



St. Xavier's College – Autonomous, Mumbai
Syllabus
For 3rd Semester Courses in Information Technology
(June 2018 onwards)

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

List of Recommended Reference books

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

CLASS: S.Y. B.Sc.IT**COURSE CODE: ITS.3.02****TITLE: Web Designing and Programming****LEARNING OBJECTIVES:**

1. To learn web page designing using HTML, CSS for the WWW along with the need for assistive technology and mechanisms to implement the same.
2. To learn web page designing using JavaScript, jQuery, XML, PHP, mysql technologies.

Total Number of lectures: 60

UNIT I	Components of the internet and web page designing	15
	<p>Internet and WWW</p> <p>What is Internet? Introduction to internet and its application, E-mail, telnet, FTP, ecommerce, e-business, internet service providers, Domain name Server, Internet address, World Wide Web(WWW) World Wide Web and its evolution, Exploring the Uniform resource locator(URL) and its components</p> <p>Browsers: Google Chrome, Mozilla Firefox, Opera, Apple Safari, Internet Explorer, Search engine, Web server: Apache , IIS, proxy server, xampp, HTTP protocol method</p> <p>Web Design Perspectives: The need for assistive technology and accessibility out of the box, understanding the assistive technologies used by person with disabilities, along with demonstrations.</p> <p>Accessibility Standards: Benefits of an inclusive design, Constructing a POUR (Perceivable, Operable, Understandable, Robust). Constructing a website using the concepts of WCAG 2.0 POUR (Perceivable, Operable, Understandable, Robust).</p>	
	<p>HTML & CSS</p> <p>HTML Tags: Formatting Tags, Understanding the difference between a tag, Element and attributes in HTML, DIV Element, SPAN Element, Creating Lists, Imagemaps, hyperlink tags, Tables, Frames, iframes. Tables, Forms,</p> <p>Best Practices in web design: National/ International, overcoming accessibility myths associated with UI.</p> <p>Canvas for 2D drawing, video, audio, content specific element: Article , footer, header, nav, section, wbr, datalist, output Form</p>	

	<p>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</p>	
UNIT II	Javascript	15
	<p>Fundamentals of JavaScript Client-Side JavaScript, Server-Side JavaScript</p> <p>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.</p> <p>Statements: Break, comment, continue, delete, function, return, switch, var</p> <p>Core JavaScript(Properties and Methods of Each): Array, Boolean , Date, Function, Math, Number, Object, String, RegExp</p> <p>Events and Event Handlers</p> <p>General Information about events, defining event handlers, Event, onAbort, onBlur, onChange, onClick, onDbClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onsubmit, onUnload</p>	
UNIT III	jQuery and XML	15
	<p>jQuery Fundamentals of jQuery, Loading and using jQuery, jQuery Syntax , jQuery Selectors ,Element Properties and attributes,</p>	

	<p>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</p>	
UNIT IV	PHP & Mysql	15
	<p>PHP Why PHP and Mysql ? Server-side web scripting , installing PHP, Adding PHP to HTML, Syntax and Variables , Passing information between pages , Strings , Arrays and Array Functions , Numbers , Basic PHP errors/problems Advanced PHP and Mysql PHP/Mysql Functions, displaying Queries in tables , building forms from queries , PHP /Mysql Efficiency, PHP/Mysql Problems Advanced array Functions , String and Regular Expressions , file system and system Functions , sessions , cookies and HTTP, type and type conversion , PHP mathematics , E-mail. Using tools to evaluate the accessibility of the website. Steps to deploy a website.</p>	

LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. HTML5 covers CSS3, JavaScript, XML, PHP, jQuery Black book, dreamtech press
2. John Pullock, Tata McGraw Hill – JavaScript: A beginners guide
3. Bear Bibeault and Yehuda Katz , dreamtech press- jQuery in Action Second Edition
4. Williamson , Tata McGraw hill – XML the complete reference
5. <http://www.w3schools.com>
6. <https://www.w3.org/standards/webdesign/accessibility>
7. <https://www.w3.org/WAI/eval/selectingtools>

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	<p>Overview of Java, OOPS fundamentals, Interface and Package</p> <p>Overview of Java Difference between C++ and Java. History of Java. Installation of JDK, Features JDK. Difference between JDK and JRE. Architecture of Java—portability Features of Java, datatypes in Java Variables in Java, scope and lifetime of variables Arrays in Java-1D,2D,different ways to declare an array Arithmetic operators, Boolean operators, assignment operators, operator Control statements- while,do-while,for, if-else, switch, string, string buffer, string Tokenizer in details</p> <p>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</p> <p>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</p>	15
UNIT II	<p>Exceptional Handling, JDBC and Thread</p> <p>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</p>	15

	<p>JDBC Understanding type I driver of JDBC, examples using JDBC, Understanding ResultSetMetaData, Prepared statement, callable statement</p> <p>Thread Java thread model, main thread, creating a thread, creating multiple threads, Using isAlive(), join(), Thread priorities, Synchronization, interthread communication</p>	
UNIT III	<p>Collection framework and design pattern <i>Collection framework</i> Collection overview , collection hierarchy, the collection interface- list interface, set interface Collection classes-ArrayList class , linked list class, Vectors and Hashtable Map <i>Design pattern</i> What is design pattern ?singleton pattern , adapter pattern , façade pattern , Factory pattern , Proxy Pattern</p>	15
UNIT IV	<p>i/o, Applets and Swing 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</p>	15

Continuous Internal Assessment

Assignments /Projects

Mid term test.

LIST OF RECOMMENDED REFERENCE BOOKS:

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

S.Y. B.Sc.IT**Course: ITS.3.05****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****TITLE :Database Systems**

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.

S.Y.IT.**Title : Embedded System****ITS.3.PR1****Objective: To be able to run embedded programs on the simulators****List of Practical's****The following practical's can be conducted on Keil or EdSim simulator**

1. Programs on the 8051 instruction set, arithmetic, logical, byte manipulation instructions
2. Programs on the jump instructions :
 - a. Write a program to find sum of 3 numbers. Transfer the LSB in R0 and MSB in R5
 - b. Compare values of registers A and B. If value of $A > B$ then swap the values of the registers
 - c. Write a program to search a number from given set of numbers
 - d. Add two numbers stored in R0 and R1. If the sum is greater than FF, Port p1.0 will be ON
 - e. Add four numbers stored in RAM location 40 to 43 display the result in binary at port0(MSB) and port1 (LSB)
 - f. 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.
3. Subroutines : write a program to check the value at port P0, if It has a value other than 08h, the subroutine will multiply that value with 0A and send it to the port P0.
4. Stack operations : Push and pop
5. Timers to generate delay
6. Flashing LEDs from left to right.
7. Interfacing 8051 with D/A converter and generating a Ramp wave.
8. Interfacing eight LEDs and setting up a binary counter on them.
9. Displaying a four digit number on seven segment display.
10. Counting from decimal numbers 00 to 99 in any register of your choice.
11. Interfacing D.C. Motor and rotating it clockwise for a fixed given number of steps.
12. Monitor the switch connected to P2 and whenever the switch is closed glow an LED connected to P1
13. Toggle all bits of P1 continuously after every 1s. Use Timer 0 mode 1 to create the delay. The program should be interrupt driven.

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:

- a. to assign initial value
- b. to deposit an amount
- c. to withdraw an amount after checking balance

- II. Write a program to Calculate sum of the digits of a number
- III. Create a login screen and authenticate the user by matching username and password through database
- IV) Write java code to design four radio buttons and whenever user clicks on a particular button the selected button should be known by text message. Implement the Listener
- V. Design the screen using swing to accept the roll number and marks in three subjects and on click of the button it shows the average of marks on the text
- VI) Write a program for exception handling. Implement user-defined exception. Create, throw and catch user – defined exception and handle runtime exception
- VII) Write java program to find whether the string is a palindrome or not
- VIII) Write java program for arranging the strings in alphabetical order
- IX) Write java program to arrange the numbers in decreasing order but the numbers should be stored using Vector
- X) Write a java program to read data from a file and copy it to another file.

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

WEB DESIGNING AND PROGRAMMING

Learning Objective:

To be able to design and develop a dynamic website.

Number of lectures: 45

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

- I. Design a web page using a text editor with different text formatting tags and save it as *aboutme .html* extension in a folder called *Prac_1* in the D - drive.
- II. **Lists, Links & Images:**

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

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

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

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

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

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

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

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

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

VII) **Javascript:**

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

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

IX) jQuery introduction:

- a. hello world example
- b. calling a function in jQuery and JavaScript
- c. Loading jQuery from Google **Journal entry:** why is it better to load the library using Google code?
- d. Applying styles to a table using jQuery CSS
- e. Design a web page to create the sliding effect using the slideup(), slidedown() and slidetoggle() methods
- f. Make use of the **toggleClass(class)** method that adds the specified class styling when clicked upon and removes the specified class styling when clicked for the second time.

X. XML:

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

XI) PHP:

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

XII) Design a complete dynamic website with all validations.

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

Continuous Internal Assessment

MCQ / Viva test during practicals

Mid Term practical test.



St. Xavier's College – Autonomous Mumbai
Syllabus
For 4th Semester Course in Information
Technology
(Nov 2018 onwards)

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 lectures)	(15
	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 I, Hans van Vliet, Wiley.
2. Software Engineering, A Practitioner's Approach I, 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 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, Monitors Classical IPC Problems Dining Philosophers Problem, Readers and Writers Problem Process Scheduling(Preemptive and Nonpreemptive) Deadlock Condition of deadlock,Resource Allocation Graph, Deadlock Detection And Recovery, Banker's Algorithm.	15 lectures
Unit 2	Linux Commands and Shell Scripts Basic Commands(ls,pwd,cd,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.	15 lectures

	Inode structure in Linux.	
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.

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
TITLE: Mobile Application Development

COURSE CODE: ITS.4.03

LEARNING OBJECTIVES:

To help students gain a strong foundation in developing mobile apps for the android operating system while also realizing the need for accessibility and implementing an accessible UI.

Total Number of lectures: 60

UNIT I	User Interface	15
	Android Foundation and basic user interface	
	<p>Introduction: Android history, Android architecture, Android versions, Building blocks</p> <p>User Interface: Fundamental components of UI design, Layouts, Button, TextView and EditText, Dialog, Lists, Notifications, Radiogroup, CheckBox</p> <p>User experience and the concept of a universal design, The Impact and implications of mobile applications accessibility, Best practices in Mobile application design.</p>	
	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 , Testing	15
	Services:	
	Lifecycle, Bound services, Notifications, Running in foreground	
	Web Services:	
	Bluetooth, Wifi, Maps, Telephone manager, Call and SMS	
	Tools for testing the Usability and the accessibility compliance of mobile applications.	

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
4. <https://developer.android.com/guide/topics/ui/accessibility/index.html>

ASSESSMENT:**THEORY:**CIA I: Written test **for 20 marks**CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

Class: SYBSc.IT**Title: 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	<p>Introduction to Data Structure, Stacks, Queues and Recursion</p> <p>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.</p> <p>Stacks</p> <p>Introduction to Stack, Array Representation of Stack, Notations (infix, prefix and post fix notation), understanding stack operations push, pop, peek , algorithm for converting infix to postfix and infix to prefix, algorithm to separate operator and operand from given string ,</p> <p>Queue concept of queue, inserting deleting data in queue, concept of circular queue, inserting deleting data in circular queue</p> <p>recursion</p> <p>What is recursion? Format of recursive function, recursion and memory visualization,</p> <p>Examples on recursion, Tower of Hanoi and its complexity.</p>	15 lectures
Unit 2	<p>Linked List</p> <p>What is a Linked List, Comparing Linked List with Arrays, advantage and disadvantage of Linked List? Singly Linked List, traversing, insertion node at beginning, ending and at middle, deleting node from beginning, ending and at middle for singly linked list, Doubly Linked List, Insertion node at beginning, ending and at middle for doubly linked list, deleting node from beginning, ending and at middle for doubly linked list, circular linked list, printing content of circular linked list, inserting node at front, end and middle of circular linked list, deleting node from front, end and middle of circular linked list, searching elements from singly, doubly, circular linked list.</p>	15 lectres

Unit 3	<p>Trees 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</p>	15 lectures
Unit 4	<p>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 Dijkstra's algorithm and Warshall's Algorithm,</p>	15 lectures

Continuous Internal Assessment
 Assignments / Project / Presentation

Reference Book:

1. Data Structure and Algorithms made easy in Java by Narashimha Karumanchi
2. Data Structured by Seymour Lipschutz- Schaum publication
3. Fundamentals of Data Structure by Ellis Horowitz, Sartaj Sahni – Galgatia Booksource

S.Y. B.Sc.IT**Course: ITS.4.05****Title: Statistical Techniques and Operation Research****Learning Objective:**

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

Number of lectures: 60

UNIT 1	Correlation Analysis, Regression Analysis and Theoretical distributions 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	15
UNIT 2	Sampling and designing of a sample survey and Test of hypothesis 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	15
UNIT 3	Linear programming Problem and Transportation problem 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	15

	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 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.	15

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