between Graph and Tree, various terminology in</p> <p>Graph(multi graph , complete graph, bipartite, isomorphism, planar and non-planar graph,</p> <p>complete graph, regular graph ),Representation of Graph (Adjacency matrix, Path Matrix,</p> <p>Linked Representation), Euler path, Hamilton path, Traversing(Breadth-First Search, Depth First Search), Spanning Tree, Algorithm for finding minimum spanning Tree- Prim's</p> <p>algorithm, Krushkal's algorithm, shortest path using Dijkstra's algorithm and Warshall's Algorithm,</p>	15 lectures

Continuous Internal Assessment

Assignments / Project / Presentation

Reference Book:

1. Data Structure and Algorithms made easy in Java by Narashimha Karumanchi

2. Data Structured by Seymour Lipschutz- Schaum publication

3. Fundamentals of Data Structure by Ellis Horowitz, Sartaj Sahni – Galgatia Booksource

**S.Y. B.Sc.IT**

**Course: ITS.4.05**

**Title: Statistical Techniques and Operation Research**

**Learning Objective:**

Acquire the knowledge of Statistics to get a better understand of data in data analytics. The central objective of operation research is to develop the skill of optimization ” to do things in a best under the given circumstances”.

**Number of lectures: 60**

UNIT 1	<b>Correlation Analysis, Regression Analysis and Theoretical distributions</b>  Introduction, definition,  Types of correlation  Methods of studying correlation  Graphic Method, Scatter Diagram, Karl Pearson’s method  <b>Regression Analysis</b>  Meaning  Types of regression analysis  Principle of least squares  Methods of studying regression  Graphic method and Algebraic method.  Regression coefficients  Regression equations  <b>Theoretical distribution</b>  Introduction  Binomial distribution  Poisson distribution	15
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	Normal distribution	
UNIT 2	<p><b>Sampling and designing of a sample survey and Test of hypothesis</b></p> <p>Methods of enumeration</p> <p>Methods of sampling</p> <p><b>Test of hypothesis</b></p> <p>Procedure of testing a hypothesis</p> <p>Test of significance -large sample</p> <p>Test of significance of difference between two means (large sample)</p> <p>Test of significance -Small sample</p> <p><b>Chi Square test</b></p> <p>Introduction</p> <p>Properties of chi square distribution</p> <p>Uses of Chi- Square test</p> <p>Test of goodness of fit</p>	15
UNIT 3	<p><b>Linear programming Problem and Transportation problem</b></p> <p>Introduction to O.R in business organizations</p> <p>Linear programming</p> <p>Definition and basic theorems</p> <p>Application areas of L.P.P</p> <p>Linear programming formulation</p> <p>Decision variables, constraints, objective function</p> <p>Graphical method</p> <p>Simplex method</p> <p><b>Transportation problem</b></p> <p>Formulation of transportation problem</p> <p>Determination of Initial Basic Feasible Solution</p> <p>North West Corner rule method</p> <p>Least Cost method</p> <p>Vogel's Approximation methods</p> <p>Test for optimality</p> <p>MODI method</p>	15

Unit 4	<p>Assignment Problem and Network schedule</p> <p><b>The assignment model</b></p> <p>Introduction</p> <p>Mathematical model of assignment problem</p> <p>The Hungarian method</p> <p><b>PERT AND CPM</b></p> <p>Network representation of simple projects</p> <p>Earliest expected time</p> <p>Occurrence time</p> <p>Forward pass computation and backward pass computation</p> <p>CPM</p> <p>Various float for activities.</p>	15
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### Continuous internal Assessment

Assignment / Survey / Test

### List of recommended books

1. Operation Research by Kanti Swaroop, Man Mohan, Gupta
2. Statistics [Theory, Methods & Application] by D.C.Sancheti , V.K.Kapoor
3. Quantitative Techniques in Management by N.D .Vohra

**S.Y. B.Sc.IT**

**Course: ITS.4.PR1**

### Practical -I:

#### **Mobile Application Development MOS Practical (Linux)**

#### **Mobile Application Development**

- 1) a. Create “Hello World” application. That will display “Hello World” in the middle of the screen in the blue color with white background.
  
- b. Create an app with two buttons. Have the first one pop up a Toast or insert text into a TextView that says “Hello”. Have the second one say “Goodbye”. Use the named

inner class approach. (**Hint:** String text = "..."; Toast tempMessage = Toast.makeText (referenceToMainActivity, text, Toast.LENGTH\_SHORT); tempMessage.show ();)

- 2) Create a project with a Spinner
  - a. That displays the choices Red, Yellow, Blue, and Green. Have a TextView whose color matches the Spinner. Set the choices in XML.
  - b. Modify the above project by adding a second Spinner with the same choices and behavior as above. But, this time, set the choices from Java.
  - c. If you want to have a prompt (i.e., title at the top when the spinner pops up, use yourSpinner.setPrompt and supply either an id or a String).
- 3)
  - a. Create a sample application with login module. (Check username and password) On successful login, go to next Activity. And on a failed login, alert user using Toast. Also pass username to next Activity with a Welcome Message.
  - b. Create a project whose initial screen has a TextView that says "Activity 1" and has a Button that says "Go to Activity 2". Have Activity 2 show a TextView that says "Activity 2" and have a Button that says "Go to Activity 1". Have the buttons switch back and forth.
  - c. Understanding of UI:  
Create an UI such that, one screen have list of all the types of cars. On selecting of any car name, next screen should show Car details like: name, launched date, company name, images (using gallery) if available, show different colors in which it is available.
- 4) Create an application to read:
  - a. File from the sdcard and display that file content to the screen.
  - b. Read messages from the mobile and display it on the screen.
- 5) Create an application to send message between two emulators.
- 6) Create an application to perform Insert, update, Delete and retrieve operation on the sqlite database.
- 7) Create an application that uses the google maps API to help you locate your current geographical location.
- 8) Create a project to send a common mail to all the intended recipients via gmail from your application.

**A journal of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

## **MOS Practical (Linux)**

### **Shell scripts**

1) Write a shell script which prints file name followed by first line of each file in the current directory

2) Write a shell script to print the information as to how many files and how many directories are present in current directory.

3) Write a shell script which accepts a filename, displays menu with following options, accepts user choice as number and takes appropriate actions

<b>Number</b>	<b>Menu option</b>	<b>Expected Action</b>
1	Contents	Display the file contents
2	Size of block	Display the file Size in blocks
3	Number of words	Display the number of words in file
4	Last four Lines	Display last five lines of the file
5	First seven Lines	Display first ten lines of the file

4) Write a shell script which accepts a filename, displays menu with following options, accepts user choice as number and takes appropriate actions

<b>Number</b>	<b>Menu option</b>	<b>Expected Action</b>
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1	No of users	Displays the No of users looged in
2	Current user	Display the login id of user logged in
3	Current Directory	Display the present working directory
4	Home Directory	Display the home directory of logged in user
5	Concatenate	Display concatenated output from two files which are listed by user.

5) Write Linux shell script which will greet user as per the login time that is

5-12 → Good Morning

12-15→ Good Afternoon

15-19→Good Evening

19-24→ Good Night

0-5→ Good Night

6) Accept a number from user. Now calculate the sum of digits.

7) A year is entered through keyboard, write a program to determine the year is leap or not.

8) Write program to print all prime numbers from 1 to 300.

9) Create a group of 2 and give them password so they can work on common project.

## AWK Command

1) Create file called emp.txt using VI editor with 10 records some of it are

```
# eno |  ename    |  desg      |  salary |  doj      |  dob      |  dept
100 |    rajesh    |             |  ceo | 30000      | 12/3/90 | 10/1/78| IT
101 | mahesh      | gm | 20000      | 11/3/95 | 10/1/81| sales
```

Solve the query using AWK/ grep command

- a) Find the names of emp who work for sales dept
- b) Name the employee whose salary is maximum
- c) Name the employee whose salary is maximum in IT dept
- d) Count the number of employee in each dept.
- e) Find the desg and name of employees who are more than 30 years old
- f) Find the name of employee who is senior most as per doj.
- g) Sort the file as per the DOB.

### **Tar, put and get command**

**1) Create tree structure in 2 different machines copy subtree of Mahesh in John directory.**



### **Networking in Linux**

Setting up LAN

Configuration TCP/IP

Adding windows computer to LAN

IP address classes

Subnetting



Configuring telnet

### **C and Java Compilers in Linux**

- 1) Use gcc/ cc/ other compiler to compile C and C++ program related to finding area of rectangle by accepting length and breadth from user.
- 2) Use java compiler to compile and run java program related to applet.
- 3) Use java compiler to compile and run socket related program in java.

**S.Y. B.Sc.IT**

**Course: ITS.4.PR2**

**Practical -II:**

**DATA STRUCTURE USING JAVA**

# STATISTICAL TECHNIQUES AND OPERATION RESEARCH

## DATA STRUCTURE USING JAVA

**For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

### **Learning Objective:**

To study different data structures and algorithms used in programs.

### **Data Structure Using Java practicals**

I) Implement a Queue in Java and perform the following operations:

- a. Create,
- b. Insert,
- c. Delete,
- d. Search a data item

II) Implement a Stack in Java and perform the following operations:

- a. Create,
- b. Push,
- c. Pop,
- d. Search

III) Write a program in Java for implementing Tower of Hanoi.

IV) Implement a Linked List in Java and perform the following operations:

- a. Create,
- b. InsertFirst,
- c. InsertLoc,
- d. DeleteFirst,
- e. DeleteLoc,
- f. Search a data item

- V) Implement a Binary Search Tree in Java and perform the following operations:
- a. Create,
  - b. Insert,
  - c. Search a data item

VI) Implement Traversing (Preorder, Inorder, Postorder) of Binary Tree in Java

VII) Implement Deletion of a node in Binary Search Tree

VIII) Implement Heap in Java and perform the following operation: a.

Create,

- b. Insert, and
- c. Delete

IX) Implement Traversing (Breadth-First Search, Depth-First Search) in Java

X) Implement following Sorting Algorithms in Java:

- a. Bubble Sort,
- b. Insertion Sort,
- c. Selection Sort,
- d. Heap Sort

## **STATISTICAL TECHNIQUES AND OPERATION RESEARCH**

**Learning Objective:** To develop R programming and analytical skill.

Following topics should be implemented in R

1. Basics of R programming
2. Program to Implement arithmetic mean of a discrete series
3. Program to Implement Median of a discrete series
4. Program to Implement Mode of a discrete series
5. Program to Implement arithmetic mean of a continuous series
6. Program to Implement Median of a continuous series
7. Program to Implement Mode of a continuous series
8. Program to Implement Mean deviation of a series
9. Program to Implement Standard deviation of a series
10. Program to Implement Range of a discrete series
11. Program to Implement Standard deviation of a continuous series
12. Program to Implement Skewness of a discrete series and continuous series
13. Program to Implement Correlation of a discrete series and continuous series
14. Program to Implement Lagranges interpolation of a discrete series

15. Implementation of North West corner rule method to find initial basic feasible solution.
16. Implementation of theoretical distribution.
17. Perform linear Regression
18. Perform Chi -Square test

**Contents:**

<b>SITS0501</b>	<b>NETWORK SECURITY AND INTERNET TECHNOLOGY</b>
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<b>SITS0502</b>	<b>C# AND ASP.NET</b>
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<b>UNIT I</b>	<b>Computer Security and Cryptography</b> Computer Security : Introduction, Need for security, Principles of Security, Types of Attacks  Cryptography : Plain text and Cipher Text, Substitution techniques, Caesar Cipher, Mono-alphabetic Cipher, Polygram, Poly alphabetic Substitution, Playfair, Hill Cipher, Transposition techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Diffie-Hellman Key Exchange.	15
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<b>SITS0503</b>	<b>DATA WAREHOUSING AND DATA MINING</b>
<b>SITS0504</b>	<b>E COMMERCE AND ERP</b>
<b>SITS0505</b>	<b>INTRODUCTION TO ARTIFICIAL INTELLIGENCE</b>
<b>SITS05PR1</b>	<b>C# AND ASP.NET AND ARTIFICIAL INTELLIGENCE</b>
<b>SITS05PR2</b>	<b>DATA WAREHOUSING &amp; DATA MINING AND NETWORK SECURITY</b>

**T.Y.B.Sc (I.T )**

**SITS0501**

**Subject: Network Security and Internet Technology**

**Objective:**

Security is an important aspect for the internet. This course teaches various security cryptography techniques and digital signature along with network security. It also introduces to the technique of accessing remote objects through RMI.

**[Total lectures 60]**

<b>UNIT II</b>	<b>Symmetric Key, Asymmetric Key Algorithms, Digital Signature</b>  DES, AES, Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm, Blowfish, Digital Signatures, Digital Certificates, Private Key Management, PKI and Security.	15
<b>UNIT III</b>	<b>Network Security</b>  What makes Network Vulnerable? Who attacks Networks?  Threats in Transit: Eavesdropping and wiretapping, Spoofing, DoS and DDoS, Link Encryption, End-to-End encryption, VPN, IPSec, Kerberos, Firewall, different types of firewall, IDS, Different types of IDS, Security of E-Mail.	15
<b>UNIT IV</b>	<b>TCP, UDP Socket Programming and RMI</b>  TCP Services, TCP handshake, Concept of windows in TCP, Congestion control, UDP Datagram, Socket concept, Types of socket, Sockets for Clients, Sockets for Servers, Remote Method Invocation, RMI Programming.	15

### **Continuous Internal Assessment**

MCQ/Presentation/Case studies

Midterm test

### **BOOKS:**

- 1) Atul Kahate: Cryptography and Network Security by Atul Kahate, 2nd Edition, Tata McGrawHill.
- 2) Behrouz A. Forouzan: TCP/IP Protocol Suite, 4th Edition, Tata McGrawHill.
- 3) Charles P Pfleeger: Security in Computing.

**TITLE: C# with ASP.NET****Learning objective:**

**Student will learn the latest development of C# and ASP.NET in framework 4.0. This will equip them with required in software industry for developing website projects.**

**[Total lectures 60]**

UNIT I	<p><b>Introduction to DOTNET framework 4.0</b>  Over view of .NET Framework, Components of .NET framework, Versions of .net framework, understanding Visual studio 2010 IDE environment: Design view, Source view, Output window, Error list window, Intelligence, Property window, Object browser window, Start page, Toolbar and Toolbox.</p> <p><b>C# language</b>  Introduction to C#: understanding C# in .NET, Overview of C# literals, Variables, Data types, Operators, Expressions, Branching and looping operations methods, Arrays, Strings. Classes and objects: class, objects, constructors, static members, static constructors, private constructor, copy constructors, destructors, member initialization, this reference, nesting of classes. Inheritance and Polymorphism: Classical inheritance, containment inheritance, defining of subclasses, visibility control, defining subclasses constructors, multilevel inheritance, Overriding methods, hiding methods, Abstract classes, abstract methods.  Interface: Defining an interface, Extending an interface, Implementing interface, Difference between interface and abstract class.</p>	15
UNIT II	<p><b>Delegate, Events and Exception handling in C#</b>  Delegate: Delegate declaration, delegate methods, Delegate's instantiation, delegates, multicast delegates, Types of error, exceptions, Syntax of exception handling code, Multiple catch statement, the exception hierarchy, general catch handler, using final statement, nested try blocks, throwing our own exceptions, checked and un checked operators, Using exceptions for debugging .  Controls in ASP.NET : introduction to control class: Text box control, button control, Label control, Image control, Image button control, Image map control, Drop down list control, Check box control, Radio button control, Table control, calendar control, site map control, Tree view control, Menu control, validation controls, login controls, Database controls.</p>	15
UNIT III	<p><b>ADO.NET</b>  ADO.NET object model, data binding, Using connection, Command, data reader classes, Queries returning results sets, passing parameters in queries, using repeater control, data adapter, Using data set (typed), Data table, Data row &amp; data column, introducing the ADO.NET entity framework, mapping your data model to an object model</p>	15

UNIT IV	<b>LINQ and Crystal Report</b> LINQ: Introducing LINQ, LINQ to objects, LINQ to XML, LINO to ADO.NET. Crystal report: Adding a crystal report to an ASP.NET application, Inserting fills, Text and special fields, sorting, grouping and subtotaling, select expert, dynamic Formatting, using the Crystal report viewer Continuous internal assessment: Assignment on unit 1, unit 2, unit 3, unit 4, midterm test	15
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#### LIST OF RECOMMENDED REFERENCE BOOKS

- 1) ASP.NET 4.0 in simple steps dreamtech press
- 2) Integrating Crystal report into an ASP.NET Application by Vincent Varallo Wrox Publication
- 3)ASP.NET-The Complete reference Tata McGraw Hill.
- 4) Beginning ASP.NET 4: in C# and VB by Imar Spaanjaars Wrox Publication.
- 5) C# and .NET 4 by Christian wrox publication.
- 6) C# 2010 and .NET 4 plat form by Andrew Troelsen Apress publication.



**TITLE: Data Warehousing and data mining.****Learning objective:**

Learn basic concept of Data Warehousing and data mining.

[Total lectures 60]

UNIT I	<b>Introduction to data Warehousing</b> What is the data warehousing, Need for data warehousing, Basic elements of data warehousing, Data warehouse architecture, Data warehouse development life cycle, data warehousing developing methodologies. Overview of the components, meta data in the data warehouse, data warehouse design consideration and dimension modeling defining the business requirement, information package requirement gathering methods, principles of dimensional modeling , dimensional table, fact table, star schema model snow flake schema, slowly changing dimension	15
UNIT II	<b>Extraction, transformation and loading</b> ETL overview, data extraction, source identification, data extraction techniques , data transformation, basic task, major transformation types, how to implement transformation, data loading, data refresh verses update, procedure for dimension table incremental loads, OLAP in the data warehouse, OLAP models.	15
UNIT III	<b>Introduction to data mining and classification</b> Basic data mining tasks, Data mining verses knowledge discovery in databases, A statistical perspective on data mining, Baye's theorem, regression and correlation, Neural networks classification introduction, Classification Introduction, issues in classification, Statistical based algorithms, Bayesian classification, distance based algorithms, simple approach, K nearest neighbors, Decision tree based algorithms, ID3.C 4.5	15
UNIT IV	<b>Clustering and association rule</b> Introduction to clustering, Hierarchical algorithms Agglomerative algorithms, Divisive clustering, Partition algorithms, Minimum spanning tree algorithm, squared error clustering large data base, BIRCH Introduction to association rule Large item set, AR general algorithm, Apriori-gen algorithm, Apriori algorithm	15

**Continuous Internet Assessment****Assignments, Written Test, Presentation**

## List Of Recommended Reference Books

- 1) Data warehousing fundamentals by Paulraj Ponniah
- 2) Data Mining Introductory and Advanced Topics, M.H. Dunham, Pearson Education.
- 3) Ian H. Witten, Data Mining, MK publishers.
- 4) W.H. Inmon, Building the Data Warehouses, Wiley Dreamtech.
- 5) R. Kimpall, The data warehouse toolkit, John Wiley.
- 6) Data warehousing, Soumendra Mohanty, Tata McGraw Hill

T.Y. B.Sc.IT

Course Code: SITS0504

### TITLE: E-COMMERCE AND ERP

#### OBJECTIVE:

To create awareness about the role of Information Technology in business and an introduction to the concepts and techniques of involved in e-commerce. Students will learn the underlying mechanism of e-commerce transactions done via paypal, how verisign works, how payment gateway works.

To introduce the concept of ERP systems and SCM's structures with special focus on Material Management module along with open source ERP software demos as a learning tool.

[Total lectures 60]

UNIT I	<b>Overview of electronic commerce and case study</b> Ecommerce Overview: understanding trade/ Business cycle, Business process and business activity, History of e-commerce, generic model of e-commerce, Evolution of e-commerce. Global and Indian scenario, difference between conventional commerce and electronic commerce, classification of ecommerce-B2B,B2C,C2C,C2B,G2G,G2C,B2G sites, introduction to IT act and its role to encourage e-business, growing e-learning and e-governance, understanding horizontal and vertical market, growth of online retailing and e-marketing concepts, Features & benefits of e-commerce –Impacts, challenges and limitations of e-commerce. Case study Amazon – success story, core values, business model, history, growth, future plan, comparison with other e-commerce sites, e-bay-business model, history, future plan, Verisign, Shopping process with Payseal	15
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	and Paypal, Flipkart-history, business model, growth, comparison with other E-commerce sites, future plan, dotcom-its rise, fall and analysis, payTM-business model, growth and history, Infrastructure for shopping cart.	
UNIT II	<p><b>E-Commerce Models, Technology of Ecommerce, M-Commerce</b></p> <p>E-Commerce Models: store-front model, brick and mortar model, build to order merchant model, service provider model, subscription-based model, broke model, advertiser model, virtual mall model, infomediary model. Portals: Difference between website and portal function of portals, feature of portal.</p> <p>Working of Payment Gateway.</p> <p>Web 3.0, Web Services, Web Mashup, Working of Search Engines, SEO, LDAP, EDI, VPN, click stream analysis.</p> <p><b>THE TECHNOLOGIES OF M-COMMERCE.</b></p> <ul style="list-style-type: none"> <li>- Computer of cell, MS, BSC, MSC, NSS, OSS.</li> <li>- Multiplexing scheme [TDMA, FDMA, CDMA].</li> <li>- Concept of uplink and downlink traffic.</li> <li>- Understanding handover</li> <li>- Understanding frequency reuse.</li> <li>- GSM in detail.</li> </ul> <p>M-COMMERCE Services Today</p>	15
UNIT III	<p><b>ERP Introduction &amp; Supply Chain Management</b></p> <p><b>Introduction:</b> What is ERP? The Need for ERP, Benefits of ERP, Growth of ERP in India In-house Implementation Pros and Cons, Vendors, Consultants, End-Users What is Supply Chain? Its objective, Supply Chain Decision making, Process View of a Supply Chain, Examples of Supply Chains</p> <p><b>The Network:</b> The Role of Distribution in the Supply Chain, Factors that influence the Distribution Network Design, Design Options for a Distribution Network, E-Business and the Distribution Network, Channels of Distribution, Distribution Networks in Practice.</p> <p><b>The Customer service dimension:</b> Customer Service and Customer Retention, Service driven logistics systems, Setting customer service priorities and service standards</p>	15
UNIT IV	<p><b>ERP Modules</b></p> <p>Finance, Sales and Distribution, Human Resource Management, Marketing, Material Management</p> <p>Understanding the functionality of the modules with the demonstration of open source ERP software.</p>	15

### Continuous Internal Assessment

CIA I: Written test for 20 marks

**REFERENCE BOOKS:**

- 1) E-Commerce: The cutting edge of business, Kamlesh K. Bajaj and Debjani Nag, Tata McGraw Hill
- 2) E-Commerce and M-Commerce technologies by P.Candace Deans and IRM press publication
- 3) “ERP”, Alexis Leon, Tata McGraw Hill.
- 4) Alexis Leon, “ERP Demystified”, Tata McGraw Hill
- 5) “Supply Chain Management Strategy, Planning and Operation”, S Chopra, P. Meindl and D. Kalra, Pearson.

**CLASS: T.Y. B.Sc.IT**

**COURSE CODE: SITS0505**

**TITLE : Introduction to Artificial Intelligence**

**LEARNING OBJECTIVES:**

To provide students with a basic exposure to the field of Artificial Intelligence.

**Total Number of lectures: 60**

<b>UNIT I</b>	<b>Introduction to AI and Searching Techniques</b>	<b>(15 lectures)</b>
	<b>Introduction to AI</b>	
	What is AI? The Foundations of Artificial Intelligence The History of Artificial Intelligence, The State of the Art Agents and Environments, Good Behavior: The Concept of Rationality, the Nature of Environments, the Structure of Agents	
	<b>Searching Techniques</b>	
	Problem-Solving Agents, Example Problems, Searching for Solutions, <b>Uninformed Search</b> Strategies, <b>Informed (Heuristic) Search</b> Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems	
<b>UNIT II</b>	<b>Learning from Observation</b>	<b>(15 lectures)</b>
	<b>Fundamentals of Javascript</b>	
	Forms of Learning, Inductive Learning, Learning Decision Trees, Ensemble Learning, Why Learning Works: Computational Learning Theory	
	<b>Introduction to ANN</b>	
	Units in neural networks, Network structures, Single layer feed-forward neural networks (perceptrons), Multilayer feed-forward neural networks, Learning neural network structures	

<b>UNIT III</b>	<b>Introduction to Genetic Algorithms</b>	(15 lectures)
	<b>Genetic Algorithms</b>	
	A Brief History of Evolutionary Computation, The Appeal for Evolution, Biological Terminology, Search Spaces and Fitness Landscapes, Elements of Genetic Algorithms, A Simple Genetic Algorithm, Genetic Algorithms and Traditional Search Methods, Some Applications of Genetic Algorithms	
<b>UNIT IV</b>	<b>Introduction to Fuzzy System</b>	(15 lectures)
	<b>Fuzzy Systems</b>	
	The Case for Imprecision, A historical Perspective, The Utility of Fuzzy Systems, Limitations of Fuzzy Systems, The Illusion: Ignoring Uncertainty and Accuracy, Uncertainty and Information, The Unknown, Fuzzy Sets and Membership, Chance verses Fuzziness	

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**LIST OF RECOMMENDED REFERENCE BOOKS and URL:**

1. Stuart Russel, Peter Norvig, “Artificial Intelligence- A Modern Approach”, Pearson Education
2. An Introduction to genetic algorithms- By Melanie Mitchell
3. Fuzzy Logic with Engineering Applications – by Timothy J. Ross
4. Elaine Rich, Kevin Knight, “Artificial Intelligence”
5. Patterson, “Introduction to Artificial Intelligence and Expert Systems”
6. Jacek M Zurada, “Introduction to Artificial Neural Systems”
7. Ahmad Ibrahim, “Introduction to Applied Fuzzy Electronics”, PHI

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**T.Y. B.Sc.IT**

**Course : SITS05PR 1**

**Practical – I:**

**Network Security and Internet Technology**

**Data warehousing and Data mining**

**Network Security and Internet Technology**

**LEARNING OBJECTIVE:**

To equip the students with skills required in software industry

Students will learn RMI and Network Security practicals.

**(Minimum 8 expts.)**

**Based on Socket and RMI**

Q1) Write a socket program using TCP to find the factorial of a number.

Q2) Write a socket program using UDP to whether the number provided is even or odd.

Q3) Write a program using RMI concept to implement a menu driven task.

Q4) Write RMI program to implement sum of digits of number.

**Based on Substitution and Transposition Cipher**

Q5) Write a java code to implement Caesar Cipher with encryption and decryption.

Q6) Write a java code to implement polygram substitution Cipher with encryption and decryption.

Q7) Write java program to implement Rail-Fence Transposition Technique taking no of rows from the user as input.

Q8) Write java program to implement Vernam cipher with encryption and decryption.

Q9) Implement RSA algorithm accepting the inputs from user.

### **Based on AES /DES/Blowfish**

Q10) Accept 16 Hex bits(64 bits) number from user and generate 16 subkeys of 12Hex bits(48bits) each using DES Algorithm and PC-1 Table .

Q11) Implement the Blow Fish algorithm.

Q12) Implement the subbyte transformation using S-Box of AES.

Q13) Implement digital signature in the program.

### **Subject : Data warehousing and Data mining**

Course  
code:SITS05PR1

**Objective :** to develop the skill of data analytics and to understand the concept of data warehouse.

Software: Oracle 11g and Weka

### **Practical topics:**

1. Oracle Database creation
2. Importing tables from data sources.



3. Designing staging area.
4. Design star schema model
5. Implementation of data extraction , transformation and loading
6. Setting up a data mart
7. Implementation of classification algorithm
  1. Naïve Bayes algorithm
  2. Decision tree based algorithms(J48)
8. Implementation of different types of clustering algorithm
  1. K means algorithm
  2. Hierarchical algorithm
9. Implementation of Apriori algorithm.
10. Implementation of classification, clustering and association rule using Knowledge flow.

**T.Y. B.Sc.IT**

**Course : SITS05PR2**

**Practical – II:**

**C# with ASP.NET  
Artificial Intelligence**

**C# with ASP.NET**

**Learning Objective:**

To equip the students with skills required in software industry Students will learn the latest of C# and ASP.NET in framework 4.0 Students can apply the skill learnt in developing website projects

- I) Write a C# code to generate fibonacci numbers in between the sequence along with an option to continue or quit. Accept the start and end numbers from user.
- II) Write a C# code to separate the numbers in an array num[20] having odd and even numbers into two arrays even[10] containing only even numbers and odd[10] containing only odd numbers. Accept the numbers from the user.
- III) Write a C# code to find a number which appears maximum number of times in an array of n numbers. Repetition is allowed.
- IV) Write a C# code to print pascals triangle. Accept the number of rows from the user
- V) Write C# code to arrange the name of cities in sorted order. Accept name of 10 cities from the user
- VI) Write C# code to use the LINQ (Language-Integrated Query) feature of C# by creating a collection of CarNames stored in string array. Now display all the names using LINQ.
- VII) Create methods add(), multiply(), subtract() ,divide() with suitable parameters and call these methods using concept of C# delegate.
- VIII) Using DataList control in ASP.NET display the following fields ENO ENAME ADDRESS PHOTO from the database. Accept the eno range from the user
- IX) Which control should be used to validate:
  - a) A password which is entered twice for confirmation
  - b) The age of the user to be over 21
  - c) The date to be after the 10/10/2000

Justify your answer by writing correct Validators and conditions.

Design a Login screen in ASP.NET which accepts user name and password. On submit it should check from the server whether the user exists or not. If the user exists in web server then he/she should be directed to proper html page with welcome message.

X) Design a Login screen in ASP.NET which accepts user name and password. On submit it should check from the server whether the user exists or not. If the user exists in web server then he/she should be directed to proper html page with welcome message.

XI) Write the following application.

The initial page is called Validator.aspx and it has 7 text boxes representing (Name, Family Name, Address, City, Zip Code, Phone and e-mail address), and a Check button. Display the page that user gets after clicking on Check button.

The required validation actions are:

- name different from family name,
- address at least 2 letters,
- city at least 2 letters,
- zip-code 5 digits,
- phone according to the format XX-XXXXXXX or XXX-XXXXXXX,
- e-mail is a valid email.

Display the page with the message that user gets after entering only some of the details correctly.

Finally display the page that the user gets after a correct submission of all the details.

XII) Create a screen which accepts student roll no. On click of submit it should display student result in the grid view with fields

Name	Course	Marks	Total	Marks	Percentage
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The database table contains table called student ( roll no, name, course , address, year)

Result (roll no, subject, marks, total marks)

XIII) Design a purchase order report using crystal report. PO must have the basic fields

VENDOR	SHIP TO	ITEM NO	DESCRIPTION	QTY	UNIT PRICE	TOTAL
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XIV) Using crystal report design simple mark-sheet for SSC result. The data should appear dynamically from database.

XV) Using crystal report design attendance report for SYIT in various subjects.

Data should be taken dynamically from database

XVI) Design the front page of the website using various controls of DOTNET framework

Some of the controls are SiteMap control, TreeView control, Menu control, Validation controls, Login controls etc.

### **Continuous Internal Assessment**

Conducting practical test

**T.Y. B.Sc.IT**

**Course: SITS05PR2**

**Practical:**

The practical for this subject can be performed in any of the following programming languages: Java, C#.NET, Python, C++ and Android.

### **Artificial Intelligence**

1. Implementation of any 2 uninformed search methods with some meaningful application.
2. Implementation of any 2 informed search methods with some application.
3. Implementation of a simple NN for any suitable application (with tool/library).
4. Implementation of a simple NN for any suitable application (without tool).
5. Implementation of a simple GA for any suitable application (with tool/library).
6. Implementation of a simple NN for any suitable application (without tool).
7. Implementation of MiniMax approach for TIC-TAC-TOE using Java/Android/Python.
8. Demonstrate the use of fuzzy systems to help the management decide whether the player should get selected for a team or not.
9. Develop a book recommend-er (a book that the reader should read and is new to the reader) Expert system or (any other).

### **ASSESSMENT:**

### **PRACTICALS \***

ESE: **45 marks** for exam + **05 marks** for journal

**A journal of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

### **Contents:**

<b>SITS0601</b>	<b>BIG DATA AND CLOUD COMPUTING</b>
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<b>SITS0602</b>	<b>IMAGE PROCESSING AND DEEP LEARNING</b>
<b>SITS0603</b>	<b>ADVANCED JAVA</b>
<b>SITS0604</b>	<b>SOFTWARE TESTING</b>
<b>SITS0605</b>	<b>PROJECT</b>
<b>SITS06PR</b>	<b>ADVANCED JAVA AND BIG DATA VISUALIZATION</b>

**CLASS: T.Y. B.Sc.IT  
SITS0601**

**COURSE CODE:**

**TITLE: Cloud Computing and Big Data**

**LEARNING OBJECTIVES:**

To study the fundamentals of cloud computing, various architectures and applications that implement cloud computing and understand the scope of its security features.

To understand the basic concept of Big data.

**Total Number of lectures: 60**

Unit I	<p><b>Cloud Computing Fundamentals:</b> Fundamental Cloud Computing Patterns, application workloads</p> <p><b>Cloud Service Models:</b></p> <p>IaaS, PaaS, SaaS</p> <p>Amazon web services: Amazon EC2, Amazon S3, Amazon SimpleDB, Amazon SQS, Amazon CloudFront</p> <p><b>Different Cloud Deployment Models:</b></p> <p>Public, Private, Community, Hybrid Cloud</p>	15
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	<p><b>What is a Cloud Storage</b></p> <ol style="list-style-type: none"> <li>1. Different storage type over Cloud: Blobs, Tables (Non-Relational), File Storage.</li> <li>2. Blob: Block Blob, Page Blob, Append Blobs.</li> <li>3. Table Storage</li> <li>4. File Storages, Amazon Elastic File System(Requirements and Applications)</li> </ol> <p>Where to use Cloud Storages, Different Cloud Storage Providers: Google Drive, Microsoft One Drive, Azure Storage, Amazon, Drop Box</p>	
Unit II	<p><b>Virtualization:</b></p> <p>Introduction &amp; benefits of Virtualization, Characteristics of Virtualized environments, Levels of Virtualization, ParaVirtualization, Full Virtualization, virtualization of CPU, memory, and I/O devices</p> <p>Technology examples: VMware, Microsoft Hyper-V, Virtual Box (Freeware App to try out on Local Computer) Hyper V- Generation 1 &amp; 2</p> <p><b>Virtual Machines</b></p> <p>What are Virtual Machines, Properties of Virtual Machines, How physical Machines can be moved to Virtual Machines(Workloads), Traffic Management – Load Balancers &amp; Traffic Managers.</p>	15
Unit III	Fundamentals of Big Data	15
	<p>Understanding Big data, concepts and terminology</p> <p>Big data characteristics, different types of data</p> <p>business motivations and drivers for big data adoption</p> <p>Business architecture, big data adoption and planning considerations</p> <p>Organizational prerequisites, Data procurement</p> <p>Big data analytics life cycle, enterprise technologies and big data business intelligence, Online transaction processing(OLTP),</p> <p>Online analytical processing(OLAP)</p> <p>Extract, Transform ,Load(ETL), Traditional BI, Big data BI</p> <p>Big Data storage concepts</p> <p>Clusters, File systems and distributed systems</p> <p>NoSQL, Sharding , Replication, CAP theorem</p>	

	<p>ACID, Big data processing concepts, Parallel data processing</p> <p>Distributed data processing, Processing workloads, batch</p> <p>Transactional Cluster, Processing in batch mode</p> <p>Batch processing</p>	
Unit IV	<p><b>Hadoop</b></p> <p>Hadoop Fundamentals, What is Hadoop? Hadoop Framework</p> <p>A Hadoop cluster, Hadoop directory layouts</p> <p>The Hadoop Distributed File System</p> <p>Hive, Hbase, Pig Latin Scripts</p> <p>Name node, Data node, Job Tracker, Task Tracker, Data block</p> <p>MapReduce</p> <p>with Map Reduce, Map and Reduce tasks</p> <p>Map, Combine, Partition, Shuffle and sort</p> <p>Reduce, understanding map reduce algorithms</p>	15

**Continuous Internal Assessment:**

Assignment / Project /Presentations

**LIST OF REFERENCE BOOKS:**

- 1)Big data fundamentals concepts, Drivers and Techniques -Thomas Earl, Wajid Khattak, Paul Bulher
- 2)Cloud computing patterns, Fehling, Leymann, Ralph Retter, et. al., Springer
- 2) Cloud Computing, Rittinghouse, Ransome, CRC press
- 3) Cloud Computing Black Book, jayaswal, Kallakurchi,Houde,Shah, DreamTech Press
- 4) Cloud Computing: A practical Approach – Anthony T. Velte, Robert Elsenpeter, Toby J. Velte
- 5) Cloud + Study guide, Todd Montgomery
- 6)Virtualizing Hadoop -George Trujillo, Charles Kim, Steven Jones , Romme Garcia, Justin Murray.

**CLASS: T.Y. B.Sc.IT**

**COURSE CODE:SIT0602**

**TITLE: Image Processing & Deep Learning**

**LEARNING OBJECTIVES:**

To keep pace with moving technology, deep learning has been added so students can apply this to solve real life problems which cannot be solved by programming alone.

**Total Number of lectures: 60**

<p><b>UNIT I</b></p>	<p><b>Introduction to Signals and Image Processing (15 lectures)</b></p> <p>Discrete Time Signal and System : Introduction of Signals, Systems and Signal processing, classification of signals, system, LTI system, Frequency domain representation of DTS &amp; Signals. Convolution, Correlation.</p> <p>Z-Transforms: Introduction, Z-transforms, Inverse Z- Transforms, properties, System Function, Application of Z- Transform, Unilateral Z- Transform.</p> <p>Image Processing: Introduction, Brightness adoption and discrimination, Image sampling and quantization, basic relationship between pixels.</p> <p><b>Spatial Filtering:</b></p> <p style="padding-left: 40px;">Histogram Processing, Arithmetic and Logic Operation,</p> <p style="padding-left: 40px;">Spatial filtering: Introduction, smoothing and sharpening filters</p>
<p><b>UNIT II</b></p>	<p><b>Image Transformation, Enhancement and Segmentation (15 lectures)</b></p> <p>Point operation and Neighbourhood Operation, Gray-Level Transformation, Median Filter , Bit plane slicing , Image Enhancement in the frequency domain: Frequency-domain filters: smoothing and sharpening filters, homomorphic filtering, Highpass and Lowpass Filters, noise reduction, MSE filtering, Inverse Filtering</p> <p>Introduction to Fourier Transform, properties of Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Comparison of Transform. Introduction to wavelet transform.</p> <p>Detections of discontinuities, edge-linking and boundary detection, thresholding, region- based segmentation, Hough transform.</p> <p><b>Image Segmentation:</b></p> <p style="padding-left: 40px;">Fundamentals, Point, Line and Edge Detection, Thresholding, Segmentation by Region Growing and by Region Splitting and Merging, Region Segmentation using Clustering and Superpixels,</p> <p><b>Feature Extraction:</b></p> <p style="padding-left: 40px;">Background, Boundary Preprocessing, Boundary Feature Descriptors, Region Feature Descriptors, Principal Components as Feature Descriptors, Whole-Image Features</p>
<p><b>UNIT III</b></p>	<p><b>Deep Learning Fundamentals (15 lectures)</b></p> <p>Biological Neuron, Linear Perceptron, Perceptron Learning Algorithm, Linear separability, Perceptron Learning Algorithm.</p>



	Feedforward Neural networks. Gradient descent and the backpropagation algorithm. Unit saturation, the vanishing gradient problem, and ways to mitigate it. ReLU Heuristics for avoiding bad local minima. Heuristics for faster training.
<b>UNIT IV</b>	<p><b>Deep Learning Algorithms (15 lectures)</b></p> <p>Convolutional Neural Networks: Architectures, convolution / pooling layers</p> <p>Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures</p> <p>Deep Unsupervised Learning: Autoencoders (standard, sparse, denoising, contractive, etc)</p> <p>Gradient descent with Adaptive Learning Rate.</p> <p>Case study of application of deep learning.</p>

### **Continuous Internal Assessment**

CIA I: Written test **for 20 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

### **LIST OF RECOMMENDED REFERENCE BOOKS:**

1. R. C. Gonsales R.E. Woods, Digital Image Processing, Second edition, Pearson
2. S. Salivahanan, Digital Signal processing TMH
3. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation.
4. Neural Networks and Deep Learning by Michael Nielsen

**T.Y. B.Sc.IT**

**Course: SITS0604**

**Title: Software Testing**

**Learning Objective:**

To develop the skill of software testing

**Number of lectures: 60**

<p><b>Unit 1</b></p>	<p><b>The basics of software testing</b> <span style="float: right;"><b>(15 lectures)</b></span></p> <p>Terms and Motivations:  Error and Bug Terminology, Testing Terms, Software Quality  The Fundamental Test Process Test Planning and Control, Test Analysis and Design,  Test Implementation and Execution,  Evaluation of the Test Exit Criteria and Reporting, Test Closure Activities</p> <p><b>Testing in software lifecycle</b></p> <p>The General V Model</p> <p>Component Test:  Explanation of Terms, Test Objects, Test Environment, Test Objectives, Test Strategy,</p> <p>Integration Test:  Integration Strategy, System Test, Acceptance test:  Testing for user acceptance, Operational testing,  Field testing, alpha testing and beta testing.</p>
<p><b>Unit 2</b></p>	<p><b>Functional testing</b> <span style="float: right;"><b>(15 lectures)</b></span></p> <p>Boundary value analysis testing,  Robustness testing, Worst case testing, Equivalence class testing, Decision table based testing,  Cause effect graphing technique and  State transition testing.</p> <p><b>Structural testing</b></p> <p>Control flow testing,  Statement coverage, Branch coverage,  Conditional coverage and path coverage, Data flow testing,  Basis path testing, cyclomatic complexity, Mutation testing, mutation and mutants,</p>

	Mutation operators and mutation score and slice based testing
<b>Unit 3</b>	<p><b>Static testing and Test management (15 lectures)</b></p> <p>Static testing, Foundations, Review, Walkthroughs, inspections, The General Process, Roles and Responsibility and Types of Review</p> <p><b>Test Management</b></p> <p>Test Planning: Quality Assurance Plan, Test Plan, Prioritizing Tests</p> <p>Cost and Economy Analysis: Cost of Testing, Test Effort Estimation</p> <p>Definition of Test Strategy: Preventives Reactive Approach, Analytical vs. Heuristic Approach</p>
<b>Unit 4</b>	<p><b>Advanced concepts of software testing (15 lectures)</b></p> <p>Metrics and models in software testing, Software metrics, categories of metrics, What should be measured during testing? Testing web applications,</p> <p>Functional testing, user interface testing, navigation testing and form based testing, automated test data generation using genetic algorithm, initial population, Crossover and mutation, fitness function and algorithm for generating test data.</p>

**List of Recommended Reference Books**

1. Software Testing by Yogesh Singh
2. Software testing foundations–AndreasSpillner, TiloLinz, HansSchaefer(SPD publication)
3. Software Testing–Ron Patton second edition
4. Software engineering–A Practitioners Approach Roger s Pressman

**T.Y. B.Sc.IT  
SITS06PROJ**

**Course:**

**Title: Project**

**Learning Objective:**

To build an innovative software solution for a well defined problem by applying the knowledge of all the application oriented software learnt in the BSc.IT course and beyond.

Students are expected to continue the project which they had started in semester V. Project will carry 8 credits with 200 Marks.

Students can do live project in industry or in-house project.

Students are expected to give time equivalent to 12 lecture periods/week, out of which 3 periods will be contact time for guidance from internal guide. There will be continuous internal assessment (CIA) for 40% of the credit (80Marks).

This will consist of:

CIA 1 → assessment of synopsis and viva on it  
CIA 2 → analysis of requirements, conceptual design, system design including DFD, Use case, and Normalization, Entity relationship diagrams

Remaining 60% of the credit (120Marks) will be end semester examination consisting of documentation, presentation and viva. This will be jointly examined by the project guide and external examiner under the subheading of marks as follows:

Documentation	Presentation	viva	Execution of	System design
	(validation, database		various modules	understanding
	handling)		with report and	
			testing	
30	30	20	30	10

### **List of project categories**

1. Hardware projects based on microcontroller / PIC
2. Networking projects
3. Mobile projects
4. Wireless technologies
5. Website projects
6. Desktop application
7. Real-time application in Linux/Unix
8. Or any other suitable project which is approved by the project guide

### **Suggested format for project report S. ITS.6.PROJ**

1. Cover page
2. Certificate from college(for in-house / external project)
3. Synopsis of project
4. Project report
  1. Table of content
  2. Definition of problem
  3. Objective and scope of project
  4. System analysis and design

#### User requirement

Functional requirement

Non-functional requirement

- ii. Normalization
- iii. DFD , context level diagrams
- iv. Flowchart, ER diagram
- v. Use case diagrams
- b. Feasibility study
  0. Technical feasibility
  1. Economical feasibility
  2. Operational feasibility

- c. Software engineering paradigm applied
  - d. Software and hardware requirement specification
  - e. PERT chart, Gantt chart
  - f. Coding
  - g. Code efficiency
    - k. Validation checks
    - l. Testing
      - Test techniques(white box and black box testing)
      - Writing Test cases
      - Using test data
      - Generating defect reports
      - Use of testing tools(manual/automated)
  - b. System security measures
  - c. Cost estimation of project
  - n. Reports
  - o. Screen shots
  - p. Future enhancement
  - q. Bibliography
  - r. Glossary
5. Students have to submit black book to college(1 per group) in A4 size with one side written (approx 150-200 pages) along with CD having full documentation and codes
6. Students doing project in industry will have to get certificate from the company.
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## **ADVANCED JAVA**

### **Learning Objective:**

To equip the students with skills required in software industry. Students will learn the latest of Java through Struts2 and Hibernate Practicals. Students can apply the skill learnt for projects.

**For a 2 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

I) Write a servlet code with the initialization parameter.

II) Implement a Stack in Java and perform the following operations: (Create, Push, Pop, Search a data item)

III) Write Filter program in servlet to block the user from particular IP address.

IV) Write a servlet which displays the cookie name and the value.

V. Create Bulletin Board Servlet

This is a bulletin board that is maintained by the server. Entries are parsed as HTML, so you can post anything from plain text to applets. The entries are saved to a file, so the board will survive server shutdowns.

Enter message:

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VI) Create a "**DataServlet.java**" which is the servlet which is making the connection to the database and retrieves the data from database. After getting the values from database, data is added to the Data List. Then data list is added to the request object and sent to the JSP page. In JSP page the values are displayed using **Iterator** class object.

VII) Create an html page with fields, eno, name, age, desg, salary. Now on submit this data to a jsp page which will update the employee table with matching eno.

VIII) Write jsp code to demonstrate the use of session object in shopping cart.

IX) Write JSP code to do login authentication from database and redirect to new JSP page as per the role assigned in the database.

X) Using struts validation framework do validation for

1)email

2)phone

3)emp no

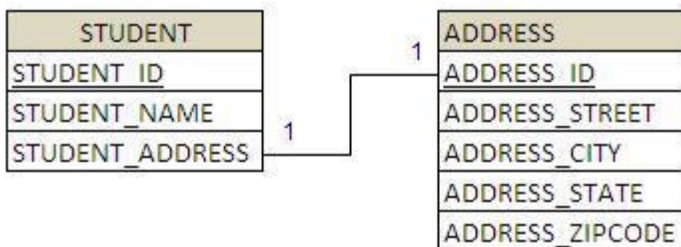
4)emp

name 5)age

XI) Create a login interceptor in struts which always intercepts and displays a login screen when the user has not logged in and tries to visit some page on the website.

XII) To persist the java objects using the Hibernate Object/Relational Mapping (ORM) framework

XIII) Consider one to one relation as shown. Now map this relationship using hibernate



### Continuous Internal Assessment

MCQ / Viva test during practicals



Mid Term practical test.

**T.Y. B.Sc.IT**

**Course: SITS06PR1**

**Practical: BIG DATA VISUALIZATION**

**Objective:**

This course is useful for those students who would like to become a data analyst or Data Scientist. A Business intelligence tool for visually analyzing data will be used. Students will be able to create as well as depict the trends, variations and density of the data in the form of graphs and charts.

**List of practical:**

- 1.Performing graphical analysis in R
- 2.Getting familiarized with different data visualization technologies.
3. Basics- Students will understand Environment set up and get acquainted with its user interface.

Toolbar Icons, Main Menu, Data types, Charts etc.

4. Data Sources:

- Data Sources,
- Data Extraction,
- Data Joining,
- Data Blending,
- Data View

5. Worksheet Calculations:

- Add worksheets,
- Rename worksheets,
- Reorder Worksheets ,
- Basic sorting,
- Basic Filters,

6.Operations on data:

Operators,  
Functions,  
Numeric calculation ,  
String calculation,  
Table calculations

#### 7. Sorting and Filtering:

Computed sorting,  
Manual sorting,  
Quick filters,  
Condition filters,  
Filter operations

#### 8.Designing Charts: Basic

Bar Chart,  
Line Chart,  
Pie Chart,  
Cross tab,  
Histogram ,  
Motion Chart,

#### 9. Designing Charts:Advanced

Gantt Chart,  
Bubble Chart,  
Tree Map,  
Waterfall chart

#### 10. Text Mining: Word Cloud:

#### 11.Dashboard: Creating a Dashboard and Formatting.

Dash board: Combine Multiple views of data to get richer insight.

12: Creating a forecast: Forecasting is about predicting the future value of a measure.

13. Create a trend line: Trend lines are used to predict the continuation of a certain trend of a variable. It also helps to identify the correlation between two variables.

14. Create a story: A story is a sequence of visualizations that work together to convey the information.

Create a story point

Explore layout option

Format a story

Present your story

Reference book:

Big Data Black Book

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