St. Xavier's College (Autonomous), Mumbai

Syllabus of the courses offered by the Department of Information Technology (2018-19)

Contents:

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

UNIT 1	**The Seven Cs of Effective Communication** Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness **Communication: Its interpretation** Basics, Nonverbal Communication, Barriers to Communication	15
UNIT 2	**Business Communication at Work Place** 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 **Report Writing** 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	15
UNIT 3	**Required Skills** Reading Skills, Listening Skills, Note Making, Precise Writing, Audiovisual Aids, Oral Communication	15
UNIT 4	**Mechanics of Writing** Transitions, Spelling Rules, Hyphenation, Transcribing Numbers, Abbreviating Technical and Non-Technical Terms, Proof Reading	15

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, Herbet 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

F.Y.B.Sc.I.T.   **COURSE: SITS0102**
TITLE: APPLIED MATHEMATICS - I

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

Number of Lectures: 60

UNIT 1	**Matrices, Eigen Values and Eigen Vectors** 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.	15
UNIT 2	**Real Valued Functions of One Variable** 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.	15
UNIT 3	**Real Valued Functions of Two or Three Variables** 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.	15
UNIT 4	**Differential Equation** 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	15

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.

F.Y.B.Sc (IT)   **COURSE:**
SITS0103

TITLE: DIGITAL ELECTRONICS

Number Of Lectures : 60

UNIT 1	**Number System**	15
	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	
	Binary Arithmetic	
	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	
	Boolean Algebra	
	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	
UNIT 2	**Logics Gates**	15
	Exclusive OR and Exclusive NOR gates, Universal Logic Gates, Implementation Of Other gates using Universal gates, Input Bubbled Logic, Assertion Level.	
	Minterm, Maxterm and Karnaugh Maps	
	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.	
	Combinational Logic Circuits	
	Introduction, Multi-input, multi-output Combinational Circuits, Code Converters Design and Implementations	
UNIT 3	**Arithmetic Circuits**	15
	Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator	
	Multiplexer, Demultiplexer, ALU, Encoder and Decoder	
	Introduction, Multiplexer, Demultiplexer, Decoder, ALU, Encoders	
	Sequential Circuits:Flip-Flop	
	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	
UNIT 4	**Counters**	15

| | Interoduction, Asynchronous Counter, Terms related to Counters, IC7493 (4-bit Binary Counter) , Synchronous Counter, Bushing, Type T Design, Type JK Design, Presettable Counter, IC7490, IC7492, Synchronous Counter ICs Analysis of Counter Circuits.
Shift Register
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 7495, Seven Segment Displays, Analysis of Shift Counters | |

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

F.Y.B.Sc (IT)   **COURSE:**
SITS0104

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

UNIT-I	**Algorithm Design, Program Structure** 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.	15
UNIT-II	**Module Design and Abstract Data Structure** 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.	15
UNIT-III	**Programming fundamentals in C** 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.	15
UNIT-IV	**Functions and Pointers in C** 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.	15

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

UNIT 1	**Introduction to data communication and networking, Network models**	
	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]
UNIT 2	**Media and Transmission modes**	
	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]
UNIT 3	**Switching and routing algorithms**	
	Switching basics, circuit switching, packet switching and Message switching. datagram networks and virtual circuit networks, routing algorithms- distance vector routing and link state routing	[15]
	Information Encoding, Error Detection and Correction	
	Introduction, representing different symbols, Minimizing errors, Error classification, types of errors, redundancy, detection versus correction, hamming distance, cyclic redundancy check, checksum	
UNIT 4	**IP**	
	IPV4 addressing**,** IPv6 addresses, IP v 6 header formats, IPv6 extension	[15]

	headers, IPv6 auto configuration, configuration via DHCP v6 , IPv6 transition strategies	

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:

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

Contents:

SITS0201	COMPUTER GRAPHICS
SITS0202	APPLIED MATHEMATICS-II
SITS0203	MICROPROCESSOR AND MICROCONTROLLERS
SITS0204	DESCRIPTIVE STATISTICS
SITS0205	INTRODUCTION TO C++ PROGRAMMING
SITS02PR	C++ PROGRAMMING &COMPUTER GRAPHICS & MICROPROCESSOR AND MICROCONTROLLERS

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

UNIT1	**Introduction. Application and Algorithmic Implementation** **Introduction and Application** Areas of Computer graphics, Video Display Devices, Raster-Scan Systems, Random-Scan System, Input Devices, Hard-Copy Devices **Algorithms** Line Drawing Algorithms-DDA Algorithm, Bresenham's Line Algorithm, Circle-Generating Algorithms, Ellipse Generating Algorithms, Filled Area Permitives	15
UNIT2	**Modeling Attributes and 2D Transformation** **Modeling and Approaches to System Requirements** Line Attributes, Curve Attributes, Color and Grayscale levels, Area-Fill Attributes, Character Attributes, Aliasing **Two Dimensional Geometric Transformation and Viewing** Basic Transformation, Matrix Representation, Composite Transformation, Other Transformation- Reflection, Shear, Viewing Pipeline, Window-two-ViewPort, Co-ordinate Transformation, Clippling Operation, Point-Clipping, Line-Clipping, Polygon Clipping, Curve Clipping, Text Clipping	15
UNIT 3	**Three-Dimensional Concept**	15

	Display Methods Three-Dimensional Display Methods-Parallel Projection, Perspective Projection, Depth Cueing, Visible Line and Surface Identification, Surface Rendering **Curves** Three-Dimensional Object Representation-Bezier Curves and Surfaces, B-Spline Curves and Surfaces	
UNIT 4	**Hidden Surface Removal Technique** **Visible-Surface Detection Method** 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	15

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.Foleya, A.Van Dan, S.K.Feiner and R.L.Phillips, Addision Wesley – Computer Graphics Principles and Practise
5. J.D.Foleya, A.Van Dan, S.K.Feiner and R.L.Phillips, Addision 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

UNIT 1	**Complex Variables** 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.	15
UNIT 2	**Laplace Transform** 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.	15
UNIT 3	**Special Integrals** Differentiation under Integral Sign, Error Function, Gamma Function, Beta Function.	15
UNIT 4	**Series** 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.	15

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: MICROPROCESSROR 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

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

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

Continuous Internal Assessment

Assignments / Projects / Mid Term Test

List of Recommended Books

1. Andrew C. Tanenbaum ,PHI – Structured Computer Organization (3rd 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 (3rd Edition) – Microprocessor Architecture and Programming and Applications with the 8085.
8. Thomas C Bartee, TMG – Digital Computer Fundamentals
9. William Stallings , PHI,1998 – Computer Organization and Architecture (4th Edition)

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 :	12
	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.	
Unit II	Univariate :	12
	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.	
	Exploratory data analysis: Stem and Leaf diagram, Dot plot.	
	Bivariate : Frequency distribution, Marginal and	
	Conditional frequency distributions.	

Unit III	Measures of central tendency	13
	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.	
Unit IV	Measures of Dispersion	17
	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	

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	C++ concepts Variables and Assignments Variables Identifiers Variable declarations Assignment Statements Reference variable Symbolic constant Input and Output cin, cout Escape sequences include directives and Namespaces Indenting and Comments Operator precedence Data types and expressions Arithmetic operators Type compatibilities 	(15 Lectures)
Unit 2	**Flow of Control and Functions** Compound statements Loops while for do while Nested loops.	(15 Lectures)

	Decision making	
	if – else	
	nested if else	
	switch	
	break and continue	
	Manipulators	
	endl	
	setw	
	sizeof	
	Increment and decrement operators	
	Type Cast Operators	
	Scope resolution operators	
	Function Prototypes	
	Built in functions and user defined functions	
	Function overloading	
	Call by reference	
	Call by value	
	const member functions	
	Inline Functions and recursive functions	
	Math Library Functions	
	Virtual Functions	
Unit 3	**Arrays, Pointers, Strings, Vectors**	(15 Lectures)
	String functions	
	strcmp	
	strcat	
	strlen	
	strcpy	

	Vector Basics	
	Arrays	
	Introduction to arrays	
	Arrays in functions	
	2-D arrays	
	Multidimensional arrays	
	Pointers and Functions	
	Introduction to pointers	
	void pointers	
	Pointers in function	
	Pointer to constant and constant pointer	
	Generic pointer	
Unit 4	**Object Oriented Feature**	(15 Lectures)
	Classes and Objects	
	-Class Specification	
	- Constructors and types	
	-Accessing class members	
	-Structures and classes	
	- Passing Objects as Arguments	
	- Returning Objects from functions	
	-Data Hiding	
	- Friend Function and Friend Class	
	Inheritance	
	-Inheritance and member accessibility	
	-Multiple Inheritance	

	- Constructors in derived class	
	-Object Composition	
	Polymorphism	
	Generic programming with Templates	
	-Function Templates	
	- Class Templates	
	- Overloading Function Templates	

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:

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

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

UNIT I	**Basics of set theory and logic**	**15**
	Sets and subsets Operations on sets Sequences mathematical structures The inclusion exclusion principle Mathematical induction Logic – propositions and logical operations Methods of proof	
	Counting principles:	
	Permutations	

		Combinations The pigeon hole principles Recurrence relation Basics of probability	
UNIT II	**Relations and Digraphs**		15
		Relations and digraphs Paths in relation and digraphs Properties of relation Equivalence relations Computer representation of relation and digraphs Transitive closure and Warshalls algorithm	
		Graph	
		Eulers paths and circuits Hamiltonion paths and circuits **Trees** Labeled trees Tree searching Minimal spanning trees	
UNIT III	**Order relations and Structures**		15
		Partially ordered sets Lattices Finite Boolean Algebra Functions on Boolean Algebra	
		Semi Groups	
		Groups Coding of Binary Information and error detection Decoding and error correction	
UNIT IV	**Languages and finite state machines**		15
		Languages Representation of special languages and grammars Finite state machines Machines and regular languages	

Continuous Internal Assessment

Problem Solving / MCQ

Midterm test

<u>List of Recommended Reference books</u>

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
	Internet and WWW	
	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) World Wide Web and its evolution, Exploring the Uniform resource locator(URL) and its components Browsers: Google Chrome, Mozilla Firefox, Opera, Apple Safari, Internet Explorer, Search engine, Web server: Apache , IIS, proxy server, xampp, HTTP protocol method	
	HTML & CSS 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. 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	
UNIT II	Javascript		15
	Fundamentals of JavaScript Client-Side JavaScript,Server-Side JavaScript		
	Operator: 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. **Statements:** Break, comment, continue, delete, function, return, switch, var **Core JavaScript**(Properties and Methods of Each): Array, Boolean , Date, Function, Math, Number, Object, String, regExp **Events and Event Handlers** 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		
UNIT III	jQuery and XML		15
	jQuery 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 **XML** Introduction to XML, Anatomy of an XML Document, creating XML Documents, creating XML DTDs, XML schemas, XSL	
UNIT IV	PHP & Mysql	15
	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 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	

LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. HTML5 covers CSS3, JavaScript, XML, PHP, jQuery Black book, dreamtech press
2. 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

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

	Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, Database recovery management **Beginning with PL / SQL**, Identifiers and Keywords, Operators, Expressions, The %TYPE Attribute, PL/SQL Block Syntax **Control Structures** : Conditional processing using IF Statements and CASE Statements, Loop Statement, While Loop Statement, For Loop Statement,	
UNIT 4	**Advanced PL/SQL**	**15**
	Stored Procedures and Functions: 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 , **Triggers:** Definition, CREATE TRIGGER Statement, Statement Level Triggers and Row Level Triggers DDL and Event Database Triggers, instead of trigger Comparison of database Triggers and Stored Procedures	

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	15
	Overview of Java	
	Difference between C++ and Java.	
	History of Java. Installation of JDK, Features JDK.	
	Difference between JDK and JRE.	
	Architecture of Java—portablity	
	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,	
		Wrapper Classes, Access Control, Modifiers, Anonymous Classes	
		Interface and Packages	
		Packages, Access Protection,	
		Importing Packages, Interfaces, Defining an Interface	
		Implementing Interfaces, Nested Interfaces,	
		Applying Interfaces,Variables in Interfaces,	
		Interfaces can be extended	
UNIT II		Exceptional Handling, JDBC and Thread	15
		Exception Handling	
		Exception Hierarchy	
		Exceptional Handling fundamentals,	
		Exception Types Uncaught Exceptions,	
		Try and catch, multiple catch clauses,	
		Nested try statements, throw, throws	
		Finally, java built in exception,	
		Creating your own exception subclasses	
		JDBC	
		Understanding type I driver of JDBC, examples using JDBC,	
		Understanding ResultSetMetaData, Prepared statement, callable statement	
		Thread	
		Java thread model, main thread, creating a thread, creating multiple	

	threads, Using isAlive(), join(), Thread priorities, Synchronization, interthread communication	
UNIT III	Collection framework and design pattern	15
	Collection framework	
	Collection overview , collection hierarchy, the collection interface- list interface, set interface	
	Collection classes-ArrayList class , linked list class,	
	Vectors and Hashtable	
	Map	
	Design pattern	
	What is design pattern ?singleton pattern , adapter pattern , façade pattern , Factory pattern , Proxy Pattern	
UNIT IV	i/o, Applets and Swing	15
	I/O basics, Reading console inputs, writing console o/p, print writer class, reading and writing files.	
	Applet fundamentals, Life Cycle of Applet, Programs using applets, introduction to swing. Difference between swing and applet.	
	JLabel and ImageIcon, JTextField, JButton, JToggleButton	
	Check boxes, radio buttons, jTabbedPane, JScrollPane , JList	
	JcomboBox , trees , JTable and event handling	

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]

UNIT 1	**Introduction to embedded systems**	15
	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	
	Microprocessors and Microcontrollers,RISC and CISC controllers	
	The 8051 Microcontrollers : Overview of 8051 family, instruction set, 8051 Microcontroller hardware, Input/output pins, Ports, Circuits, external memory, Counters and Timers	
	Programming embedded systems: structure of embedded program, build process, compiling, linking and locating	
UNIT 2	**Memory and peripherals**	15
	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	
	Peripherals: Control and Status Registers, Device Driver, developing a device driver, Timer - Watchdog Timers	
UNIT 3	**Interprocess Communication and Real Time Operating System (RTOS)**	15
	Shared Data Problem, Use of Semaphores, Mutex	
	Priority Inversion Problem	
	Inter Process Communications using Signals , Queue and Mailbox functions	

	Operating system basics, Goals of operating systems, RTOS services, Interrupt routines in RTOS environment	
	RTOS task scheduling models	
UNIT 4	**Design and Development**	**15**
	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 constrains
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.

   o Using polling method
   o 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. **<u>Elements:</u>** 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. 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. **<u>Content:</u>** 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 form 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:

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

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

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

UNIT II	**Modeling and the UI aspects** (15 lectures)
	Modeling and Approaches to System Requirements
	Events and system requirements, Things and system requirements, Data entities and Objects, Entity-Relationship diagram, Traditional Approach, Object oriented approach
	Performing User Interface Design
	The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.
UNIT III	**Software Testing Concepts** (15 lectures)
	Testing Strategies and Tactics
	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
UNIT IV	**Project Management** (15 lectures)
	Software Project Management
	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 ‖, Hans van Vliet, Wiley.
2. Software Engineering, A Practitioner's Approach‖, Roger S. Pressman, TMH
3. System Analysis and Design, by Satzinger
4. An Integrated Approach to Software Engineering, PankajJalote, 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	**Introduction To Operating System, Process and DeadLock**	15 lectures
	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		
	Layered, Monolithic, Microkernel		
	Process and Thread		
	Process Management Creation, Termination, States Thread Model and Implementation,		
	Interprocess Communication & Synchronization Race Condition		
	Critical Region, Dekker Algorithm, Mutual Exclusion, Semaphores, Monitiors Classical IPC		
	Problems Dining Philosophers Problem, Readers and Writers Problem Process		
	Scheduling(Preemptive and Nonpremptive)		
	Deadlock		
	Condition of deadlock,Resource Allocation Graph, Deadlock Detection And		
	Recovery, Banker's Algorithm.		
Unit 2	**Linux Commands and Shell Scripts**	15 lectures	
	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, 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.	
Unit 3	**Memory Management:**	15 lectures
	Static Allocation, Dynamic Allocation, Segmentation, Paging, paged segmentation and segmented paging. Virtual Memory, Page Replacement Algorithm (Optimal Page Replacement Algorithm, First-In First-Out)	
Unit 4	**File System and Distributed Operating System**	15 lectures
	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 Distributed System.	

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

UNIT I	**User Interface**	**15**
	Android Foundation and basic user interface	
	Introduction: Android history, Android architecture, Android versions, Building blocks **User Interface:** Layouts, Button, TextView and EditText, Dialog, Lists, Notifications, Radiogroup, CheckBox	

	Advanced User Interface:		
	SeekBar, ProgressBar, ToggleButton, ListView, Spinner, CustomControls Date and Time Pickers, Sliding drawer Tabs, Tabs with swipe, Custom title bar		
UNIT II	**Android Programming and Data Persistence**	**15**	
	Activities, Lifecycle, Preferences, Menu – Context and Options menu Activities and intents		
	Data Persistence –(internal memory and SD Card)		
	Data Storage & Permissions: Process & application context, Permission systems, Internal storage, External storage, Cache management, Preferences		
UNIT III	**Databases, Content Providers & Contacts**	**15**	
	Databases		
	SQL review, DB helper, Database operations, Cursors, Databases, SQL review, DB helper, Database operations, Cursors		
	Content Providers & Contacts		
	Content providers & URIs, Accessing contacts, Insertion, deletion, updating, Managed cursors		
UNIT IV	**Services and Web Services**	**15**	
	Services:		
	Lifecycle, Bound services, Notifications, Running in foreground		
	Web Services:		
	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	**Introduction To Operating System, Process and DeadLock**	15 lectures
	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 Layered, Monolithic, Microkernel Process and Thread Process Management Creation, Termination, States Thread Model and Implementation, Interprocess Communication & Synchronization Race Condition Critical Region, Dekker Algorithm, Mutual Exclusion, Semaphores, Monitiors Classical IPC Problems Dining Philosophers Problem, Readers and Writers Problem Process Scheduling(Preemptive and Nonpremptive)	

	Deadlock Condition of deadlock,Resource Allocation Graph, Deadlock Detection And Recovery,Banker's Algorithm.	
Unit 2	**Linux Commands and Shell Scripts** 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	15 lectures
Unit 3	**Memory Management:** Static Allocation, Dynamic Allocation, Segmentation, Paging, paged segmentation and segmented paging. Virtual Memory, Page Replacement Algorithm (Optimal Page Replacement Algorithm, First-In First-Out)	15 lectures
Unit 4	**File System and Distributed Operating System** 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 Distributed System.	15 lectures

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	**Introduction to Data Structure, Stacks, Queues and Recursion**	15 lectures
	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.	

		Stacks	
		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 ,	
		Queue concept of queue, inserting deleting data in queue, concept of circular queue, inserting deleting data in circular queue	
		recursion	
		What is recursion? Format of recursive function, recursion and memory visualization,	
		Examples on recursion, Tower of Hanoi and its complexity.	
Unit 2	**Linked List**		15 lectres
	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.		
Unit 3	**Trees**		15 lectures
	What is a Tree, Binary Tree and Binary search Tree, properties of Binary Tree,		

	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 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	**Sorting and Graph** Sorting Bubble Sort, Selection Sort, Insertion Sort, Radix sort and its complexity Heap property, Heapify, Building Heap, Heapsort algorithm and complexity Merge sort and its complexity. Quick sort and its complexity. Graphs Definition of Graph, difference between Graph and Tree, various terminology in Graph(multi graph , complete graph, bipartite, isomorphism, planar and non-planar graph, complete graph, regular graph),Representation of Graph (Adjacency matrix, Path Matrix, Linked Representation), Euler path, Hamilton path, Traversing(Breadth-First Search, Depth First Search), Spanning Tree, Algorithm for finding minimum spanning Tree- Prim's algorithm, Krushkal's algorithm, shortest path using	15 lectures

	Dijkastra's algorithm and Warshall's Algorithm,	

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	**Correlation Analysis, Regression Analysis and Theoretical distributions**	15
	Introduction,	
	definition,	
	Types of correlation	
	Methods of studying correlation	
	Graphic Method, Scatter Diagram, Karl Pearson's method	
	Regression Analysis	

	Meaning	
	Types of regression analysis	
	Principle of least squares	
	Methods of studying regression	
	Graphic method and Algebraic method.	
	Regression coefficients	
	Regression equations	
	Theoretical distribution	
	Introduction	
	Binomial distribution	
	Poisson distribution	
	Normal distribution	
UNIT 2	**Sampling and designing of a sample survey and Test of hypothesis**	15
	Methods of enumeration	
	Methods of sampling	
	Test of hypothesis	
	Procedure of testing a hypothesis	
	Test of significance -large sample	
	Test of significance of difference between two means (large sample)	
	Test of significance -Small sample	
	Chi Square test	
	Introduction	
	Properties of chi square distribution	
	Uses of Chi- Square test	
	Test of goodness of fit	
UNIT 3	**Linear programming Problem and Transportation problem**	15
	Introduction to O.R in business organizations	
	Linear programming	
	Definition and basic theorems	

	Application areas of L.P.P	
	Linear programming formulation	
	Decision variables, constraints, objective function	
	Graphical method	
	Simplex method	
	Transportation problem	
	Formulation of transportation problem	
	Determination of Initial Basic Feasible Solution	
	North West Corner rule method	
	Least Cost method	
	Vogel's Approximation methods	
	Test for optimality	
	MODI method	
Unit 4	Assignment Problem and Network schedule	15
	The assignment model	
	Introduction	
	Mathematical model of assignment problem	
	The Hungarian method	
	PERT AND CPM	
	Network representation of simple projects	
	Earliest expected time	
	Occurrence time	
	Forward pass computation and backward pass computation	
	CPM	
	Various float for activities.	

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

Number	Menu option	Expected Action
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

Number	Menu option	Expected Action
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.

     /   /

bin sbin etc   home mnt

                                                  bin sbin etc home mnt

            Mahesh   **John**

Networking in Linux

Setting up LAN

Configuration TCP/IP

Adding windows computer to LAN

IP address classes

Subnetting

Configuring telnet

C an 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:

S.ITS5.01	NETWORK SECURITY AND INTERNET TECHNOLOGY
S.ITS5.02	C# AND ASP.NET

S.ITS5.03	DATA WAREHOUSING AND DATA MINING
S.ITS 5.04	E COMMERCE AND M- COMMERCE TECHNOLOGIES
S.ITS5.05	INTRODUCTION TO ARTIFICIAL INTELLIGENCE
S.ITS5.PR1	C# AND ASP.NET AND ARTIFICIAL INTELLIGENCE
S.ITS5.PR2	DATA WAREHOUSING AND NETWORK SECURITY (DWDM&NSIT)

T.Y.B.Sc (I.T)   **S.ITS5.01**
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]

UNIT I	**Computer Security and Cryptography** 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, Steganography, Key Range and Key Size, Possible Types of Attacks, Diffie-Hellman Key Exchange.	15
UNIT II	**Symmetric Key, Asymmetric Key Algorithms, Digital Signature** DES, AES, Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm, Symmetric and Asymmetric key cryptography together, Digital Signatures, Digital Certificates, Private Key Management, PKI and Security.	15
UNIT III	**Designing Trusted Operating System and Network Security** *Designing Trusted OS* What is Trusted System, Military Security policy, Commercial security policy, Clark-Wilson security policy. Models of security: Multilevel security, Bell-La Padula model, Biba integrity model, Trusted Operating system design. Understanding MAC, DAC. Trusted Computing Base and its functions.	15

	Network Security What makes Network Vulnerable? Who attacks Networks? Threat Precursors, 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.	
UNIT IV	**TCP/IP Protocol Suite and RMI** OSI Model, TCP/IP Protocol Suite, IPV 4 Addresses and Protocol and IPV6 Addresses and Protocol, Address Resolution Protocol (ARP), Streams, Sockets for Clients, Sockets for Servers, Secure Sockets, UDP Datagram and Sockets, 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.

T.Y. B.Sc.IT   **S.ITS5.02**

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	**Introduction to DOTNET framework 4.0** 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. **C# language** Introduction to C#: understanding C# in .NET, Overview of C# literals, Variables, Data types, Operators, Expressions, Branching and looping	15

	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.	
UNIT II	**Delegate, Events and Exception handling in C#** 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.	15
UNIT III	**ADO.NET** 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& data column, introducing the ADO.NET entity framework, mapping your data model to an object model	15
UNIT IV	**LINQ and Crystal Report** 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

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.

T.Y. B.Sc.IT   **S.ITS5.03**

TITLE: Data Warehousing and data mining.

Learning objective:

Learn basic concept of Data Warehousing and data mining.

[Total lectures 60]

UNIT I	**Introduction to data Warehousing**	15
	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	
UNIT II	**Extraction, transformation and loading**	15
	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.	
UNIT III	**Introduction to data miming and classification**	15
	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	
UNIT IV	**Clustering and association rule**	15
	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 | |

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 **S.ITS5.04**

TITLE: E-COMMERCE AND M-COMMERCE TECHNOLOGY

OBJECTIVE:

To create an awareness about role of it in business and to introduce concepts and techniques of e-commerce Students will learn the ecommerce transaction done via paypal, how verisingn works, how payment gateway works.

Student can apply the skill learnt in developing website project on e-commerce, m-commerce.

[Total lectures 60]

UNIT I	**Overview of electronic commerce and case study** 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 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 .	15
UNIT II	E-Commerce Models, Portals E-Commerce Models: store-front model, brick and mortar model, build to order merchant model, service provider model, subscription based model, broker model, advertiser model, virtual mall model, infomediary model. Portals: Difference between website and portal function of portals, portals technologies, feature of portal.	15
UNIT III	Advance technology of Ecommerce and security Rich internet application, web 2.0, Web Services, Web Mashup, Working of Search Engines, SEO, LDAP, EDI, VPN, click stream analysis. E-CRM-Concept& definition, features Goals of E-Cm business framework, Types of E-CRM. Working of Payment Gateway. Security concerns in e-commerce. Public and Private key, encryption. Cryptography and types of cryptography, Digital signature. Role of Certificate Authority. Firewall and types of firewall Intrusion Detection System and Honey posts, SSL and IP sec protocol. Net banking, DoS and DDoS attack.	15
UNIT IV	M-Commerce Technologies	15

| | 1) INTRODUCTION TO m-COMMERCE
- What is m-Commerce
- Why wireless?
- Compare 2G, 3G, 4G
- WAP
--WAP architecture
--How WAP works –WAP benefit –WAP limitations

2) THE TECHNOLOGIES OF m-COMMERCE.
- Computer of cell, MS, BSC, MSC, NSS, OSS.
- Multiplexing scheme [TDMA, FDMA, CDMA].
- Concept of uplink and downlink traffic.
- Understanding handover
- Understanding frequency reuse.
- GSM in detail.

3) M-COMMERCE Services Today
- introduction
-mobile portals
-mobile information services
-mobile directory services
-mobile banking and trading
-mobile E-tailing and E-Ticketing
-mobile entertainment
-mobile business application and services | |

Continuous Internal Assessment

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

CIA II: Assignments / Project / Presentation / Case Study/ 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) m-Commerce by Norman sadeh john and wiley & Sons Publication.

4) E-Commerce strategies, technology and applications (David) Tata McGrawHill

5) Introduction of E-Commerce (jeffrey) Tata-McGrawHill

CLASS: T.Y. B.Sc.IT   **COURSE CODE: S.ITS5.05**

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

UNIT I	**Introduction to AI and Searching Techniques** (15 lectures)
	Introduction to AI

	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

	Searching Techniques
	Problem-Solving Agents, Example Problems, Searching for Solutions, **Uninformed Search** Strategies, **Informed (Heuristic) Search** Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems
UNIT II	**Learning from Observation** (15 lectures)
	Fundamentals of Javascript
	Forms of Learning, Inductive Learning, Learning Decision Trees, Ensemble Learning, Why Learning Works: Computational Learning Theory
	Introduction to ANN
	Units in neural networks, Network structures, Single layer feed-forward neural networks (perceptrons), Multilayer feed-forward neural networks, Learning neural network structures
UNIT III	**Introduction to Genetic Algorithms** (15 lectures)
	Genetic Algorithms
	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

UNIT IV	Introduction to Fuzzy System	(15 lectures)
	Fuzzy Systems	
	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

T.Y. B.Sc.IT   **Course: S.ITS6.PR1**

Practical:

A) 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 Caeser 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 algoritm.

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

Q13) Implement digital signature in the program.

B) **Subject : Data warehousing and Data mining**

Course code:
S.ITS5.PR1

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
   a. Naïve Bayes algorithm
   b. Decision tree based algorithms(J48)

8. Implementation of different types of clustering algorithm
    a. K means algorithm
    b. Hierarchical algorithm
9. Implementation of Apriori algorithm.
10. Implementation of classification, clustering and association rule using Knowledge flow.

T.Y. B.Sc.IT   **Course : S.ITS.5.PR1**

Practical – II:

C) 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(), substract() ,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

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

XIV) Using crystal report design simple mark-sheet for SSC result. The data should appear dynamically form 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

Practical:

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

D) **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:

S.ITS6.01	BIG DATA AND CLOUD COMPUTING

S.ITS6.02	ENTERPRISE RESOURCE PLANNING
S.ITS6.03	ADVANCED JAVA
S.ITS 6.04	SOFTWARE TESTING
S.ITS6.05	PROJECT
S.ITS6.PR	ADVANCED JAVA AND MOBILE APPLICATION DEVELOPMENT

CLASS: T.Y. B.Sc.IT   **COURSE CODE:**
S.ITS6.01

 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	**Evolution of Cloud and its fundamentals:**	10
	Hardware evolution, Internet Software evolution, Protocols for communication, Common interface to the internet, the appearance of Cloud Formations.	
	Cloud Computing Service Models:	
	IaaS, PaaS, SaaS	
	Different Cloud Models:	
	Public, Private, Hybrid Cloud	

Unit II	**Virtualization:**	20
	Introduction & benefits of Virtualization, Characteristics of Virtualized environments, Taxonomy of Virtualization techniques, Pros and Cons of Virtualization, Technology examples: VMware, Microsoft Hyper-V, Virtual Box (Freeware App to try out on Local Computer) Hyper V- Generation 1 & 2	
	Storage:	
	What is a Cloud Storage	
	1. Different storage type over Cloud: Blobs, Tables (Non-Relational), File Storage.	
	2. Blob: Block Blob, Page Blob, Append Blobs.	
	3.Table Storage	
	4. File Storages.	
	File Systems: NTFS, HDFS.	
	Where to use Cloud Storages, Different Cloud Storage Providers: Google Drive, Microsoft One Drive, Azure Storage, Amazon S3(Simple Storage Service), Drop Box	
	Virtual Machines	
	What are Virtual Machines, Which scenario where we can use Virtual Machines, VM's on Cloud (Azure – VM /Amazon EC2), Components of Virtual Machines, How physical Machines can be moved to Virtual Machines(Workloads), Traffic Management – Load Balancers & Traffic Managers, Comparing VMware/HyperVisor VM's to Azure Cloud VM	
	Security Related to Cloud Computing:	
	Risk Management, Authentications Modes [Multi Factor, Single SignOn]	
Unit III	**Fundamentals of Big Data**	10
	understanding Big data , concepts and terminology	
	Big data characteristics, different types of data	
	business motivations and drivers for big data adoption	
	Business architecture, big data adoption and planning considerations	

	Organizational prerequisites, Data procurement	
	Big data analytics life cycle, enterprise technologies and big data business intelligence, Online transaction processing(OLTP),	
	Online analytical processing(OLAP)	
	Extract ,transform ,Load(ETL), Traditional BI, Big data BI	
Unit IV	**Big data storage concepts**	20
	Clusters, File systems and distributed systems	
	NoSQL, Sharding, Replication, CAP theorem	
	ACID, Big data processing concepts, Parallel data processing	
	Distributed data processing, Processing workloads, batch	
	Transactional Cluster, Processing in batch mode	
	Batch processing with Map Reduce, Map and Reduce tasks	
	Map, Combine, Partition, Shuffle and sort	
	Reduce, Understanding map reduce algorithms	
	Hadoop	
	Hadoop Fundamentals, What is hadoop?, Hadoop Framework	
	A hadoop cluster, Hadoop directory layouts	
	The Hadoop distributed File System	
	YARN and HDFS	

LIST OF REFERENCE BOOKS:

1)Big data fundamentals concepts, Drivers and Techniques -Thomas Earl, Wajid Khattak, Paul Bulher
2)Virtualizing Hadoop   -George Trujillo, Charles Kim, Steven Jones , Romme Garcia, Justin Murray
3)Cloud computing patterns, Fehling, Leymann, Ralph Retter, et. al., Springer
4)Cloud Computing, Rittinghouse, Ransome, CRC press

ASSESSMENT:

THEORY:

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

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

ESE PATTERN:

 For 60 marks: 4 Units- 4 Questions of 15 marks each [per unit]

For 100 marks: 4 Units- 5 Questions of 20 marks each [Q1 of ALL units and Q2 to Q5 per unit]

TITLE : Enterprise Resource Planning

LEARNING OBJECTIVES:

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 Number of lectures: 60

UNIT I	**ERP-An Introduction and Implementation** (15 lectures)
	ERP-An Introduction
	What is ERP? The Need for ERP, Benefits of ERP, Business Models, Growth of ERP in India
	ERP Implementation Lifecycle introduction
	In-house Implementation Pros and Cons, Vendors, Consultants, End-Users
UNIT II	**Supply Chain Management – I** (15 lectures)
	Introduction -
	What is Supply Chain? Its objective, Supply Chain Decision making, Process View of a Supply Chain, Examples of Supply Chains
	The Network -
	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.
UNIT III	**Supply Chain Management - II** (15 lectures)
	The Customer service dimension –
	Customer Service and Customer Retention, Service driven logistics systems,

	Setting customer service priorities and service standards
	Benchmarking the Supply Chain –
	Benchmarking the logistics process, Mapping supply chain processes, Supplier and distributor benchmarking, Setting benchmarking priorities, performance indicators
UNIT IV	**ERP Modules** (15 lectures)
	Key ERP Modules
	Finance, Sales and Distribution, Human Resource Management, Marketing, Material Management
	Understanding the functionality of the modules with the demonstration of open source ERP software

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LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. "ERP", Alexis Leon, Tata McGraw Hill.
2. "Supply Chain Management Strategy, Planning and Operation", S Chopra, P. Meindl and D. Kalra, Pearson.
3. "Logistics and Supply Chain Management", Martin Christopher, Pearson
4. Alexis Leon, "ERP Demystified", Tata McGraw Hill
5. "Enterprise Resource Planning", E. Monk, B. Wagner, Cengage Learning
6. Materials Management with SAP ERP, 3rd Edition, Martin Murray, SAP PRESS.

T.Y. B.Sc.IT **Course: S.ITS6.03**
Title: Advanced Java

Learning Objective:

To equip the students with skills required in software industry

Students will learn the latest of Java through Struts2, Hibernate and Spring.

Students can apply the skill learnt for projects.

Total Number of lectures: 60

Unit 1	**J2EE Concepts and Java Database Connectivity [JDBC]** **(15 lectures)**
	JDBC
	- Introduction to JDBC Architecture
	- Type I Driver (JDBC-ODBC Bridge)
	- Types of Driver
	- Understanding Statement, PreparedStatement, CallableStatement Interface through examples
	- Understanding ResultSet , ResultSetMetadata interface through examples
	- Difference between execute() , executeUpdate(), executeQuery() method
	- Transactions , Commits, Rollbacks, and Savepoints Batch Processing
	J2EE
	-meaning of J2EE, J2EE Architecture.
	-Component Technology (EJB) and Service Technology (JNDI, JAAS).
Unit 2	**Servlet and JSP** **(15 lectures)**
	Servlet
	- What is a Servlet ?
	- Servlet Lifecycle
	- Servlet API
	-Object model of Servlet framework.
	-understanding web.xml, servlet tags and directory structure of web application.
	- GenericServlet and HttpServlet, ServletConfig & ServletContext
	- Handling Form data with get and post request
	- Initializing a servlet
	- Request Dispatcher, Redirecting Request.
	- Session Management.
	-Filters in servlet
	-programs in servlet to read all parameters from form, database handling

	program,
	reading cookies values.
	JSP
	- What is JSP page? Compare it with servlet
	- Lifecycle of JSP page
	- JSP syntax using Directive, Declaration , Expression , Scriplet, Comment
	- Using javabean and Action Tag in JSP
	- JSP implicit objects
	- Using JSP standard tag library (JSTL)
	- Session management
	- Exception handling
	- Custom tag
	- Transferring Control to Another Web Component
	- Using JDBC in JSP
	-Programs in JSP.
	-Integrating JSP with JQuery, Bootstrap, Angular JS, JSON.
Unit 3	**Struts** **(15 lectures)**
	Basic of Struts2
	- Understanding MVC architecture
	- Struts2 framework.
	-understanding default-stack.
	-comparing struts with other framework.
	Working with Struts2 Actions
	1) Introducing Struts 2 actions
	2) Packaging your actions
	3) Implementing actions

	Adding workflow with interceptors 1) Why intercept requests? 2) Interceptors in action 3) Surveying the built-in Struts 2 interceptors 4) Declaring interceptors 5) Building your own interceptor **Data transfer: OGNL and type conversion** 1) Data transfer and type conversion: common tasks of the web application domain 2) OGNL and Struts 2 3) Built-in type converters 4) Customizing type conversion **Validation framework** 1) RequiredFieldValidator Class 2) RequiredStringValidator Class 3) ExpressionValidator Class 4) Email Validator Class 5) RegexFieldValidator Class 6) DateRangeFieldValidator Class **Struts UI and Tiles**
Unit 4	**Hibernate and Spring** **(15 lectures)** **Hibernate** - Introduction to Hibernate

- Understanding ORM (Object Relational Mapping)

- Understanding Transient, Persistent and Detached Object states

- Issues while writing manual JDBC code.

- Hibernate and JPA (Java Persistence API).

- Writing persistence classes.

-Steps to work with Hibernate.

- Handling CRUD operations in Hibernate.

- Mapping Inheritance between classes with tables in database.

-HQL

-One to One and One to One mapping in Hibernate.

Core Spring

-Springing into action.

-Wiring beans.

-Advanced wiring.

-Aspect oriented Spring.

Spring in Web and Backend

-Building spring web application

-JDBC with spring / Hibernate with spring

Continuous Internal Assessment

Assignment on unit 1, unit 2, unit 3, unit 4

Mid Term Test.

BOOKS:

1) Struts 2 in Action --Manning publication

Author: Donald Brown, Chad Michael Davis, and Scott Stanlick

2) Spring in Action—Craig Walls—Manning Dreamtech press

2) Pure JSP by James Goodwill Techmedia SAMS publication

3) Hibernate in Action Manning publication Author: Christian Bauer and Gavin King

REFERENCE:

1) Java Servlet Programming O'Reilly Publication-Author: Jason Hunter.

2) Struts 2 Black Book.

3) Database Programming with JDBC and Java – O'Relly Publication.

T.Y. B.Sc.IT   **Course: S.ITS6.04**
Title: Software Testing

Learning Objective:

To develop the skill of software testing

Number of lectures: 60

Unit 1	The basics of software testing (15 lectures)
	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

	Testing in software lifecycle The General V Model Component Test: Explanation of Terms**,** Test Objects**,** Test Environment**,** Test Objectives**,** Test Strategy, Integration Test: Integration Strategy, System Test, Acceptance test: Testing for user acceptance**,** Operational testing**,** Field testing, alpha testing and beta testing.
Unit 2	**Functional testing** **(15 lectures)** Boundary value analysis testing, Robustness testing, Worst case testing, Equivalence class testing, Decision table based testing, Cause effect graphing technique and State transition testing. **Structural testing** 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, Mutation operators and mutation score and slice based testing
Unit 3	**Static testing and Test management** **(15 lectures)** Static testing, Foundations, Review, Walkthroughs, inspections, The General Process, Roles and Responsibility and Types of Review

	Test Management Test Planning: Quality Assurance Plan, Test Plan, Prioritizing Tests Cost and Economy Analysis: Cost of Testing, Test Effort Estimation Definition of Test Strategy: Preventives Reactive Approach, Analytical vs. Heuristic Approach
Unit 4	**Advanced concepts of software testing** **(15 lectures)** Metrics and models in software testing, Software metrics, categories of metrics, What should be measured during testing? Testing web applications, 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.

List of Recommended Reference Books

1. SoftwareTestingbyYogesh Singh

2. Softwaretestingfoundations–AndreasSpillner, TiloLinz, HansSchaefer   (SPD publication)

3. Software Testing–Ron Patton second edition

4. Software engineering–A Practitioners Approach   Roger s Pressman

5. Software testing–Principles, Techniques and Tools- TataMc-GrawHill   education Pvt .Ltd, New Delhi

T.Y. B.Sc.IT   **Course: S.ITS6.PROJ**

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→ ERD, Normalization, complete level system design including DFD, Use case, analysis of requirement gathered, diagram design

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	Execution of	System design
	(validation, database Handling,)	various modules with report and testing, UI, Project Quality	Understanding And viva
30	30	30	30

List of project categories

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

Suggested format for project report S.ITS6.PROJ

1. Cover page
2. Certificate from college(for in-house / external project)
3. Synopsis of project
4. Project report
   a. Table of content
   b. Definition of problem
   c. Objective and scope of project
   d. System analysis and design
   e. User requirement
   f. Functional requirement
   g. Non-functional requirement
   h. Normalization
   i. DFD, context level diagrams

   j. Flowchart, ER diagram

   k. Use case diagrams

   l. Feasibility study

      1. Technical feasibility
      2. Economical feasibility
      3. Operational feasibility
   m. Software engineering paradigm applied
   n, Software and hardware requirement specification

   o. PERT chart, Gantt chart

   p. Coding

   q. Code efficiency
   r. Validation checks
   s. Testing

      - Test techniques(white box and black box testing)
      - Writing Test cases
      - Using test data

- Generating defect reports

- Use of testing tools(manual/automated)

t. System security measures

u. Cost estimation of project

v. Screen shots

w. Future enhancement

x. Bibliography

y. Glossary

5. Students have to submit black book to college(1 per group) in A4 size with one side written (approx 100-200 pages) along with CD having full documentation and codes

6. Students doing project in industry will have to get certificate from the company.

T.Y. B.Sc.IT   **Course: S.ITS6.PR1**

Practical:

A) 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:

     Submit Message ‖ Clear Message ‖ View Postings

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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
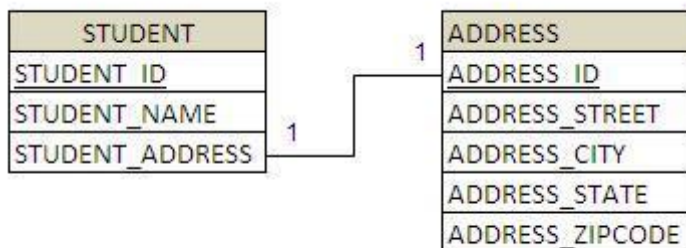
1)email

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

STUDENT		ADDRESS
STUDENT_ID		ADDRESS_ID
STUDENT_NAME	1	ADDRESS_STREET
STUDENT_ADDRESS	1	ADDRESS_CITY
		ADDRESS_STATE
		ADDRESS_ZIPCODE

Continuous Internal Assessment

MCQ / Viva test during practicals

Mid Term practical test.

Practical:

B) 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 your Spinner. Set Prompt 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 Text View that says "Activity 1" and has a Button that says "Go to Activity 2". Have Activity 2 show a Text View 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 scared 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 slate 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.

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.

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